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Modul:Convert

Vorlage:Transwiki guide Vorlage:Lua Vorlage:Uses TemplateStyles This module converts a value from one unit of measurement to another. For example:

- `{{convert|123|lb|kg}}` → 123 pounds (56 kg)

The module is called using a template—parameters passed to the template are used by this module to control how a conversion is performed. For example, units can be abbreviated (like `kg`), or displayed as names (like `kilogram`), and the output value can be rounded to a specified precision. For usage information, see Help:Convert.

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Templates and modules

Templates that invoke this module are:

- Template:Convert
- Template:Cvt Vorlage:Green

The following modules are required:

- Module:Convert – *(this module)* code to convert units
- Module:Convert/data – unit definitions
- Module:Convert/text – text messages, and parameter names and values

The following modules are optional and are used only if required and if the module exists:

- Module:Convert/extra – extra (temporary) unit definitions; used if a unit is not found in Module:Convert/data
- Module:ConvertNumeric – code to spell an input value in words (only English is supported; however, see vi:Module:ConvertNumeric)

For Wikidata support the following modules are required:

- Module:Convert/wikidata
- Module:Convert/wikidata/data

The following help pages are available:

- Help:Convert – overview
- Help:Convert messages – describes error and warning messages; messages link to this page so it is required when the module is copied to another wiki
- Help:Convert units – overview of units

A page containing a convert error is added to the following hidden category, providing the page is in a specified namespace (articles, by default):

- Vorlage:Clc

Units are defined in the wikitext of the master list of units.

- Module:Convert/documentation/conversion data – master list of unit definitions
- Module:Convert/makeunits – translates wikitext from the master list to Lua
- Module talk:Convert/makeunits – makeunits results; copy the text to Module:Convert/data

Module:Convert/data is transcluded into every page using the convert module, so experimenting with a new unit in that module would involve a significant overhead. The Module:Convert/extra module is an alternative which is only transcluded on pages with a unit that is not defined in the main data module.

Module talk:Convert/show lists all unit links so they can be checked.

Sandbox

When making a change, copy the current modules to the sandbox pages, then edit the sandbox copies:

- Module:Convert • Module:Convert/sandbox • same content
- Module:Convert/data • Module:Convert/data/sandbox • same content
- Module:Convert/text • Module:Convert/text/sandbox • same content
- Module:Convert/extra • Module:Convert/extra/sandbox • same content
- Module:Convert/wikidata • Module:Convert/wikidata/sandbox • same content
- Module:Convert/wikidata/data • Module:Convert/wikidata/data/sandbox • same content

Use the following template to test the results (example `{{convert/sandbox|123|lb|kg}}`):

- Template:Convert/sandbox

Template:Convert/sandbox invokes Module:Convert/sandbox with parameter Vorlage:Para which causes convert to use the sandbox modules rather than the normal modules.

The following should be used to test the results of editing the convert modules.

- Template:Convert/testcases#Sandbox testcases – links to testcases
- Module:Convert/tester – module to run tests by comparing template output with fixed text

It is not necessary to save a testcases page before viewing test results. For example, Template:Convert/testcases/sandbox4 could be edited to change the tests. While still editing that page, paste Vorlage:Nowrap (without quotes) into the page title box under "Preview page with this template", then click "Show preview".

Configuration

The template that invokes this module can define options to configure the module. For example:

- `{{#invoke:convert|convert|numdot=,|numsep=.}}`

  Sets the decimal mark to be a comma, and the thousands separator to be a dot.

Other options, with default values, are:

- `|maxsigfig=14` – maximum number of significant figures
- `|nscat=0` – namespaces (comma separated) in which an error or warning adds a category to the page
- `|warnings=0` – 0 (zero) disables warnings; 1 shows important warnings; 2 shows all warnings

An option in the template can specify that the sandbox versions of the modules be used. If specified, the text on the right-hand side of the equals sign must be the name of the subpage for each sandbox module.

- `|sandbox=sandbox` – omit for normal operation

All text used for input parameters and for output messages and categories can be customized. For example, at enwiki the option `|lk=on` can be used to link each displayed unit to its article. The "`lk`" and "`on`" can be replaced with any desired text. In addition, input and output numbers can be formatted and can use digits in the local language. See the translation guide for more information.

To do

Document the modules to access Wikidata!

Module version history

- Version 1 December 2013
- Version 2 January 2014
- Version 3 April 2014
- Version 4 July 2014
- Version 5 September 2014
- Version 6 November 2014
- Version 7 December 2014
- Version 8 February 2015
- Version 9 February 2015
- Version 10 May 2015

- Version 11 June 2015
- Version 12 August 2015
- Version 13 March 2016
- Version 14 June 2016 Vorlage:Green
- Version 15 September 2016
- Version 16 January 2017
- Version 17 May 2017
- Version 18 July 2017
- Version 19 August 2017
- Version 20 December 2017 Vorlage:Green
- Version 21 January 2018 Vorlage:Green
- Version 22 February 2018 Vorlage:Green
- Version 23 June 2018 Vorlage:Green
- Version 24 May 2019 Vorlage:Green
- Version 25 May 2021 Vorlage:Green
- Version 26 June 2021 Vorlage:Green
- Version 27 February 2022 Vorlage:Green

```
-- Convert a value from one unit of measurement to another.
-- Example: {{convert|123|lb|kg}} --> 123 pounds (56 kg)
-- See [[:en:Template:Convert/Transwiki guide]] if copying to another wiki.

local MINUS = '−'  -- Unicode U+2212 MINUS SIGN (UTF-8: e2 88 92)
local abs = math.abs
local floor = math.floor
local format = string.format
local log10 = math.log10
local ustring = mw.ustring
local ulen = ustring.len
local usub = ustring.sub

-- Configuration options to keep magic values in one location.
-- Conversion data and message text are defined in separate modules.
local config, maxsigfig
local numdot  -- must be '.' or ',' or a character which works in a regex
local numsep, numsep_remove, numsep_remove2
local data_code, all_units
local text_code
local varname        -- can be a code to use variable names that depend on value
local from_en_table  -- to translate an output string of en digits to local langu
local to_en_table    -- to translate an input string of digits in local language
-- Use translation_table in convert/text to change the following.
local en_default           -- true uses lang=en unless convert has lang=local or
local group_method = 3     -- code for how many digits are in a group
local per_word = 'per'     -- for units like "liters per kilometer"
local plural_suffix = 's'  -- only other useful value is probably '' to disable p
local omitsep              -- true to omit separator before local symbol/name

-- All units should be defined in the data module. However, to cater for quick ch
-- and experiments, any unknown unit is looked up in an extra data module, if it
-- That module would be transcluded in only a small number of pages, so there sho
-- little server overhead from making changes, and changes should propagate quick
local extra_module  -- name of module with extra units
local extra_units   -- nil or table of extra units from extra_module
```

```
-- Some options in the invoking template can set variables used later in the modu
local currency_text  -- for a user-defined currency symbol: {{convert|12|$/ha|$=€

local function from_en(text)
        -- Input is a string representing a number in en digits with '.' decimal
        -- without digit grouping (which is done just after calling this).
        -- Return the translation of the string with numdot and digits in local l
        if numdot ~= '.' then
                text = text:gsub('%.', numdot)
        end
        if from_en_table then
                text = text:gsub('%d', from_en_table)
        end
        return text
end

local function to_en(text)
        -- Input is a string representing a number in the local language with
        -- an optional numdot decimal mark and numsep digit grouping.
        -- Return the translation of the string with '.' mark and en digits,
        -- and no separators (they have to be removed here to handle cases like
        -- numsep = '.' and numdot = ',' with input "1.234.567,8").
        if to_en_table then
                text = ustring.gsub(text, '%d', to_en_table)
        end
        if numsep_remove then
                text = text:gsub(numsep_remove, '')
        end
        if numsep_remove2 then
                text = text:gsub(numsep_remove2, '')
        end
        if numdot ~= '.' then
                text = text:gsub(numdot, '.')
        end
        return text
end

local function decimal_mark(text)
        -- Return ',' if text probably is using comma for decimal mark, or has no
        -- Return '.' if text probably is using dot for decimal mark.
        -- Otherwise return nothing (decimal mark not known).
        if not text:find('[.,]') then return ',' end
        text = text:gsub('^%-', ''):gsub('%+%d+/%d+$', ''):gsub('[Ee]%-?%d+$', '
        local decimal =
                text:match('^0?([.,])%d+$') or
                text:match('%d([.,])%d?%d?$') or
                text:match('%d([.,])%d%d%d%d+$')
        if decimal then return decimal end
        if text:match('%.%d+%.') then return ',' end
        if text:match('%,%d+,') then return '.' end
end

local add_warning, with_separator  -- forward declarations
local function to_en_with_check(text, parms)
        -- Version of to_en() for a wiki using numdot = ',' and numsep = '.' to c
        -- text (an input number as a string) which might have been copied from e
        -- For example, in '1.234' the '.' could be a decimal mark or a group sep
        -- From viwiki.
        if to_en_table then
                text = ustring.gsub(text, '%d', to_en_table)
        end
        if decimal_mark(text) == '.' then
                local original = text
                text = text:gsub(',', '')  -- for example, interpret "1,234.5" as
```

```
                if parms then
                        add_warning(parms, 0, 'cvt_enwiki_num', original, with_se
                end
        else
                if numsep_remove then
                        text = text:gsub(numsep_remove, '')
                end
                if numsep_remove2 then
                        text = text:gsub(numsep_remove2, '')
                end
                if numdot ~= '.' then
                        text = text:gsub(numdot, '.')
                end
        end
        return text
end

local function omit_separator(id)
        -- Return true if there should be no separator before id (a unit symbol c
        -- For zhwiki, there should be no separator if id uses local characters.
        -- The following kludge should be a sufficient test.
        if omitsep then
                if id:sub(1, 2) == '-{' then  -- for "-{...}-" content language v
                        return true
                end
                if id:byte() > 127 then
                        local first = usub(id, 1, 1)
                        if first ~= 'Å' and first ~= '°' and first ~= 'µ' then
                                return true
                        end
                end
        end
        return id:sub(1, 1) == '/'  -- no separator before units like "/ha"
end

local spell_module  -- name of module that can spell numbers
local speller       -- function from that module to handle spelling (set if neede
local wikidata_module, wikidata_data_module  -- names of Wikidata modules
local wikidata_code, wikidata_data  -- exported tables from those modules (set if

local function set_config(args)
        -- Set configuration options from template #invoke or defaults.
        config = args
        maxsigfig = config.maxsigfig or 14  -- maximum number of significant figu
        local data_module, text_module
        local sandbox = config.sandbox and ('/' .. config.sandbox) or ''
        data_module = "Module:Convert/data" .. sandbox
        text_module = "Module:Convert/text" .. sandbox
        extra_module = "Module:Convert/extra" .. sandbox
        wikidata_module = "Module:Convert/wikidata" .. sandbox
        wikidata_data_module = "Module:Convert/wikidata/data" .. sandbox
        spell_module = "Module:ConvertNumeric"
        data_code = mw.loadData(data_module)
        text_code = mw.loadData(text_module)
        all_units = data_code.all_units
        local translation = text_code.translation_table
        if translation then
                numdot = translation.numdot
                numsep = translation.numsep
                if numdot == ',' and numsep == '.' then
                        if text_code.all_messages.cvt_enwiki_num then
                                to_en = to_en_with_check
                        end
                end
```

```
                if translation.group then
                        group_method = translation.group
                end
                if translation.per_word then
                        per_word = translation.per_word
                end
                if translation.plural_suffix then
                        plural_suffix = translation.plural_suffix
                end
                varname = translation.varname
                from_en_table = translation.from_en
                local use_workaround = true
                if use_workaround then
                        -- 2013-07-05 workaround bug by making a copy of the requ
                        -- mw.ustring.gsub fails with a table (to_en_table) as th
                        -- if the table is accessed via mw.loadData.
                        local source = translation.to_en
                        if source then
                                to_en_table = {}
                                for k, v in pairs(source) do
                                        to_en_table[k] = v
                                end
                        end
                else
                        to_en_table = translation.to_en
                end
                if translation.lang == 'en default' then
                        en_default = true  -- for hiwiki
                end
                omitsep = translation.omitsep  -- for zhwiki
        end
        numdot = config.numdot or numdot or '.'  -- decimal mark before fractiona
        numsep = config.numsep or numsep or ','  -- group separator for numbers
        -- numsep should be ',' or '.' or '' or ' ' or a Unicode character.
        -- numsep_remove must work in a regex to identify separators to be remove
        if numsep ~= '' then
                numsep_remove = (numsep == '.') and '%.' or numsep
        end
        if numsep ~= ',' and numdot ~= ',' then
                numsep_remove2 = ','  -- so numbers copied from enwiki will work
        end
end

local function collection()
        -- Return a table to hold items.
        return {
                n = 0,
                add = function (self, item)
                        self.n = self.n + 1
                        self[self.n] = item
                end,
        }
end

local function divide(numerator, denominator)
        -- Return integers quotient, remainder resulting from dividing the two
        -- given numbers, which should be unsigned integers.
        local quotient, remainder = floor(numerator / denominator), numerator % d
        if not (0 <= remainder and remainder < denominator) then
                -- Floating point limits may need this, as in {{convert|160.02|Ym
                remainder = 0
        end
        return quotient, remainder
end
```

```
local function split(text, delimiter)
        -- Return a numbered table with fields from splitting text.
        -- The delimiter is used in a regex without escaping (for example, '.' wo
        -- Each field has any leading/trailing whitespace removed.
        local t = {}
        text = text .. delimiter  -- to get last item
        for item in text:gmatch('%s*(.-)%s*' .. delimiter) do
                table.insert(t, item)
        end
        return t
end

local function strip(text)
        -- If text is a string, return its content with no leading/trailing
        -- whitespace. Otherwise return nil (a nil argument gives a nil result).
        if type(text) == 'string' then
                return text:match("^%s*(.-)%s*$")
        end
end

local function table_len(t)
        -- Return length (<100) of a numbered table to replace #t which is
        -- documented to not work if t is accessed via mw.loadData().
        for i = 1, 100 do
                if t[i] == nil then
                        return i - 1
                end
        end
end

local function wanted_category(catkey, catsort, want_warning)
        -- Return message category if it is wanted in current namespace,
        -- otherwise return ''.
        local cat
        local title = mw.title.getCurrentTitle()
        if title then
                local nsdefault = '0'  -- default namespace: '0' = article; '0,10
                local namespace = title.namespace
                for _, v in ipairs(split(config.nscat or nsdefault, ',')) do
                        if namespace == tonumber(v) then
                                cat = text_code.all_categories[want_warning and '
                                if catsort and catsort ~= '' and cat:sub(-2) == '
                                        cat = cat:sub(1, -3) .. '|' .. mw.text.no
                                end
                                break
                        end
                end
        end
        return cat or ''
end

local function message(parms, mcode, is_warning)
        -- Return wikitext for an error message, including category if specified
        -- for the message type.
        -- mcode = numbered table specifying the message:
        --    mcode[1] = 'cvt_xxx' (string used as a key to get message info)
        --    mcode[2] = 'parm1' (string to replace '$1' if any in message)
        --    mcode[3] = 'parm2' (string to replace '$2' if any in message)
        --    mcode[4] = 'parm3' (string to replace '$3' if any in message)
        local msg
        if type(mcode) == 'table' then
                if mcode[1] == 'cvt_no_output' then
                        -- Some errors should cause convert to output an empty st
```

```
                        -- for example, for an optional field in an infobox.
                        return ''
                end
                msg = text_code.all_messages[mcode[1]]
        end
        parms.have_problem = true
        local function subparm(fmt, ...)
                local rep = {}
                for i, v in ipairs({...}) do
                        rep['$' .. i] = v
                end
                return (fmt:gsub('$%d+', rep))
        end
        if msg then
                local parts = {}
                local regex, replace = msg.regex, msg.replace
                for i = 1, 3 do
                        local limit = 40
                        local s = mcode[i + 1]
                        if s then
                                if regex and replace then
                                        s = s:gsub(regex, replace)
                                        limit = nil  -- allow long "should be" me
                                end
                                -- Escape user input so it does not break the mes
                                -- To avoid tags (like {{convert|1<math>23</math>
                                -- the mouseover title, any strip marker starting
                                -- replaced with '...' (text not needing i18n).
                                local append
                                local pos = s:find(string.char(127), 1, true)
                                if pos then
                                        append = '...'
                                        s = s:sub(1, pos - 1)
                                end
                                if limit and ulen(s) > limit then
                                        s = usub(s, 1, limit)
                                        append = '...'
                                end
                                s = mw.text.nowiki(s) .. (append or '')
                        else
                                s = '?'
                        end
                        parts['$' .. i] = s
                end
                local function ispreview()
                        -- Return true if a prominent message should be shown.
                        if parms.test == 'preview' or parms.test == 'nopreview' t
                                -- For testing, can preview a real message or sim
                                -- when running automated tests.
                                return parms.test == 'preview'
                        end
                        local success, revid = pcall(function ()
                                return (parms.frame):preprocess('{{REVISIONID}}')
                        return success and (revid == '')
                end
                local want_warning = is_warning and
                        not config.warnings and  -- show unobtrusive warnings if
                        not msg.nowarn           -- but use msg settings, not sta
                local title = string.gsub(msg[1] or 'Missing message', '$%d+', pa
                local text = want_warning and '*' or msg[2] or 'Missing message'
                local cat = wanted_category(msg[3], mcode[2], want_warning)
                local anchor = msg[4] or ''
                local fmtkey = ispreview() and 'cvt_format_preview' or
                        (want_warning and 'cvt_format2' or msg.format or 'cvt_for
```

```
                local fmt = text_code.all_messages[fmtkey] or 'convert: bug'
                return subparm(fmt, title:gsub('"', '&quot;'), text, cat, anchor)
        end
        return 'Convert internal error: unknown message'
end

function add_warning(parms, level, key, text1, text2)  -- for forward declaration
        -- If enabled, add a warning that will be displayed after the convert res
        -- A higher level is more verbose: more kinds of warnings are displayed.
        -- To reduce output noise, only the first warning is displayed.
        if level <= (tonumber(config.warnings) or 1) then
                if parms.warnings == nil then
                        parms.warnings = message(parms, { key, text1, text2 }, t
                end
        end
end

local function spell_number(parms, inout, number, numerator, denominator)
        -- Return result of spelling (number, numerator, denominator), or
        -- return nil if spelling is not available or not supported for given te
        -- Examples (each value must be a string or nil):
        --   number  numerator  denominator  output
        --   ------  ---------  -----------  -------------------
        --   "1.23"    nil        nil        one point two three
        --    "1"      "2"        "3"        one and two thirds
        --    nil      "2"        "3"        two thirds
        if not speller then
                local function get_speller(module)
                        return require(module).spell_number
                end
                local success
                success, speller = pcall(get_speller, spell_module)
                if not success or type(speller) ~= 'function' then
                        add_warning(parms, 1, 'cvt_no_spell', 'spell')
                        return nil
                end
        end
        local case
        if parms.spell_upper == inout then
                case = true
                parms.spell_upper = nil  -- only uppercase first word in a multi
        end
        local sp = not parms.opt_sp_us
        local adj = parms.opt_adjectival
        return speller(number, numerator, denominator, case, sp, adj)
end

------------------------------------------------------------------------------
-- BEGIN: Code required only for built-in units.
-- LATER: If need much more code, move to another module to simplify this module
local function speed_of_sound(altitude)
        -- This is for the Mach built-in unit of speed.
        -- Return speed of sound in metres per second at given altitude in feet.
        -- If no altitude given, use default (zero altitude = sea level).
        -- Table gives speed of sound in miles per hour at various altitudes:
        --   altitude = -17,499 to 402,499 feet
        -- mach_table[a + 4] = s where
        --   a = (altitude / 5000) rounded to nearest integer (-3 to 80)
        --   s = speed of sound (mph) at that altitude
        -- LATER: Should calculate result from an interpolation between the next
        -- lower and higher altitudes in table, rather than rounding to nearest.
        -- From: http://www.aerospaceweb.org/question/atmosphere/q0112.shtml
        local mach_table = {
                799.5, 787.0, 774.2, 761.207051,
```

```
                748.0, 734.6, 721.0, 707.0, 692.8, 678.3, 663.5, 660.1, 660.1, 66
                660.1, 660.1, 660.1, 662.0, 664.3, 666.5, 668.9, 671.1, 673.4, 67
                677.9, 683.7, 689.9, 696.0, 702.1, 708.1, 714.0, 719.9, 725.8, 73
                737.3, 737.7, 737.7, 736.2, 730.5, 724.6, 718.8, 712.9, 707.0, 70
                695.0, 688.9, 682.8, 676.6, 670.4, 664.1, 657.8, 652.9, 648.3, 64
                639.1, 634.4, 629.6, 624.8, 620.0, 615.2, 613.2, 613.2, 613.2, 61
                614.4, 615.3, 616.7, 619.8, 623.4, 629.7, 635.0, 641.1, 650.6, 66
                672.5, 674.3, 676.1, 677.9, 679.7, 681.5, 683.3, 685.1, 686.8, 68
        }
        altitude = altitude or 0
        local a = (altitude < 0) and -altitude or altitude
        a = floor(a / 5000 + 0.5)
        if altitude < 0 then
                a = -a
        end
        if a < -3 then
                a = -3
        elseif a > 80 then
                a = 80
        end
        return mach_table[a + 4] * 0.44704  -- mph converted to m/s
end
-- END: Code required only for built-in units.
--------------------------------------------------------------------------

local function add_style(parms, class)
        -- Add selected template style to parms if not already present.
        parms.templatestyles = parms.templatestyles or {}
        if not parms.templatestyles[class] then
                parms.templatestyles[class] = parms.frame:extensionTag({
                        name = 'templatestyles', args = { src = text_code.titles
                })
        end
end

local function get_styles(parms)
        -- Return string of required template styles, empty if none.
        if parms.templatestyles then
                local t = {}
                for _, v in pairs(parms.templatestyles) do
                        table.insert(t, v)
                end
                return table.concat(t)
        end
        return ''
end

local function get_range(word)
        -- Return a range (string or table) corresponding to word (like "to"),
        -- or return nil if not a range word.
        local ranges = text_code.ranges
        return ranges.types[word] or ranges.types[ranges.aliases[word]]
end

local function check_mismatch(unit1, unit2)
        -- If unit1 cannot be converted to unit2, return an error message table.
        -- This allows conversion between units of the same type, and between
        -- Nm (normally torque) and ftlb (energy), as in gun-related articles.
        -- This works because Nm is the base unit (scale = 1) for both the
        -- primary type (torque), and the alternate type (energy, where Nm = J).
        -- A match occurs if the primary types are the same, or if unit1 matches
        -- the alternate type of unit2, and vice versa. That provides a whitelist
        -- of which conversions are permitted between normally incompatible types
        if unit1.utype == unit2.utype or
```

```
                (unit1.utype == unit2.alttype and unit1.alttype == unit2.utype) t
                return nil
        end
        return { 'cvt_mismatch', unit1.utype, unit2.utype }
end

local function override_from(out_table, in_table, fields)
        -- Copy the specified fields from in_table to out_table, but do not
        -- copy nil fields (keep any corresponding field in out_table).
        for _, field in ipairs(fields) do
                if in_table[field] then
                        out_table[field] = in_table[field]
                end
        end
end

local function shallow_copy(t)
        -- Return a shallow copy of table t.
        -- Do not need the features and overhead of the Scribunto mw.clone().
        local result = {}
        for k, v in pairs(t) do
                result[k] = v
        end
        return result
end

local unit_mt = {
        -- Metatable to get missing values for a unit that does not accept SI pre
        -- Warning: The boolean value 'false' is returned for any missing field
        -- so __index is not called twice for the same field in a given unit.
        __index = function (self, key)
                local value
                if key == 'name1' or key == 'sym_us' then
                        value = self.symbol
                elseif key == 'name2' then
                        value = self.name1 .. plural_suffix
                elseif key == 'name1_us' then
                        value = self.name1
                        if not rawget(self, 'name2_us') then
                                -- If name1_us is 'foot', do not make name2_us by
                                self.name2_us = self.name2
                        end
                elseif key == 'name2_us' then
                        local raw1_us = rawget(self, 'name1_us')
                        if raw1_us then
                                value = raw1_us .. plural_suffix
                        else
                                value = self.name2
                        end
                elseif key == 'link' then
                        value = self.name1
                else
                        value = false
                end
                rawset(self, key, value)
                return value
        end
}

local function prefixed_name(unit, name, index)
        -- Return unit name with SI prefix inserted at correct position.
        -- index = 1 (name1), 2 (name2), 3 (name1_us), 4 (name2_us).
        -- The position is a byte (not character) index, so use Lua's sub().
        local pos = rawget(unit, 'prefix_position')
```

```
	if type(pos) == 'string' then
		pos = tonumber(split(pos, ',')[index])
	end
	if pos then
		return name:sub(1, pos - 1) .. unit.si_name .. name:sub(pos)
	end
	return unit.si_name .. name
end

local unit_prefixed_mt = {
	-- Metatable to get missing values for a unit that accepts SI prefixes.
	-- Before use, fields si_name, si_prefix must be defined.
	-- The unit must define _symbol, _name1 and
	-- may define _sym_us, _name1_us, _name2_us
	-- (_sym_us, _name2_us may be defined for a language using sp=us
	-- to refer to a variant unrelated to U.S. units).
	__index = function (self, key)
		local value
		if key == 'symbol' then
			value = self.si_prefix .. self._symbol
		elseif key == 'sym_us' then
			value = rawget(self, '_sym_us')
			if value then
				value = self.si_prefix .. value
			else
				value = self.symbol
			end
		elseif key == 'name1' then
			value = prefixed_name(self, self._name1, 1)
		elseif key == 'name2' then
			value = rawget(self, '_name2')
			if value then
				value = prefixed_name(self, value, 2)
			else
				value = self.name1 .. plural_suffix
			end
		elseif key == 'name1_us' then
			value = rawget(self, '_name1_us')
			if value then
				value = prefixed_name(self, value, 3)
			else
				value = self.name1
			end
		elseif key == 'name2_us' then
			value = rawget(self, '_name2_us')
			if value then
				value = prefixed_name(self, value, 4)
			elseif rawget(self, '_name1_us') then
				value = self.name1_us .. plural_suffix
			else
				value = self.name2
			end
		elseif key == 'link' then
			value = self.name1
		else
			value = false
		end
		rawset(self, key, value)
		return value
	end
}

local unit_per_mt = {
	-- Metatable to get values for a per unit of form "x/y".
```

```
	-- This is never called to determine a unit name or link because per unit
	-- are handled as a special case.
	-- Similarly, the default output is handled elsewhere, and for a symbol
	-- this is only called from get_default() for default_exceptions.
	__index = function (self, key)
		local value
		if key == 'symbol' then
			local per = self.per
			local unit1, unit2 = per[1], per[2]
			if unit1 then
				value = unit1[key] .. '/' .. unit2[key]
			else
				value = '/' .. unit2[key]
			end
		elseif key == 'sym_us' then
			value = self.symbol
		elseif key == 'scale' then
			local per = self.per
			local unit1, unit2 = per[1], per[2]
			value = (unit1 and unit1.scale or 1) * self.scalemultipli
		else
			value = false
		end
		rawset(self, key, value)
		return value
	end
}

local function make_per(unitcode, unit_table, ulookup)
	-- Return true, t where t is a per unit with unit codes expanded to unit
	-- or return false, t where t is an error message table.
	local result = {
		unitcode = unitcode,
		utype = unit_table.utype,
		per = {}
	}
	override_from(result, unit_table, { 'invert', 'iscomplex', 'default', 'li
	result.symbol_raw = (result.symbol or false)  -- to distinguish between a
	local prefix
	for i, v in ipairs(unit_table.per) do
		if i == 1 and v == '' then
			-- First unit symbol can be empty; that gives a nil first
		elseif i == 1 and text_code.currency[v] then
			prefix = currency_text or v
		else
			local success, t = ulookup(v)
			if not success then return false, t end
			result.per[i] = t
		end
	end
	local multiplier = unit_table.multiplier
	if not result.utype then
		-- Creating an automatic per unit.
		local unit1 = result.per[1]
		local utype = (unit1 and unit1.utype or prefix or '') .. '/' .. r
		local t = data_code.per_unit_fixups[utype]
		if t then
			if type(t) == 'table' then
				utype = t.utype or utype
				result.link = result.link or t.link
				multiplier = multiplier or t.multiplier
			else
				utype = t
			end
```

```
                end
                result.utype = utype
        end
        result.scalemultiplier = multiplier or 1
        result.vprefix = prefix or false  -- set to non-nil to avoid calling __in
        return true, setmetatable(result, unit_per_mt)
end

local function lookup(parms, unitcode, what, utable, fails, depth)
        -- Return true, t where t is a copy of the unit's converter table,
        -- or return false, t where t is an error message table.
        -- Parameter 'what' determines whether combination units are accepted:
        --   'no_combination'  : single unit only
        --   'any_combination' : single unit or combination or output multiple
        --   'only_multiple'   : single unit or output multiple only
        -- Parameter unitcode is a symbol (like 'g'), with an optional SI prefix
        -- If, for example, 'kg' is in this table, that entry is used;
        -- otherwise the prefix ('k') is applied to the base unit ('g').
        -- If unitcode is a known combination code (and if allowed by what),
        -- a table of output multiple unit tables is included in the result.
        -- For compatibility with the old template, an underscore in a unitcode i
        -- replaced with a space so usage like {{convert|350|board_feet}} works.
        -- Wikignomes may also put two spaces or " " in combinations, so
        -- replace underscore, " ", and multiple spaces with a single space
        utable = utable or parms.unittable or all_units
        fails = fails or {}
        depth = depth and depth + 1 or 1
        if depth > 9 then
                -- There are ways to mistakenly define units which result in infi
                -- recursion when lookup() is called. That gives a long delay and
                -- confusing error messages, so the depth parameter is used as a
                return false, { 'cvt_lookup', unitcode }
        end
        if unitcode == nil or unitcode == '' then
                return false, { 'cvt_no_unit' }
        end
        unitcode = unitcode:gsub('_', ' '):gsub(' ', ' '):gsub('  +', ' ')
        local function call_make_per(t)
                return make_per(unitcode, t,
                        function (ucode) return lookup(parms, ucode, 'no_combinat
                )
        end
        local t = utable[unitcode]
        if t then
                if t.shouldbe then
                        return false, { 'cvt_should_be', t.shouldbe }
                end
                if t.sp_us then
                        parms.opt_sp_us = true
                end
                local target = t.target  -- nil, or unitcode is an alias for this
                if target then
                        local success, result = lookup(parms, target, what, utabl
                        if not success then return false, result end
                        override_from(result, t, { 'customary', 'default', 'link'
                        local multiplier = t.multiplier
                        if multiplier then
                                result.multiplier = tostring(multiplier)
                                result.scale = result.scale * multiplier
                        end
                        return true, result
                end
                if t.per then
                        return call_make_per(t)
```

```
                end
                local combo = t.combination  -- nil or a table of unitcodes
                if combo then
                        local multiple = t.multiple
                        if what == 'no_combination' or (what == 'only_multiple' a
                                return false, { 'cvt_bad_unit', unitcode }
                        end
                        -- Recursively create a combination table containing the
                        -- converter table of each unitcode.
                        local result = { utype = t.utype, multiple = multiple, co
                        local cvt = result.combination
                        for i, v in ipairs(combo) do
                                local success, t = lookup(parms, v, multiple and
                                if not success then return false, t end
                                cvt[i] = t
                        end
                        return true, result
                end
                local result = shallow_copy(t)
                result.unitcode = unitcode
                if result.prefixes then
                        result.si_name = ''
                        result.si_prefix = ''
                        return true, setmetatable(result, unit_prefixed_mt)
                end
                return true, setmetatable(result, unit_mt)
        end
        local SIprefixes = text_code.SIprefixes
        for plen = SIprefixes[1] or 2, 1, -1 do
                -- Look for an SI prefix; should never occur with an alias.
                -- Check for longer prefix first ('dam' is decametre).
                -- SIprefixes[1] = prefix maximum #characters (as seen by mw.ustr
                local prefix = usub(unitcode, 1, plen)
                local si = SIprefixes[prefix]
                if si then
                        local t = utable[usub(unitcode, plen+1)]
                        if t and t.prefixes then
                                local result = shallow_copy(t)
                                result.unitcode = unitcode
                                result.si_name = parms.opt_sp_us and si.name_us o
                                result.si_prefix = si.prefix or prefix
                                result.scale = t.scale * 10 ^ (si.exponent * t.pr
                                return true, setmetatable(result, unit_prefixed_m
                        end
                end
        end
        -- Accept user-defined combinations like "acre+m2+ha" or "acre m2 ha" for
        -- If '+' is used, each unit code can include a space, and any error is f
        -- If ' ' is used and if each space-separated word is a unit code, it is
        -- but errors are not fatal so the unit code can be looked up as an extra
        local err_is_fatal
        local combo = collection()
        if unitcode:find('+', 1, true) then
                err_is_fatal = true
                for item in (unitcode .. '+'):gmatch('%s*(.-)%s*%+') do
                        if item ~= '' then
                                combo:add(item)
                        end
                end
        elseif unitcode:find('%s') then
                for item in unitcode:gmatch('%S+') do
                        combo:add(item)
                end
        end
```

```
	if combo.n > 1 then
		local function lookup_combo()
			if what == 'no_combination' or what == 'only_multiple' th
				return false, { 'cvt_bad_unit', unitcode }
			end
			local result = { combination = {} }
			local cvt = result.combination
			for i, v in ipairs(combo) do
				local success, t = lookup(parms, v, 'only_multipl
				if not success then return false, t end
				if i == 1 then
					result.utype = t.utype
				else
					local mismatch = check_mismatch(result, t
					if mismatch then
						return false, mismatch
					end
				end
				cvt[i] = t
			end
			return true, result
		end
		local success, result = lookup_combo()
		if success or err_is_fatal then
			return success, result
		end
	end
	-- Accept any unit with an engineering notation prefix like "e6cuft"
	-- (million cubic feet), but not chained prefixes like "e3e6cuft",
	-- and not if the unit is a combination or multiple,
	-- and not if the unit has an offset or is a built-in.
	-- Only en digits are accepted.
	local exponent, baseunit = unitcode:match('^e(%d+)(.*)')
	if exponent then
		local engscale = text_code.eng_scales[exponent]
		if engscale then
			local success, result = lookup(parms, baseunit, 'no_combi
			if success and not (result.offset or result.builtin or re
				result.unitcode = unitcode  -- 'e6cuft' not 'cuft
				result.defkey = unitcode  -- key to lookup defaul
				result.engscale = engscale
				result.scale = result.scale * 10 ^ tonumber(expor
				return true, result
			end
		end
	end
	-- Look for x/y; split on right-most slash to get scale correct (x/y/z is
	local top, bottom = unitcode:match('^(.-)/([^/]+)$')
	if top and not unitcode:find('e%d') then
		-- If valid, create an automatic per unit for an "x/y" unit code
		-- The unitcode must not include extraneous spaces.
		-- Engineering notation (apart from at start and which has been s
		-- is not supported so do not make a per unit if find text like
		local success, result = call_make_per({ per = {top, bottom} })
		if success then
			return true, result
		end
	end
	if not parms.opt_ignore_error and not get_range(unitcode) then
		-- Want the "what links here" list for the extra_module to show c
		-- where an extra unit is used, so do not require it if invoked f
		-- or if looking up a range word which cannot be a unit.
		if not extra_units then
			local success, extra = pcall(function () return require(e
```

```
                        if success and type(extra) == 'table' then
                                extra_units = extra
                        end
                end
                if extra_units then
                        -- A unit in one data table might refer to a unit in the
                        -- switch between them, relying on fails or depth to term
                        if not fails[unitcode] then
                                fails[unitcode] = true
                                local other = (utable == all_units) and extra_uni
                                local success, result = lookup(parms, unitcode, w
                                if success then
                                        return true, result
                                end
                        end
                end
        end
        if to_en_table then
                -- At fawiki it is common to translate all digits so a unit like
                local en_code = ustring.gsub(unitcode, '%d', to_en_table)
                if en_code ~= unitcode then
                        return lookup(parms, en_code, what, utable, fails, depth)
                end
        end
        return false, { 'cvt_unknown', unitcode }
end

local function valid_number(num)
        -- Return true if num is a valid number.
        -- In Scribunto (different from some standard Lua), when expressed as a s
        -- overflow or other problems are indicated with text like "inf" or "nan"
        -- which are regarded as invalid here (each contains "n").
        if type(num) == 'number' and tostring(num):find('n', 1, true) == nil then
                return true
        end
end

local function hyphenated(name, parts)
        -- Return a hyphenated form of given name (for adjectival usage).
        -- The name may be linked and the target of the link must not be changed.
        -- Hypothetical examples:
        --   [[long ton|ton]]         →  [[long ton|ton]]          (no change)
        --   [[tonne|long ton]]       →  [[tonne|long-ton]]
        --   [[metric ton|long ton]]  →  [[metric ton|long-ton]]
        --   [[long ton]]             →  [[long ton|long-ton]]
        -- Input can also have multiple links in a single name like:
        --   [[United States customary units|U.S.]] [[US gallon|gallon]]
        --   [[mile]]s per [[United States customary units|U.S.]] [[quart]]
        --   [[long ton]]s per [[short ton]]
        -- Assume that links cannot be nested (never like "[[abc[[def]]ghi]]").
        -- This uses a simple and efficient procedure that works for most cases.
        -- Some units (if used) would require more, and can later think about
        -- adding a method to handle exceptions.
        -- The procedure is to replace each space with a hyphen, but
        -- not a space after ')' [for "(pre-1954 US) nautical mile"], and
        -- not spaces immediately before '(' or in '(...)' [for cases like
        -- "British thermal unit (ISO)" and "Calorie (International Steam Table)"
        if name:find(' ', 1, true) then
                if parts then
                        local pos
                        if name:sub(1, 1) == '(' then
                                pos = name:find(')', 1, true)
                                if pos then
                                        return name:sub(1, pos+1) .. name:sub(pos
```

```
                                end
                        elseif name:sub(-1) == ')' then
                                pos = name:find('(', 1, true)
                                if pos then
                                        return name:sub(1, pos-2):gsub(' ', '-')
                                end
                        end
                        return name:gsub(' ', '-')
                end
                parts = collection()
                for before, item, after in name:gmatch('([^[]*)(%[%[[^[]*%]%])([^
                        if item:find(' ', 1, true) then
                                local prefix
                                local plen = item:find('|', 1, true)
                                if plen then
                                        prefix = item:sub(1, plen)
                                        item = item:sub(plen + 1, -3)
                                else
                                        prefix = item:sub(1, -3) .. '|'
                                        item = item:sub(3, -3)
                                end
                                item = prefix .. hyphenated(item, parts) .. ']]'
                        end
                        parts:add(before:gsub(' ', '-') .. item .. after:gsub(' '
                end
                if parts.n == 0 then
                        -- No link like "[[...]]" was found in the original name.
                        parts:add(hyphenated(name, parts))
                end
                return table.concat(parts)
        end
        return name
end

local function hyphenated_maybe(parms, want_name, sep, id, inout)
        -- Return s, f where
        --   s = id, possibly modified
        --   f = true if hyphenated
        -- Possible modifications: hyphenate; prepend '-'; append mid text.
        if id == nil or id == '' then
                return ''
        end
        local mid = (inout == (parms.opt_flip and 'out' or 'in')) and parms.mid o
        if want_name then
                if parms.opt_adjectival then
                        return '-' .. hyphenated(id) .. mid, true
                end
                if parms.opt_add_s and id:sub(-1) ~= 's' then
                        id = id .. 's'  -- for nowiki
                end
        end
        return sep .. id .. mid
end

local function use_minus(text)
        -- Return text with Unicode minus instead of '-', if present.
        if text:sub(1, 1) == '-' then
                return MINUS .. text:sub(2)
        end
        return text
end

local function digit_groups(parms, text, method)
        -- Return a numbered table of groups of digits (left-to-right, in local l
```

```
	-- Parameter method is a number or nil:
	--   3 for 3-digit grouping (default), or
	--   2 for 3-then-2 grouping (only for digits before decimal mark).
	local len_right
	local len_left = text:find('.', 1, true)
	if len_left then
		len_right = #text - len_left
		len_left = len_left - 1
	else
		len_left = #text
	end
	local twos = method == 2 and len_left > 5
	local groups = collection()
	local run = len_left
	local n
	if run < 4 or (run == 4 and parms.opt_comma5) then
		if parms.opt_gaps then
			n = run
		else
			n = #text
		end
	elseif twos then
		n = run % 2 == 0 and 1 or 2
	else
		n = run % 3 == 0 and 3 or run % 3
	end
	while run > 0 do
		groups:add(n)
		run = run - n
		n = (twos and run > 3) and 2 or 3
	end
	if len_right then
		if groups.n == 0 then
			groups:add(0)
		end
		if parms.opt_gaps and len_right > 3 then
			local want4 = not parms.opt_gaps3  -- true gives no gap b
			local isfirst = true
			run = len_right
			while run > 0 do
				n = (want4 and run == 4) and 4 or (run > 3 and 3
				if isfirst then
					isfirst = false
					groups[groups.n] = groups[groups.n] + 1 +
				else
					groups:add(n)
				end
				run = run - n
			end
		else
			groups[groups.n] = groups[groups.n] + 1 + len_right
		end
	end
	local pos = 1
	for i, length in ipairs(groups) do
		groups[i] = from_en(text:sub(pos, pos + length - 1))
		pos = pos + length
	end
	return groups
end

function with_separator(parms, text)  -- for forward declaration above
	-- Input text is a number in en digits with optional '.' decimal mark.
	-- Return an equivalent, formatted for display:
```

```
        --   with a custom decimal mark instead of '.', if wanted
        --   with thousand separators inserted, if wanted
        --   digits in local language
        -- The given text is like '123' or '123.' or '12345.6789'.
        -- The text has no sign (caller inserts that later, if necessary).
        -- When using gaps, they are inserted before and after the decimal mark.
        -- Separators are inserted only before the decimal mark.
        -- A trailing dot (as in '123.') is removed because their use appears to
        -- be accidental, and such a number should be shown as '123' or '123.0'.
        -- It is useful for convert to suppress the dot so, for example, '4000.'
        -- is a simple way of indicating that all the digits are significant.
        if text:sub(-1) == '.' then
                text = text:sub(1, -2)
        end
        if #text < 4 or parms.opt_nocomma or numsep == '' then
                return from_en(text)
        end
        local groups = digit_groups(parms, text, group_method)
        if parms.opt_gaps then
                if groups.n <= 1 then
                        return groups[1] or ''
                end
                local nowrap = '<span style="white-space: nowrap">'
                local gap = '<span style="margin-left: 0.25em">'
                local close = '</span>'
                return nowrap .. groups[1] .. gap .. table.concat(groups, close
        end
        return table.concat(groups, numsep)
end

-- An input value like 1.23e12 is displayed using scientific notation (1.23×10¹²)
-- That also makes the output use scientific notation, except for small values.
-- In addition, very small or very large output values use scientific notation.
-- Use format(fmtpower, significand, '10', exponent) where each argument is a st
local fmtpower = '%s<span style="margin:0 .15em 0 .25em">×</span>%s<sup>%s</sup>

local function with_exponent(parms, show, exponent)
        -- Return wikitext to display the implied value in scientific notation.
        -- Input uses en digits; output uses digits in local language.
        return format(fmtpower, with_separator(parms, show), from_en('10'), use_m
end

local function make_sigfig(value, sigfig)
        -- Return show, exponent that are equivalent to the result of
        -- converting the number 'value' (where value >= 0) to a string,
        -- rounded to 'sigfig' significant figures.
        -- The returned items are:
        --   show: a string of digits; no sign and no dot;
        --         there is an implied dot before show.
        --   exponent: a number (an integer) to shift the implied dot.
        -- Resulting value = tonumber('.' .. show) * 10^exponent.
        -- Examples:
        --   make_sigfig(23.456, 3) returns '235', 2 (.235 * 10^2).
        --   make_sigfig(0.0023456, 3) returns '235', -2 (.235 * 10^-2).
        --   make_sigfig(0, 3) returns '000', 1 (.000 * 10^1).
        if sigfig <= 0 then
                sigfig = 1
        elseif sigfig > maxsigfig then
                sigfig = maxsigfig
        end
        if value == 0 then
                return string.rep('0', sigfig), 1
        end
        local exp, fracpart = math.modf(log10(value))
```

```
	if fracpart >= 0 then
		fracpart = fracpart - 1
		exp = exp + 1
	end
	local digits = format('%.0f', 10^(fracpart + sigfig))
	if #digits > sigfig then
		-- Overflow (for sigfig=3: like 0.9999 rounding to "1000"; need "
		digits = digits:sub(1, sigfig)
		exp = exp + 1
	end
	assert(#digits == sigfig, 'Bug: rounded number has wrong length')
	return digits, exp
end

-- Fraction output format.
local fracfmt = {
	{ -- Like {{frac}} (fraction slash).
		'<span class="frac" role="math">{SIGN}<span class="num">{NUM}</sp
		'<span class="frac" role="math">{SIGN}{WHOLE}<span class="sr-only
		style = 'frac',
	},
	{ -- Like {{sfrac}} (stacked fraction, that is, horizontal bar).
		'<span class="sfrac tion" role="math">{SIGN}<span class="num">{NU
		'<span class="sfrac" role="math">{SIGN}{WHOLE}<span class="sr-onl
		style = 'sfrac',
	},
}

local function format_fraction(parms, inout, negative, wholestr, numstr, denstr,
	-- Return wikitext for a fraction, possibly spelled.
	-- Inputs use en digits and have no sign; output uses digits in local lan
	local wikitext
	if not style then
		style = parms.opt_fraction_horizontal and 2 or 1
	end
	if wholestr == '' then
		wholestr = nil
	end
	local substitute = {
		SIGN = negative and MINUS or '',
		WHOLE = wholestr and with_separator(parms, wholestr),
		NUM = from_en(numstr),
		DEN = from_en(denstr),
	}
	wikitext = fracfmt[style][wholestr and 2 or 1]:gsub('{(%u+)}', substitute
	if do_spell then
		if negative then
			if wholestr then
				wholestr = '-' .. wholestr
			else
				numstr = '-' .. numstr
			end
		end
		local s = spell_number(parms, inout, wholestr, numstr, denstr)
		if s then
			return s
		end
	end
	add_style(parms, fracfmt[style].style)
	return wikitext
end

local function format_number(parms, show, exponent, isnegative)
	-- Parameter show is a string or a table containing strings.
```

```
	-- Each string is a formatted number in en digits and optional '.' decima
	-- A table represents a fraction: integer, numerator, denominator;
	-- if a table is given, exponent must be nil.
	-- Return t where t is a table with fields:
	--   show = wikitext formatted to display implied value
	--          (digits in local language)
	--   is_scientific = true if show uses scientific notation
	--   clean = unformatted show (possibly adjusted and with inserted '.')
	--          (en digits)
	--   sign = '' or MINUS
	--   exponent = exponent (possibly adjusted)
	-- The clean and exponent fields can be used to calculate the
	-- rounded absolute value, if needed.
	--
	-- The value implied by the arguments is found from:
	--   exponent is nil; and
	--   show is a string of digits (no sign), with an optional dot;
	--   show = '123.4' is value 123.4, '1234' is value 1234.0;
	-- or:
	--   exponent is an integer indicating where dot should be;
	--   show is a string of digits (no sign and no dot);
	--   there is an implied dot before show;
	--   show does not start with '0';
	--   show = '1234', exponent = 3 is value 0.1234*10^3 = 123.4.
	--
	-- The formatted result:
	-- * Is for an output value and is spelled if wanted and possible.
	-- * Includes a Unicode minus if isnegative and not spelled.
	-- * Uses a custom decimal mark, if wanted.
	-- * Has digits grouped where necessary, if wanted.
	-- * Uses scientific notation if requested, or for very small or large va
	--   (which forces result to not be spelled).
	-- * Has no more than maxsigfig significant digits
	--   (same as old template and {{#expr}}).
	local xhi, xlo  -- these control when scientific notation (exponent) is u
	if parms.opt_scientific then
		xhi, xlo = 4, 2  -- default for output if input uses e-notation
	elseif parms.opt_scientific_always then
		xhi, xlo = 0, 0  -- always use scientific notation (experimental)
	else
		xhi, xlo = 10, 4  -- default
	end
	local sign = isnegative and MINUS or ''
	local maxlen = maxsigfig
	local tfrac
	if type(show) == 'table' then
		tfrac = show
		show = tfrac.wholestr
		assert(exponent == nil, 'Bug: exponent given with fraction')
	end
	if not tfrac and not exponent then
		local integer, dot, decimals = show:match('^(%d*)(%.?)(.*)')
		if integer == '0' or integer == '' then
			local zeros, figs = decimals:match('^(0*)([^0]?.*)')
			if #figs == 0 then
				if #zeros > maxlen then
					show = '0.' .. zeros:sub(1, maxlen)
				end
			elseif #zeros >= xlo then
				show = figs
				exponent = -#zeros
			elseif #figs > maxlen then
				show = '0.' .. zeros .. figs:sub(1, maxlen)
			end
```

```
                elseif #integer >= xhi then
                        show = integer .. decimals
                        exponent = #integer
                else
                        maxlen = maxlen + #dot
                        if #show > maxlen then
                                show = show:sub(1, maxlen)
                        end
                end
        end
        if exponent then
                local function zeros(n)
                        return string.rep('0', n)
                end
                if #show > maxlen then
                        show = show:sub(1, maxlen)
                end
                if exponent > xhi or exponent <= -xlo or (exponent == xhi and sho
                        -- When xhi, xlo = 10, 4 (the default), scientific notati
                        -- rounded value satisfies: value >= 1e9 or value < 1e-4
                        -- except if show is '1000000000' (1e9), for example:
                        -- {{convert|1000000000|m|m|sigfig=10}} → 1,000,000,000 m
                        local significand
                        if #show > 1 then
                                significand = show:sub(1, 1) .. '.' .. show:sub(2
                        else
                                significand = show
                        end
                        return {
                                clean = '.' .. show,
                                exponent = exponent,
                                sign = sign,
                                show = sign .. with_exponent(parms, significand,
                                is_scientific = true,
                        }
                end
                if exponent >= #show then
                        show = show .. zeros(exponent - #show)  -- result has no
                elseif exponent <= 0 then
                        show = '0.' .. zeros(-exponent) .. show
                else
                        show = show:sub(1, exponent) .. '.' .. show:sub(exponent+
                end
        end
        local formatted_show
        if tfrac then
                show = tostring(tfrac.value)  -- to set clean in returned table
                formatted_show = format_fraction(parms, 'out', isnegative, tfrac
        else
                if isnegative and show:match('^0.?0*$') then
                        sign = ''  -- don't show minus if result is negative but
                end
                formatted_show = sign .. with_separator(parms, show)
                if parms.opt_spell_out then
                        formatted_show = spell_number(parms, 'out', sign .. show)
                end
        end
        return {
                clean = show,
                sign = sign,
                show = formatted_show,
                is_scientific = false,  -- to avoid calling __index
        }
end
```

```
local function extract_fraction(parms, text, negative)
	-- If text represents a fraction, return
	--   value, altvalue, show, denominator
	-- where
	--   value is a number (value of the fraction in argument text)
	--   altvalue is an alternate interpretation of any fraction for the hand
	--        unit where "12.1+3/4" means 12 hands 1.75 inches
	--   show is a string (formatted text for display of an input value,
	--        and is spelled if wanted and possible)
	--   denominator is value of the denominator in the fraction
	-- Otherwise, return nil.
	-- Input uses en digits and '.' decimal mark (input has been translated),
	-- Output uses digits in local language and local decimal mark, if any.
	-----------------------------------------------------------------------
	-- Originally this function accepted x+y/z where x, y, z were any valid
	-- numbers, possibly with a sign. For example '1.23e+2+1.2/2.4' = 123.5,
	-- and '2-3/8' = 1.625. However, such usages were found to be errors or
	-- misunderstandings, so since August 2014 the following restrictions app
	--   x (if present) is an integer or has a single digit after decimal mar
	--   y and z are unsigned integers
	--   e-notation is not accepted
	-- The overall number can start with '+' or '-' (so '12+3/4' and '+12+3/4
	-- and '-12-3/4' are valid).
	-- Any leading negative sign is removed by the caller, so only inputs
	-- like the following are accepted here (may have whitespace):
	--   negative = false       false        true (there was a leading '-')
	--   text     = '2/3'       '+2/3'       '2/3'
	--   text     = '1+2/3'     '+1+2/3'     '1-2/3'
	--   text     = '12.3+1/2'  '+12.3+1/2'  '12.3-1/2'
	-- Values like '12.3+1/2' are accepted, but are intended only for use
	-- with the hands unit (not worth adding code to enforce that).
	-----------------------------------------------------------------------
	local leading_plus, prefix, numstr, slashes, denstr =
		text:match('^%s*(%+?)%s*(.-)%s*(%d+)%s*(/+)%s*(%d+)%s*$')
	if not leading_plus then
		-- Accept a single U+2044 fraction slash because that may be past
		leading_plus, prefix, numstr, denstr =
			text:match('^%s*(%+?)%s*(.-)%s*(%d+)%s*%s*(%d+)%s*$')
		slashes = '/'
	end
	local numerator = tonumber(numstr)
	local denominator = tonumber(denstr)
	if numerator == nil or denominator == nil or (negative and leading_plus ~
		return nil
	end
	local whole, wholestr
	if prefix == '' then
		wholestr = ''
		whole = 0
	else
		-- Any prefix must be like '12+' or '12-' (whole number and fract
		-- '12.3+' and '12.3-' are also accepted (single digit after deci
		-- because '12.3+1/2 hands' is valid (12 hands 3½ inches).
		local num1, num2, frac_sign = prefix:match('^(%d+)(%.?%d?)%s*([+%
		if num1 == nil then return nil end
		if num2 == '' then  -- num2 must be '' or like '.1' but not '.' o
			wholestr = num1
		else
			if #num2 ~= 2 then return nil end
			wholestr = num1 .. num2
		end
		if frac_sign ~= (negative and '-' or '+') then return nil end
		whole = tonumber(wholestr)
```

```
                if whole == nil then return nil end
        end
        local value = whole + numerator / denominator
        if not valid_number(value) then return nil end
        local altvalue = whole + numerator / (denominator * 10)
        local style = #slashes  -- kludge: 1 or 2 slashes can be used to select s
        if style > 2 then style = 2 end
        local wikitext = format_fraction(parms, 'in', negative, leading_plus .. w
        return value, altvalue, wikitext, denominator
end

local function extract_number(parms, text, another, no_fraction)
        -- Return true, info if can extract a number from text,
        -- where info is a table with the result,
        -- or return false, t where t is an error message table.
        -- Input can use en digits or digits in local language and can
        -- have references at the end. Accepting references is intended
        -- for use in infoboxes with a field for a value passed to convert.
        -- Parameter another = true if the expected value is not the first.
        -- Before processing, the input text is cleaned:
        -- * Any thousand separators (valid or not) are removed.
        -- * Any sign is replaced with '-' (if negative) or '' (otherwise).
        --   That replaces Unicode minus with '-'.
        -- If successful, the returned info table contains named fields:
        --   value    = a valid number
        --   altvalue = a valid number, usually same as value but different
        --              if fraction used (for hands unit)
        --   singular = true if value is 1 or -1 (to use singular form of units)
        --   clean    = cleaned text with any separators and sign removed
        --              (en digits and '.' decimal mark)
        --   show     = text formatted for output, possibly with ref strip marker
        --              (digits in local language and custom decimal mark)
        -- The resulting show:
        -- * Is for an input value and is spelled if wanted and possible.
        -- * Has a rounded value, if wanted.
        -- * Has digits grouped where necessary, if wanted.
        -- * If negative, a Unicode minus is used; otherwise the sign is
        --   '+' (if the input text used '+'), or is '' (if no sign in input).
        text = strip(text or '')
        local reference
        local pos = text:find('\127', 1, true)
        if pos then
                local before = text:sub(1, pos - 1)
                local remainder = text:sub(pos)
                local refs = {}
                while #remainder > 0 do
                        local ref, spaces
                        ref, spaces, remainder = remainder:match('^(\127[^\127]*U
                        if ref then
                                table.insert(refs, ref)
                        else
                                refs = {}
                                break
                        end
                end
                if #refs > 0 then
                        text = strip(before)
                        reference = table.concat(refs)
                end
        end
        local clean = to_en(text, parms)
        if clean == '' then
                return false, { another and 'cvt_no_num2' or 'cvt_no_num' }
        end
```

```
	local isnegative, propersign = false, ''  -- most common case
	local singular, show, denominator
	local value = tonumber(clean)
	local altvalue
	if value then
		local sign = clean:sub(1, 1)
		if sign == '+' or sign == '-' then
			propersign = (sign == '+') and '+' or MINUS
			clean = clean:sub(2)
		end
		if value < 0 then
			isnegative = true
			value = -value
		end
	else
		local valstr
		for _, prefix in ipairs({ '-', MINUS, '&minus;' }) do
			-- Including '-' sets isnegative in case input is a fract
			local plen = #prefix
			if clean:sub(1, plen) == prefix then
				valstr = clean:sub(plen + 1)
				if valstr:match('^%s') then  -- "- 1" is invalid
					return false, { 'cvt_bad_num', text }
				end
				break
			end
		end
		if valstr then
			isnegative = true
			propersign = MINUS
			clean = valstr
			value = tonumber(clean)
		end
		if value == nil then
			if not no_fraction then
				value, altvalue, show, denominator = extract_frac
			end
			if value == nil then
				return false, { 'cvt_bad_num', text }
			end
			if value <= 1 then
				singular = true  -- for example, "½ mile" or "one
			end
		end
	end
	if not valid_number(value) then  -- for example, "1e310" may overflow
		return false, { 'cvt_invalid_num' }
	end
	if show == nil then
		-- clean is a non-empty string with no spaces, and does not repre
		-- and value = tonumber(clean) is a number >= 0.
		-- If the input uses e-notation, show will be displayed using a p
		-- we use the number as given so it might not be normalized scien
		-- The input value is spelled if specified so any e-notation is i
		-- that allows input like 2e6 to be spelled as "two million" whic
		-- because the spell module converts '2e6' to '2000000' before sp
		local function rounded(value, default, exponent)
			local precision = parms.opt_ri
			if precision then
				local fmt = '%.' .. format('%d', precision) .. 'f
				local result = fmt:format(tonumber(value) + 2e-14
				if not exponent then
					singular = (tonumber(result) == 1)
				end
```

```
                                return result
                        end
                        return default
                end
                singular = (value == 1)
                local scientific
                local significand, exponent = clean:match('^([%d.]+)[Ee]([+%-]?%d
                if significand then
                        show = with_exponent(parms, rounded(significand, signific
                        scientific = true
                else
                        show = with_separator(parms, rounded(value, clean))
                end
                show = propersign .. show
                if parms.opt_spell_in then
                        show = spell_number(parms, 'in', propersign .. rounded(va
                        scientific = false
                end
                if scientific then
                        parms.opt_scientific = true
                end
        end
        if isnegative and (value ~= 0) then
                value = -value
                altvalue = -(altvalue or value)
        end
        return true, {
                value = value,
                altvalue = altvalue or value,
                singular = singular,
                clean = clean,
                show = show .. (reference or ''),
                denominator = denominator,
        }
end

local function get_number(text)
        -- Return v, f where:
        --   v = nil (text is not a number)
        -- or
        --   v = value of text (text is a number)
        --   f = true if value is an integer
        -- Input can use en digits or digits in local language or separators,
        -- but no Unicode minus, and no fraction.
        if text then
                local number = tonumber(to_en(text))
                if number then
                        local _, fracpart = math.modf(number)
                        return number, (fracpart == 0)
                end
        end
end

local function gcd(a, b)
        -- Return the greatest common denominator for the given values,
        -- which are known to be positive integers.
        if a > b then
                a, b = b, a
        end
        if a <= 0 then
                return b
        end
        local r = b % a
        if r <= 0 then
```

```
                return a
        end
        if r == 1 then
                return 1
        end
        return gcd(r, a)
end

local function fraction_table(value, denominator)
        -- Return value as a string or a table:
        -- * If result is a string, there is no fraction, and the result
        --   is value formatted as a string of en digits.
        -- * If result is a table, it represents a fraction with named fields:
        --   wholestr, numstr, denstr (strings of en digits for integer, numerato
        -- The result is rounded to the nearest multiple of (1/denominator).
        -- If the multiple is zero, no fraction is included.
        -- No fraction is included if value is very large as the fraction would
        -- be unhelpful, particularly if scientific notation is required.
        -- Input value is a non-negative number.
        -- Input denominator is a positive integer for the desired fraction.
        if value <= 0 then
                return '0'
        end
        if denominator <= 0 or value > 1e8 then
                return format('%.2f', value)
        end
        local integer, decimals = math.modf(value)
        local numerator = floor((decimals * denominator) +
                0.5 + 2e-14)  -- add fudge for some common cases of bad rounding
        if numerator >= denominator then
                integer = integer + 1
                numerator = 0
        end
        local wholestr = tostring(integer)
        if numerator > 0 then
                local div = gcd(numerator, denominator)
                if div > 1 then
                        numerator = numerator / div
                        denominator = denominator / div
                end
                return {
                        wholestr = (integer > 0) and wholestr or '',
                        numstr = tostring(numerator),
                        denstr = tostring(denominator),
                        value = value,
                }
        end
        return wholestr
end

local function preunits(count, preunit1, preunit2)
        -- If count is 1:
        --     ignore preunit2
        --     return p1
        -- else:
        --     preunit1 is used for preunit2 if the latter is empty
        --     return p1, p2
        -- where:
        --     p1 is text to insert before the input unit
        --     p2 is text to insert before the output unit
        --     p1 or p2 may be nil to mean "no preunit"
        -- Using '+' gives output like "5+ feet" (no space before, but space afte
        local function withspace(text, wantboth)
                -- Return text with space before and, if wantboth, after.
```

```
                -- However, no space is added if there is a space or ' ' or
                -- at that position ('-' is for adjectival text).
                -- There is also no space if text starts with '&'
                -- (e.g. '&deg;' would display a degree symbol with no preceding
                local char = text:sub(1, 1)
                if char == '&' then
                        return text  -- an html entity can be used to specify the
                end
                if not (char == ' ' or char == '-' or char == '+') then
                        text = ' ' .. text
                end
                if wantboth then
                        char = text:sub(-1, -1)
                        if not (char == ' ' or char == '-' or text:sub(-6, -1) ==
                                text = text .. ' '
                        end
                end
                return text
        end
        local PLUS = '+ '
        preunit1 = preunit1 or ''
        local trim1 = strip(preunit1)
        if count == 1 then
                if trim1 == '' then
                        return nil
                end
                if trim1 == '+' then
                        return PLUS
                end
                return withspace(preunit1, true)
        end
        preunit1 = withspace(preunit1)
        preunit2 = preunit2 or ''
        local trim2 = strip(preunit2)
        if trim1 == '+' then
                if trim2 == '' or trim2 == '+' then
                        return PLUS, PLUS
                end
                preunit1 = PLUS
        end
        if trim2 == '' then
                if trim1 == '' then
                        return nil, nil
                end
                preunit2 = preunit1
        elseif trim2 == '+' then
                preunit2 = PLUS
        elseif trim2 == '&#32;' then  -- trick to make preunit2 empty
                preunit2 = nil
        else
                preunit2 = withspace(preunit2)
        end
        return preunit1, preunit2
end

local function range_text(range, want_name, parms, before, after, inout, options)
        -- Return before .. rtext .. after
        -- where rtext is the text that separates two values in a range.
        local rtext, adj_text, exception
        options = options or {}
        if type(range) == 'table' then
                -- Table must specify range text for ('off' and 'on') or ('input
                -- and may specify range text for 'adj=on',
                -- and may specify exception = true.
```

```
                rtext = range[want_name and 'off' or 'on'] or
                                range[((inout == 'in') == (parms.opt_flip == true
                adj_text = range['adj']
                exception = range['exception']
        else
                rtext = range
        end
        if parms.opt_adjectival then
                if want_name or (exception and parms.abbr_org == 'on') then
                        rtext = adj_text or rtext:gsub(' ', '-'):gsub(' ',
                end
        end
        if rtext == '−' and (options.spaced or after:sub(1, #MINUS) == MINUS) the
                rtext = ' − '
        end
        return before .. rtext .. after
end

local function get_composite(parms, iparm, in_unit_table)
        -- Look for a composite input unit. For example, {{convert|1|yd|2|ft|3|in
        -- would result in a call to this function with
        --   iparm = 3 (parms[iparm] = "2", just after the first unit)
        --   in_unit_table = (unit table for "yd"; contains value 1 for number of
        -- Return true, iparm, unit where
        --   iparm = index just after the composite units (7 in above example)
        --   unit = composite unit table holding all input units,
        -- or return true if no composite unit is present in parms,
        -- or return false, t where t is an error message table.
        local default, subinfo
        local composite_units, count = { in_unit_table }, 1
        local fixups = {}
        local total = in_unit_table.valinfo[1].value
        local subunit = in_unit_table
        while subunit.subdivs do  -- subdivs is nil or a table of allowed subdivi
                local subcode = strip(parms[iparm+1])
                local subdiv = subunit.subdivs[subcode] or subunit.subdivs[(all_u
                if not subdiv then
                        break
                end
                local success
                success, subunit = lookup(parms, subcode, 'no_combination')
                if not success then return false, subunit end  -- should never oc
                success, subinfo = extract_number(parms, parms[iparm])
                if not success then return false, subinfo end
                iparm = iparm + 2
                subunit.inout = 'in'
                subunit.valinfo = { subinfo }
                -- Recalculate total as a number of subdivisions.
                -- subdiv[1] = number of subdivisions per previous unit (integer
                total = total * subdiv[1] + subinfo.value
                if not default then  -- set by the first subdiv with a default de
                        default = subdiv.default
                end
                count = count + 1
                composite_units[count] = subunit
                if subdiv.unit or subdiv.name then
                        fixups[count] = { unit = subdiv.unit, name = subdiv.name,
                end
        end
        if count == 1 then
                return true  -- no error and no composite unit
        end
        for i, fixup in pairs(fixups) do
                local unit = fixup.unit
```

```
                local name = fixup.name
                if not unit or (count > 2 and name) then
                        composite_units[i].fixed_name = name
                else
                        local success, alternate = lookup(parms, unit, 'no_combir
                        if not success then return false, alternate end  -- shoul
                        alternate.inout = 'in'
                        alternate.valinfo = fixup.valinfo
                        composite_units[i] = alternate
                end
        end
        return true, iparm, {
                utype = in_unit_table.utype,
                scale = subunit.scale,  -- scale of last (least significant) unit
                valinfo = { { value = total, clean = subinfo.clean, denominator =
                composite = composite_units,
                default = default or in_unit_table.default
        }
end

local function translate_parms(parms, kv_pairs)
        -- Update fields in parms by translating each key:value in kv_pairs to te
        -- used by this module (may involve translating from local language to En
        -- Also, checks are performed which may display warnings, if enabled.
        -- Return true if successful or return false, t where t is an error messa
        currency_text = nil  -- local testing can hold module in memory; must cle
        if kv_pairs.adj and kv_pairs.sing then
                -- For enwiki (before translation), warn if attempt to use adj an
                -- as the latter is a deprecated alias for the former.
                if kv_pairs.adj ~= kv_pairs.sing and kv_pairs.sing ~= '' then
                        add_warning(parms, 1, 'cvt_unknown_option', 'sing=' .. kv
                end
                kv_pairs.sing = nil
        end
        kv_pairs.comma = kv_pairs.comma or config.comma  -- for plwiki who want c
        for loc_name, loc_value in pairs(kv_pairs) do
                local en_name = text_code.en_option_name[loc_name]
                if en_name then
                        local en_value = text_code.en_option_value[en_name]
                        if en_value == 'INTEGER' then  -- altitude_ft, altitude_m
                                en_value = nil
                                if loc_value == '' then
                                        add_warning(parms, 2, 'cvt_empty_option',
                                else
                                        local minimum
                                        local number, is_integer = get_number(loc
                                        if en_name == 'sigfig' then
                                                minimum = 1
                                        elseif en_name == 'frac' then
                                                minimum = 2
                                                if number and number < 0 then
                                                        parms.opt_fraction_horizo
                                                        number = -number
                                                end
                                        else
                                                minimum = -1e6
                                        end
                                        if number and is_integer and number >= mi
                                                en_value = number
                                        else
                                                local m
                                                if en_name == 'frac' then
                                                        m = 'cvt_bad_frac'
                                                elseif en_name == 'sigfig' then
```

```
                                                m = 'cvt_bad_sigfig'
                                        else
                                                m = 'cvt_bad_altitude'
                                        end
                                        add_warning(parms, 1, m, loc_name
                                end
                        end
                elseif en_value == 'TEXT' then  -- $, input, qid, qual, s
                        en_value = loc_value ~= '' and loc_value or nil
                        if not en_value and (en_name == '$' or en_name ==
                                add_warning(parms, 2, 'cvt_empty_option',
                        elseif en_name == '$' then
                                -- Value should be a single character lik
                                currency_text = (loc_value == 'euro') and
                        elseif en_name == 'input' then
                                -- May have something like {{convert|inpu
                                -- with optional fields. In that case, wa
                                parms.input_text = loc_value  -- keep inp
                        end
                else
                        en_value = en_value[loc_value]
                        if en_value and en_value:sub(-1) == '?' then
                                en_value = en_value:sub(1, -2)
                                add_warning(parms, -1, 'cvt_deprecated',
                        end
                        if en_value == nil then
                                if loc_value == '' then
                                        add_warning(parms, 2, 'cvt_empty_
                                else
                                        add_warning(parms, 1, 'cvt_unknow
                                end
                        elseif en_value == '' then
                                en_value = nil  -- an ignored option like
                        elseif type(en_value) == 'string' and en_value:su
                                for _, v in ipairs(split(en_value, ',')) 
                                        local lhs, rhs = v:match('^(.-)=(
                                        if rhs then
                                                parms[lhs] = tonumber(rhs
                                        else
                                                parms[v] = true
                                        end
                                end
                                en_value = nil
                        end
                end
                parms[en_name] = en_value
        else
                add_warning(parms, 1, 'cvt_unknown_option', loc_name .. '
        end
end
local abbr_entered = parms.abbr
local cfg_abbr = config.abbr
if cfg_abbr then
        -- Don't warn if invalid because every convert would show that wa
        if cfg_abbr == 'on always' then
                parms.abbr = 'on'
        elseif cfg_abbr == 'off always' then
                parms.abbr = 'off'
        elseif parms.abbr == nil then
                if cfg_abbr == 'on default' then
                        parms.abbr = 'on'
                elseif cfg_abbr == 'off default' then
                        parms.abbr = 'off'
                end
```

```
		end
	end
	if parms.abbr then
		if parms.abbr == 'unit' then
			parms.abbr = 'on'
			parms.number_word = true
		end
		parms.abbr_org = parms.abbr  -- original abbr, before any flip
	elseif parms.opt_hand_hh then
		parms.abbr_org = 'on'
		parms.abbr = 'on'
	else
		parms.abbr = 'out'  -- default is to abbreviate output only (use
	end
	if parms.opt_order_out then
		-- Disable options that do not work in a useful way with order=ou
		parms.opt_flip = nil  -- override adj=flip
		parms.opt_spell_in = nil
		parms.opt_spell_out = nil
		parms.opt_spell_upper = nil
	end
	if parms.opt_spell_out and not abbr_entered then
		parms.abbr = 'off'  -- should show unit name when spelling the ou
	end
	if parms.opt_flip then
		local function swap_in_out(option)
			local value = parms[option]
			if value == 'in' then
				parms[option] = 'out'
			elseif value == 'out' then
				parms[option] = 'in'
			end
		end
		swap_in_out('abbr')
		swap_in_out('lk')
		if parms.opt_spell_in and not parms.opt_spell_out then
			-- For simplicity, and because it does not appear to be r
			-- user cannot set an option to spell the output only.
			parms.opt_spell_in = nil
			parms.opt_spell_out = true
		end
	end
	if parms.opt_spell_upper then
		parms.spell_upper = parms.opt_flip and 'out' or 'in'
	end
	if parms.opt_table or parms.opt_tablecen then
		if abbr_entered == nil and parms.lk == nil then
			parms.opt_values = true
		end
		parms.table_align = parms.opt_table and 'right' or 'center'
	end
	if parms.table_align or parms.opt_sortable_on then
		parms.need_table_or_sort = true
	end
	local disp_joins = text_code.disp_joins
	local default_joins = disp_joins['b']
	parms.join_between = default_joins[3] or '; '
	local disp = parms.disp
	if disp == nil then  -- special case for the most common setting
		parms.joins = default_joins
	elseif disp == 'x' then
		-- Later, parms.joins is set from the input parameters.
	else
		-- Old template does this.
```

```
                local abbr = parms.abbr
                if disp == 'slash' then
                        if abbr_entered == nil then
                                disp = 'slash-nbsp'
                        elseif abbr == 'in' or abbr == 'out' then
                                disp = 'slash-sp'
                        else
                                disp = 'slash-nosp'
                        end
                elseif disp == 'sqbr' then
                        if abbr == 'on' then
                                disp = 'sqbr-nbsp'
                        else
                                disp = 'sqbr-sp'
                        end
                end
                parms.joins = disp_joins[disp] or default_joins
                parms.join_between = parms.joins[3] or parms.join_between
                parms.wantname = parms.joins.wantname
        end
        if (en_default and not parms.opt_lang_local and (parms[1] or ''):find('%d
                from_en_table = nil
        end
        if en_default and from_en_table then
                -- For hiwiki: localized symbol/name is defined with the US symbo
                -- and is used if output uses localized numbers.
                parms.opt_sp_us = true
        end
        return true
end

local function get_values(parms)
        -- If successful, update parms and return true, v, i where
        --   v = table of input values
        --   i = index to next entry in parms after those processed here
        -- or return false, t where t is an error message table.
        local valinfo = collection()  -- numbered table of input values
        local range = collection()  -- numbered table of range items (having, for
        local had_nocomma  -- true if removed "nocomma" kludge from second parame
        local parm2 = strip(parms[2])
        if parm2 and parm2:sub(-7, -1) == 'nocomma' then
                parms[2] = strip(parm2:sub(1, -8))
                parms.opt_nocomma = true
                had_nocomma = true
        end
        local function extractor(i)
                -- If the parameter is not a value, try unpacking it as a range (
                -- However, "-1-2/3" is a negative fraction (-1⅔), so it must be
                -- Do not unpack a parameter if it is like "3-1/2" which is somet
                -- used instead of "3+1/2" (and which should not be interpreted a
                -- Unpacked items are inserted into the parms table.
                -- The tail recursion allows combinations like "1x2 to 3x4".
                local valstr = strip(parms[i])  -- trim so any '-' as a negative
                local success, result = extract_number(parms, valstr, i > 1)
                if not success and valstr and i < 20 then  -- check i to limit ab
                        local lhs, sep, rhs = valstr:match('^(%S+)%s+(%S+)%s+(%S
                        if lhs and not (sep == '-' and rhs:match('/')) then
                                if sep:find('%d') then
                                        return success, result  -- to reject {{cc
                                end
                                parms[i] = rhs
                                table.insert(parms, i, sep)
                                table.insert(parms, i, lhs)
                                return extractor(i)
```

```
                        end
                        if not valstr:match('%-.*/') then
                                for _, sep in ipairs(text_code.ranges.words) do
                                        local start, stop = valstr:find(sep, 2, t
                                        if start then
                                                parms[i] = valstr:sub(stop + 1)
                                                table.insert(parms, i, sep)
                                                table.insert(parms, i, valstr:sub
                                                return extractor(i)
                                        end
                                end
                        end
                end
                return success, result
        end
        local i = 1
        local is_change
        while true do
                local success, info = extractor(i)  -- need to set parms.opt_nocc
                if not success then return false, info end
                i = i + 1
                if is_change then
                        info.is_change = true  -- value is after "±" and so is a
                        is_change = nil
                end
                valinfo:add(info)
                local range_item = get_range(strip(parms[i]))
                if not range_item then
                        break
                end
                i = i + 1
                range:add(range_item)
                if type(range_item) == 'table' then
                        -- For range "x", if append unit to some values, append i
                        parms.in_range_x = parms.in_range_x or range_item.in_rang
                        parms.out_range_x = parms.out_range_x or range_item.out_r
                        parms.abbr_range_x = parms.abbr_range_x or range_item.abb
                        is_change = range_item.is_range_change
                end
        end
        if range.n > 0 then
                if range.n > 30 then  -- limit abuse, although 4 is a more likely
                        return false, { 'cvt_invalid_num' }  -- misleading messag
                end
                parms.range = range
        elseif had_nocomma then
                return false, { 'cvt_unknown', parm2 }
        end
        return true, valinfo, i
end

local function simple_get_values(parms)
        -- If input is like "{{convert|valid_value|valid_unit|...}}",
        -- return true, i, in_unit, in_unit_table
        -- i = index in parms of what follows valid_unit, if anything.
        -- The valid_value is not negative and does not use a fraction, and
        -- no options requiring further processing of the input are used.
        -- Otherwise, return nothing or return false, parm1 for caller to interpr
        -- Testing shows this function is successful for 96% of converts in artic
        -- and that on average it speeds up converts by 8%.
        local clean = to_en(strip(parms[1] or ''), parms)
        if parms.opt_ri or parms.opt_spell_in or #clean > 10 or not clean:match('
                return false, clean
        end
```

```
        local value = tonumber(clean)
        if not value then return end
        local info = {
                value = value,
                altvalue = value,
                singular = (value == 1),
                clean = clean,
                show = with_separator(parms, clean),
        }
        local in_unit = strip(parms[2])
        local success, in_unit_table = lookup(parms, in_unit, 'no_combination')
        if not success then return end
        in_unit_table.valinfo = { info }
        return true, 3, in_unit, in_unit_table
end

local function wikidata_call(parms, operation, ...)
        -- Return true, s where s is the result of a Wikidata operation,
        -- or return false, t where t is an error message table.
        local function worker(...)
                wikidata_code = wikidata_code or require(wikidata_module)
                wikidata_data = wikidata_data or mw.loadData(wikidata_data_module
                return wikidata_code[operation](wikidata_data, ...)
        end
        local success, status, result = pcall(worker, ...)
        if success then
                return status, result
        end
        if parms.opt_sortable_debug then
                -- Use debug=yes to crash if an error while accessing Wikidata.
                error('Error accessing Wikidata: ' .. status, 0)
        end
        return false, { 'cvt_wd_fail' }
end

local function get_parms(parms, args)
        -- If successful, update parms and return true, unit where
        --   parms is a table of all arguments passed to the template
        --        converted to named arguments, and
        --   unit is the input unit table;
        -- or return false, t where t is an error message table.
        -- For special processing (not a convert), can also return
        -- true, wikitext where wikitext is the final result.
        -- The returned input unit table may be for a fake unit using the specifi
        -- unit code as the symbol and name, and with bad_mcode = message code ta
        -- MediaWiki removes leading and trailing whitespace from the values of
        -- named arguments. However, the values of numbered arguments include any
        -- whitespace entered in the template, and whitespace is used by some
        -- parameters (example: the numbered parameters associated with "disp=x"}
        local kv_pairs = {}  -- table of input key:value pairs where key is a nam
        for k, v in pairs(args) do
                if type(k) == 'number' or k == 'test' then  -- parameter "test" i
                        parms[k] = v
                else
                        kv_pairs[k] = v
                end
        end
        if parms.test == 'wikidata' then
                local ulookup = function (ucode)
                        -- Use empty table for parms so it does not accumulate re
                        return lookup({}, ucode, 'no_combination')
                end
                return wikidata_call(parms, '_listunits', ulookup)
        end
```

```
	local success, msg = translate_parms(parms, kv_pairs)
	if not success then return false, msg end
	if parms.input then
		success, msg = wikidata_call(parms, '_adjustparameters', parms, 1
		if not success then return false, msg end
	end
	local success, i, in_unit, in_unit_table = simple_get_values(parms)
	if not success then
		if type(i) == 'string' and i:match('^NNN+$') then
			-- Some infoboxes have examples like {{convert|NNN|m}} (3
			-- Output an empty string for these.
			return false, { 'cvt_no_output' }
		end
		local valinfo
		success, valinfo, i = get_values(parms)
		if not success then return false, valinfo end
		in_unit = strip(parms[i])
		i = i + 1
		success, in_unit_table = lookup(parms, in_unit, 'no_combination')
		if not success then
			in_unit = in_unit or ''
			if parms.opt_ignore_error then  -- display given unit cod
				in_unit_table = ''  -- suppress error message and
			end
			in_unit_table = setmetatable({
				symbol = in_unit, name2 = in_unit, utype = in_uni
				scale = 1, default = '', defkey = '', linkey = ''
				bad_mcode = in_unit_table }, unit_mt)
		end
		in_unit_table.valinfo = valinfo
	end
	if parms.test == 'msg' then
		-- Am testing the messages produced when no output unit is specif
		-- the input unit has a missing or invalid default.
		-- Set two units for testing that.
		-- LATER: Remove this code.
		if in_unit == 'chain' then
			in_unit_table.default = nil  -- no default
		elseif in_unit == 'rd' then
			in_unit_table.default  = "ft!X!m"  -- an invalid expressi
		end
	end
	in_unit_table.inout = 'in'  -- this is an input unit
	if not parms.range then
		local success, inext, composite_unit = get_composite(parms, i, in
		if not success then return false, inext end
		if composite_unit then
			in_unit_table = composite_unit
			i = inext
		end
	end
	if in_unit_table.builtin == 'mach' then
		-- As with old template, a number following Mach as the input uni
		-- That is deprecated: should use altitude_ft=NUMBER or altitude_
		local success, info
		success = tonumber(parms[i])  -- this will often work and will gi
		if success then
			info = { value = success }
		else
			success, info = extract_number(parms, parms[i], false, tr
		end
		if success then
			i = i + 1
			in_unit_table.altitude = info.value
```

```
		end
	end
	local word = strip(parms[i])
	i = i + 1
	local precision, is_bad_precision
	local function set_precision(text)
		local number, is_integer = get_number(text)
		if number then
			if is_integer then
				precision = number
			else
				precision = text
				is_bad_precision = true
			end
			return true  -- text was used for precision, good or bad
		end
	end
	if word and not set_precision(word) then
		parms.out_unit = parms.out_unit or word
		if set_precision(strip(parms[i])) then
			i = i + 1
		end
	end
	if parms.opt_adj_mid then
		word = parms[i]
		i = i + 1
		if word then  -- mid-text words
			if word:sub(1, 1) == '-' then
				parms.mid = word
			else
				parms.mid = ' ' .. word
			end
		end
	end
	if parms.opt_one_preunit then
		parms[parms.opt_flip and 'preunit2' or 'preunit1'] = preunits(1,
		i = i + 1
	end
	if parms.disp == 'x' then
		-- Following is reasonably compatible with the old template.
		local first = parms[i] or ''
		local second = parms[i+1] or ''
		i = i + 2
		if strip(first) == '' then  -- user can enter '&#32;' rather thar
			first = ' [ ' .. first
			second = ' ]' .. second
		end
		parms.joins = { first, second }
	elseif parms.opt_two_preunits then
		local p1, p2 = preunits(2, parms[i], parms[i+1])
		i = i + 2
		if parms.preunit1 then
			-- To simplify documentation, allow unlikely use of adj=p
			-- (however, an output unit must be specified with adj=pr
			parms.preunit1 = parms.preunit1 .. p1
			parms.preunit2 = p2
		else
			parms.preunit1, parms.preunit2 = p1, p2
		end
	end
	if precision == nil then
		if set_precision(strip(parms[i])) then
			i = i + 1
		end
```

```
        end
        if is_bad_precision then
                add_warning(parms, 1, 'cvt_bad_prec', precision)
        else
                parms.precision = precision
        end
        for j = i, i + 3 do
                local parm = parms[j]  -- warn if find a non-empty extraneous par
                if parm and parm:match('%S') then
                        add_warning(parms, 1, 'cvt_unknown_option', parm)
                        break
                end
        end
        return true, in_unit_table
end

local function record_default_precision(parms, out_current, precision)
        -- If necessary, adjust parameters and return a possibly adjusted precisi
        -- When converting a range of values where a default precision is require
        -- that default is calculated for each value because the result sometimes
        -- depends on the precise input and output values. This function may caus
        -- the entire convert process to be repeated in order to ensure that the
        -- same default precision is used for each individual convert.
        -- If that were not done, a range like 1000 to 1000.4 may give poor resul
        -- because the first output could be heavily rounded, while the second is
        -- For range 1000.4 to 1000, this function can give the second convert th
        -- same default precision that was used for the first.
        if not parms.opt_round_each then
                local maxdef = out_current.max_default_precision
                if maxdef then
                        if maxdef < precision then
                                parms.do_convert_again = true
                                out_current.max_default_precision = precision
                        else
                                precision = out_current.max_default_precision
                        end
                else
                        out_current.max_default_precision = precision
                end
        end
        return precision
end

local function default_precision(parms, invalue, inclean, denominator, outvalue,
        -- Return a default value for precision (an integer like 2, 0, -2).
        -- If denominator is not nil, it is the value of the denominator in incle
        -- Code follows procedures used in old template.
        local fudge = 1e-14  -- {{Order of magnitude}} adds this, so we do too
        local prec, minprec, adjust
        local subunit_ignore_trailing_zero
        local subunit_more_precision  -- kludge for "in" used in input like "|2|f
        local composite = in_current.composite
        if composite then
                subunit_ignore_trailing_zero = true  -- input "|2|st|10|lb" has p
                if composite[#composite].exception == 'subunit_more_precision' th
                        subunit_more_precision = true  -- do not use standard pre
                end
        end
        if denominator and denominator > 0 then
                prec = math.max(log10(denominator), 1)
        else
                -- Count digits after decimal mark, handling cases like '12.345e6
                local exponent
                local integer, dot, decimals, expstr = inclean:match('^(%d*)(%.?)
```

```
                local e = expstr:sub(1, 1)
                if e == 'e' or e == 'E' then
                        exponent = tonumber(expstr:sub(2))
                end
                if dot == '' then
                        prec = subunit_ignore_trailing_zero and 0 or -integer:mat
                else
                        prec = #decimals
                end
                if exponent then
                        -- So '1230' and '1.23e3' both give prec = -1, and '0.001
                        prec = prec - exponent
                end
        end
        if in_current.istemperature and out_current.istemperature then
                -- Converting between common temperatures (°C, °F, °R, K); not ke
                -- Kelvin value can be almost zero, or small but negative due to
                -- Also, an input value like -300 C (below absolute zero) gives r
                -- Calculate minimum precision from absolute value.
                adjust = 0
                local kelvin = abs((invalue - in_current.offset) * in_current.sca
                if kelvin < 1e-8 then  -- assume nonzero due to input or calculat
                        minprec = 2
                else
                        minprec = 2 - floor(log10(kelvin) + fudge)  -- 3 sigfigs
                end
        else
                if invalue == 0 or outvalue <= 0 then
                        -- We are never called with a negative outvalue, but it m
                        -- This is special-cased to avoid calculation exceptions
                        return record_default_precision(parms, out_current, 0)
                end
                if out_current.exception == 'integer_more_precision' and floor(in
                        -- With certain output units that sometimes give poor res
                        -- with default rounding, use more precision when the inp
                        -- value is equal to an integer. An example of a poor res
                        -- is when input 50 gives a smaller output than input 49;
                        -- Experiment shows this helps, but it does not eliminate
                        -- surprises because it is not clear whether "50" should
                        -- interpreted as "from 45 to 55" or "from 49.5 to 50.5"
                        adjust = -log10(in_current.scale)
                elseif subunit_more_precision then
                        -- Conversion like "{{convert|6|ft|1|in|cm}}" (where subu
                        -- has a non-standard adjust value, to give more output p
                        adjust = log10(out_current.scale) + 2
                else
                        adjust = log10(abs(invalue / outvalue))
                end
                adjust = adjust + log10(2)
                -- Ensure that the output has at least two significant figures.
                minprec = 1 - floor(log10(outvalue) + fudge)
        end
        if extra then
                adjust = extra.adjust or adjust
                minprec = extra.minprec or minprec
        end
        return record_default_precision(parms, out_current, math.max(floor(prec +
end

local function convert(parms, invalue, info, in_current, out_current)
        -- Convert given input value from one unit to another.
        -- Return output_value (a number) if a simple convert, or
        -- return f, t where
        --   f = true, t = table of information with results, or
```

```
	--   f = false, t = error message table.
	local inscale = in_current.scale
	local outscale = out_current.scale
	if not in_current.iscomplex and not out_current.iscomplex then
		return invalue * (inscale / outscale)  -- minimize overhead for m
	end
	if in_current.invert or out_current.invert then
		-- Inverted units, such as inverse length, inverse time, or
		-- fuel efficiency. Built-in units do not have invert set.
		if (in_current.invert or 1) * (out_current.invert or 1) < 0 then
			return 1 / (invalue * inscale * outscale)
		end
		return invalue * (inscale / outscale)
	elseif in_current.offset then
		-- Temperature (there are no built-ins for this type of unit).
		if info.is_change then
			return invalue * (inscale / outscale)
		end
		return (invalue - in_current.offset) * (inscale / outscale) + out
	else
		-- Built-in unit.
		local in_builtin = in_current.builtin
		local out_builtin = out_current.builtin
		if in_builtin and out_builtin then
			if in_builtin == out_builtin then
				return invalue
			end
			-- There are no cases (yet) where need to convert from or
			-- built-in unit to another, so this should never occur.
			return false, { 'cvt_bug_convert' }
		end
		if in_builtin == 'mach' or out_builtin == 'mach' then
			-- Should check that only one altitude is given but am pl
			-- in_current.altitude (which can only occur when Mach is
			-- and out_current.altitude cannot occur.
			local alt = parms.altitude_ft or in_current.altitude
			if not alt and parms.altitude_m then
				alt = parms.altitude_m / 0.3048  -- 1 ft = 0.3048
			end
			local spd = speed_of_sound(alt)
			if in_builtin == 'mach' then
				inscale = spd
				return invalue * (inscale / outscale)
			end
			outscale = spd
			local adjust = 0.1 / inscale
			return true, {
				outvalue = invalue * (inscale / outscale),
				adjust = log10(adjust) + log10(2),
			}
		elseif in_builtin == 'hand' then
			-- 1 hand = 4 inches; 1.2 hands = 6 inches.
			-- Decimals of a hand are only defined for the first digi
			-- the first fractional digit should be a number of inche
			-- However, this code interprets the entire fractional pa
			-- of inches / 10 (so 1.75 inches would be 0.175 hands).
			-- A value like 12.3 hands is exactly 12*4 + 3 inches; ba
			local integer, fracpart = math.modf(invalue)
			local inch_value = 4 * integer + 10 * fracpart  -- equiva
			local factor = inscale / outscale
			if factor == 4 then
				-- Am converting to inches: show exact result, ar
				if parms.abbr_org == nil then
					out_current.usename = true
```

```
                                end
                                local show = format('%g', abs(inch_value))  -- sh
                                if not show:find('e', 1, true) then
                                        return true, {
                                                invalue = inch_value,
                                                outvalue = inch_value,
                                                clean = show,
                                                show = show,
                                        }
                                end
                        end
                        local outvalue = (integer + 2.5 * fracpart) * factor
                        local fracstr = info.clean:match('%.(.*)') or ''
                        local fmt
                        if fracstr == '' then
                                fmt = '%.0f'
                        else
                                fmt = '%.' .. format('%d', #fracstr - 1) .. 'f'
                        end
                        return true, {
                                invalue = inch_value,
                                clean = format(fmt, inch_value),
                                outvalue = outvalue,
                                minprec = 0,
                        }
                end
        end
        return false, { 'cvt_bug_convert' }  -- should never occur
end

local function user_style(parms, i)
        -- Return text for a user-specified style for a table cell, or '' if none
        -- given i = 1 (input style) or 2 (output style).
        local style = parms[(i == 1) and 'stylein' or 'styleout']
        if style then
                style = style:gsub('"', '')
                if style ~= '' then
                        if style:sub(-1) ~= ';' then
                                style = style .. ';'
                        end
                        return style
                end
        end
        return ''
end

local function make_table_or_sort(parms, invalue, info, in_current, scaled_top)
        -- Set options to handle output for a table or a sort key, or both.
        -- The text sort key is based on the value resulting from converting
        -- the input to a fake base unit with scale = 1, and other properties
        -- required for a conversion derived from the input unit.
        -- For other modules, return the sort key in a hidden span element, and
        -- the scaled value used to generate the sort key.
        -- If scaled_top is set, it is the scaled value of the numerator of a per
        -- to be combined with this unit (the denominator) to make the sort key.
        -- Scaling only works with units that convert with a factor (not temperat
        local sortkey, scaled_value
        if parms.opt_sortable_on then
                local base = {  -- a fake unit with enough fields for a valid cor
                        scale = 1,
                        invert = in_current.invert and 1,
                        iscomplex = in_current.iscomplex,
                        offset = in_current.offset and 0,
                }
```

```
                local outvalue, extra = convert(parms, invalue, info, in_current,
                if extra then
                        outvalue = extra.outvalue
                end
                if in_current.istemperature then
                        -- Have converted to kelvin; assume numbers close to zero
                        -- rounding error and should be zero.
                        if abs(outvalue) < 1e-12 then
                                outvalue = 0
                        end
                end
                if scaled_top and outvalue ~= 0 then
                        outvalue = scaled_top / outvalue
                end
                scaled_value = outvalue
                if not valid_number(outvalue) then
                        if outvalue < 0 then
                                sortkey = '1000000000000000000'
                        else
                                sortkey = '9000000000000000000'
                        end
                elseif outvalue == 0 then
                        sortkey = '5000000000000000000'
                else
                        local mag = floor(log10(abs(outvalue)) + 1e-14)
                        local prefix
                        if outvalue > 0 then
                                prefix = 7000 + mag
                        else
                                prefix = 2999 - mag
                                outvalue = outvalue + 10^(mag+1)
                        end
                        sortkey = format('%d', prefix) .. format('%015.0f', floo
                end
        end
        local sortspan
        if sortkey and not parms.table_align then
                sortspan = parms.opt_sortable_debug and
                        '<span data-sort-value="' .. sortkey .. '♠"><span style='
                        '<span data-sort-value="' .. sortkey .. '♠"></span>'
                parms.join_before = sortspan
        end
        if parms.table_align then
                local sort
                if sortkey then
                        sort = ' data-sort-value="' .. sortkey .. '"'
                        if parms.opt_sortable_debug then
                                parms.join_before = '<span style="border:1px soli
                        end
                else
                        sort = ''
                end
                local style = 'style="text-align:' .. parms.table_align .. ';'
                local joins = {}
                for i = 1, 2 do
                        joins[i] = (i == 1 and '' or '\n|') .. style .. user_styl
                end
                parms.table_joins = joins
        end
        return sortspan, scaled_value
end

local cvt_to_hand
```

```
local function cvtround(parms, info, in_current, out_current)
        -- Return true, t where t is a table with the conversion results; fields:
        --   show = rounded, formatted string with the result of converting value
        --      using the rounding specified in parms.
        --   singular = true if result (after rounding and ignoring any negative
        --      is "1", or like "1.00", or is a fraction with value < 1;
        --   (and more fields shown below, and a calculated 'absvalue' field).
        -- or return false, t where t is an error message table.
        -- Input info.clean uses en digits (it has been translated, if necessary)
        -- Output show uses en or non-en digits as appropriate, or can be spelled
        if out_current.builtin == 'hand' then
                return cvt_to_hand(parms, info, in_current, out_current)
        end
        local invalue = in_current.builtin == 'hand' and info.altvalue or info.va
        local outvalue, extra = convert(parms, invalue, info, in_current, out_cur
        if parms.need_table_or_sort then
                parms.need_table_or_sort = nil  -- process using first input valu
                make_table_or_sort(parms, invalue, info, in_current)
        end
        if extra then
                if not outvalue then return false, extra end
                invalue = extra.invalue or invalue
                outvalue = extra.outvalue
        end
        if not valid_number(outvalue) then
                return false, { 'cvt_invalid_num' }
        end
        local isnegative
        if outvalue < 0 then
                isnegative = true
                outvalue = -outvalue
        end
        local precision, show, exponent
        local denominator = out_current.frac
        if denominator then
                show = fraction_table(outvalue, denominator)
        else
                precision = parms.precision
                if not precision then
                        if parms.sigfig then
                                show, exponent = make_sigfig(outvalue, parms.sigf
                        elseif parms.opt_round then
                                local n = parms.opt_round
                                if n == 0.5 then
                                        local integer, fracpart = math.modf(floo
                                        if fracpart == 0 then
                                                show = format('%.0f', integer)
                                        else
                                                show = format('%.1f', integer + f
                                        end
                                else
                                        show = format('%.0f', floor((outvalue / n
                                end
                        elseif in_current.builtin == 'mach' then
                                local sigfig = info.clean:gsub('^[0.]+', ''):gsub
                                show, exponent = make_sigfig(outvalue, sigfig)
                        else
                                local inclean = info.clean
                                if extra then
                                        inclean = extra.clean or inclean
                                        show = extra.show
                                end
                                if not show then
                                        precision = default_precision(parms, inva
```

```
                                end
                        end
                end
        end
        if precision then
                if precision >= 0 then
                        local fudge
                        if precision <= 8 then
                                -- Add a fudge to handle common cases of bad roun
                                -- to precisely represent some values. This makes
                                -- {{convert|-100.1|C|K}} and {{convert|5555000|u
                                -- Old template uses #expr round, which invokes P
                                -- LATER: Investigate how PHP round() works.
                                fudge = 2e-14
                        else
                                fudge = 0
                        end
                        local fmt = '%.' .. format('%d', precision) .. 'f'
                        local success
                        success, show = pcall(format, fmt, outvalue + fudge)
                        if not success then
                                return false, { 'cvt_big_prec', tostring(precisio
                        end
                else
                        precision = -precision  -- #digits to zero (in addition t
                        local shift = 10 ^ precision
                        show = format('%.0f', outvalue/shift)
                        if show ~= '0' then
                                exponent = #show + precision
                        end
                end
        end
        local t = format_number(parms, show, exponent, isnegative)
        if type(show) == 'string' then
                -- Set singular using match because on some systems 0.99999999999
                if exponent then
                        t.singular = (exponent == 1 and show:match('^10*$'))
                else
                        t.singular = (show == '1' or show:match('^1%.0*$'))
                end
        else
                t.fraction_table = show
                t.singular = (outvalue <= 1)  -- cannot have 'fraction == 1', but
        end
        t.raw_absvalue = outvalue  -- absolute value before rounding
        return true, setmetatable(t, {
                __index = function (self, key)
                        if key == 'absvalue' then
                                -- Calculate absolute value after rounding, if ne
                                local clean, exponent = rawget(self, 'clean'), ra
                                local value = tonumber(clean)  -- absolute value
                                if exponent then
                                        value = value * 10^exponent
                                end
                                rawset(self, key, value)
                                return value
                        end
                end })
end

function cvt_to_hand(parms, info, in_current, out_current)
        -- Convert input to hands, inches.
        -- Return true, t where t is a table with the conversion results;
        -- or return false, t where t is an error message table.
```

```
	if parms.abbr_org == nil then
		out_current.usename = true  -- default is to show name not symbol
	end
	local precision = parms.precision
	local frac = out_current.frac
	if not frac and precision and precision > 1 then
		frac = (precision == 2) and 2 or 4
	end
	local out_next = out_current.out_next
	if out_next then
		-- Use magic knowledge to determine whether the next unit is inch
		-- The following ensures that when the output combination "hand i
		-- value is rounded to match the hands value. Also, displaying sa
		-- is better as 61.5 implies the value is not 61.4.
		if out_next.exception == 'subunit_more_precision' then
			out_next.frac = frac
		end
	end
	-- Convert to inches; calculate hands from that.
	local dummy_unit_table = { scale = out_current.scale / 4, frac = frac }
	local success, outinfo = cvtround(parms, info, in_current, dummy_unit_tab
	if not success then return false, outinfo end
	local tfrac = outinfo.fraction_table
	local inches = outinfo.raw_absvalue
	if tfrac then
		inches = floor(inches)  -- integer part only; fraction added late
	else
		inches = floor(inches + 0.5)  -- a hands measurement never shows
	end
	local hands, inches = divide(inches, 4)
	outinfo.absvalue = hands + inches/4  -- supposed to be the absolute round
	local inchstr = tostring(inches)  -- '0', '1', '2' or '3'
	if precision and precision <= 0 then  -- using negative or 0 for precisio
		hands = floor(outinfo.raw_absvalue/4 + 0.5)
		inchstr = ''
	elseif tfrac then
		-- Always show an integer before fraction (like "15.0½") because
		inchstr = numdot .. format_fraction(parms, 'out', false, inchstr,
	else
		inchstr = numdot .. from_en(inchstr)
	end
	outinfo.show = outinfo.sign .. with_separator(parms, format('%.0f', hands
	return true, outinfo
end

local function evaluate_condition(value, condition)
	-- Return true or false from applying a conditional expression to value,
	-- or throw an error if invalid.
	-- A very limited set of expressions is supported:
	--    v < 9
	--    v * 9 < 9
	-- where
	--    'v' is replaced with value
	--    9 is any number (as defined by Lua tonumber)
	--      only en digits are accepted
	--    '<' can also be '<=' or '>' or '>='
	-- In addition, the following form is supported:
	--    LHS and RHS
	-- where
	--    LHS, RHS = any of above expressions.
	local function compare(value, text)
		local arithop, factor, compop, limit = text:match('^%s*v%s*([*]?)
		if arithop == nil then
			error('Invalid default expression', 0)
```

```
                elseif arithop == '*' then
                        factor = tonumber(factor)
                        if factor == nil then
                                error('Invalid default expression', 0)
                        end
                        value = value * factor
                end
                limit = tonumber(limit)
                if limit == nil then
                        error('Invalid default expression', 0)
                end
                if compop == '<' then
                        return value < limit
                elseif compop == '<=' then
                        return value <= limit
                elseif compop == '>' then
                        return value > limit
                elseif compop == '>=' then
                        return value >= limit
                end
                error('Invalid default expression', 0)  -- should not occur
        end
        local lhs, rhs = condition:match('^(.-%W)and(%W.*)')
        if lhs == nil then
                return compare(value, condition)
        end
        return compare(value, lhs) and compare(value, rhs)
end

local function get_default(value, unit_table)
        -- Return true, s where s = name of unit's default output unit,
        -- or return false, t where t is an error message table.
        -- Some units have a default that depends on the input value
        -- (the first value if a range of values is used).
        -- If '!' is in the default, the first bang-delimited field is an
        -- expression that uses 'v' to represent the input value.
        -- Example: 'v < 120 ! small ! big ! suffix' (suffix is optional)
        -- evaluates 'v < 120' as a boolean with result
        -- 'smallsuffix' if (value < 120), or 'bigsuffix' otherwise.
        -- Input must use en digits and '.' decimal mark.
        local default = data_code.default_exceptions[unit_table.defkey or unit_ta
        if not default then
                local per = unit_table.per
                if per then
                        local function a_default(v, u)
                                local success, ucode = get_default(v, u)
                                if not success then
                                        return '?'  -- an unlikely error has occu
                                end
                                -- Attempt to use only the first unit if a combi
                                -- This is not bulletproof but should work for mo
                                -- Where it does not work, the convert will need
                                local t = all_units[ucode]
                                if t then
                                        local combo = t.combination
                                        if combo then
                                                -- For a multiple like ftin, the
                                                local i = t.multiple and table_le
                                                ucode = combo[i]
                                        end
                                else
                                        -- Try for an automatically generated com
                                        local item = ucode:match('^(.-)%+') or uc
                                        if all_units[item] then
```

```
                                                return item
                                        end
                                end
                                end
                                return ucode
                        end
                        local unit1, unit2 = per[1], per[2]
                        local def1 = (unit1 and a_default(value, unit1) or unit_t
                        local def2 = a_default(1, unit2)  -- 1 because per unit d
                        return true, def1 .. '/' .. def2
                end
                return false, { 'cvt_no_default', unit_table.symbol }
        end
        if default:find('!', 1, true) == nil then
                return true, default
        end
        local t = split(default, '!')
        if #t == 3 or #t == 4 then
                local success, result = pcall(evaluate_condition, value, t[1])
                if success then
                        default = result and t[2] or t[3]
                        if #t == 4 then
                                default = default .. t[4]
                        end
                        return true, default
                end
        end
        return false, { 'cvt_bad_default', unit_table.symbol }
end

local linked_pages  -- to record linked pages so will not link to the same page m

local function unlink(unit_table)
        -- Forget that the given unit has previously been linked (if it has).
        -- That is needed when processing a range of inputs or outputs when an id
        -- for the first range value may have been evaluated, but only an id for
        -- the last value is displayed, and that id may need to be linked.
        linked_pages[unit_table.unitcode or unit_table] = nil
end

local function make_link(link, id, unit_table)
        -- Return wikilink "[[link|id]]", possibly abbreviated as in examples:
        --   [[Mile|mile]]  --> [[mile]]
        --   [[Mile|miles]] --> [[mile]]s
        -- However, just id is returned if:
        -- * no link given (so caller does not need to check if a link was define
        -- * link has previously been used during the current convert (to avoid d
        local link_key
        if unit_table then
                link_key = unit_table.unitcode or unit_table
        else
                link_key = link
        end
        if not link or link == '' or linked_pages[link_key] then
                return id
        end
        linked_pages[link_key] = true
        -- Following only works for language en, but it should be safe on other w
        -- and overhead of doing it generally does not seem worthwhile.
        local l = link:sub(1, 1):lower() .. link:sub(2)
        if link == id or l == id then
                return '[[' .. id .. ']]'
        elseif link .. 's' == id or l .. 's' == id then
                return '[[' .. id:sub(1, -2) .. ']]s'
        else
```

```
                return '[[' .. link .. '|' .. id .. ']]'
        end
end

local function variable_name(clean, unit_table)
        -- For slwiki, a unit name depends on the value.
        -- Parameter clean is the unsigned rounded value in en digits, as a strin
        -- Value             Source    Example for "m"
        -- integer 1:        name1     meter  (also is the name of the unit)
        -- integer 2:        var{1}    metra
        -- integer 3 and 4:  var{2}    metri
        -- integer else:     var{3}    metrov (0 and 5 or more)
        -- real/fraction:    var{4}    metra
        -- var{i} means the i'th field in unit_table.varname if it exists and has
        -- an i'th field, otherwise name2.
        -- Fields are separated with "!" and are not empty.
        -- A field for a unit using an SI prefix has the prefix name inserted,
        -- replacing '#' if found, or before the field otherwise.
        local vname
        if clean == '1' then
                vname = unit_table.name1
        elseif unit_table.varname then
                local i
                if clean == '2' then
                        i = 1
                elseif clean == '3' or clean == '4' then
                        i = 2
                elseif clean:find('.', 1, true) then
                        i = 4
                else
                        i = 3
                end
                if i > 1 and varname == 'pl' then
                        i = i - 1
                end
                vname = split(unit_table.varname, '!')[i]
        end
        if vname then
                local si_name = rawget(unit_table, 'si_name') or ''
                local pos = vname:find('#', 1, true)
                if pos then
                        vname = vname:sub(1, pos - 1) .. si_name .. vname:sub(pos
                else
                        vname = si_name .. vname
                end
                return vname
        end
        return unit_table.name2
end

local function linked_id(parms, unit_table, key_id, want_link, clean)
        -- Return final unit id (symbol or name), optionally with a wikilink,
        -- and update unit_table.sep if required.
        -- key_id is one of: 'symbol', 'sym_us', 'name1', 'name1_us', 'name2', 'n
        local abbr_on = (key_id == 'symbol' or key_id == 'sym_us')
        if abbr_on and want_link then
                local symlink = rawget(unit_table, 'symlink')
                if symlink then
                        return symlink  -- for exceptions that have the linked sy
                end
        end
        local multiplier = rawget(unit_table, 'multiplier')
        local per = unit_table.per
        if per then
```

```
		local paren1, paren2 = '', ''  -- possible parentheses around bot
		local unit1 = per[1]  -- top unit_table, or nil
		local unit2 = per[2]  -- bottom unit_table
		if abbr_on then
			if not unit1 then
				unit_table.sep = ''  -- no separator in "$2/acre"
			end
			if not want_link then
				local symbol = unit_table.symbol_raw
				if symbol then
					return symbol  -- for exceptions that hav
				end
			end
			if (unit2.symbol):find('·', 1, true) then
				paren1, paren2 = '(', ')'
			end
		end
		local key_id2  -- unit2 is always singular
		if key_id == 'name2' then
			key_id2 = 'name1'
		elseif key_id == 'name2_us' then
			key_id2 = 'name1_us'
		else
			key_id2 = key_id
		end
		local result
		if abbr_on then
			result = '/'
		elseif omitsep then
			result = per_word
		elseif unit1 then
			result = ' ' .. per_word .. ' '
		else
			result = per_word .. ' '
		end
		if want_link and unit_table.link then
			if abbr_on or not varname then
				result = (unit1 and linked_id(parms, unit1, key_i
			else
				result = (unit1 and variable_name(clean, unit1) o
			end
			if omit_separator(result) then
				unit_table.sep = ''
			end
			return make_link(unit_table.link, result, unit_table)
		end
		if unit1 then
			result = linked_id(parms, unit1, key_id, want_link, clear
			if unit1.sep then
				unit_table.sep = unit1.sep
			end
		elseif omitsep then
			unit_table.sep = ''
		end
		return result .. paren1 .. linked_id(parms, unit2, key_id2, want_
	end
	if multiplier then
		-- A multiplier (like "100" in "100km") forces the unit to be plu
		multiplier = from_en(multiplier)
		if not omitsep then
			multiplier = multiplier .. (abbr_on and ' ' or ' ')
		end
		if not abbr_on then
			if key_id == 'name1' then
```

```
                                key_id = 'name2'
                        elseif key_id == 'name1_us' then
                                key_id = 'name2_us'
                        end
                end
        else
                multiplier = ''
        end
        local id = unit_table.fixed_name or ((varname and not abbr_on) and variab
        if omit_separator(id) then
                unit_table.sep = ''
        end
        if want_link then
                local link = data_code.link_exceptions[unit_table.linkey or unit_
                if link then
                        local before = ''
                        local i = unit_table.customary
                        if i == 1 and parms.opt_sp_us then
                                i = 2  -- show "U.S." not "US"
                        end
                        if i == 3 and abbr_on then
                                i = 4  -- abbreviate "imperial" to "imp"
                        end
                        local customary = text_code.customary_units[i]
                        if customary then
                                -- LATER: This works for language en only, but it
                                local pertext
                                if id:sub(1, 1) == '/' then
                                        -- Want unit "/USgal" to display as "/U.S
                                        pertext = '/'
                                        id = id:sub(2)
                                elseif id:sub(1, 4) == 'per ' then
                                        -- Similarly want "per U.S. gallon", not
                                        pertext = 'per '
                                        id = id:sub(5)
                                else
                                        pertext = ''
                                end
                                -- Omit any "US"/"U.S."/"imp"/"imperial" from sta
                                local removes = (i < 3) and { 'US ', 'US ',
                                for _, prefix in ipairs(removes) do
                                        local plen = #prefix
                                        if id:sub(1, plen) == prefix then
                                                id = id:sub(plen + 1)
                                                break
                                        end
                                end
                                before = pertext .. make_link(customary.link, cus
                        end
                        id = before .. make_link(link, id, unit_table)
                end
        end
        return multiplier .. id
end

local function make_id(parms, which, unit_table)
        -- Return id, f where
        --   id = unit name or symbol, possibly modified
        --   f = true if id is a name, or false if id is a symbol
        -- using the value for index 'which', and for 'in' or 'out' (unit_table.i
        -- Result is '' if no symbol/name is to be used.
        -- In addition, set unit_table.sep = ' ' or ' ' or ''
        -- (the separator that caller will normally insert before the id).
        if parms.opt_values then
```

```
                unit_table.sep = ''
                return ''
        end
        local inout = unit_table.inout
        local info = unit_table.valinfo[which]
        local abbr_org = parms.abbr_org
        local adjectival = parms.opt_adjectival
        local lk = parms.lk
        local want_link = (lk == 'on' or lk == inout)
        local usename = unit_table.usename
        local singular = info.singular
        local want_name
        if usename then
                want_name = true
        else
                if abbr_org == nil then
                        if parms.wantname then
                                want_name = true
                        end
                        if unit_table.usesymbol then
                                want_name = false
                        end
                end
                if want_name == nil then
                        local abbr = parms.abbr
                        if abbr == 'on' or abbr == inout or (abbr == 'mos' and in
                                want_name = false
                        else
                                want_name = true
                        end
                end
        end
        local key
        if want_name then
                if lk == nil and unit_table.builtin == 'hand' then
                        want_link = true
                end
                if parms.opt_use_nbsp then
                        unit_table.sep = ' '
                else
                        unit_table.sep = ' '
                end
                if parms.opt_singular then
                        local value
                        if inout == 'in' then
                                value = info.value
                        else
                                value = info.absvalue
                        end
                        if value then  -- some unusual units do not always set va
                                value = abs(value)
                                singular = (0 < value and value < 1.0001)
                        end
                end
                if unit_table.engscale then
                        -- engscale: so "|1|e3kg" gives "1 thousand kilograms" (p
                        singular = false
                end
                key = (adjectival or singular) and 'name1' or 'name2'
                if parms.opt_sp_us then
                        key = key .. '_us'
                end
        else
                if unit_table.builtin == 'hand' then
```

```
                        if parms.opt_hand_hh then
                                unit_table.symbol = 'hh'  -- LATER: might want i
                        end
                end
                unit_table.sep = ' '
                key = parms.opt_sp_us and 'sym_us' or 'symbol'
        end
        return linked_id(parms, unit_table, key, want_link, info.clean), want_nam
end

local function decorate_value(parms, unit_table, which, number_word)
        -- If needed, update unit_table so values will be shown with extra inform
        -- For consistency with the old template (but different from fmtpower),
        -- the style to display powers of 10 includes "display:none" to allow son
        -- browsers to copy, for example, "10³" as "10^3", rather than as "103".
        local info
        local engscale = unit_table.engscale
        local prefix = unit_table.vprefix
        if engscale or prefix then
                info = unit_table.valinfo[which]
                if info.decorated then
                        return  -- do not redecorate if repeating convert
                end
                info.decorated = true
                if engscale then
                        local inout = unit_table.inout
                        local abbr = parms.abbr
                        if (abbr == 'on' or abbr == inout) and not parms.number_w
                                info.show = info.show ..
                                        '<span style="margin-left:0.2em">×<span s
                                        from_en('10') ..
                                        '</span></span><s style="display:none">^<
                                        from_en(tostring(engscale.exponent)) ..
                        elseif number_word then
                                local number_id
                                local lk = parms.lk
                                if lk == 'on' or lk == inout then
                                        number_id = make_link(engscale.link, engs
                                else
                                        number_id = engscale[1]
                                end
                                -- WP:NUMERAL recommends " " in values like
                                info.show = info.show .. (parms.opt_adjectival ar
                        end
                end
                if prefix then
                        info.show = prefix .. info.show
                end
        end
end

local function process_input(parms, in_current)
        -- Processing required once per conversion.
        -- Return block of text to represent input (value/unit).
        if parms.opt_output_only or parms.opt_output_number_only or parms.opt_out
                parms.joins = { '', '' }
                return ''
        end
        local first_unit
        local composite = in_current.composite  -- nil or table of units
        if composite then
                first_unit = composite[1]
        else
                first_unit = in_current
```

```
	end
	local id1, want_name = make_id(parms, 1, first_unit)
	local sep = first_unit.sep  -- separator between value and unit, set by m
	local preunit = parms.preunit1
	if preunit then
		sep = ''  -- any separator is included in preunit
	else
		preunit = ''
	end
	if parms.opt_input_unit_only then
		parms.joins = { '', '' }
		if composite then
			local parts = { id1 }
			for i, unit in ipairs(composite) do
				if i > 1 then
					table.insert(parts, (make_id(parms, 1, ur
				end
			end
			id1 = table.concat(parts, ' ')
		end
		if want_name and parms.opt_adjectival then
			return preunit .. hyphenated(id1)
		end
		return  preunit .. id1
	end
	if parms.opt_also_symbol and not composite and not parms.opt_flip then
		local join1 = parms.joins[1]
		if join1 == ' (' or join1 == ' [' then
			parms.joins = { ' [' .. first_unit[parms.opt_sp_us and 's
		end
	end
	if in_current.builtin == 'mach' and first_unit.sep ~= '' then  -- '' mean
		local prefix = id1 .. ' '
		local range = parms.range
		local valinfo = first_unit.valinfo
		local result = prefix .. valinfo[1].show
		if range then
			-- For simplicity and because more not needed, handle one
			local prefix2 = make_id(parms, 2, first_unit) .. ' '
			result = range_text(range[1], want_name, parms, result, p
		end
		return preunit .. result
	end
	if composite then
		-- Simplify: assume there is no range, and no decoration.
		local mid = (not parms.opt_flip) and parms.mid or ''
		local sep1 = ' '
		local sep2 = ' '
		if parms.opt_adjectival and want_name then
			sep1 = '-'
			sep2 = '-'
		end
		if omitsep and sep == '' then
			-- Testing the id of the most significant unit should be
			sep1 = ''
			sep2 = ''
		end
		local parts = { first_unit.valinfo[1].show .. sep1 .. id1 }
		for i, unit in ipairs(composite) do
			if i > 1 then
				table.insert(parts, unit.valinfo[1].show .. sep1
			end
		end
		return table.concat(parts, sep2) .. mid
```

```
        end
        local add_unit = (parms.abbr == 'mos') or
                parms[parms.opt_flip and 'out_range_x' or 'in_range_x'] or
                (not want_name and parms.abbr_range_x)
        local range = parms.range
        if range and not add_unit then
                unlink(first_unit)
        end
        local id = range and make_id(parms, range.n + 1, first_unit) or id1
        local extra, was_hyphenated = hyphenated_maybe(parms, want_name, sep, id
        if was_hyphenated then
                add_unit = false
        end
        local result
        local valinfo = first_unit.valinfo
        if range then
                for i = 0, range.n do
                        local number_word
                        if i == range.n then
                                add_unit = false
                                number_word = true
                        end
                        decorate_value(parms, first_unit, i+1, number_word)
                        local show = valinfo[i+1].show
                        if add_unit then
                                show = show .. first_unit.sep .. (i == 0 and id1
                        end
                        if i == 0 then
                                result = show
                        else
                                result = range_text(range[i], want_name, parms, r
                        end
                end
        else
                decorate_value(parms, first_unit, 1, true)
                result = valinfo[1].show
        end
        return result .. preunit .. extra
end

local function process_one_output(parms, out_current)
        -- Processing required for each output unit.
        -- Return block of text to represent output (value/unit).
        local inout = out_current.inout  -- normally 'out' but can be 'in' for or
        local id1, want_name = make_id(parms, 1, out_current)
        local sep = out_current.sep  -- set by make_id
        local preunit = parms.preunit2
        if preunit then
                sep = ''  -- any separator is included in preunit
        else
                preunit = ''
        end
        if parms.opt_output_unit_only then
                if want_name and parms.opt_adjectival then
                        return preunit .. hyphenated(id1)
                end
                return preunit .. id1
        end
        if out_current.builtin == 'mach' and out_current.sep ~= '' then  -- '' me
                local prefix = id1 .. ' '
                local range = parms.range
                local valinfo = out_current.valinfo
                local result = prefix .. valinfo[1].show
                if range then
```

```
                        -- For simplicity and because more not needed, handle one
                        result = range_text(range[1], want_name, parms, result, p
                end
                return preunit .. result
        end
        local add_unit = (parms[parms.opt_flip and 'in_range_x' or 'out_range_x']
                (not want_name and parms.abbr_range_x)) and
                not parms.opt_output_number_only
        local range = parms.range
        if range and not add_unit then
                unlink(out_current)
        end
        local id = range and make_id(parms, range.n + 1, out_current) or id1
        local extra, was_hyphenated = hyphenated_maybe(parms, want_name, sep, id,
        if was_hyphenated then
                add_unit = false
        end
        local result
        local valinfo = out_current.valinfo
        if range then
                for i = 0, range.n do
                        local number_word
                        if i == range.n then
                                add_unit = false
                                number_word = true
                        end
                        decorate_value(parms, out_current, i+1, number_word)
                        local show = valinfo[i+1].show
                        if add_unit then
                                show = show .. out_current.sep .. (i == 0 and id1
                        end
                        if i == 0 then
                                result = show
                        else
                                result = range_text(range[i], want_name, parms, r
                        end
                end
        else
                decorate_value(parms, out_current, 1, true)
                result = valinfo[1].show
        end
        if parms.opt_output_number_only then
                return result
        end
        return result .. preunit .. extra
end

local function make_output_single(parms, in_unit_table, out_unit_table)
        -- Return true, item where item = wikitext of the conversion result
        -- for a single output (which is not a combination or a multiple);
        -- or return false, t where t is an error message table.
        if parms.opt_order_out and in_unit_table.unitcode == out_unit_table.unitc
                out_unit_table.valinfo = in_unit_table.valinfo
        else
                out_unit_table.valinfo = collection()
                for _, v in ipairs(in_unit_table.valinfo) do
                        local success, info = cvtround(parms, v, in_unit_table, c
                        if not success then return false, info end
                        out_unit_table.valinfo:add(info)
                end
        end
        return true, process_one_output(parms, out_unit_table)
end
```

```
local function make_output_multiple(parms, in_unit_table, out_unit_table)
        -- Return true, item where item = wikitext of the conversion result
        -- for an output which is a multiple (like 'ftin');
        -- or return false, t where t is an error message table.
        local inout = out_unit_table.inout  -- normally 'out' but can be 'in' for
        local multiple = out_unit_table.multiple  -- table of scaling factors (wi
        local combos = out_unit_table.combination  -- table of unit tables (will
        local abbr = parms.abbr
        local abbr_org = parms.abbr_org
        local disp = parms.disp
        local want_name = (abbr_org == nil and (disp == 'or' or disp == 'slash'))
                                                not (abbr == 'on' or abbr == inou
        local want_link = (parms.lk == 'on' or parms.lk == inout)
        local mid = parms.opt_flip and parms.mid or ''
        local sep1 = ' '
        local sep2 = ' '
        if parms.opt_adjectival and want_name then
                sep1 = '-'
                sep2 = '-'
        end
        local do_spell = parms.opt_spell_out
        parms.opt_spell_out = nil  -- so the call to cvtround does not spell the
        local function make_result(info, isfirst)
                local fmt, outvalue, sign
                local results = {}
                for i = 1, #combos do
                        local tfrac, thisvalue, strforce
                        local out_current = combos[i]
                        out_current.inout = inout
                        local scale = multiple[i]
                        if i == 1 then  -- least significant unit ('in' from 'fti
                                local decimals
                                out_current.frac = out_unit_table.frac
                                local success, outinfo = cvtround(parms, info, ir
                                if not success then return false, outinfo end
                                if isfirst then
                                        out_unit_table.valinfo = { outinfo }  --
                                end
                                sign = outinfo.sign
                                tfrac = outinfo.fraction_table
                                if outinfo.is_scientific then
                                        strforce = outinfo.show
                                        decimals = ''
                                elseif tfrac then
                                        decimals = ''
                                else
                                        local show = outinfo.show  -- number as a
                                        local p1, p2 = show:find(numdot, 1, true)
                                        decimals = p1 and show:sub(p2 + 1) or ''
                                end
                                fmt = '%.' .. ulen(decimals) .. 'f'  -- to reproc
                                if decimals == '' then
                                        if tfrac then
                                                outvalue = floor(outinfo.raw_absv
                                        else
                                                outvalue = floor(outinfo.raw_absv
                                        end
                                else
                                        outvalue = outinfo.absvalue
                                end
                        end
                        if scale then
                                outvalue, thisvalue = divide(outvalue, scale)
                        else
```

```
                        thisvalue = outvalue
                end
                local id
                if want_name then
                        if varname then
                                local clean
                                if strforce or tfrac then
                                        clean = '.1'  -- dummy value to f
                                else
                                        clean = format(fmt, thisvalue)
                                end
                                id = variable_name(clean, out_current)
                        else
                                local key = 'name2'
                                if parms.opt_adjectival then
                                        key = 'name1'
                                elseif tfrac then
                                        if thisvalue == 0 then
                                                key = 'name1'
                                        end
                                elseif parms.opt_singular then
                                        if 0 < thisvalue and thisvalue <
                                                key = 'name1'
                                        end
                                else
                                        if thisvalue == 1 then
                                                key = 'name1'
                                        end
                                end
                                id = out_current[key]
                        end
                else
                        id = out_current['symbol']
                end
                if i == 1 and omit_separator(id) then
                        -- Testing the id of the least significant unit s
                        sep1 = ''
                        sep2 = ''
                end
                if want_link then
                        local link = out_current.link
                        if link then
                                id = make_link(link, id, out_current)
                        end
                end
                local strval
                local spell_inout = (i == #combos or outvalue == 0) and i
                if strforce and outvalue == 0 then
                        sign = ''  -- any sign is in strforce
                        strval = strforce  -- show small values in scient
                elseif tfrac then
                        local wholestr = (thisvalue > 0) and tostring(thi
                        strval = format_fraction(parms, spell_inout, fals
                else
                        strval = (thisvalue == 0) and from_en('0') or wit
                        if do_spell then
                                strval = spell_number(parms, spell_inout,
                        end
                end
                table.insert(results, strval .. sep1 .. id)
                if outvalue == 0 then
                        break
                end
                fmt = '%.0f'  -- only least significant unit can have a n
```

```
                end
                local reversed, count = {}, #results
                for i = 1, count do
                        reversed[i] = results[count + 1 - i]
                end
                return true, sign .. table.concat(reversed, sep2)
        end
        local valinfo = in_unit_table.valinfo
        local success, result = make_result(valinfo[1], true)
        if not success then return false, result end
        local range = parms.range
        if range then
                for i = 1, range.n do
                        local success, result2 = make_result(valinfo[i+1])
                        if not success then return false, result2 end
                        result = range_text(range[i], want_name, parms, result, r
                end
        end
        return true, result .. mid
end

local function process(parms, in_unit_table, out_unit_table)
        -- Return true, s, outunit where s = final wikitext result,
        -- or return false, t where t is an error message table.
        linked_pages = {}
        local success, bad_output
        local bad_input_mcode = in_unit_table.bad_mcode  -- nil if input unit is
        local out_unit = parms.out_unit
        if out_unit == nil or out_unit == '' or type(out_unit) == 'function' ther
                if bad_input_mcode or parms.opt_input_unit_only then
                        bad_output = ''
                else
                        local getdef = type(out_unit) == 'function' and out_unit
                        success, out_unit = getdef(in_unit_table.valinfo[1].value
                        parms.out_unit = out_unit
                        if not success then
                                bad_output = out_unit
                        end
                end
        end
        if not bad_output and not out_unit_table then
                success, out_unit_table = lookup(parms, out_unit, 'any_combinatio
                if success then
                        local mismatch = check_mismatch(in_unit_table, out_unit_t
                        if mismatch then
                                bad_output = mismatch
                        end
                else
                        bad_output = out_unit_table
                end
        end
        local lhs, rhs
        local flipped = parms.opt_flip and not bad_input_mcode
        if bad_output then
                rhs = (bad_output == '') and '' or message(parms, bad_output)
        elseif parms.opt_input_unit_only then
                rhs = ''
        else
                local combos  -- nil (for 'ft' or 'ftin'), or table of unit table
                if not out_unit_table.multiple then  -- nil/false ('ft' or 'm ft'
                        combos = out_unit_table.combination
                end
                local frac = parms.frac  -- nil or denominator of fraction for ou
                if frac then
```

```
                        -- Apply fraction to the unit (if only one), or to non-SI
                        -- except that if a precision is also specified, the frac
                        -- the hand unit; that allows the following result:
                        -- {{convert|156|cm|in hand|1|frac=2}} → 156 centimetres
                        -- However, the following is handled elsewhere as a speci
                        -- {{convert|156|cm|hand in|1|frac=2}} → 156 centimetres
                        if combos then
                                local precision = parms.precision
                                for _, unit in ipairs(combos) do
                                        if unit.builtin == 'hand' or (not precisi
                                                unit.frac = frac
                                        end
                                end
                        else
                                out_unit_table.frac = frac
                        end
                end
                local outputs = {}
                local imax = combos and #combos or 1  -- 1 (single unit) or numbe
                if imax == 1 then
                        parms.opt_order_out = nil  -- only useful with an output
                end
                if not flipped and not parms.opt_order_out then
                        -- Process left side first so any duplicate links (from 1
                        -- on right. Example: {{convert|28|e9pc|e9ly|abbr=off|lk=
                        lhs = process_input(parms, in_unit_table)
                end
                for i = 1, imax do
                        local success, item
                        local out_current = combos and combos[i] or out_unit_tabl
                        out_current.inout = 'out'
                        if i == 1 then
                                if imax > 1 and out_current.builtin == 'hand' the
                                        out_current.out_next = combos[2]  -- buil
                                end
                                if parms.opt_order_out then
                                        out_current.inout = 'in'
                                end
                        end
                        if out_current.multiple then
                                success, item = make_output_multiple(parms, in_ur
                        else
                                success, item = make_output_single(parms, in_unit
                        end
                        if not success then return false, item end
                        outputs[i] = item
                end
                if parms.opt_order_out then
                        lhs = outputs[1]
                        table.remove(outputs, 1)
                end
                local sep = parms.table_joins and parms.table_joins[2] or parms.j
                rhs = table.concat(outputs, sep)
        end
        if flipped or not lhs then
                local input = process_input(parms, in_unit_table)
                if flipped then
                        lhs = rhs
                        rhs = input
                else
                        lhs = input
                end
        end
        if parms.join_before then
```

```
                lhs = parms.join_before .. lhs
        end
        local wikitext
        if bad_input_mcode then
                if bad_input_mcode == '' then
                        wikitext = lhs
                else
                        wikitext = lhs .. message(parms, bad_input_mcode)
                end
        elseif parms.table_joins then
                wikitext = parms.table_joins[1] .. lhs .. parms.table_joins[2] .
        else
                wikitext = lhs .. parms.joins[1] .. rhs .. parms.joins[2]
        end
        if parms.warnings and not bad_input_mcode then
                wikitext = wikitext .. parms.warnings
        end
        return true, get_styles(parms) .. wikitext, out_unit_table
end

local function main_convert(frame)
        -- Do convert, and if needed, do it again with higher default precision.
        local parms = { frame = frame }  -- will hold template arguments, after t
        set_config(frame.args)
        local success, result = get_parms(parms, frame:getParent().args)
        if success then
                if type(result) ~= 'table' then
                        return tostring(result)
                end
                local in_unit_table = result
                local out_unit_table
                for _ = 1, 2 do  -- use counter so cannot get stuck repeating cor
                        success, result, out_unit_table = process(parms, in_unit_
                        if success and parms.do_convert_again then
                                parms.do_convert_again = false
                        else
                                break
                        end
                end
        end
        -- If input=x gives a problem, the result should be just the user input
        -- (if x is a property like P123 it has been replaced with '').
        -- An unknown input unit would display the input and an error message
        -- with success == true at this point.
        -- Also, can have success == false with a message that outputs an empty s
        if parms.input_text then
                if success and not parms.have_problem then
                        return result
                end
                local cat
                if parms.tracking then
                        -- Add a tracking category using the given text as the ca
                        -- There is currently only one type of tracking, but in p
                        -- items could be tracked, using different sort keys for
                        cat = wanted_category('tracking', parms.tracking)
                end
                return parms.input_text .. (cat or '')
        end
        return success and result or message(parms, result)
end

local function _unit(unitcode, options)
        -- Helper function for Module:Val to look up a unit.
        -- Parameter unitcode must be a string to identify the wanted unit.
```

```
	-- Parameter options must be nil or a table with optional fields:
	--   value = number (for sort key; default value is 1)
	--   scaled_top = nil for a normal unit, or a number for a unit which is
	--                the denominator of a per unit (for sort key)
	--   si = { 'symbol', 'link' }
	--                (a table with two strings) to make an SI unit
	--                that will be used for the look up
	--   link = true if result should be [[linked]]
	--   sort = 'on' or 'debug' if result should include a sort key in a
	--                span element ('debug' makes the key visible)
	--   name = true for the name of the unit instead of the symbol
	--   us = true for the US spelling of the unit, if any
	-- Return nil if unitcode is not a non-empty string.
	-- Otherwise return a table with fields:
	--   text = requested symbol or name of unit, optionally linked
	--   scaled_value = input value adjusted by unit scale; used for sort key
	--   sortspan = span element with sort key like that provided by {{ntsh}}
	--     calculated from the result of converting value
	--     to a base unit with scale 1.
	--   unknown = true if the unitcode was not known
	unitcode = strip(unitcode)
	if unitcode == nil or unitcode == '' then
		return nil
	end
	set_config({})
	linked_pages = {}
	options = options or {}
	local parms = {
		abbr = options.name and 'off' or 'on',
		lk = options.link and 'on' or nil,
		opt_sp_us = options.us and true or nil,
		opt_ignore_error = true,  -- do not add pages using this functio
		opt_sortable_on = options.sort == 'on' or options.sort == 'debug'
		opt_sortable_debug = options.sort == 'debug',
	}
	if options.si then
		-- Make a dummy table of units (just one unit) for lookup to use
		-- This makes lookup recognize any SI prefix in the unitcode.
		local symbol = options.si[1] or '?'
		parms.unittable = { [symbol] = {
			_name1 = symbol,
			_name2 = symbol,
			_symbol = symbol,
			utype = symbol,
			scale = symbol == 'g' and 0.001 or 1,
			prefixes = 1,
			default = symbol,
			link = options.si[2],
		}}
	end
	local success, unit_table = lookup(parms, unitcode, 'no_combination')
	if not success then
		unit_table = setmetatable({
			symbol = unitcode, name2 = unitcode, utype = unitcode,
			scale = 1, default = '', defkey = '', linkey = '' }, unit
	end
	local value = tonumber(options.value) or 1
	local clean = tostring(abs(value))
	local info = {
		value = value,
		altvalue = value,
		singular = (clean == '1'),
		clean = clean,
		show = clean,
```

```
        }
        unit_table.inout = 'in'
        unit_table.valinfo = { info }
        local sortspan, scaled_value
        if options.sort then
                sortspan, scaled_value = make_table_or_sort(parms, value, info, u
        end
        return {
                text = make_id(parms, 1, unit_table),
                sortspan = sortspan,
                scaled_value = scaled_value,
                unknown = not success and true or nil,
        }
end

return { convert = main_convert, _unit = _unit }
```

Modul:Convert/Doku

Dies ist die Dokumentationsseite für Modul:Convert

Vorlage:Transwiki guide Vorlage:Lua Vorlage:Uses TemplateStyles This module converts a value from one unit of measurement to another. For example:

- `{{convert|123|lb|kg}}` → 123 pounds (56 kg)

The module is called using a template—parameters passed to the template are used by this module to control how a conversion is performed. For example, units can be abbreviated (like `kg`), or displayed as names (like `kilogram`), and the output value can be rounded to a specified precision. For usage information, see Help:Convert.

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Templates and modules

Templates that invoke this module are:

- Template:Convert
- Template:Cvt Vorlage:Green

The following modules are required:

- Module:Convert – *(this module)* code to convert units
- Module:Convert/data – unit definitions
- Module:Convert/text – text messages, and parameter names and values

The following modules are optional and are used only if required and if the module exists:

- Module:Convert/extra – extra (temporary) unit definitions; used if a unit is not found in Module:Convert/data
- Module:ConvertNumeric – code to spell an input value in words (only English is supported; however, see vi:Module:ConvertNumeric)

For Wikidata support the following modules are required:

- Module:Convert/wikidata
- Module:Convert/wikidata/data

The following help pages are available:

- Help:Convert – overview
- Help:Convert messages – describes error and warning messages; messages link to this page so it is required when the module is copied to another wiki
- Help:Convert units – overview of units

A page containing a convert error is added to the following hidden category, providing the page is in a specified namespace (articles, by default):

- Vorlage:Clc

Units are defined in the wikitext of the master list of units.

- Module:Convert/documentation/conversion data – master list of unit definitions
- Module:Convert/makeunits – translates wikitext from the master list to Lua
- Module talk:Convert/makeunits – makeunits results; copy the text to Module:Convert/data

Module:Convert/data is transcluded into every page using the convert module, so experimenting with a new unit in that module would involve a significant overhead. The Module:Convert/extra module is an alternative which is only transcluded on pages with a unit that is not defined in the main data module.

Module talk:Convert/show lists all unit links so they can be checked.

Sandbox

When making a change, copy the current modules to the sandbox pages, then edit the sandbox copies:

- Module:Convert • Module:Convert/sandbox • same content
- Module:Convert/data • Module:Convert/data/sandbox • same content
- Module:Convert/text • Module:Convert/text/sandbox • same content
- Module:Convert/extra • Module:Convert/extra/sandbox • same content
- Module:Convert/wikidata • Module:Convert/wikidata/sandbox • same content
- Module:Convert/wikidata/data • Module:Convert/wikidata/data/sandbox • same content

Use the following template to test the results (example `{{convert/sandbox|123|lb|kg}}`):

- Template:Convert/sandbox

Template:Convert/sandbox invokes Module:Convert/sandbox with parameter Vorlage:Para which causes convert to use the sandbox modules rather than the normal modules.

The following should be used to test the results of editing the convert modules.

- Template:Convert/testcases#Sandbox testcases – links to testcases
- Module:Convert/tester – module to run tests by comparing template output with fixed text

It is not necessary to save a testcases page before viewing test results. For example, Template: Convert/testcases/sandbox4 could be edited to change the tests. While still editing that page, paste Vorlage:Nowrap (without quotes) into the page title box under "Preview page with this template", then click "Show preview".

Configuration

The template that invokes this module can define options to configure the module. For example:

- `{{#invoke:convert|convert|numdot=,|numsep=.}}`

  Sets the decimal mark to be a comma, and the thousands separator to be a dot.

Other options, with default values, are:

- `|maxsigfig=14` – maximum number of significant figures
- `|nscat=0` – namespaces (comma separated) in which an error or warning adds a category to the page
- `|warnings=0` – 0 (zero) disables warnings; 1 shows important warnings; 2 shows all warnings

An option in the template can specify that the sandbox versions of the modules be used. If specified, the text on the right-hand side of the equals sign must be the name of the subpage for each sandbox module.

- `|sandbox=sandbox` – omit for normal operation

All text used for input parameters and for output messages and categories can be customized. For example, at enwiki the option `|lk=on` can be used to link each displayed unit to its article. The "`lk`" and "`on`" can be replaced with any desired text. In addition, input and output numbers can be formatted and can use digits in the local language. See the translation guide for more information.

To do

Document the modules to access Wikidata!

Module version history

- Version 1 December 2013
- Version 2 January 2014
- Version 3 April 2014
- Version 4 July 2014
- Version 5 September 2014
- Version 6 November 2014
- Version 7 December 2014
- Version 8 February 2015
- Version 9 February 2015
- Version 10 May 2015

- Version 11 June 2015
- Version 12 August 2015
- Version 13 March 2016
- Version 14 June 2016 Vorlage:Green
- Version 15 September 2016
- Version 16 January 2017
- Version 17 May 2017
- Version 18 July 2017
- Version 19 August 2017
- Version 20 December 2017 Vorlage:Green
- Version 21 January 2018 Vorlage:Green
- Version 22 February 2018 Vorlage:Green
- Version 23 June 2018 Vorlage:Green
- Version 24 May 2019 Vorlage:Green
- Version 25 May 2021 Vorlage:Green
- Version 26 June 2021 Vorlage:Green
- Version 27 February 2022 Vorlage:Green

Modul:Convert/data

This page defines the conversion data used by Module:Convert. All documentation (from Module:Convert/doc) is at that page.

Do not manually add units to this page. First add the unit definitions in Module:Convert/documentation/conversion data. And then update this page by copying the results from Module:Convert/makeunits (those results appear at Module talk:Convert/makeunits).

Any changes should first be tested at Module:Convert/data/sandbox—see Module:Convert/sandbox/testcases.

New units can be manually added at Module:Convert/extra as a temporary measure before being incorporated into this main table.

```
-- Conversion data used by [[Module:Convert]] which uses mw.loadData() for
-- read-only access to this module so that it is loaded only once per page.
-- See [[:en:Template:Convert/Transwiki guide]] if copying to another wiki.
--
-- These data tables follow:
--   all_units           all properties for a unit, including default output
--   default_exceptions  exceptions for default output ('kg' and 'g' have differe
--   link_exceptions     exceptions for links ('kg' and 'g' have different links)
--
-- These tables are generated by a script which reads the wikitext of a page that
-- documents the required properties of each unit; see [[:en:Module:Convert/doc]]

--------------------------------------------------------------------------------
-- Do not change the data in this table because it is created by running --
-- a script that reads the wikitext from a wiki page (see note above).   --
--------------------------------------------------------------------------------
local all_units = {
    ["Gy"] = {
        _name1   = "gray",
        _symbol  = "Gy",
        utype    = "absorbed radiation dose",
        scale    = 1,
        prefixes = 1,
        default  = "rad",
        link     = "Gray (unit)",
    },
    ["rad"] = {
        _name1   = "rad",
        _symbol  = "rad",
        utype    = "absorbed radiation dose",
        scale    = 0.01,
        prefixes = 1,
        default  = "Gy",
        link     = "Rad (unit)",
    },
    ["cm/s2"] = {
        name1    = "centimetre per second squared",
        name1_us = "centimeter per second squared",
        name2    = "centimetres per second squared",
        name2_us = "centimeters per second squared",
        symbol   = "cm/s<sup>2</sup>",
        utype    = "acceleration",
```

```
        scale    = 0.01,
        default  = "ft/s2",
        link     = "Gal (unit)",
    },
    ["ft/s2"] = {
        name1    = "foot per second squared",
        name2    = "feet per second squared",
        symbol   = "ft/s<sup>2</sup>",
        utype    = "acceleration",
        scale    = 0.3048,
        default  = "m/s2",
    },
    ["g0"] = {
        name1    = "standard gravity",
        name2    = "standard gravities",
        symbol   = "''g''<sub>0</sub>",
        utype    = "acceleration",
        scale    = 9.80665,
        default  = "m/s2",
    },
    ["g-force"] = {
        name2    = "''g''",
        symbol   = "''g''",
        utype    = "acceleration",
        scale    = 9.80665,
        default  = "m/s2",
        link     = "g-force",
    },
    ["km/hs"] = {
        name1    = "kilometre per hour per second",
        name1_us = "kilometer per hour per second",
        name2    = "kilometres per hour per second",
        name2_us = "kilometers per hour per second",
        symbol   = "km/(h·s)",
        utype    = "acceleration",
        scale    = 0.27777777777777779,
        default  = "mph/s",
        link     = "Acceleration",
    },
    ["km/s2"] = {
        name1    = "kilometre per second squared",
        name1_us = "kilometer per second squared",
        name2    = "kilometres per second squared",
        name2_us = "kilometers per second squared",
        symbol   = "km/s<sup>2</sup>",
        utype    = "acceleration",
        scale    = 1000,
        default  = "mph/s",
        link     = "Acceleration",
    },
    ["m/s2"] = {
        name1    = "metre per second squared",
        name1_us = "meter per second squared",
        name2    = "metres per second squared",
        name2_us = "meters per second squared",
        symbol   = "m/s<sup>2</sup>",
        utype    = "acceleration",
        scale    = 1,
        default  = "ft/s2",
    },
    ["mph/s"] = {
        name1    = "mile per hour per second",
        name2    = "miles per hour per second",
        symbol   = "mph/s",
```

```
        utype    = "acceleration",
        scale    = 0.44704,
        default  = "km/hs",
        link     = "Acceleration",
    },
    ["km/h/s"] = {
        target   = "km/hs",
    },
    ["standard gravity"] = {
        target   = "g0",
    },
    ["1000sqft"] = {
        name1    = "thousand square feet",
        name2    = "thousand square feet",
        symbol   = "1000 sq ft",
        utype    = "area",
        scale    = 92.90304,
        default  = "m2",
        link     = "Square foot",
    },
    ["a"] = {
        _name1   = "are",
        _symbol  = "a",
        utype    = "area",
        scale    = 100,
        prefixes = 1,
        default  = "sqft",
        link     = "Hectare#Are",
    },
    ["acre"] = {
        symbol   = "acre",
        usename  = 1,
        utype    = "area",
        scale    = 4046.8564224,
        default  = "ha",
        subdivs  = { ["rood"] = { 4, default = "ha" }, ["sqperch"] = { 160, defau
    },
    ["acre-sing"] = {
        target   = "acre",
    },
    ["arpent"] = {
        symbol   = "arpent",
        usename  = 1,
        utype    = "area",
        scale    = 3418.89,
        default  = "ha",
    },
    ["cda"] = {
        name1    = "cuerda",
        symbol   = "cda",
        utype    = "area",
        scale    = 3930.395625,
        default  = "ha acre",
    },
    ["daa"] = {
        name1    = "decare",
        symbol   = "daa",
        utype    = "area",
        scale    = 1000,
        default  = "km2 sqmi",
    },
    ["dunam"] = {
        symbol   = "dunam",
        usename  = 1,
```

```
        utype    = "area",
        scale    = 1000,
        default  = "km2 sqmi",
    },
    ["dunum"] = {
        symbol   = "dunum",
        usename  = 1,
        utype    = "area",
        scale    = 1000,
        default  = "km2 sqmi",
        link     = "Dunam",
    },
    ["ha"] = {
        name1    = "hectare",
        symbol   = "ha",
        utype    = "area",
        scale    = 10000,
        default  = "acre",
    },
    ["hectare"] = {
        name1    = "hectare",
        symbol   = "ha",
        usename  = 1,
        utype    = "area",
        scale    = 10000,
        default  = "acre",
    },
    ["Irish acre"] = {
        name1    = "Irish acre",
        symbol   = "Irish acres",
        utype    = "area",
        scale    = 6555.2385024,
        default  = "ha",
        link     = "Acre (Irish)",
    },
    ["m2"] = {
        _name1   = "square metre",
        _name1_us= "square meter",
        _symbol  = "m<sup>2</sup>",
        prefix_position= 8,
        utype    = "area",
        scale    = 1,
        prefixes = 2,
        default  = "sqft",
        link     = "Square metre",
    },
    ["pondemaat"] = {
        name1    = "pondemaat",
        name2    = "pondemaat",
        symbol   = "pond",
        utype    = "area",
        scale    = 3674.363358816,
        default  = "m2",
        link     = ":nl:pondemaat",
    },
    ["pyeong"] = {
        name2    = "pyeong",
        symbol   = "pyeong",
        usename  = 1,
        utype    = "area",
        scale    = 3.3057851239669422,
        default  = "m2",
    },
    ["rai"] = {
```

```
        name2    = "rai",
        symbol   = "rai",
        utype    = "area",
        scale    = 1600,
        default  = "m2",
        link     = "Rai (unit)",
    },
    ["rood"] = {
        symbol   = "rood",
        usename  = 1,
        utype    = "area",
        scale    = 1011.7141056,
        default  = "sqft m2",
        subdivs  = { ["sqperch"] = { 40, default = "m2" } },
        link     = "Rood (unit)",
    },
    ["sqfoot"] = {
        name1    = "square foot",
        name2    = "square foot",
        symbol   = "sq ft",
        utype    = "area",
        scale    = 0.09290304,
        default  = "m2",
    },
    ["sqft"] = {
        name1    = "square foot",
        name2    = "square feet",
        symbol   = "sq ft",
        utype    = "area",
        scale    = 0.09290304,
        default  = "m2",
    },
    ["sqin"] = {
        name1    = "square inch",
        name2    = "square inches",
        symbol   = "sq in",
        utype    = "area",
        scale    = 0.00064516,
        default  = "cm2",
    },
    ["sqmi"] = {
        name1    = "square mile",
        symbol   = "sq mi",
        utype    = "area",
        scale    = 2589988.110336,
        default  = "km2",
    },
    ["sqnmi"] = {
        name1    = "square nautical mile",
        symbol   = "sq nmi",
        utype    = "area",
        scale    = 3429904,
        default  = "km2 sqmi",
        link     = "Nautical mile",
    },
    ["sqperch"] = {
        name2    = "perches",
        symbol   = "perch",
        usename  = 1,
        utype    = "area",
        scale    = 25.29285264,
        default  = "m2",
        link     = "Rod (unit)#Area and volume",
    },
```

```
    ["sqverst"] = {
        symbol   = "square verst",
        usename  = 1,
        utype    = "area",
        scale    = 1138062.24,
        default  = "km2 sqmi",
        link     = "Verst",
    },
    ["sqyd"] = {
        name1    = "square yard",
        symbol   = "sq yd",
        utype    = "area",
        scale    = 0.83612736,
        default  = "m2",
    },
    ["tsubo"] = {
        name2    = "tsubo",
        symbol   = "tsubo",
        usename  = 1,
        utype    = "area",
        scale    = 3.3057851239669422,
        default  = "m2",
        link     = "Japanese units of measurement#Area",
    },
    ["acres"] = {
        target   = "acre",
    },
    ["are"] = {
        target   = "a",
    },
    ["decare"] = {
        target   = "daa",
    },
    ["foot2"] = {
        target   = "sqfoot",
    },
    ["ft2"] = {
        target   = "sqft",
    },
    ["in2"] = {
        target   = "sqin",
        symbol   = "in<sup>2</sup>",
    },
    ["km²"] = {
        target   = "km2",
    },
    ["mi2"] = {
        target   = "sqmi",
    },
    ["million acre"] = {
        target   = "e6acre",
    },
    ["million acres"] = {
        target   = "e6acre",
    },
    ["million hectares"] = {
        target   = "e6ha",
    },
    ["m²"] = {
        target   = "m2",
    },
    ["nmi2"] = {
        target   = "sqnmi",
    },
```

```
    ["pond"] = {
        target   = "pondemaat",
    },
    ["sq arp"] = {
        target   = "arpent",
    },
    ["sqkm"] = {
        target   = "km2",
    },
    ["sqm"] = {
        target   = "m2",
    },
    ["square verst"] = {
        target   = "sqverst",
    },
    ["verst2"] = {
        target   = "sqverst",
    },
    ["yd2"] = {
        target   = "sqyd",
    },
    ["m2/ha"] = {
        name1    = "square metre per hectare",
        name1_us = "square meter per hectare",
        name2    = "square metres per hectare",
        name2_us = "square meters per hectare",
        symbol   = "m<sup>2</sup>/ha",
        utype    = "area per unit area",
        scale    = 0.0001,
        default  = "sqft/acre",
        link     = "Basal area",
    },
    ["sqft/acre"] = {
        name1    = "square foot per acre",
        name2    = "square feet per acre",
        symbol   = "sq ft/acre",
        utype    = "area per unit area",
        scale    = 2.295684113865932e-5,
        default  = "m2/ha",
        link     = "Basal area",
    },
    ["cent"] = {
        name1    = "cent",
        symbol   = "¢",
        utype    = "cent",
        scale    = 1,
        default  = "cent",
        link     = "Cent (currency)",
    },
    ["¢"] = {
        target   = "cent",
    },
    ["A.h"] = {
        name1    = "ampere hour",
        symbol   = "A·h",
        utype    = "charge",
        scale    = 3600,
        default  = "coulomb",
    },
    ["coulomb"] = {
        _name1   = "coulomb",
        _symbol  = "C",
        utype    = "charge",
        scale    = 1,
```

```
        prefixes = 1,
        default  = "e",
        link     = "Coulomb",
    },
    ["e"] = {
        name1    = "elementary charge",
        symbol   = "''e''",
        utype    = "charge",
        scale    = 1.602176487e-19,
        default  = "coulomb",
    },
    ["g-mol"] = {
        name1    = "gram-mole",
        symbol   = "g&#8209;mol",
        utype    = "chemical amount",
        scale    = 1,
        default  = "lbmol",
        link     = "Mole (unit)",
    },
    ["gmol"] = {
        name1    = "gram-mole",
        symbol   = "gmol",
        utype    = "chemical amount",
        scale    = 1,
        default  = "lbmol",
        link     = "Mole (unit)",
    },
    ["kmol"] = {
        name1    = "kilomole",
        symbol   = "kmol",
        utype    = "chemical amount",
        scale    = 1000,
        default  = "lbmol",
        link     = "Mole (unit)",
    },
    ["lb-mol"] = {
        name1    = "pound-mole",
        symbol   = "lb&#8209;mol",
        utype    = "chemical amount",
        scale    = 453.59237,
        default  = "mol",
    },
    ["lbmol"] = {
        name1    = "pound-mole",
        symbol   = "lbmol",
        utype    = "chemical amount",
        scale    = 453.59237,
        default  = "mol",
    },
    ["mol"] = {
        name1    = "mole",
        symbol   = "mol",
        utype    = "chemical amount",
        scale    = 1,
        default  = "lbmol",
        link     = "Mole (unit)",
    },
    ["kgCO2/L"] = {
        name1    = "kilogram per litre",
        name1_us = "kilogram per liter",
        name2    = "kilograms per litre",
        name2_us = "kilograms per liter",
        symbol   = "kg(CO<sub>2</sub>)/L",
        utype    = "co2 per unit volume",
```

```
        scale    = 1000,
        default  = "lbCO2/USgal",
        link     = "Exhaust gas",
    },
    ["lbCO2/USgal"] = {
        name1    = "pound per US gallon",
        name2    = "pounds per US gallon",
        symbol   = "lbCO2/US gal",
        utype    = "co2 per unit volume",
        scale    = 119.82642731689663,
        default  = "kgCO2/L",
        link     = "Exhaust gas",
    },
    ["oz/lb"] = {
        per      = { "oz", "lb" },
        utype    = "concentration",
        default  = "mg/kg",
    },
    ["mg/kg"] = {
        per      = { "mg", "kg" },
        utype    = "concentration",
        default  = "oz/lb",
    },
    ["g/dm3"] = {
        name1    = "gram per cubic decimetre",
        name1_us = "gram per cubic decimeter",
        name2    = "grams per cubic decimetre",
        name2_us = "grams per cubic decimeter",
        symbol   = "g/dm<sup>3</sup>",
        utype    = "density",
        scale    = 1,
        default  = "kg/m3",
        link     = "Density",
    },
    ["g/L"] = {
        name1    = "gram per litre",
        name1_us = "gram per liter",
        name2    = "grams per litre",
        name2_us = "grams per liter",
        symbol   = "g/L",
        utype    = "density",
        scale    = 1,
        default  = "lb/cuin",
        link     = "Density",
    },
    ["g/mL"] = {
        name1    = "gram per millilitre",
        name1_us = "gram per milliliter",
        name2    = "grams per millilitre",
        name2_us = "grams per milliliter",
        symbol   = "g/mL",
        utype    = "density",
        scale    = 1000,
        default  = "lb/cuin",
        link     = "Density",
    },
    ["g/ml"] = {
        name1    = "gram per millilitre",
        name1_us = "gram per milliliter",
        name2    = "grams per millilitre",
        name2_us = "grams per milliliter",
        symbol   = "g/ml",
        utype    = "density",
        scale    = 1000,
```

```
        default  = "lb/cuin",
        link     = "Density",
    },
    ["kg/dm3"] = {
        name1    = "kilogram per cubic decimetre",
        name1_us = "kilogram per cubic decimeter",
        name2    = "kilograms per cubic decimetre",
        name2_us = "kilograms per cubic decimeter",
        symbol   = "kg/dm<sup>3</sup>",
        utype    = "density",
        scale    = 1000,
        default  = "lb/cuft",
        link     = "Density",
    },
    ["kg/L"] = {
        name1    = "kilogram per litre",
        name1_us = "kilogram per liter",
        name2    = "kilograms per litre",
        name2_us = "kilograms per liter",
        symbol   = "kg/L",
        utype    = "density",
        scale    = 1000,
        default  = "lb/USgal",
        link     = "Density",
    },
    ["kg/l"] = {
        name1    = "kilogram per litre",
        name1_us = "kilogram per liter",
        name2    = "kilograms per litre",
        name2_us = "kilograms per liter",
        symbol   = "kg/l",
        utype    = "density",
        scale    = 1000,
        default  = "lb/USgal",
        link     = "Density",
    },
    ["kg/m3"] = {
        name1    = "kilogram per cubic metre",
        name1_us = "kilogram per cubic meter",
        name2    = "kilograms per cubic metre",
        name2_us = "kilograms per cubic meter",
        symbol   = "kg/m<sup>3</sup>",
        utype    = "density",
        scale    = 1,
        default  = "lb/cuyd",
        link     = "Density",
    },
    ["lb/cuft"] = {
        name1    = "pound per cubic foot",
        name2    = "pounds per cubic foot",
        symbol   = "lb/cu ft",
        utype    = "density",
        scale    = 16.018463373960142,
        default  = "g/cm3",
        link     = "Density",
    },
    ["lb/cuin"] = {
        name1    = "pound per cubic inch",
        name2    = "pounds per cubic inch",
        symbol   = "lb/cu in",
        utype    = "density",
        scale    = 27679.904710203122,
        default  = "g/cm3",
        link     = "Density",
```

```
    },
    ["lb/cuyd"] = {
        name1    = "pound per cubic yard",
        name2    = "pounds per cubic yard",
        symbol   = "lb/cu yd",
        utype    = "density",
        scale    = 0.5932764212577829,
        default  = "kg/m3",
        link     = "Density",
    },
    ["lb/impgal"] = {
        name1    = "pound per imperial gallon",
        name2    = "pounds per imperial gallon",
        symbol   = "lb/imp gal",
        utype    = "density",
        scale    = 99.776372663101697,
        default  = "kg/L",
        link     = "Density",
    },
    ["lb/in3"] = {
        name1    = "pound per cubic inch",
        name2    = "pounds per cubic inch",
        symbol   = "lb/cu in",
        utype    = "density",
        scale    = 27679.904710203122,
        default  = "g/cm3",
        link     = "Density",
    },
    ["lb/U.S.gal"] = {
        name1    = "pound per U.S. gallon",
        name2    = "pounds per U.S. gallon",
        symbol   = "lb/U.S. gal",
        utype    = "density",
        scale    = 119.82642731689663,
        default  = "kg/L",
        link     = "Density",
    },
    ["lb/USbu"] = {
        name1    = "pound per US bushel",
        name2    = "pounds per US bushel",
        symbol   = "lb/US bu",
        utype    = "density",
        scale    = 12.871859780974471,
        default  = "kg/m3",
        link     = "Bushel",
    },
    ["lb/USgal"] = {
        name1    = "pound per US gallon",
        name2    = "pounds per US gallon",
        symbol   = "lb/US gal",
        utype    = "density",
        scale    = 119.82642731689663,
        default  = "kg/L",
        link     = "Density",
    },
    ["lbm/cuin"] = {
        name1    = "pound mass per cubic inch",
        name2    = "pounds mass per cubic inch",
        symbol   = "lbm/cu in",
        utype    = "density",
        scale    = 27679.904710203122,
        default  = "g/cm3",
        link     = "Density",
    },
```

```
    ["mg/L"] = {
        name1    = "milligram per litre",
        name1_us = "milligram per liter",
        name2    = "milligrams per litre",
        name2_us = "milligrams per liter",
        symbol   = "mg/L",
        utype    = "density",
        scale    = 0.001,
        default  = "lb/cuin",
        link     = "Density",
    },
    ["oz/cuin"] = {
        name1    = "ounce per cubic inch",
        name2    = "ounces per cubic inch",
        symbol   = "oz/cu in",
        utype    = "density",
        scale    = 1729.9940443876951,
        default  = "g/cm3",
        link     = "Density",
    },
    ["g/cm3"] = {
        per      = { "g", "cm3" },
        utype    = "density",
        default  = "lb/cuin",
    },
    ["g/m3"] = {
        per      = { "g", "m3" },
        utype    = "density",
        default  = "lb/cuyd",
        link     = "Density",
    },
    ["Mg/m3"] = {
        per      = { "Mg", "m3" },
        utype    = "density",
        default  = "lb/cuft",
    },
    ["mg/l"] = {
        per      = { "mg", "l" },
        utype    = "density",
        default  = "oz/cuin",
    },
    ["µg/dL"] = {
        per      = { "µg", "dL" },
        utype    = "density",
        default  = "lb/cuin",
    },
    ["µg/l"] = {
        per      = { "µg", "l" },
        utype    = "density",
        default  = "oz/cuin",
    },
    ["lb/ft3"] = {
        target   = "lb/cuft",
    },
    ["lb/yd3"] = {
        target   = "lb/cuyd",
    },
    ["lbm/in3"] = {
        target   = "lbm/cuin",
    },
    ["mcg/dL"] = {
        target   = "µg/dL",
    },
    ["oz/in3"] = {
```

```
        target   = "oz/cuin",
    },
    ["ug/dL"] = {
        target   = "µg/dL",
    },
    ["ug/l"] = {
        target   = "µg/l",
    },
    ["B.O.T.U."] = {
        name1    = "Board of Trade Unit",
        symbol   = "B.O.T.U.",
        utype    = "energy",
        scale    = 3600000,
        default  = "MJ",
        link     = "Kilowatt-hour",
    },
    ["bboe"] = {
        name1    = "barrel of oil equivalent",
        name2    = "barrels of oil equivalent",
        symbol   = "bboe",
        utype    = "energy",
        scale    = 6117863200,
        default  = "GJ",
    },
    ["BOE"] = {
        name1    = "barrel of oil equivalent",
        name2    = "barrels of oil equivalent",
        symbol   = "BOE",
        utype    = "energy",
        scale    = 6117863200,
        default  = "GJ",
    },
    ["BTU"] = {
        name1    = "British thermal unit",
        symbol   = "BTU",
        utype    = "energy",
        scale    = 1055.05585262,
        default  = "kJ",
    },
    ["Btu"] = {
        name1    = "British thermal unit",
        symbol   = "Btu",
        utype    = "energy",
        scale    = 1055.05585262,
        default  = "kJ",
    },
    ["BTU-39F"] = {
        name1    = "British thermal unit (39°F)",
        name2    = "British thermal units (39°F)",
        symbol   = "BTU<sub>39°F</sub>",
        utype    = "energy",
        scale    = 1059.67,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-39F"] = {
        name1    = "British thermal unit (39°F)",
        name2    = "British thermal units (39°F)",
        symbol   = "Btu<sub>39°F</sub>",
        utype    = "energy",
        scale    = 1059.67,
        default  = "kJ",
        link     = "British thermal unit",
    },
```

```
    ["BTU-59F"] = {
        name1    = "British thermal unit (59°F)",
        name2    = "British thermal units (59°F)",
        symbol   = "BTU<sub>59°F</sub>",
        utype    = "energy",
        scale    = 1054.804,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-59F"] = {
        name1    = "British thermal unit (59°F)",
        name2    = "British thermal units (59°F)",
        symbol   = "Btu<sub>59°F</sub>",
        utype    = "energy",
        scale    = 1054.804,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-60F"] = {
        name1    = "British thermal unit (60°F)",
        name2    = "British thermal units (60°F)",
        symbol   = "BTU<sub>60°F</sub>",
        utype    = "energy",
        scale    = 1054.68,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-60F"] = {
        name1    = "British thermal unit (60°F)",
        name2    = "British thermal units (60°F)",
        symbol   = "Btu<sub>60°F</sub>",
        utype    = "energy",
        scale    = 1054.68,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-63F"] = {
        name1    = "British thermal unit (63°F)",
        name2    = "British thermal units (63°F)",
        symbol   = "BTU<sub>63°F</sub>",
        utype    = "energy",
        scale    = 1054.6,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-63F"] = {
        name1    = "British thermal unit (63°F)",
        name2    = "British thermal units (63°F)",
        symbol   = "Btu<sub>63°F</sub>",
        utype    = "energy",
        scale    = 1054.6,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-ISO"] = {
        name1    = "British thermal unit (ISO)",
        name2    = "British thermal units (ISO)",
        symbol   = "BTU<sub>ISO</sub>",
        utype    = "energy",
        scale    = 1055.056,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-ISO"] = {
```

```
        target   = "BTU-ISO",
    },
    ["BTU-IT"] = {
        name1    = "British thermal unit (IT)",
        name2    = "British thermal units (IT)",
        symbol   = "BTU<sub>IT</sub>",
        utype    = "energy",
        scale    = 1055.05585262,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-IT"] = {
        name1    = "British thermal unit (IT)",
        name2    = "British thermal units (IT)",
        symbol   = "Btu<sub>IT</sub>",
        utype    = "energy",
        scale    = 1055.05585262,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-mean"] = {
        name1    = "British thermal unit (mean)",
        name2    = "British thermal units (mean)",
        symbol   = "BTU<sub>mean</sub>",
        utype    = "energy",
        scale    = 1055.87,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-mean"] = {
        name1    = "British thermal unit (mean)",
        name2    = "British thermal units (mean)",
        symbol   = "Btu<sub>mean</sub>",
        utype    = "energy",
        scale    = 1055.87,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-th"] = {
        name1    = "British thermal unit (thermochemical)",
        name2    = "British thermal units (thermochemical)",
        symbol   = "BTU<sub>th</sub>",
        utype    = "energy",
        scale    = 1054.35026444,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-th"] = {
        name1    = "British thermal unit (thermochemical)",
        name2    = "British thermal units (thermochemical)",
        symbol   = "Btu<sub>th</sub>",
        utype    = "energy",
        scale    = 1054.35026444,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Cal"] = {
        name1    = "calorie",
        symbol   = "Cal",
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
    },
    ["cal"] = {
```

```
        name1    = "calorie",
        symbol   = "cal",
        utype    = "energy",
        scale    = 4.184,
        default  = "J",
    },
    ["Cal-15"] = {
        name1    = "Calorie (15°C)",
        name2    = "Calories (15°C)",
        symbol   = "Cal<sub>15</sub>",
        utype    = "energy",
        scale    = 4185.8,
        default  = "kJ",
        link     = "Calorie",
    },
    ["cal-15"] = {
        name1    = "calorie (15°C)",
        name2    = "calories (15°C)",
        symbol   = "cal<sub>15</sub>",
        utype    = "energy",
        scale    = 4.1858,
        default  = "J",
        link     = "Calorie",
    },
    ["Cal-IT"] = {
        name1    = "Calorie (International Steam Table)",
        name2    = "Calories (International Steam Table)",
        symbol   = "Cal<sub>IT</sub>",
        utype    = "energy",
        scale    = 4186.8,
        default  = "kJ",
        link     = "Calorie",
    },
    ["cal-IT"] = {
        name1    = "calorie (International Steam Table)",
        name2    = "calories (International Steam Table)",
        symbol   = "cal<sub>IT</sub>",
        utype    = "energy",
        scale    = 4.1868,
        default  = "J",
        link     = "Calorie",
    },
    ["Cal-th"] = {
        name1    = "Calorie (thermochemical)",
        name2    = "Calories (thermochemical)",
        symbol   = "Cal<sub>th</sub>",
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
        link     = "Calorie",
    },
    ["cal-th"] = {
        name1    = "calorie (thermochemical)",
        name2    = "calories (thermochemical)",
        symbol   = "cal<sub>th</sub>",
        utype    = "energy",
        scale    = 4.184,
        default  = "J",
        link     = "Calorie",
    },
    ["CHU-IT"] = {
        name1    = "Celsius heat unit (International Table)",
        name2    = "Celsius heat units (International Table)",
        symbol   = "CHU<sub>IT</sub>",
```

```
        utype    = "energy",
        scale    = 1899.100534716,
        default  = "kJ",
        link     = "Conversion of units#Energy",
    },
    ["cufootnaturalgas"] = {
        name1    = "cubic foot of natural gas",
        name2    = "cubic foot of natural gas",
        symbol   = "cuftnaturalgas",
        usename  = 1,
        utype    = "energy",
        scale    = 1055055.85262,
        default  = "MJ",
        link     = "Conversion of units#Energy",
    },
    ["cuftnaturalgas"] = {
        name1    = "cubic foot of natural gas",
        name2    = "cubic feet of natural gas",
        symbol   = "cuftnaturalgas",
        usename  = 1,
        utype    = "energy",
        scale    = 1055055.85262,
        default  = "MJ",
        link     = "Conversion of units#Energy",
    },
    ["Eh"] = {
        name1    = "Hartree",
        symbol   = "''E''<sub>h</sub>",
        utype    = "energy",
        scale    = 4.35974417e-18,
        default  = "eV",
    },
    ["erg"] = {
        symbol   = "erg",
        utype    = "energy",
        scale    = 0.0000001,
        default  = "µJ",
    },
    ["eV"] = {
        name1    = "electronvolt",
        symbol   = "eV",
        utype    = "energy",
        scale    = 1.602176487e-19,
        default  = "aJ",
    },
    ["feV"] = {
        name1    = "femtoelectronvolt",
        symbol   = "feV",
        utype    = "energy",
        scale    = 1.602176487e-34,
        default  = "yJ",
        link     = "Electronvolt",
    },
    ["foe"] = {
        symbol   = "foe",
        utype    = "energy",
        scale    = 1e44,
        default  = "YJ",
        link     = "Foe (unit)",
    },
    ["ftlb"] = {
        name1    = "foot-pound",
        symbol   = "ft·lb",
        utype    = "energy",
```

```
        alttype  = "torque",
        scale    = 1.3558179483314004,
        default  = "J",
        link     = "Foot-pound (energy)",
    },
    ["ftlb-f"] = {
        name1    = "foot-pound force",
        name2    = "foot-pounds force",
        symbol   = "ft·lb<sub>f</sub>",
        utype    = "energy",
        alttype  = "torque",
        scale    = 1.3558179483314004,
        default  = "J",
        link     = "Foot-pound (energy)",
    },
    ["ftlbf"] = {
        name1    = "foot-pound force",
        name2    = "foot-pounds force",
        symbol   = "ft·lbf",
        utype    = "energy",
        alttype  = "torque",
        scale    = 1.3558179483314004,
        default  = "J",
        link     = "Foot-pound (energy)",
    },
    ["ftpdl"] = {
        name1    = "foot-poundal",
        symbol   = "ft·pdl",
        utype    = "energy",
        scale    = 0.0421401100938048,
        default  = "J",
    },
    ["GeV"] = {
        name1    = "gigaelectronvolt",
        symbol   = "GeV",
        utype    = "energy",
        scale    = 1.602176487e-10,
        default  = "nJ",
        link     = "Electronvolt",
    },
    ["gTNT"] = {
        name2    = "grams of TNT",
        symbol   = "gram of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
        link     = "TNT equivalent",
    },
    ["Gtoe"] = {
        name1    = "gigatonne of oil equivalent",
        name2    = "gigatonnes of oil equivalent",
        symbol   = "Gtoe",
        utype    = "energy",
        scale    = 4.1868e19,
        default  = "EJ",
        link     = "Tonne of oil equivalent",
    },
    ["GtonTNT"] = {
        name2    = "gigatons of TNT",
        symbol   = "gigaton of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e18,
```

```
        default  = "EJ",
        link     = "TNT equivalent",
    },
    ["GtTNT"] = {
        name2    = "gigatonnes of TNT",
        symbol   = "gigatonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e18,
        default  = "EJ",
        link     = "TNT equivalent",
    },
    ["GW.h"] = {
        name1    = "gigawatt-hour",
        symbol   = "GW·h",
        utype    = "energy",
        scale    = 3.6e12,
        default  = "TJ",
        link     = "Kilowatt-hour",
    },
    ["GWh"] = {
        name1    = "gigawatt-hour",
        symbol   = "GWh",
        utype    = "energy",
        scale    = 3.6e12,
        default  = "TJ",
        link     = "Kilowatt-hour",
    },
    ["hph"] = {
        name1    = "horsepower-hour",
        symbol   = "hp·h",
        utype    = "energy",
        scale    = 2684519.537696172792,
        default  = "kWh",
        link     = "Horsepower",
    },
    ["inlb"] = {
        name1    = "inch-pound",
        symbol   = "in·lb",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.1129848290276167,
        default  = "mJ",
        link     = "Foot-pound (energy)",
    },
    ["inlb-f"] = {
        name1    = "inch-pound force",
        name2    = "inch-pounds force",
        symbol   = "in·lb<sub>f</sub>",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.1129848290276167,
        default  = "mJ",
        link     = "Foot-pound (energy)",
    },
    ["inlbf"] = {
        name1    = "inch-pound force",
        name2    = "inch-pounds force",
        symbol   = "in·lbf",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.1129848290276167,
        default  = "mJ",
        link     = "Foot-pound (energy)",
```

```
    },
    ["inoz-f"] = {
        name1    = "inch-ounce force",
        name2    = "inch-ounces force",
        symbol   = "in·oz<sub>f</sub>",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.00706155181422604375,
        default  = "mJ",
        link     = "Foot-pound (energy)",
    },
    ["inozf"] = {
        name1    = "inch-ounce force",
        name2    = "inch-ounces force",
        symbol   = "in·ozf",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.00706155181422604375,
        default  = "mJ",
        link     = "Foot-pound (energy)",
    },
    ["J"] = {
        _name1   = "joule",
        _symbol  = "J",
        utype    = "energy",
        scale    = 1,
        prefixes = 1,
        default  = "cal",
        link     = "Joule",
    },
    ["kBOE"] = {
        name1    = "kilo barrel of oil equivalent",
        name2    = "kilo barrels of oil equivalent",
        symbol   = "kBOE",
        utype    = "energy",
        scale    = 6.1178632e12,
        default  = "TJ",
        link     = "Barrel of oil equivalent",
    },
    ["kcal"] = {
        name1    = "kilocalorie",
        symbol   = "kcal",
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
        link     = "Calorie",
    },
    ["kcal-15"] = {
        name1    = "kilocalorie (15°C)",
        name2    = "kilocalories (15°C)",
        symbol   = "kcal<sub>15</sub>",
        utype    = "energy",
        scale    = 4185.8,
        default  = "kJ",
        link     = "Calorie",
    },
    ["kcal-IT"] = {
        name1    = "kilocalorie (International Steam Table)",
        name2    = "kilocalories (International Steam Table)",
        symbol   = "kcal<sub>IT</sub>",
        utype    = "energy",
        scale    = 4186.8,
        default  = "kJ",
        link     = "Calorie",
```

```
    },
    ["kcal-th"] = {
        name1    = "kilocalorie (thermochemical)",
        name2    = "kilocalories (thermochemical)",
        symbol   = "kcal<sub>th</sub>",
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
        link     = "Calorie",
    },
    ["kerg"] = {
        name1    = "kiloerg",
        symbol   = "kerg",
        utype    = "energy",
        scale    = 0.0001,
        default  = "mJ",
        link     = "Erg",
    },
    ["keV"] = {
        name1    = "kiloelectronvolt",
        symbol   = "keV",
        utype    = "energy",
        scale    = 1.602176487e-16,
        default  = "fJ",
        link     = "Electronvolt",
    },
    ["kgTNT"] = {
        name2    = "kilograms of TNT",
        symbol   = "kilogram of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "TNT equivalent",
    },
    ["kt(TNT)"] = {
        name1    = "kilotonne",
        name1_us = "kiloton",
        symbol   = "kt",
        utype    = "energy",
        scale    = 4.184e12,
        default  = "TJ",
        link     = "TNT equivalent",
    },
    ["ktoe"] = {
        name1    = "kilotonne of oil equivalent",
        name2    = "kilotonnes of oil equivalent",
        symbol   = "ktoe",
        utype    = "energy",
        scale    = 4.1868e13,
        default  = "TJ",
        link     = "Tonne of oil equivalent",
    },
    ["ktonTNT"] = {
        name1    = "kiloton of TNT",
        name2    = "kilotons of TNT",
        symbol   = "kt",
        utype    = "energy",
        scale    = 4.184e12,
        default  = "TJ",
        link     = "TNT equivalent",
    },
    ["ktTNT"] = {
        name2    = "kilotonnes of TNT",
```

```
        symbol   = "kilotonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e12,
        default  = "TJ",
        link     = "TNT equivalent",
    },
    ["kW.h"] = {
        name1    = "kilowatt-hour",
        symbol   = "kW·h",
        utype    = "energy",
        scale    = 3600000,
        default  = "MJ",
    },
    ["kWh"] = {
        name1    = "kilowatt-hour",
        symbol   = "kWh",
        utype    = "energy",
        scale    = 3600000,
        default  = "MJ",
    },
    ["Mcal"] = {
        name1    = "megacalorie",
        symbol   = "Mcal",
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "Calorie",
    },
    ["mcal"] = {
        name1    = "millicalorie",
        symbol   = "mcal",
        utype    = "energy",
        scale    = 0.004184,
        default  = "mJ",
        link     = "Calorie",
    },
    ["Mcal-15"] = {
        name1    = "megacalorie (15°C)",
        name2    = "megacalories (15°C)",
        symbol   = "Mcal<sub>15</sub>",
        utype    = "energy",
        scale    = 4185800,
        default  = "MJ",
        link     = "Calorie",
    },
    ["mcal-15"] = {
        name1    = "millicalorie (15°C)",
        name2    = "millicalories (15°C)",
        symbol   = "mcal<sub>15</sub>",
        utype    = "energy",
        scale    = 0.0041858,
        default  = "mJ",
        link     = "Calorie",
    },
    ["Mcal-IT"] = {
        name1    = "megacalorie (International Steam Table)",
        name2    = "megacalories (International Steam Table)",
        symbol   = "Mcal<sub>IT</sub>",
        utype    = "energy",
        scale    = 4186800,
        default  = "MJ",
        link     = "Calorie",
    },
```

```
    ["mcal-IT"] = {
        name1    = "millicalorie (International Steam Table)",
        name2    = "millicalories (International Steam Table)",
        symbol   = "mcal<sub>IT</sub>",
        utype    = "energy",
        scale    = 0.0041868,
        default  = "mJ",
        link     = "Calorie",
    },
    ["Mcal-th"] = {
        name1    = "megacalorie (thermochemical)",
        name2    = "megacalories (thermochemical)",
        symbol   = "Mcal<sub>th</sub>",
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "Calorie",
    },
    ["mcal-th"] = {
        name1    = "millicalorie (thermochemical)",
        name2    = "millicalories (thermochemical)",
        symbol   = "mcal<sub>th</sub>",
        utype    = "energy",
        scale    = 0.004184,
        default  = "mJ",
        link     = "Calorie",
    },
    ["Merg"] = {
        name1    = "megaerg",
        symbol   = "Merg",
        utype    = "energy",
        scale    = 0.1,
        default  = "J",
        link     = "Erg",
    },
    ["merg"] = {
        name1    = "millierg",
        symbol   = "merg",
        utype    = "energy",
        scale    = 0.0000000001,
        default  = "µJ",
        link     = "Erg",
    },
    ["MeV"] = {
        name1    = "megaelectronvolt",
        symbol   = "MeV",
        utype    = "energy",
        scale    = 1.602176487e-13,
        default  = "pJ",
        link     = "Electronvolt",
    },
    ["meV"] = {
        name1    = "millielectronvolt",
        symbol   = "meV",
        utype    = "energy",
        scale    = 1.602176487e-22,
        default  = "zJ",
        link     = "Electronvolt",
    },
    ["MMBtu"] = {
        name1    = "million British thermal units",
        name2    = "million British thermal units",
        symbol   = "MMBtu",
        utype    = "energy",
```

```
        scale    = 1055055852.62,
        default  = "GJ",
        link     = "British thermal unit",
    },
    ["Mt(TNT)"] = {
        name1    = "megatonne",
        name1_us = "megaton",
        symbol   = "Mt",
        utype    = "energy",
        scale    = 4.184e15,
        default  = "PJ",
        link     = "TNT equivalent",
    },
    ["Mtoe"] = {
        name1    = "megatonne of oil equivalent",
        name2    = "megatonnes of oil equivalent",
        symbol   = "Mtoe",
        utype    = "energy",
        scale    = 4.1868e16,
        default  = "PJ",
        link     = "Tonne of oil equivalent",
    },
    ["MtonTNT"] = {
        name1    = "megaton of TNT",
        name2    = "megatons of TNT",
        symbol   = "Mt",
        utype    = "energy",
        scale    = 4.184e15,
        default  = "PJ",
        link     = "TNT equivalent",
    },
    ["mtonTNT"] = {
        name2    = "millitons of TNT",
        symbol   = "milliton of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "TNT equivalent",
    },
    ["MtTNT"] = {
        name2    = "megatonnes of TNT",
        symbol   = "megatonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e15,
        default  = "PJ",
        link     = "TNT equivalent",
    },
    ["mtTNT"] = {
        name2    = "millitonnes of TNT",
        symbol   = "millitonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "TNT equivalent",
    },
    ["MW.h"] = {
        name1    = "megawatt-hour",
        symbol   = "MW·h",
        utype    = "energy",
        scale    = 3600000000,
        default  = "GJ",
```

```
        link     = "Kilowatt-hour",
    },
    ["mW.h"] = {
        name1    = "milliwatt-hour",
        symbol   = "mW·h",
        utype    = "energy",
        scale    = 3.6,
        default  = "J",
        link     = "Kilowatt-hour",
    },
    ["MWh"] = {
        name1    = "megawatt-hour",
        symbol   = "MWh",
        utype    = "energy",
        scale    = 3600000000,
        default  = "GJ",
        link     = "Kilowatt-hour",
    },
    ["mWh"] = {
        name1    = "milliwatt-hour",
        symbol   = "mWh",
        utype    = "energy",
        scale    = 3.6,
        default  = "J",
        link     = "Kilowatt-hour",
    },
    ["neV"] = {
        name1    = "nanoelectronvolt",
        symbol   = "neV",
        utype    = "energy",
        scale    = 1.602176487e-28,
        default  = "yJ",
        link     = "Electronvolt",
    },
    ["PeV"] = {
        name1    = "petaelectronvolt",
        symbol   = "PeV",
        utype    = "energy",
        scale    = 0.0001602176487,
        default  = "mJ",
        link     = "Electronvolt",
    },
    ["peV"] = {
        name1    = "picoelectronvolt",
        symbol   = "peV",
        utype    = "energy",
        scale    = 1.602176487e-31,
        default  = "yJ",
        link     = "Electronvolt",
    },
    ["PSh"] = {
        name1    = "Pferdestärkenstunde",
        symbol   = "PSh",
        utype    = "energy",
        scale    = 2647795.5,
        default  = "kWh",
    },
    ["quad"] = {
        name1    = "quadrillion British thermal units",
        name2    = "quadrillion British thermal units",
        symbol   = "quad",
        utype    = "energy",
        scale    = 1.054804e18,
        default  = "EJ",
```

```
        link     = "Quad (unit)",
    },
    ["Ry"] = {
        name1    = "rydberg",
        symbol   = "Ry",
        utype    = "energy",
        scale    = 2.1798741e-18,
        default  = "eV",
        link     = "Rydberg constant",
    },
    ["scf"] = {
        name1    = "standard cubic foot",
        name2    = "standard cubic feet",
        symbol   = "scf",
        utype    = "energy",
        scale    = 2869.2044809344,
        default  = "kJ",
    },
    ["scfoot"] = {
        name1    = "standard cubic foot",
        name2    = "standard cubic foot",
        symbol   = "scf",
        utype    = "energy",
        scale    = 2869.2044809344,
        default  = "kJ",
    },
    ["t(TNT)"] = {
        name1    = "tonne",
        name1_us = "ton",
        symbol   = "t",
        utype    = "energy",
        scale    = 4184000000,
        default  = "GJ",
        link     = "TNT equivalent",
    },
    ["TeV"] = {
        name1    = "teraelectronvolt",
        symbol   = "TeV",
        utype    = "energy",
        scale    = 1.602176487e-7,
        default  = "µJ",
        link     = "Electronvolt",
    },
    ["th"] = {
        name1    = "thermie",
        symbol   = "th",
        utype    = "energy",
        scale    = 4186800,
        default  = "MJ",
        link     = "Conversion of units#Energy",
    },
    ["thm-EC"] = {
        name1    = "therm (EC)",
        name2    = "therms (EC)",
        symbol   = "thm (EC)",
        utype    = "energy",
        scale    = 105506000,
        default  = "MJ",
        link     = "Therm",
    },
    ["thm-UK"] = {
        name1    = "therm (UK)",
        name2    = "therms (UK)",
        symbol   = "thm (UK)",
```

```
        utype    = "energy",
        scale    = 105505585.257348,
        default  = "MJ",
        link     = "Therm",
    },
    ["thm-US"] = {
        name1    = "therm (US)",
        name1_us = "therm (U.S.)",
        name2    = "therms (US)",
        name2_us = "therms (U.S.)",
        symbol   = "thm (US)",
        sym_us   = "thm (U.S.)",
        utype    = "energy",
        scale    = 105480400,
        default  = "MJ",
        link     = "Therm",
    },
    ["toe"] = {
        name1    = "tonne of oil equivalent",
        name2    = "tonnes of oil equivalent",
        symbol   = "toe",
        utype    = "energy",
        scale    = 41868000000,
        default  = "GJ",
    },
    ["tonTNT"] = {
        name2    = "tons of TNT",
        symbol   = "ton of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000000,
        default  = "GJ",
        link     = "TNT equivalent",
    },
    ["tTNT"] = {
        name2    = "tonnes of TNT",
        symbol   = "tonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000000,
        default  = "GJ",
        link     = "TNT equivalent",
    },
    ["TtonTNT"] = {
        name2    = "teratons of TNT",
        symbol   = "teraton of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e21,
        default  = "ZJ",
        link     = "TNT equivalent",
    },
    ["TtTNT"] = {
        name2    = "teratonnes of TNT",
        symbol   = "teratonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e21,
        default  = "ZJ",
        link     = "TNT equivalent",
    },
    ["TW.h"] = {
        name1    = "terawatt-hour",
        symbol   = "TW·h",
```

```
        utype    = "energy",
        scale    = 3.6e15,
        default  = "PJ",
        link     = "Kilowatt-hour",
    },
    ["TWh"] = {
        name1    = "terawatt-hour",
        symbol   = "TWh",
        utype    = "energy",
        scale    = 3.6e15,
        default  = "PJ",
        link     = "Kilowatt-hour",
    },
    ["W.h"] = {
        name1    = "watt-hour",
        symbol   = "W·h",
        utype    = "energy",
        scale    = 3600,
        default  = "kJ",
        link     = "Kilowatt-hour",
    },
    ["Wh"] = {
        name1    = "watt-hour",
        symbol   = "Wh",
        utype    = "energy",
        scale    = 3600,
        default  = "kJ",
        link     = "Kilowatt-hour",
    },
    ["µerg"] = {
        name1    = "microerg",
        symbol   = "µerg",
        utype    = "energy",
        scale    = 1e-13,
        default  = "nJ",
        link     = "Erg",
    },
    ["µeV"] = {
        name1    = "microelectronvolt",
        symbol   = "µeV",
        utype    = "energy",
        scale    = 1.602176487e-25,
        default  = "yJ",
        link     = "Electronvolt",
    },
    ["µW.h"] = {
        name1    = "microwatt-hour",
        symbol   = "µW·h",
        utype    = "energy",
        scale    = 0.0036,
        default  = "mJ",
        link     = "Kilowatt-hour",
    },
    ["µWh"] = {
        name1    = "microwatt-hour",
        symbol   = "µWh",
        utype    = "energy",
        scale    = 0.0036,
        default  = "mJ",
        link     = "Kilowatt-hour",
    },
    ["-kW.h"] = {
        target   = "kW.h",
        link     = "Kilowatt hour",
```

```
    },
    ["btu"] = {
        target   = "BTU",
    },
    ["Calorie"] = {
        target   = "Cal",
    },
    ["ft.lbf"] = {
        target   = "ftlbf",
    },
    ["ft·lbf"] = {
        target   = "ftlbf",
    },
    ["g-cal-15"] = {
        target   = "cal-15",
    },
    ["g-cal-IT"] = {
        target   = "cal-IT",
    },
    ["g-cal-th"] = {
        target   = "cal-th",
    },
    ["g-kcal-15"] = {
        target   = "kcal-15",
    },
    ["g-kcal-IT"] = {
        target   = "kcal-IT",
    },
    ["g-kcal-th"] = {
        target   = "kcal-th",
    },
    ["g-Mcal-15"] = {
        target   = "Mcal-15",
    },
    ["g-mcal-15"] = {
        target   = "mcal-15",
    },
    ["g-Mcal-IT"] = {
        target   = "Mcal-IT",
    },
    ["g-mcal-IT"] = {
        target   = "mcal-IT",
    },
    ["g-Mcal-th"] = {
        target   = "Mcal-th",
    },
    ["g-mcal-th"] = {
        target   = "mcal-th",
    },
    ["GW-h"] = {
        target   = "GW.h",
    },
    ["GW·h"] = {
        target   = "GW.h",
    },
    ["Hartree"] = {
        target   = "Eh",
    },
    ["hp.h"] = {
        target   = "hph",
    },
    ["in.lb-f"] = {
        target   = "inlb-f",
    },
```

```
    ["in.lbf"] = {
        target   = "inlbf",
    },
    ["in.oz-f"] = {
        target   = "inoz-f",
    },
    ["in.ozf"] = {
        target   = "inozf",
    },
    ["kbboe"] = {
        target   = "kBOE",
        symbol   = "kbboe",
    },
    ["kg-cal-15"] = {
        target   = "Cal-15",
    },
    ["kg-cal-IT"] = {
        target   = "Cal-IT",
    },
    ["kg-cal-th"] = {
        target   = "Cal-th",
    },
    ["kW-h"] = {
        target   = "kW.h",
    },
    ["kW·h"] = {
        target   = "kW.h",
    },
    ["MW-h"] = {
        target   = "MW.h",
    },
    ["mW-h"] = {
        target   = "mW.h",
    },
    ["MW·h"] = {
        target   = "MW.h",
    },
    ["TW-h"] = {
        target   = "TW.h",
    },
    ["uerg"] = {
        target   = "µerg",
    },
    ["ueV"] = {
        target   = "µeV",
    },
    ["uW-h"] = {
        target   = "µW.h",
    },
    ["uW.h"] = {
        target   = "µW.h",
    },
    ["uWh"] = {
        target   = "µWh",
    },
    ["W-h"] = {
        target   = "W.h",
    },
    ["eVpar"] = {
        _name1   = "electronvolt",
        _symbol  = "eV",
        utype    = "energy per chemical amount",
        scale    = 96485.329522144166,
        prefixes = 1,
```

```
        default  = "kcal/mol",
        link     = "Electronvolt",
    },
    ["kcal/mol"] = {
        per      = { "kcal", "mol" },
        utype    = "energy per chemical amount",
        default  = "kJ/mol",
        link     = "Kilocalorie per mole",
    },
    ["kJ/mol"] = {
        per      = { "kJ", "mol" },
        utype    = "energy per chemical amount",
        default  = "kcal/mol",
        link     = "Joule per mole",
    },
    ["kWh/100 km"] = {
        name1    = "kilowatt-hour per 100 kilometres",
        name1_us = "kilowatt-hour per 100 kilometers",
        name2    = "kilowatt-hours per 100 kilometres",
        name2_us = "kilowatt-hours per 100 kilometers",
        symbol   = "kW·h/100 km",
        utype    = "energy per unit length",
        scale    = 36,
        default  = "MJ/km kWh/mi",
        link     = "Kilowatt-hour",
    },
    ["kWh/100 mi"] = {
        name1    = "kilowatt-hour per 100 miles",
        name2    = "kilowatt-hours per 100 miles",
        symbol   = "kW·h/100 mi",
        utype    = "energy per unit length",
        scale    = 22.3694,
        default  = "mpge",
        link     = "Miles per gallon gasoline equivalent",
    },
    ["MJ/100 km"] = {
        name1    = "megajoule per 100 kilometres",
        name1_us = "megajoule per 100 kilometers",
        name2    = "megajoules per 100 kilometres",
        name2_us = "megajoules per 100 kilometers",
        symbol   = "MJ/100 km",
        utype    = "energy per unit length",
        scale    = 10,
        default  = "BTU/mi",
        link     = "British thermal unit",
    },
    ["mpge"] = {
        name1    = "mile per gallon gasoline equivalent",
        name2    = "miles per gallon gasoline equivalent",
        symbol   = "mpg&#8209;e",
        utype    = "energy per unit length",
        scale    = 13e-6,
        invert   = -1,
        iscomplex= true,
        default  = "kWh/100 mi",
        link     = "Miles per gallon gasoline equivalent",
    },
    ["BTU/mi"] = {
        per      = { "BTU", "mi" },
        utype    = "energy per unit length",
        default  = "v > 1525 ! M ! k ! J/km",
    },
    ["kJ/km"] = {
        per      = { "kJ", "km" },
```

```
        utype    = "energy per unit length",
        default  = "BTU/mi",
    },
    ["kWh/km"] = {
        per      = { "-kW.h", "km" },
        utype    = "energy per unit length",
        default  = "MJ/km kWh/mi",
    },
    ["kWh/mi"] = {
        per      = { "-kW.h", "mi" },
        utype    = "energy per unit length",
        default  = "kWh/km MJ/km",
    },
    ["MJ/km"] = {
        per      = { "MJ", "km" },
        utype    = "energy per unit length",
        default  = "BTU/mi",
    },
    ["mpg-e"] = {
        target   = "mpge",
    },
    ["BTU/lb"] = {
        name1    = "British thermal unit per pound",
        name2    = "British thermal units per pound",
        symbol   = "BTU/lb",
        utype    = "energy per unit mass",
        scale    = 429.92261414790346,
        default  = "kJ/kg",
        link     = "British thermal unit",
    },
    ["cal/g"] = {
        name1    = "calorie per gram",
        name2    = "calories per gram",
        symbol   = "cal/g",
        utype    = "energy per unit mass",
        scale    = 4184,
        default  = "J/g",
    },
    ["GJ/kg"] = {
        name1    = "gigajoule per kilogram",
        name2    = "gigajoules per kilogram",
        symbol   = "GJ/kg",
        utype    = "energy per unit mass",
        scale    = 1e9,
        default  = "ktTNT/t",
        link     = "Specific energy",
    },
    ["J/g"] = {
        name1    = "joule per gram",
        name2    = "joules per gram",
        symbol   = "J/g",
        utype    = "energy per unit mass",
        scale    = 1000,
        default  = "kcal/g",
        link     = "Specific energy",
    },
    ["kcal/g"] = {
        name1    = "kilocalorie per gram",
        name2    = "kilocalories per gram",
        symbol   = "kcal/g",
        utype    = "energy per unit mass",
        scale    = 4184000,
        default  = "kJ/g",
    },
```

```
    ["kJ/g"] = {
        name1    = "kilojoule per gram",
        name2    = "kilojoules per gram",
        symbol   = "kJ/g",
        utype    = "energy per unit mass",
        scale    = 1000000,
        default  = "kcal/g",
        link     = "Specific energy",
    },
    ["kJ/kg"] = {
        name1    = "kilojoule per kilogram",
        name2    = "kilojoules per kilogram",
        symbol   = "kJ/kg",
        utype    = "energy per unit mass",
        scale    = 1000,
        default  = "BTU/lb",
        link     = "Specific energy",
    },
    ["ktonTNT/MT"] = {
        name2    = "kilotons of TNT per metric ton",
        symbol   = "kiloton of TNT per metric ton",
        usename  = 1,
        utype    = "energy per unit mass",
        scale    = 4184000000,
        default  = "GJ/kg",
        link     = "TNT equivalent",
    },
    ["ktTNT/t"] = {
        name2    = "kilotonnes of TNT per tonne",
        symbol   = "kilotonne of TNT per tonne",
        usename  = 1,
        utype    = "energy per unit mass",
        scale    = 4184000000,
        default  = "GJ/kg",
        link     = "TNT equivalent",
    },
    ["MtonTNT/MT"] = {
        name2    = "megatons of TNT per metric ton",
        symbol   = "megaton of TNT per metric ton",
        usename  = 1,
        utype    = "energy per unit mass",
        scale    = 4.184e12,
        default  = "TJ/kg",
        link     = "TNT equivalent",
    },
    ["MtTNT/MT"] = {
        name2    = "megatonnes of TNT per tonne",
        symbol   = "megatonne of TNT per tonne",
        usename  = 1,
        utype    = "energy per unit mass",
        scale    = 4.184e12,
        default  = "TJ/kg",
        link     = "TNT equivalent",
    },
    ["TJ/kg"] = {
        name1    = "terajoule per kilogram",
        name2    = "terajoules per kilogram",
        symbol   = "TJ/kg",
        utype    = "energy per unit mass",
        scale    = 1e12,
        default  = "MtTNT/MT",
        link     = "Specific energy",
    },
    ["Cal/g"] = {
```

```
        per      = { "Cal", "g" },
        utype    = "energy per unit mass",
        default  = "kJ/g",
    },
    ["BTU/cuft"] = {
        per      = { "BTU", "cuft" },
        utype    = "energy per unit volume",
        default  = "kJ/L",
    },
    ["Cal/12USoz(mL)serve"] = {
        per      = { "Cal", "-12USoz(mL)serve" },
        utype    = "energy per unit volume",
        default  = "kJ/L",
    },
    ["Cal/12USoz(ml)serve"] = {
        per      = { "Cal", "-12USoz(ml)serve" },
        utype    = "energy per unit volume",
        default  = "kJ/l",
    },
    ["Cal/12USozserve"] = {
        per      = { "Cal", "-12USozserve" },
        utype    = "energy per unit volume",
        default  = "kJ/L",
    },
    ["Cal/USoz"] = {
        per      = { "Cal", "USoz" },
        utype    = "energy per unit volume",
        default  = "kJ/ml",
    },
    ["kJ/L"] = {
        per      = { "kJ", "L" },
        utype    = "energy per unit volume",
        default  = "BTU/cuft",
    },
    ["kJ/l"] = {
        per      = { "kJ", "l" },
        utype    = "energy per unit volume",
        default  = "BTU/cuft",
    },
    ["kJ/ml"] = {
        per      = { "kJ", "ml" },
        utype    = "energy per unit volume",
        default  = "Cal/USoz",
    },
    ["MJ/m3"] = {
        per      = { "MJ", "m3" },
        utype    = "energy per unit volume",
        default  = "BTU/cuft",
    },
    ["Sv"] = {
        _name1   = "sievert",
        _symbol  = "Sv",
        utype    = "equivalent radiation dose",
        scale    = 1,
        prefixes = 1,
        default  = "rem",
        link     = "Sievert",
    },
    ["rem"] = {
        _name1   = "rem",
        _symbol  = "rem",
        utype    = "equivalent radiation dose",
        scale    = 0.01,
        prefixes = 1,
```

```
        default  = "Sv",
        link     = "Roentgen equivalent man",
    },
    ["g/km"] = {
        name1    = "gram per kilometre",
        name1_us = "gram per kilometer",
        name2    = "grams per kilometre",
        name2_us = "grams per kilometer",
        symbol   = "g/km",
        utype    = "exhaust emission",
        scale    = 1e-6,
        default  = "oz/mi",
        link     = "Exhaust gas",
    },
    ["g/mi"] = {
        name1    = "gram per mile",
        name2    = "grams per mile",
        symbol   = "g/mi",
        utype    = "exhaust emission",
        scale    = 6.2137119223733397e-7,
        default  = "g/km",
        link     = "Exhaust gas",
    },
    ["gCO2/km"] = {
        name1    = "gram of CO<sub>2</sub> per kilometre",
        name1_us = "gram of CO<sub>2</sub> per kilometer",
        name2    = "grams of CO<sub>2</sub> per kilometre",
        name2_us = "grams of CO<sub>2</sub> per kilometer",
        symbol   = "g(CO<sub>2</sub>)/km",
        utype    = "exhaust emission",
        scale    = 1e-6,
        default  = "ozCO2/mi",
        link     = "Exhaust gas",
    },
    ["gCO2/mi"] = {
        name1    = "gram of CO<sub>2</sub> per mile",
        name2    = "grams of CO<sub>2</sub> per mile",
        symbol   = "g(CO<sub>2</sub>)/mi",
        utype    = "exhaust emission",
        scale    = 6.2137119223733397e-7,
        default  = "gCO2/km",
        link     = "Exhaust gas",
    },
    ["kg/km"] = {
        name1    = "kilogram per kilometre",
        name1_us = "kilogram per kilometer",
        name2    = "kilograms per kilometre",
        name2_us = "kilograms per kilometer",
        symbol   = "kg/km",
        utype    = "exhaust emission",
        scale    = 0.001,
        default  = "lb/mi",
        link     = "Exhaust gas",
    },
    ["kgCO2/km"] = {
        name1    = "kilogram of CO<sub>2</sub> per kilometre",
        name1_us = "kilogram of CO<sub>2</sub> per kilometer",
        name2    = "kilograms of CO<sub>2</sub> per kilometre",
        name2_us = "kilograms of CO<sub>2</sub> per kilometer",
        symbol   = "kg(CO<sub>2</sub>)/km",
        utype    = "exhaust emission",
        scale    = 0.001,
        default  = "lbCO2/mi",
        link     = "Exhaust gas",
```

```
    },
    ["lb/mi"] = {
        name1    = "pound per mile",
        name2    = "pounds per mile",
        symbol   = "lb/mi",
        utype    = "exhaust emission",
        scale    = 0.00028184923173665794,
        default  = "kg/km",
        link     = "Exhaust gas",
    },
    ["lbCO2/mi"] = {
        name1    = "pound of CO<sub>2</sub> per mile",
        name2    = "pounds of CO<sub>2</sub> per mile",
        symbol   = "lb(CO<sub>2</sub>)/mi",
        utype    = "exhaust emission",
        scale    = 0.00028184923173665794,
        default  = "kgCO2/km",
        link     = "Exhaust gas",
    },
    ["oz/mi"] = {
        name1    = "ounce per mile",
        name2    = "ounces per mile",
        symbol   = "oz/mi",
        utype    = "exhaust emission",
        scale    = 1.7615576983541121e-5,
        default  = "g/km",
        link     = "Exhaust gas",
    },
    ["ozCO2/mi"] = {
        name1    = "ounce of CO<sub>2</sub> per mile",
        name2    = "ounces of CO<sub>2</sub> per mile",
        symbol   = "oz(CO<sub>2</sub>)/mi",
        utype    = "exhaust emission",
        scale    = 1.7615576983541121e-5,
        default  = "gCO2/km",
        link     = "Exhaust gas",
    },
    ["cuft/a"] = {
        name1    = "cubic foot per annum",
        name2    = "cubic feet per annum",
        symbol   = "cu ft/a",
        utype    = "flow",
        scale    = 8.9730672142368242e-10,
        default  = "m3/a",
        link     = "Cubic foot per second",
    },
    ["cuft/d"] = {
        name1    = "cubic foot per day",
        name2    = "cubic feet per day",
        symbol   = "cu ft/d",
        utype    = "flow",
        scale    = 3.2774128000000003e-7,
        default  = "m3/d",
        link     = "Cubic foot per second",
    },
    ["cuft/h"] = {
        name1    = "cubic foot per hour",
        name2    = "cubic feet per hour",
        symbol   = "cu ft/h",
        utype    = "flow",
        scale    = 7.8657907200000004e-6,
        default  = "m3/h",
        link     = "Cubic foot per second",
    },
```

```
    ["cuft/min"] = {
        name1    = "cubic foot per minute",
        name2    = "cubic feet per minute",
        symbol   = "cu ft/min",
        utype    = "flow",
        scale    = 0.00047194744319999999,
        default  = "m3/min",
    },
    ["cuft/s"] = {
        name1    = "cubic foot per second",
        name2    = "cubic feet per second",
        symbol   = "cu ft/s",
        utype    = "flow",
        scale    = 28316846592e-12,
        default  = "m3/s",
    },
    ["cumi/a"] = {
        name1    = "cubic mile per annum",
        name2    = "cubic miles per annum",
        symbol   = "cu mi/a",
        utype    = "flow",
        scale    = 132.08171170940057,
        default  = "km3/a",
        link     = "Cubic foot per second",
    },
    ["cuyd/h"] = {
        name1    = "cubic yard per hour",
        name2    = "cubic yards per hour",
        symbol   = "cuyd/h",
        utype    = "flow",
        scale    = 0.00021237634944000001,
        default  = "m3/h",
        link     = "Cubic foot per second",
    },
    ["cuyd/s"] = {
        name1    = "cubic yard per second",
        name2    = "cubic yards per second",
        symbol   = "cu yd/s",
        utype    = "flow",
        scale    = 0.76455485798400002,
        default  = "m3/s",
    },
    ["Goilbbl/a"] = {
        name1    = "billion barrels per year",
        name2    = "billion barrels per year",
        symbol   = "Gbbl/a",
        utype    = "flow",
        scale    = 5.0380033629933836,
        default  = "v * 1.58987294928 < 10 ! e6 ! e9 ! m3/a",
        link     = "Barrel per day",
    },
    ["impgal/h"] = {
        name1    = "imperial gallon per hour",
        name2    = "imperial gallons per hour",
        symbol   = "imp gal/h",
        utype    = "flow",
        scale    = 1.2628027777777779e-6,
        default  = "m3/h",
        link     = "Gallon",
    },
    ["impgal/min"] = {
        name1    = "imperial gallon per minute",
        name2    = "imperial gallons per minute",
        symbol   = "imp gal/min",
```

```
        utype    = "flow",
        scale    = 7.5768166666666671e-5,
        default  = "m3/s",
        link     = "Gallon",
    },
    ["impgal/s"] = {
        name1    = "imperial gallon per second",
        name2    = "imperial gallons per second",
        symbol   = "impgal/s",
        utype    = "flow",
        scale    = 0.00454609,
        default  = "m3/s",
        link     = "Imperial gallons per second",
    },
    ["km3/a"] = {
        name1    = "cubic kilometre per annum",
        name1_us = "cubic kilometer per annum",
        name2    = "cubic kilometres per annum",
        name2_us = "cubic kilometers per annum",
        symbol   = "km<sup>3</sup>/a",
        utype    = "flow",
        scale    = 31.68808781402895,
        default  = "cumi/a",
        link     = "Cubic metre per second",
    },
    ["km3/d"] = {
        name1    = "cubic kilometre per day",
        name1_us = "cubic kilometer per day",
        name2    = "cubic kilometres per day",
        name2_us = "cubic kilometers per day",
        symbol   = "km<sup>3</sup>/d",
        utype    = "flow",
        scale    = 11574.074074074075,
        default  = "cuft/d",
        link     = "Cubic metre per second",
    },
    ["koilbbl/a"] = {
        name1    = "thousand barrels per year",
        name2    = "thousand barrels per year",
        symbol   = "kbbl/a",
        utype    = "flow",
        scale    = 5.0380033629933841e-6,
        default  = "v * 1.58987294928 < 10 ! ! e3 ! m3/a",
        link     = "Barrel per day",
    },
    ["koilbbl/d"] = {
        name1    = "thousand barrels per day",
        name2    = "thousand barrels per day",
        symbol   = "kbbl/d",
        utype    = "flow",
        scale    = 0.0018401307283333335,
        default  = "v * 1.58987294928 < 10 ! ! e3 ! m3/d",
        link     = "Barrel per day",
    },
    ["L/h"] = {
        name1    = "litre per hour",
        name1_us = "liter per hour",
        name2    = "litres per hour",
        name2_us = "liters per hour",
        symbol   = "L/h",
        utype    = "flow",
        scale    = 2.7777777777777776e-7,
        default  = "impgal/h USgal/h",
        link     = "Cubic metre per second",
```

```
    },
    ["L/min"] = {
        name1    = "litre per minute",
        name1_us = "liter per minute",
        name2    = "litres per minute",
        name2_us = "liters per minute",
        symbol   = "L/min",
        utype    = "flow",
        scale    = 1.6666666666666667e-5,
        default  = "impgal/min USgal/min",
        link     = "Cubic metre per second",
    },
    ["L/s"] = {
        name1    = "litre per second",
        name1_us = "liter per second",
        name2    = "litres per second",
        name2_us = "liters per second",
        symbol   = "L/s",
        utype    = "flow",
        scale    = 0.001,
        default  = "cuft/s",
        link     = "Cubic metre per second",
    },
    ["m3/a"] = {
        name1    = "cubic metre per annum",
        name1_us = "cubic meter per annum",
        name2    = "cubic metres per annum",
        name2_us = "cubic meters per annum",
        symbol   = "m<sup>3</sup>/a",
        utype    = "flow",
        scale    = 3.1688087814028947e-8,
        default  = "cuft/a",
        link     = "Cubic metre per second",
    },
    ["m3/d"] = {
        name1    = "cubic metre per day",
        name1_us = "cubic meter per day",
        name2    = "cubic metres per day",
        name2_us = "cubic meters per day",
        symbol   = "m<sup>3</sup>/d",
        utype    = "flow",
        scale    = 1.1574074074074073e-5,
        default  = "cuft/d",
        link     = "Cubic metre per second",
    },
    ["m3/h"] = {
        name1    = "cubic metre per hour",
        name1_us = "cubic meter per hour",
        name2    = "cubic metres per hour",
        name2_us = "cubic meters per hour",
        symbol   = "m<sup>3</sup>/h",
        utype    = "flow",
        scale    = 0.00027777777777777778,
        default  = "cuft/h",
        link     = "Cubic metre per second",
    },
    ["m3/min"] = {
        name1    = "cubic metre per minute",
        name1_us = "cubic meter per minute",
        name2    = "cubic metres per minute",
        name2_us = "cubic meters per minute",
        symbol   = "m<sup>3</sup>/min",
        utype    = "flow",
        scale    = 0.016666666666666666,
```

```
        default  = "cuft/min",
        link     = "Cubic metre per second",
    },
    ["m3/s"] = {
        name1    = "cubic metre per second",
        name1_us = "cubic meter per second",
        name2    = "cubic metres per second",
        name2_us = "cubic meters per second",
        symbol   = "m<sup>3</sup>/s",
        utype    = "flow",
        scale    = 1,
        default  = "cuft/s",
    },
    ["Moilbbl/a"] = {
        name1    = "million barrels per year",
        name2    = "million barrels per year",
        symbol   = "Mbbl/a",
        utype    = "flow",
        scale    = 0.0050380033629933837,
        default  = "v * 1.58987294928 < 10 ! e3 ! e6 ! m3/a",
        link     = "Barrel per day",
    },
    ["Moilbbl/d"] = {
        name1    = "million barrels per day",
        name2    = "million barrels per day",
        symbol   = "Mbbl/d",
        utype    = "flow",
        scale    = 1.8401307283333335,
        default  = "v * 1.58987294928 < 10 ! e3 ! e6 ! m3/d",
        link     = "Barrel per day",
    },
    ["oilbbl/a"] = {
        name1    = "barrel per year",
        name2    = "barrels per year",
        symbol   = "bbl/a",
        utype    = "flow",
        scale    = 5.0380033629933841e-9,
        default  = "m3/a",
        link     = "Barrel per day",
    },
    ["oilbbl/d"] = {
        name1    = "barrel per day",
        name2    = "barrels per day",
        symbol   = "bbl/d",
        utype    = "flow",
        scale    = 1.8401307283333336e-6,
        default  = "m3/d",
    },
    ["Toilbbl/a"] = {
        name1    = "trillion barrels per year",
        name2    = "trillion barrels per year",
        symbol   = "Tbbl/a",
        utype    = "flow",
        scale    = 5038.0033629933832,
        default  = "v * 1.58987294928 < 10 ! e9 ! e12 ! m3/a",
        link     = "Barrel per day",
    },
    ["U.S.gal/d"] = {
        name1    = "U.S. gallon per day",
        name2    = "U.S. gallons per day",
        symbol   = "U.S. gal/d",
        utype    = "flow",
        scale    = 4.3812636388888893e-8,
        default  = "m3/s",
```

```
        customary= 1,
    },
    ["U.S.gal/h"] = {
        name1    = "gallon per hour",
        name2    = "gallons per hour",
        symbol   = "gal/h",
        utype    = "flow",
        scale    = 1.0515032733333334e-6,
        default  = "m3/h",
        link     = "Gallon",
        customary= 2,
    },
    ["U.S.gal/min"] = {
        name1    = "U.S. gallon per minute",
        name2    = "U.S. gallons per minute",
        symbol   = "U.S. gal/min",
        utype    = "flow",
        scale    = 6.3090196400000003e-5,
        default  = "m3/s",
        link     = "Gallon",
    },
    ["USgal/a"] = {
        name1    = "US gallon per year",
        name2    = "US gallons per year",
        symbol   = "US gal/a",
        utype    = "flow",
        scale    = 1.1995246102365199e-10,
        default  = "m3/s",
    },
    ["USgal/d"] = {
        name1    = "US gallon per day",
        name2    = "US gallons per day",
        symbol   = "US gal/d",
        utype    = "flow",
        scale    = 4.3812636388888893e-8,
        default  = "m3/s",
    },
    ["USgal/h"] = {
        name1    = "gallon per hour",
        name2    = "gallons per hour",
        symbol   = "gal/h",
        utype    = "flow",
        scale    = 1.0515032733333334e-6,
        default  = "m3/h",
        link     = "Gallon",
        customary= 1,
    },
    ["USgal/min"] = {
        name1    = "US gallon per minute",
        name2    = "US gallons per minute",
        symbol   = "US gal/min",
        utype    = "flow",
        scale    = 6.3090196400000003e-5,
        default  = "m3/s",
        link     = "Gallon",
    },
    ["USgal/s"] = {
        name1    = "US gallon per second",
        name1_us = "U.S. gallon per second",
        name2    = "US gallons per second",
        name2_us = "U.S. gallons per second",
        symbol   = "USgal/s",
        utype    = "flow",
        scale    = 0.003785411784,
```

```
        default  = "m3/s",
        link     = "US gallons per second",
    },
    ["ft3/a"] = {
        target   = "cuft/a",
    },
    ["ft3/d"] = {
        target   = "cuft/d",
    },
    ["ft3/h"] = {
        target   = "cuft/h",
    },
    ["ft3/s"] = {
        target   = "cuft/s",
    },
    ["Gcuft/a"] = {
        target   = "e9cuft/a",
    },
    ["Gcuft/d"] = {
        target   = "e9cuft/d",
    },
    ["kcuft/a"] = {
        target   = "e3cuft/a",
    },
    ["kcuft/d"] = {
        target   = "e3cuft/d",
    },
    ["kcuft/s"] = {
        target   = "e3cuft/s",
    },
    ["Mcuft/a"] = {
        target   = "e6cuft/a",
    },
    ["Mcuft/d"] = {
        target   = "e6cuft/d",
    },
    ["Mcuft/s"] = {
        target   = "e6cuft/s",
    },
    ["m³/s"] = {
        target   = "m3/s",
    },
    ["Tcuft/a"] = {
        target   = "e12cuft/a",
    },
    ["Tcuft/d"] = {
        target   = "e12cuft/d",
    },
    ["u.s.gal/min"] = {
        target   = "U.S.gal/min",
    },
    ["usgal/min"] = {
        target   = "USgal/min",
    },
    ["-LTf"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "LTf",
        utype    = "force",
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["-STf"] = {
        name1    = "short ton-force",
```

```
        name2    = "short tons-force",
        symbol   = "STf",
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
    ["dyn"] = {
        name1    = "dyne",
        symbol   = "dyn",
        utype    = "force",
        scale    = 0.00001,
        default  = "gr-f",
    },
    ["g-f"] = {
        name1    = "gram-force",
        name2    = "grams-force",
        symbol   = "g<sub>f</sub>",
        utype    = "force",
        scale    = 0.00980665,
        default  = "mN oz-f",
        link     = "Kilogram-force",
    },
    ["gf"] = {
        name1    = "gram-force",
        name2    = "grams-force",
        symbol   = "gf",
        utype    = "force",
        scale    = 0.00980665,
        default  = "mN ozf",
        link     = "Kilogram-force",
    },
    ["gr-f"] = {
        name1    = "grain-force",
        name2    = "grains-force",
        symbol   = "gr<sub>f</sub>",
        utype    = "force",
        scale    = 0.0006354602307515,
        default  = "µN",
        link     = "Pound (force)",
    },
    ["grf"] = {
        name1    = "grain-force",
        name2    = "grains-force",
        symbol   = "grf",
        utype    = "force",
        scale    = 0.0006354602307515,
        default  = "µN",
        link     = "Pound (force)",
    },
    ["kdyn"] = {
        name1    = "kilodyne",
        symbol   = "kdyn",
        utype    = "force",
        scale    = 0.01,
        default  = "oz-f",
        link     = "Dyne",
    },
    ["kg-f"] = {
        name1    = "kilogram-force",
        name2    = "kilograms-force",
        symbol   = "kg<sub>f</sub>",
        utype    = "force",
        scale    = 9.80665,
        default  = "N lb-f",
```

```
    },
    ["kgf"] = {
        name1    = "kilogram-force",
        name2    = "kilograms-force",
        symbol   = "kgf",
        utype    = "force",
        scale    = 9.80665,
        default  = "N lbf",
    },
    ["kp"] = {
        name1    = "kilopond",
        symbol   = "kp",
        utype    = "force",
        scale    = 9.80665,
        default  = "N lb-f",
        link     = "Kilogram-force",
    },
    ["L/T-f"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "L/T<sub>f</sub>",
        utype    = "force",
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["L/Tf"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "L/Tf",
        utype    = "force",
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["lb-f"] = {
        name1    = "pound-force",
        name2    = "pounds-force",
        symbol   = "lb<sub>f</sub>",
        utype    = "force",
        scale    = 4.4482216152605,
        default  = "N",
        link     = "Pound (force)",
    },
    ["lbf"] = {
        name1    = "pound-force",
        name2    = "pounds-force",
        symbol   = "lbf",
        utype    = "force",
        scale    = 4.4482216152605,
        default  = "N",
        link     = "Pound (force)",
    },
    ["lb(f)"] = {
        name1    = "pound",
        symbol   = "lb",
        utype    = "force",
        scale    = 4.4482216152605,
        default  = "N",
        link     = "Pound (force)",
    },
    ["LT-f"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "LT<sub>f</sub>",
        utype    = "force",
```

```
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["LTf"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "LTf",
        usename  = 1,
        utype    = "force",
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["Mdyn"] = {
        name1    = "megadyne",
        symbol   = "Mdyn",
        utype    = "force",
        scale    = 10,
        default  = "lb-f",
        link     = "Dyne",
    },
    ["mdyn"] = {
        name1    = "millidyne",
        symbol   = "mdyn",
        utype    = "force",
        scale    = 0.00000001,
        default  = "gr-f",
        link     = "Dyne",
    },
    ["mg-f"] = {
        name1    = "milligram-force",
        name2    = "milligrams-force",
        symbol   = "mg<sub>f</sub>",
        utype    = "force",
        scale    = 0.00000980665,
        default  = "µN gr-f",
        link     = "Kilogram-force",
    },
    ["mgf"] = {
        name1    = "milligram-force",
        name2    = "milligrams-force",
        symbol   = "mgf",
        utype    = "force",
        scale    = 0.00000980665,
        default  = "µN grf",
        link     = "Kilogram-force",
    },
    ["Mp"] = {
        name1    = "megapond",
        symbol   = "Mp",
        utype    = "force",
        scale    = 9806.65,
        default  = "kN LT-f ST-f",
        link     = "Kilogram-force",
    },
    ["mp"] = {
        name1    = "millipond",
        symbol   = "mp",
        utype    = "force",
        scale    = 0.00000980665,
        default  = "µN gr-f",
        link     = "Kilogram-force",
    },
    ["N"] = {
        _name1   = "newton",
```

```
        _symbol  = "N",
        utype    = "force",
        scale    = 1,
        prefixes = 1,
        default  = "lb-f",
        link     = "Newton (unit)",
    },
    ["oz-f"] = {
        name1    = "ounce-force",
        name2    = "ounces-force",
        symbol   = "oz<sub>f</sub>",
        utype    = "force",
        scale    = 0.2780138203095378125,
        default  = "mN",
        link     = "Pound (force)",
    },
    ["ozf"] = {
        name1    = "ounce-force",
        name2    = "ounces-force",
        symbol   = "ozf",
        utype    = "force",
        scale    = 0.2780138203095378125,
        default  = "mN",
        link     = "Pound (force)",
    },
    ["p"] = {
        name1    = "pond",
        symbol   = "p",
        utype    = "force",
        scale    = 0.00980665,
        default  = "mN oz-f",
        link     = "Kilogram-force",
    },
    ["pdl"] = {
        name1    = "poundal",
        symbol   = "pdl",
        utype    = "force",
        scale    = 0.138254954376,
        default  = "N",
    },
    ["S/T-f"] = {
        name1    = "short ton-force",
        name2    = "short tons-force",
        symbol   = "S/T<sub>f</sub>",
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
    ["S/Tf"] = {
        name1    = "short ton-force",
        name2    = "short tons-force",
        symbol   = "S/Tf",
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
    ["ST-f"] = {
        name1    = "short ton-force",
        name2    = "short tons-force",
        symbol   = "ST<sub>f</sub>",
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
```

```
    ["STf"] = {
        name1    = "short ton-force",
        name2    = "short tons-force",
        symbol   = "STf",
        usename  = 1,
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
    ["t-f"] = {
        name1    = "tonne-force",
        name2    = "tonnes-force",
        symbol   = "t<sub>f</sub>",
        utype    = "force",
        scale    = 9806.65,
        default  = "kN LT-f ST-f",
        link     = "Ton-force#Tonne-force",
    },
    ["tf"] = {
        name1    = "tonne-force",
        name2    = "tonnes-force",
        symbol   = "tf",
        utype    = "force",
        scale    = 9806.65,
        default  = "kN LTf STf",
        link     = "Ton-force#Tonne-force",
    },
    ["dyne"] = {
        target   = "dyn",
    },
    ["newtons"] = {
        target   = "N",
    },
    ["poundal"] = {
        target   = "pdl",
    },
    ["tonne-force"] = {
        target   = "tf",
    },
    ["impgal/mi"] = {
        per      = { "@impgal", "mi" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "l/km USgal/mi",
    },
    ["km/L"] = {
        per      = { "km", "L" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "mpgimp mpgus",
    },
    ["km/l"] = {
        per      = { "km", "l" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "mpgimp mpgus",
    },
    ["L/100 km"] = {
        per      = { "L", "100km" },
        utype    = "fuel efficiency",
        invert   = 1,
```

```
        iscomplex= true,
        default  = "mpgimp mpgus",
        symlink  = "[[Fuel economy in automobiles#Units of measure|L/100 km]
    },
    ["l/100 km"] = {
        per      = { "l", "100km" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "mpgimp mpgus",
        symlink  = "[[Fuel economy in automobiles#Units of measure|l/100 km]
    },
    ["L/km"] = {
        per      = { "L", "km" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "mpgimp mpgus",
    },
    ["l/km"] = {
        per      = { "l", "km" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "mpgimp mpgus",
    },
    ["mi/impqt"] = {
        per      = { "mi", "impqt" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "km/L",
    },
    ["mi/U.S.qt"] = {
        per      = { "mi", "U.S.qt" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "km/L",
    },
    ["mi/USqt"] = {
        per      = { "mi", "USqt" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "km/L",
    },
    ["mi/usqt"] = {
        per      = { "mi", "usqt" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "km/L",
    },
    ["mpgimp"] = {
        per      = { "mi", "@impgal" },
        symbol   = "mpg<sub>&#8209;imp</sub>",
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "L/100 km+mpgus",
        symlink  = "[[Fuel economy in automobiles#Units of measure|mpg]]<sub>&#82
    },
    ["mpgus"] = {
```

```
        per      = { "mi", "+USgal" },
        symbol   = "mpg<sub>&#8209;US</sub>",
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "L/100 km+mpgimp",
        symlink  = "[[Fuel economy in automobiles#Units of measure|mpg]]<sub>&#82
    },
    ["U.S.gal/mi"] = {
        per      = { "*U.S.gal", "mi" },
        sp_us    = true,
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "l/km impgal/mi",
    },
    ["usgal/mi"] = {
        per      = { "+USgal", "mi" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "l/km impgal/mi",
    },
    ["L/100km"] = {
        target   = "L/100 km",
    },
    ["l/100km"] = {
        target   = "l/100 km",
    },
    ["mpg"] = {
        shouldbe = "Use %{mpgus%} for miles per US gallon or %{mpgimp%} for miles
    },
    ["mpgU.S."] = {
        target   = "mpgus",
        symbol   = "mpg<sub>&#8209;U.S.</sub>",
        sp_us    = true,
        symlink  = "[[Fuel economy in automobiles#Units of measure|mpg]]<sub>&#82
    },
    ["mpgu.s."] = {
        target   = "mpgus",
        symbol   = "mpg<sub>&#8209;U.S.</sub>",
        sp_us    = true,
        symlink  = "[[Fuel economy in automobiles#Units of measure|mpg]]<sub>&#82
    },
    ["mpgUS"] = {
        target   = "mpgus",
    },
    ["USgal/mi"] = {
        target   = "usgal/mi",
    },
    ["kPa/m"] = {
        per      = { "kPa", "-m-frac" },
        utype    = "fracture gradient",
        default  = "psi/ft",
    },
    ["psi/ft"] = {
        per      = { "psi", "-ft-frac" },
        utype    = "fracture gradient",
        default  = "kPa/m",
    },
    ["cm/km"] = {
        name1    = "centimetre per kilometre",
        name1_us = "centimeter per kilometer",
        name2    = "centimetres per kilometre",
```

```
        name2_us = "centimeters per kilometer",
        symbol   = "cm/km",
        utype    = "gradient",
        scale    = 0.00001,
        default  = "ft/mi",
        link     = "Grade (slope)",
    },
    ["ft/mi"] = {
        name1    = "foot per mile",
        name2    = "feet per mile",
        symbol   = "ft/mi",
        utype    = "gradient",
        scale    = 0.00018939393939393939,
        default  = "v < 5.28 ! c ! ! m/km",
        link     = "Grade (slope)",
    },
    ["ft/nmi"] = {
        name1    = "foot per nautical mile",
        name2    = "feet per nautical mile",
        symbol   = "ft/nmi",
        utype    = "gradient",
        scale    = 0.00016457883369330455,
        default  = "v < 6.076 ! c ! ! m/km",
        link     = "Grade (slope)",
    },
    ["in/ft"] = {
        name1    = "inch per foot",
        name2    = "inches per foot",
        symbol   = "in/ft",
        utype    = "gradient",
        scale    = 0.083333333333333329,
        default  = "mm/m",
        link     = "Grade (slope)",
    },
    ["in/mi"] = {
        name1    = "inch per mile",
        name2    = "inches per mile",
        symbol   = "in/mi",
        utype    = "gradient",
        scale    = 1.5782828282828283e-5,
        default  = "v < 0.6336 ! m ! c ! m/km",
        link     = "Grade (slope)",
    },
    ["m/km"] = {
        name1    = "metre per kilometre",
        name1_us = "meter per kilometer",
        name2    = "metres per kilometre",
        name2_us = "meters per kilometer",
        symbol   = "m/km",
        utype    = "gradient",
        scale    = 0.001,
        default  = "ft/mi",
        link     = "Grade (slope)",
    },
    ["mm/km"] = {
        name1    = "millimetre per kilometre",
        name1_us = "millimeter per kilometer",
        name2    = "millimetres per kilometre",
        name2_us = "millimeters per kilometer",
        symbol   = "mm/km",
        utype    = "gradient",
        scale    = 0.000001,
        default  = "in/mi",
        link     = "Grade (slope)",
```

```
    },
    ["mm/m"] = {
        name1    = "millimetre per metre",
        name1_us = "millimeter per meter",
        name2    = "millimetres per metre",
        name2_us = "millimeters per meter",
        symbol   = "mm/m",
        utype    = "gradient",
        scale    = 0.001,
        default  = "in/ft",
        link     = "Grade (slope)",
    },
    ["admi"] = {
        name1    = "admiralty mile",
        symbol   = "nmi (admiralty)",
        utype    = "length",
        scale    = 1853.184,
        default  = "km mi",
        link     = "Nautical mile",
    },
    ["AU"] = {
        name1    = "astronomical unit",
        symbol   = "AU",
        utype    = "length",
        scale    = 149597870700,
        default  = "km mi",
    },
    ["Brnmi"] = {
        name1    = "British nautical mile",
        symbol   = "(Brit) nmi",
        utype    = "length",
        scale    = 1853.184,
        default  = "km mi",
        link     = "Nautical mile",
    },
    ["bu"] = {
        name2    = "bu",
        symbol   = "bu",
        usename  = 1,
        utype    = "length",
        scale    = 0.0030303030303030303,
        default  = "mm",
        link     = "Japanese units of measurement#Length",
    },
    ["ch"] = {
        name1    = "chain",
        symbol   = "ch",
        utype    = "length",
        scale    = 20.1168,
        default  = "ft m",
        subdivs  = { ["ft"] = { 66, default = "m" }, ["yd"] = { 22, default = "m
        link     = "Chain (unit)",
    },
    ["chlk"] = {
        name1    = "[[Chain (unit)|chain]]",
        symbol   = "[[Chain (unit)|ch]]",
        utype    = "length",
        scale    = 20.1168,
        default  = "ft m",
        link     = "",
    },
    ["chain"] = {
        symbol   = "chain",
        usename  = 1,
```

```
        utype    = "length",
        scale    = 20.1168,
        default  = "ft m",
        subdivs  = { ["ft"] = { 66, default = "m" }, ["yd"] = { 22, default = "m"
        link     = "Chain (unit)",
    },
    ["chainlk"] = {
        symbol   = "[[Chain (unit)|chain]]",
        usename  = 1,
        utype    = "length",
        scale    = 20.1168,
        default  = "ft m",
        link     = "",
    },
    ["dpcm"] = {
        name2    = "dot/cm",
        symbol   = "dot/cm",
        utype    = "length",
        scale    = 100,
        invert   = -1,
        iscomplex= true,
        default  = "dpi",
        link     = "Dots per inch",
    },
    ["dpi"] = {
        name2    = "DPI",
        symbol   = "DPI",
        utype    = "length",
        scale    = 39.370078740157481,
        invert   = -1,
        iscomplex= true,
        default  = "pitch",
        link     = "Dots per inch",
    },
    ["fathom"] = {
        symbol   = "fathom",
        usename  = 1,
        utype    = "length",
        scale    = 1.8288,
        default  = "ft m",
    },
    ["foot"] = {
        name1    = "foot",
        name2    = "foot",
        symbol   = "ft",
        utype    = "length",
        scale    = 0.3048,
        default  = "m",
        subdivs  = { ["in"] = { 12, default = "m" } },
        link     = "Foot (unit)",
    },
    ["ft"] = {
        name1    = "foot",
        name2    = "feet",
        symbol   = "ft",
        utype    = "length",
        scale    = 0.3048,
        exception= "integer_more_precision",
        default  = "m",
        subdivs  = { ["in"] = { 12, default = "m" } },
        link     = "Foot (unit)",
    },
    ["furlong"] = {
        symbol   = "furlong",
```

```
        usename  = 1,
        utype    = "length",
        scale    = 201.168,
        default  = "ft m",
    },
    ["Gly"] = {
        name1    = "gigalight-year",
        symbol   = "Gly",
        utype    = "length",
        scale    = 9.4607304725808e24,
        default  = "Mpc",
        link     = "Light-year#Definitions",
    },
    ["Gpc"] = {
        name1    = "gigaparsec",
        symbol   = "Gpc",
        utype    = "length",
        scale    = 3.0856775814671916e25,
        default  = "Gly",
        link     = "Parsec#Megaparsecs and gigaparsecs",
    },
    ["hand"] = {
        name1    = "hand",
        symbol   = "h",
        utype    = "length",
        builtin  = "hand",
        scale    = 0.1016,
        iscomplex= true,
        default  = "in cm",
        link     = "Hand (unit)",
    },
    ["in"] = {
        name1    = "inch",
        name2    = "inches",
        symbol   = "in",
        utype    = "length",
        scale    = 0.0254,
        exception= "subunit_more_precision",
        default  = "mm",
    },
    ["inabbreviated"] = {
        name2    = "in",
        symbol   = "in",
        utype    = "length",
        scale    = 0.0254,
        default  = "mm",
        link     = "Inch",
    },
    ["kly"] = {
        name1    = "kilolight-year",
        symbol   = "kly",
        utype    = "length",
        scale    = 9.4607304725808e18,
        default  = "pc",
        link     = "Light-year#Definitions",
    },
    ["kpc"] = {
        name1    = "kiloparsec",
        symbol   = "kpc",
        utype    = "length",
        scale    = 3.0856775814671916e19,
        default  = "kly",
        link     = "Parsec#Parsecs and kiloparsecs",
    },
```

```
    ["LD"] = {
        name1    = "lunar distance",
        symbol   = "LD",
        utype    = "length",
        scale    = 384403000,
        default  = "km mi",
        link     = "Lunar distance (astronomy)",
    },
    ["league"] = {
        symbol   = "league",
        usename  = 1,
        utype    = "length",
        scale    = 4828.032,
        default  = "km",
        link     = "League (unit)",
    },
    ["ly"] = {
        name1    = "light-year",
        symbol   = "ly",
        utype    = "length",
        scale    = 9.4607304725808e15,
        default  = "AU",
    },
    ["m"] = {
        _name1   = "metre",
        _name1_us= "meter",
        _symbol  = "m",
        utype    = "length",
        scale    = 1,
        prefixes = 1,
        default  = "v > 0 and v < 3 ! ftin ! ft",
        link     = "Metre",
    },
    ["mi"] = {
        name1    = "mile",
        symbol   = "mi",
        utype    = "length",
        scale    = 1609.344,
        default  = "km",
        subdivs  = { ["ch"] = { 80, default = "km" }, ["chlk"] = { 80, default =
    },
    ["mil"] = {
        symbol   = "mil",
        usename  = 1,
        utype    = "length",
        scale    = 0.0000254,
        default  = "mm",
        link     = "Thousandth of an inch",
    },
    ["Mly"] = {
        name1    = "megalight-year",
        symbol   = "Mly",
        utype    = "length",
        scale    = 9.4607304725808e21,
        default  = "kpc",
        link     = "Light-year#Definitions",
    },
    ["Mpc"] = {
        name1    = "megaparsec",
        symbol   = "Mpc",
        utype    = "length",
        scale    = 3.0856775814671916e22,
        default  = "Mly",
        link     = "Parsec#Megaparsecs and gigaparsecs",
```

```
    },
    ["NM"] = {
        name1    = "nautical mile",
        symbol   = "NM",
        utype    = "length",
        scale    = 1852,
        default  = "km mi",
    },
    ["nmi"] = {
        name1    = "nautical mile",
        symbol   = "nmi",
        utype    = "length",
        scale    = 1852,
        default  = "km mi",
    },
    ["oldUKnmi"] = {
        name1    = "nautical mile",
        symbol   = "nmi",
        utype    = "length",
        scale    = 1853.184,
        default  = "km mi",
    },
    ["oldUSnmi"] = {
        name1    = "nautical mile",
        symbol   = "nmi",
        utype    = "length",
        scale    = 1853.24496,
        default  = "km mi",
    },
    ["pc"] = {
        name1    = "parsec",
        symbol   = "pc",
        utype    = "length",
        scale    = 3.0856775814671916e16,
        default  = "ly",
    },
    ["perch"] = {
        name2    = "perches",
        symbol   = "perch",
        usename  = 1,
        utype    = "length",
        scale    = 5.0292,
        default  = "ft m",
        link     = "Rod (unit)",
    },
    ["pitch"] = {
        name2    = "µm",
        symbol   = "µm",
        utype    = "length",
        scale    = 1e-6,
        default  = "dpi",
        defkey   = "pitch",
        linkey   = "pitch",
        link     = "Dots per inch",
    },
    ["pole"] = {
        symbol   = "pole",
        usename  = 1,
        utype    = "length",
        scale    = 5.0292,
        default  = "ft m",
        link     = "Rod (unit)",
    },
    ["pre1954U.S.nmi"] = {
```

```
        name1    = "(pre-1954 U.S.) nautical mile",
        symbol   = "(pre&#8209;1954 U.S.) nmi",
        utype    = "length",
        scale    = 1853.24496,
        default  = "km mi",
        link     = "Nautical mile",
    },
    ["pre1954USnmi"] = {
        name1    = "(pre-1954 US) nautical mile",
        name1_us = "(pre-1954 U.S.) nautical mile",
        symbol   = "(pre&#8209;1954 US) nmi",
        sym_us   = "(pre&#8209;1954 U.S.) nmi",
        utype    = "length",
        scale    = 1853.24496,
        default  = "km mi",
        link     = "Nautical mile",
    },
    ["rd"] = {
        name1    = "rod",
        symbol   = "rd",
        utype    = "length",
        scale    = 5.0292,
        default  = "ft m",
        link     = "Rod (unit)",
    },
    ["royal cubit"] = {
        name1    = "royal cubit",
        symbol   = "cu",
        utype    = "length",
        scale    = 0.524,
        default  = "mm",
    },
    ["rtkm"] = {
        name1    = "route kilometre",
        name1_us = "route kilometer",
        symbol   = "km",
        utype    = "length",
        scale    = 1000,
        default  = "mi",
        link     = "Kilometre",
    },
    ["rtmi"] = {
        name1    = "route mile",
        symbol   = "mi",
        utype    = "length",
        scale    = 1609.344,
        default  = "km",
        link     = "Mile",
    },
    ["shaku"] = {
        name2    = "shaku",
        symbol   = "shaku",
        usename  = 1,
        utype    = "length",
        scale    = 0.30303030303030304,
        default  = "m",
        link     = "Shaku (unit)",
    },
    ["sm"] = {
        name1    = "smoot",
        symbol   = "sm",
        utype    = "length",
        scale    = 1.70180,
        default  = "m",
```

```
        link     = "Smoot (unit)",
    },
    ["smi"] = {
        name1    = "statute mile",
        symbol   = "mi",
        utype    = "length",
        scale    = 1609.344,
        default  = "km",
        subdivs  = { ["chain"] = { 80, default = "km" } },
    },
    ["solar radius"] = {
        name1    = "solar radius",
        name2    = "solar radii",
        symbol   = "''R''<sub>⊙</sub>",
        utype    = "length",
        scale    = 695700e3,
        default  = "km",
    },
    ["sun"] = {
        name2    = "sun",
        symbol   = "sun",
        usename  = 1,
        utype    = "length",
        scale    = 0.030303030303030304,
        default  = "mm",
        link     = "Japanese units of measurement#Length",
    },
    ["thou"] = {
        name2    = "thou",
        symbol   = "thou",
        usename  = 1,
        utype    = "length",
        scale    = 0.0000254,
        default  = "mm",
        link     = "Thousandth of an inch",
    },
    ["verst"] = {
        symbol   = "verst",
        usename  = 1,
        utype    = "length",
        scale    = 1066.8,
        default  = "km mi",
    },
    ["yd"] = {
        name1    = "yard",
        symbol   = "yd",
        utype    = "length",
        scale    = 0.9144,
        default  = "m",
        subdivs  = { ["ft"] = { 3, default = "m" } },
    },
    ["µin"] = {
        name1    = "microinch",
        name2    = "microinches",
        symbol   = "µin",
        utype    = "length",
        scale    = 0.0000000254,
        default  = "nm",
        link     = "SI prefix#Non-metric units",
    },
    ["Å"] = {
        name1    = "ångström",
        symbol   = "Å",
        utype    = "length",
```

```
        scale    = 0.0000000001,
        default  = "in",
    },
    ["Hz"] = {
        _name1   = "hertz",
        _name2   = "hertz",
        _symbol  = "Hz",
        utype    = "length",
        scale    = 3.3356409519815204e-9,
        invert   = -1,
        iscomplex= true,
        prefixes = 1,
        default  = "m",
        link     = "Hertz",
    },
    ["rpm"] = {
        name1    = "revolution per minute",
        name2    = "revolutions per minute",
        symbol   = "rpm",
        utype    = "length",
        scale    = 5.5594015866358675e-11,
        invert   = -1,
        iscomplex= true,
        default  = "Hz",
        link     = "Revolutions per minute",
    },
    ["-ft-frac"] = {
        target   = "ft",
        link     = "Fracture gradient",
    },
    ["-in-stiff"] = {
        target   = "in",
        link     = "Stiffness",
    },
    ["-m-frac"] = {
        target   = "m",
        link     = "Fracture gradient",
    },
    ["-m-stiff"] = {
        target   = "m",
        link     = "Stiffness",
    },
    ["100km"] = {
        target   = "km",
        multiplier= 100,
    },
    ["100mi"] = {
        target   = "mi",
        multiplier= 100,
    },
    ["100miles"] = {
        target   = "mi",
        symbol   = "miles",
        multiplier= 100,
    },
    ["admiralty nmi"] = {
        target   = "oldUKnmi",
    },
    ["angstrom"] = {
        target   = "Å",
    },
    ["au"] = {
        target   = "AU",
        symbol   = "au",
```

```
    },
    ["feet"] = {
        target   = "ft",
    },
    ["hands"] = {
        target   = "hand",
    },
    ["inch"] = {
        target   = "in",
    },
    ["light-year"] = {
        target   = "ly",
    },
    ["meter"] = {
        target   = "m",
        sp_us    = true,
    },
    ["meters"] = {
        target   = "m",
        sp_us    = true,
    },
    ["metre"] = {
        target   = "m",
    },
    ["metres"] = {
        target   = "m",
    },
    ["micrometre"] = {
        target   = "µm",
    },
    ["micron"] = {
        target   = "µm",
        default  = "µin",
    },
    ["mile"] = {
        target   = "mi",
    },
    ["miles"] = {
        target   = "mi",
    },
    ["parsec"] = {
        target   = "pc",
    },
    ["rod"] = {
        target   = "rd",
    },
    ["smoot"] = {
        target   = "sm",
    },
    ["uin"] = {
        target   = "µin",
    },
    ["yard"] = {
        target   = "yd",
    },
    ["yards"] = {
        target   = "yd",
    },
    ["yds"] = {
        target   = "yd",
    },
    ["dtex"] = {
        name1    = "decitex",
        name2    = "decitex",
```

```
        symbol   = "dtex",
        utype    = "linear density",
        scale    = 1e-7,
        default  = "lb/yd",
        link     = "Units of textile measurement#Units",
    },
    ["kg/cm"] = {
        name1    = "kilogram per centimetre",
        name1_us = "kilogram per centimeter",
        name2    = "kilograms per centimetre",
        name2_us = "kilograms per centimeter",
        symbol   = "kg/cm",
        utype    = "linear density",
        scale    = 100,
        default  = "lb/yd",
        link     = "Linear density",
    },
    ["kg/m"] = {
        name1    = "kilogram per metre",
        name1_us = "kilogram per meter",
        name2    = "kilograms per metre",
        name2_us = "kilograms per meter",
        symbol   = "kg/m",
        utype    = "linear density",
        scale    = 1,
        default  = "lb/yd",
        link     = "Linear density",
    },
    ["lb/ft"] = {
        name1    = "pound per foot",
        name2    = "pounds per foot",
        symbol   = "lb/ft",
        utype    = "linear density",
        scale    = 1.4881639435695539,
        default  = "kg/m",
        link     = "Linear density",
    },
    ["lb/yd"] = {
        name1    = "pound per yard",
        name2    = "pounds per yard",
        symbol   = "lb/yd",
        utype    = "linear density",
        scale    = 0.49605464785651798,
        default  = "kg/m",
        link     = "Linear density",
    },
    ["G"] = {
        _name1   = "gauss",
        _name2   = "gauss",
        _symbol  = "G",
        utype    = "magnetic field strength",
        scale    = 0.0001,
        prefixes = 1,
        default  = "T",
        link     = "Gauss (unit)",
    },
    ["T"] = {
        _name1   = "tesla",
        _symbol  = "T",
        utype    = "magnetic field strength",
        scale    = 1,
        prefixes = 1,
        default  = "G",
        link     = "Tesla (unit)",
```

```
    },
    ["A/m"] = {
        name1    = "ampere per metre",
        name1_us = "ampere per meter",
        name2    = "amperes per metre",
        name2_us = "amperes per meter",
        symbol   = "A/m",
        utype    = "magnetizing field",
        scale    = 1,
        default  = "Oe",
    },
    ["kA/m"] = {
        name1    = "kiloampere per metre",
        name1_us = "kiloampere per meter",
        name2    = "kiloamperes per metre",
        name2_us = "kiloamperes per meter",
        symbol   = "kA/m",
        utype    = "magnetizing field",
        scale    = 1000,
        default  = "kOe",
        link     = "Ampere per metre",
    },
    ["MA/m"] = {
        name1    = "megaampere per metre",
        name1_us = "megaampere per meter",
        name2    = "megaamperes per metre",
        name2_us = "megaamperes per meter",
        symbol   = "MA/m",
        utype    = "magnetizing field",
        scale    = 1e6,
        default  = "kOe",
        link     = "Ampere per metre",
    },
    ["Oe"] = {
        _name1   = "oersted",
        _symbol  = "Oe",
        utype    = "magnetizing field",
        scale    = 79.5774715,
        prefixes = 1,
        default  = "kA/m",
        link     = "Oersted",
    },
    ["-Lcwt"] = {
        name1    = "hundredweight",
        name2    = "hundredweight",
        symbol   = "cwt",
        utype    = "mass",
        scale    = 50.80234544,
        default  = "lb",
    },
    ["-Scwt"] = {
        name1    = "hundredweight",
        name2    = "hundredweight",
        symbol   = "cwt",
        utype    = "mass",
        scale    = 45.359237,
        default  = "lb",
    },
    ["-ST"] = {
        name1    = "short ton",
        symbol   = "ST",
        utype    = "mass",
        scale    = 907.18474,
        default  = "t",
```

```
    },
    ["carat"] = {
        symbol   = "carat",
        usename  = 1,
        utype    = "mass",
        scale    = 0.0002,
        default  = "g",
        link     = "Carat (mass)",
    },
    ["drachm"] = {
        name1_us = "dram",
        symbol   = "drachm",
        usename  = 1,
        utype    = "mass",
        scale    = 0.001771845195,
        default  = "g",
        link     = "Dram (unit)",
    },
    ["dram"] = {
        target   = "drachm",
    },
    ["dwt"] = {
        name1    = "pennyweight",
        symbol   = "dwt",
        utype    = "mass",
        scale    = 0.00155517384,
        default  = "oz g",
    },
    ["DWton"] = {
        symbol   = "deadweight ton",
        usename  = 1,
        utype    = "mass",
        scale    = 1016.0469088,
        default  = "DWtonne",
        link     = "Deadweight tonnage",
    },
    ["DWtonne"] = {
        symbol   = "deadweight tonne",
        usename  = 1,
        utype    = "mass",
        scale    = 1000,
        default  = "DWton",
        link     = "Deadweight tonnage",
    },
    ["g"] = {
        _name1   = "gram",
        _symbol  = "g",
        utype    = "mass",
        scale    = 0.001,
        prefixes = 1,
        default  = "oz",
        link     = "Gram",
    },
    ["gr"] = {
        name1    = "grain",
        symbol   = "gr",
        utype    = "mass",
        scale    = 0.00006479891,
        default  = "g",
        link     = "Grain (unit)",
    },
    ["Gt"] = {
        name1    = "gigatonne",
        symbol   = "Gt",
```

```
        utype    = "mass",
        scale    = 1000000000000,
        default  = "LT ST",
        link     = "Tonne",
    },
    ["impgalh2o"] = {
        name1    = "imperial gallon of water",
        name2    = "imperial gallons of water",
        symbol   = "imp gal H<sub>2</sub>O",
        utype    = "mass",
        scale    = 4.5359236999999499,
        default  = "lb kg",
        link     = "Imperial gallon",
    },
    ["kt"] = {
        name1    = "kilotonne",
        symbol   = "kt",
        utype    = "mass",
        scale    = 1000000,
        default  = "LT ST",
        link     = "Tonne",
    },
    ["lb"] = {
        name1    = "pound",
        symbol   = "lb",
        utype    = "mass",
        scale    = 0.45359237,
        exception= "integer_more_precision",
        default  = "kg",
        subdivs  = { ["oz"] = { 16, default = "kg" } },
        link     = "Pound (mass)",
    },
    ["Lcwt"] = {
        name1    = "long hundredweight",
        name2    = "long hundredweight",
        symbol   = "Lcwt",
        usename  = 1,
        utype    = "mass",
        scale    = 50.80234544,
        default  = "lb",
        subdivs  = { ["qtr"] = { 4, default = "kg" }, ["st"] = { 8, default = "kg
        link     = "Hundredweight",
    },
    ["long cwt"] = {
        name1    = "long hundredweight",
        name2    = "long hundredweight",
        symbol   = "long cwt",
        utype    = "mass",
        scale    = 50.80234544,
        default  = "lb kg",
        subdivs  = { ["qtr"] = { 4, default = "kg" } },
        link     = "Hundredweight",
    },
    ["long qtr"] = {
        name1    = "long quarter",
        symbol   = "long qtr",
        utype    = "mass",
        scale    = 12.70058636,
        default  = "lb kg",
    },
    ["LT"] = {
        symbol   = "long ton",
        usename  = 1,
        utype    = "mass",
```

```
        scale    = 1016.0469088,
        default  = "t",
        subdivs  = { ["Lcwt"] = { 20, default = "t", unit = "-Lcwt" } },
    },
    ["lt"] = {
        name1    = "long ton",
        symbol   = "LT",
        utype    = "mass",
        scale    = 1016.0469088,
        default  = "t",
        subdivs  = { ["Lcwt"] = { 20, default = "t", unit = "-Lcwt" } },
    },
    ["metric ton"] = {
        symbol   = "metric ton",
        usename  = 1,
        utype    = "mass",
        scale    = 1000,
        default  = "long ton",
        link     = "Tonne",
    },
    ["MT"] = {
        name1    = "metric ton",
        symbol   = "t",
        utype    = "mass",
        scale    = 1000,
        default  = "LT ST",
        link     = "Tonne",
    },
    ["Mt"] = {
        name1    = "megatonne",
        symbol   = "Mt",
        utype    = "mass",
        scale    = 1000000000,
        default  = "LT ST",
        link     = "Tonne",
    },
    ["oz"] = {
        name1    = "ounce",
        symbol   = "oz",
        utype    = "mass",
        scale    = 0.028349523125,
        default  = "g",
    },
    ["ozt"] = {
        name1    = "troy ounce",
        symbol   = "ozt",
        utype    = "mass",
        scale    = 0.0311034768,
        default  = "oz g",
    },
    ["pdr"] = {
        name1    = "pounder",
        symbol   = "pdr",
        utype    = "mass",
        scale    = 0.45359237,
        default  = "kg",
        link     = "Pound (mass)",
    },
    ["qtr"] = {
        name1    = "quarter",
        symbol   = "qtr",
        utype    = "mass",
        scale    = 12.70058636,
        default  = "lb kg",
```

```
        subdivs  = { ["lb"] = { 28, default = "kg" } },
        link     = "Long quarter",
    },
    ["Scwt"] = {
        name1    = "short hundredweight",
        name2    = "short hundredweight",
        symbol   = "Scwt",
        usename  = 1,
        utype    = "mass",
        scale    = 45.359237,
        default  = "lb",
        link     = "Hundredweight",
    },
    ["short cwt"] = {
        name1    = "short hundredweight",
        name2    = "short hundredweight",
        symbol   = "short cwt",
        utype    = "mass",
        scale    = 45.359237,
        default  = "lb kg",
        link     = "Hundredweight",
    },
    ["short qtr"] = {
        name1    = "short quarter",
        symbol   = "short qtr",
        utype    = "mass",
        scale    = 11.33980925,
        default  = "lb kg",
    },
    ["ST"] = {
        symbol   = "short ton",
        usename  = 1,
        utype    = "mass",
        scale    = 907.18474,
        default  = "t",
        subdivs  = { ["Scwt"] = { 20, default = "t", unit = "-Scwt" } },
    },
    ["shtn"] = {
        name1    = "short ton",
        symbol   = "sh tn",
        utype    = "mass",
        scale    = 907.18474,
        default  = "t",
    },
    ["shton"] = {
        symbol   = "ton",
        usename  = 1,
        utype    = "mass",
        scale    = 907.18474,
        default  = "t",
    },
    ["solar mass"] = {
        name1    = "solar mass",
        name2    = "solar masses",
        symbol   = "''M''<sub>☉</sub>",
        utype    = "mass",
        scale    = 1.98855e30,
        default  = "kg",
    },
    ["st"] = {
        name1    = "stone",
        name2    = "stone",
        symbol   = "st",
        utype    = "mass",
```

```
        scale    = 6.35029318,
        default  = "lb kg",
        subdivs  = { ["lb"] = { 14, default = "kg lb" } },
        link     = "Stone (unit)",
    },
    ["t"] = {
        name1    = "tonne",
        name1_us = "metric ton",
        symbol   = "t",
        utype    = "mass",
        scale    = 1000,
        default  = "LT ST",
    },
    ["tonne"] = {
        name1    = "tonne",
        name1_us = "metric ton",
        symbol   = "t",
        utype    = "mass",
        scale    = 1000,
        default  = "shton",
    },
    ["troy pound"] = {
        symbol   = "troy pound",
        usename  = 1,
        utype    = "mass",
        scale    = 0.3732417216,
        default  = "lb kg",
        link     = "Troy weight",
    },
    ["usgalh2o"] = {
        name1    = "US gallon of water",
        name1_us = "U.S. gallon of water",
        name2    = "US gallons of water",
        name2_us = "U.S. gallons of water",
        symbol   = "US gal H<sub>2</sub>O",
        utype    = "mass",
        scale    = 3.7776215836051126,
        default  = "lb kg",
        link     = "United States customary units#Fluid volume",
    },
    ["viss"] = {
        name2    = "viss",
        symbol   = "viss",
        utype    = "mass",
        scale    = 1.632932532,
        default  = "kg",
        link     = "Myanmar units of measurement#Mass",
    },
    ["billion tonne"] = {
        target   = "e9t",
    },
    ["kilogram"] = {
        target   = "kg",
    },
    ["kilotonne"] = {
        target   = "kt",
    },
    ["lbs"] = {
        target   = "lb",
    },
    ["lbt"] = {
        target   = "troy pound",
    },
    ["lcwt"] = {
```

```
        target   = "Lcwt",
    },
    ["long ton"] = {
        target   = "LT",
    },
    ["mcg"] = {
        target   = "µg",
    },
    ["million tonne"] = {
        target   = "e6t",
    },
    ["scwt"] = {
        target   = "Scwt",
    },
    ["short ton"] = {
        target   = "ST",
    },
    ["stone"] = {
        target   = "st",
    },
    ["thousand tonne"] = {
        target   = "e3t",
    },
    ["tonnes"] = {
        target   = "t",
    },
    ["kg/kW"] = {
        name1    = "kilogram per kilowatt",
        name2    = "kilograms per kilowatt",
        symbol   = "kg/kW",
        utype    = "mass per unit power",
        scale    = 0.001,
        default  = "lb/hp",
        link     = "Kilowatt",
    },
    ["lb/hp"] = {
        name1    = "pound per horsepower",
        name2    = "pounds per horsepower",
        symbol   = "lb/hp",
        utype    = "mass per unit power",
        scale    = 0.00060827738784176115,
        default  = "kg/kW",
        link     = "Horsepower",
    },
    ["kg/h"] = {
        per      = { "kg", "h" },
        utype    = "mass per unit time",
        default  = "lb/h",
    },
    ["lb/h"] = {
        per      = { "lb", "h" },
        utype    = "mass per unit time",
        default  = "kg/h",
    },
    ["g-mol/d"] = {
        name1    = "gram-mole per day",
        name2    = "gram-moles per day",
        symbol   = "g&#8209;mol/d",
        utype    = "molar rate",
        scale    = 1.1574074074074073e-5,
        default  = "µmol/s",
        link     = "Mole (unit)",
    },
    ["g-mol/h"] = {
```

```
        name1    = "gram-mole per hour",
        name2    = "gram-moles per hour",
        symbol   = "g&#8209;mol/h",
        utype    = "molar rate",
        scale    = 0.00027777777777777778,
        default  = "mmol/s",
        link     = "Mole (unit)",
    },
    ["g-mol/min"] = {
        name1    = "gram-mole per minute",
        name2    = "gram-moles per minute",
        symbol   = "g&#8209;mol/min",
        utype    = "molar rate",
        scale    = 0.016666666666666666,
        default  = "g-mol/s",
        link     = "Mole (unit)",
    },
    ["g-mol/s"] = {
        name1    = "gram-mole per second",
        name2    = "gram-moles per second",
        symbol   = "g&#8209;mol/s",
        utype    = "molar rate",
        scale    = 1,
        default  = "lb-mol/min",
        link     = "Mole (unit)",
    },
    ["gmol/d"] = {
        name1    = "gram-mole per day",
        name2    = "gram-moles per day",
        symbol   = "gmol/d",
        utype    = "molar rate",
        scale    = 1.1574074074074073e-5,
        default  = "µmol/s",
        link     = "Mole (unit)",
    },
    ["gmol/h"] = {
        name1    = "gram-mole per hour",
        name2    = "gram-moles per hour",
        symbol   = "gmol/h",
        utype    = "molar rate",
        scale    = 0.00027777777777777778,
        default  = "mmol/s",
        link     = "Mole (unit)",
    },
    ["gmol/min"] = {
        name1    = "gram-mole per minute",
        name2    = "gram-moles per minute",
        symbol   = "gmol/min",
        utype    = "molar rate",
        scale    = 0.016666666666666666,
        default  = "gmol/s",
        link     = "Mole (unit)",
    },
    ["gmol/s"] = {
        name1    = "gram-mole per second",
        name2    = "gram-moles per second",
        symbol   = "gmol/s",
        utype    = "molar rate",
        scale    = 1,
        default  = "lbmol/min",
        link     = "Mole (unit)",
    },
    ["kmol/d"] = {
        name1    = "kilomole per day",
```

```
        name2    = "kilomoles per day",
        symbol   = "kmol/d",
        utype    = "molar rate",
        scale    = 0.011574074074074073,
        default  = "mmol/s",
        link     = "Mole (unit)",
    },
    ["kmol/h"] = {
        name1    = "kilomole per hour",
        name2    = "kilomoles per hour",
        symbol   = "kmol/h",
        utype    = "molar rate",
        scale    = 0.27777777777777779,
        default  = "mol/s",
        link     = "Mole (unit)",
    },
    ["kmol/min"] = {
        name1    = "kilomole per minute",
        name2    = "kilomoles per minute",
        symbol   = "kmol/min",
        utype    = "molar rate",
        scale    = 16.666666666666668,
        default  = "mol/s",
        link     = "Kilomole (unit)",
    },
    ["kmol/s"] = {
        name1    = "kilomole per second",
        name2    = "kilomoles per second",
        symbol   = "kmol/s",
        utype    = "molar rate",
        scale    = 1000,
        default  = "lb-mol/s",
        link     = "Mole (unit)",
    },
    ["lb-mol/d"] = {
        name1    = "pound-mole per day",
        name2    = "pound-moles per day",
        symbol   = "lb&#8209;mol/d",
        utype    = "molar rate",
        scale    = 0.0052499116898148141,
        default  = "mmol/s",
        link     = "Pound-mole",
    },
    ["lb-mol/h"] = {
        name1    = "pound-mole per hour",
        name2    = "pound-moles per hour",
        symbol   = "lb&#8209;mol/h",
        utype    = "molar rate",
        scale    = 0.12599788055555555,
        default  = "mol/s",
        link     = "Pound-mole",
    },
    ["lb-mol/min"] = {
        name1    = "pound-mole per minute",
        name2    = "pound-moles per minute",
        symbol   = "lb&#8209;mol/min",
        utype    = "molar rate",
        scale    = 7.5598728333333334,
        default  = "mol/s",
        link     = "Pound-mole",
    },
    ["lb-mol/s"] = {
        name1    = "pound-mole per second",
        name2    = "pound-moles per second",
```

```
        symbol   = "lb&#8209;mol/s",
        utype    = "molar rate",
        scale    = 453.59237,
        default  = "kmol/s",
        link     = "Pound-mole",
    },
    ["lbmol/d"] = {
        name1    = "pound-mole per day",
        name2    = "pound-moles per day",
        symbol   = "lbmol/d",
        utype    = "molar rate",
        scale    = 0.0052499116898148141,
        default  = "mmol/s",
        link     = "Pound-mole",
    },
    ["lbmol/h"] = {
        name1    = "pound-mole per hour",
        name2    = "pound-moles per hour",
        symbol   = "lbmol/h",
        utype    = "molar rate",
        scale    = 0.12599788055555555,
        default  = "mol/s",
        link     = "Pound-mole",
    },
    ["lbmol/min"] = {
        name1    = "pound-mole per minute",
        name2    = "pound-moles per minute",
        symbol   = "lbmol/min",
        utype    = "molar rate",
        scale    = 7.5598728333333334,
        default  = "mol/s",
        link     = "Pound-mole",
    },
    ["lbmol/s"] = {
        name1    = "pound-mole per second",
        name2    = "pound-moles per second",
        symbol   = "lbmol/s",
        utype    = "molar rate",
        scale    = 453.59237,
        default  = "kmol/s",
        link     = "Pound-mole",
    },
    ["mmol/s"] = {
        name1    = "millimole per second",
        name2    = "millimoles per second",
        symbol   = "mmol/s",
        utype    = "molar rate",
        scale    = 0.001,
        default  = "lb-mol/d",
        link     = "Mole (unit)",
    },
    ["mol/d"] = {
        name1    = "mole per day",
        name2    = "moles per day",
        symbol   = "mol/d",
        utype    = "molar rate",
        scale    = 1.1574074074074073e-5,
        default  = "µmol/s",
        link     = "Mole (unit)",
    },
    ["mol/h"] = {
        name1    = "mole per hour",
        name2    = "moles per hour",
        symbol   = "mol/h",
```

```
        utype    = "molar rate",
        scale    = 0.00027777777777777778,
        default  = "mmol/s",
        link     = "Mole (unit)",
    },
    ["mol/min"] = {
        name1    = "mole per minute",
        name2    = "moles per minute",
        symbol   = "mol/min",
        utype    = "molar rate",
        scale    = 0.016666666666666666,
        default  = "mol/s",
        link     = "Mole (unit)",
    },
    ["mol/s"] = {
        name1    = "mole per second",
        name2    = "moles per second",
        symbol   = "mol/s",
        utype    = "molar rate",
        scale    = 1,
        default  = "lb-mol/min",
        link     = "Mole (unit)",
    },
    ["µmol/s"] = {
        name1    = "micromole per second",
        name2    = "micromoles per second",
        symbol   = "µmol/s",
        utype    = "molar rate",
        scale    = 0.000001,
        default  = "lb-mol/d",
        link     = "Mole (unit)",
    },
    ["umol/s"] = {
        target   = "µmol/s",
    },
    ["/acre"] = {
        name1    = "per acre",
        name2    = "per acre",
        symbol   = "/acre",
        utype    = "per unit area",
        scale    = 0.00024710538146716532,
        default  = "/ha",
        link     = "Acre",
    },
    ["/ha"] = {
        name1    = "per hectare",
        name2    = "per hectare",
        symbol   = "/ha",
        utype    = "per unit area",
        scale    = 100e-6,
        default  = "/acre",
        link     = "Hectare",
    },
    ["/sqcm"] = {
        name1    = "per square centimetre",
        name1_us = "per square centimeter",
        name2    = "per square centimetre",
        name2_us = "per square centimeter",
        symbol   = "/cm<sup>2</sup>",
        utype    = "per unit area",
        scale    = 1e4,
        default  = "/sqin",
        link     = "Square centimetre",
    },
```

```
    ["/sqin"] = {
        name1    = "per square inch",
        name2    = "per square inch",
        symbol   = "/in<sup>2</sup>",
        utype    = "per unit area",
        scale    = 1550.0031000062002,
        default  = "/sqcm",
        link     = "Square inch",
    },
    ["/sqkm"] = {
        name1    = "per square kilometre",
        name1_us = "per square kilometer",
        name2    = "per square kilometre",
        name2_us = "per square kilometer",
        symbol   = "/km<sup>2</sup>",
        utype    = "per unit area",
        scale    = 1e-6,
        default  = "/sqmi",
        link     = "Square kilometre",
    },
    ["/sqmi"] = {
        name1    = "per square mile",
        name2    = "per square mile",
        symbol   = "/sq mi",
        utype    = "per unit area",
        scale    = 3.8610215854244582e-7,
        default  = "/sqkm",
        link     = "Square mile",
    },
    ["PD/acre"] = {
        name1    = "inhabitant per acre",
        name2    = "inhabitants per acre",
        symbol   = "/acre",
        utype    = "per unit area",
        scale    = 0.00024710538146716532,
        default  = "PD/ha",
        link     = "Acre",
    },
    ["PD/ha"] = {
        name1    = "inhabitant per hectare",
        name2    = "inhabitants per hectare",
        symbol   = "/ha",
        utype    = "per unit area",
        scale    = 100e-6,
        default  = "PD/acre",
        link     = "Hectare",
    },
    ["PD/sqkm"] = {
        name1    = "inhabitant per square kilometre",
        name1_us = "inhabitant per square kilometer",
        name2    = "inhabitants per square kilometre",
        name2_us = "inhabitants per square kilometer",
        symbol   = "/km<sup>2</sup>",
        utype    = "per unit area",
        scale    = 1e-6,
        default  = "PD/sqmi",
        link     = "Square kilometre",
    },
    ["PD/sqmi"] = {
        name1    = "inhabitant per square mile",
        name2    = "inhabitants per square mile",
        symbol   = "/sq mi",
        utype    = "per unit area",
        scale    = 3.8610215854244582e-7,
```

```
        default  = "PD/sqkm",
        link     = "Square mile",
    },
    ["/cm2"] = {
        target   = "/sqcm",
    },
    ["/in2"] = {
        target   = "/sqin",
    },
    ["/km2"] = {
        target   = "/sqkm",
    },
    ["pd/acre"] = {
        target   = "PD/acre",
    },
    ["pd/ha"] = {
        target   = "PD/ha",
    },
    ["PD/km2"] = {
        target   = "PD/sqkm",
    },
    ["pd/km2"] = {
        target   = "PD/sqkm",
    },
    ["PD/km²"] = {
        target   = "PD/sqkm",
    },
    ["pd/sqkm"] = {
        target   = "PD/sqkm",
    },
    ["pd/sqmi"] = {
        target   = "PD/sqmi",
    },
    ["/l"] = {
        name1    = "per litre",
        name1_us = "per liter",
        name2    = "per litre",
        name2_us = "per liter",
        symbol   = "/l",
        utype    = "per unit volume",
        scale    = 1000,
        default  = "/usgal",
        link     = "Litre",
    },
    ["/USgal"] = {
        name1    = "per gallon",
        name2    = "per gallon",
        symbol   = "/gal",
        utype    = "per unit volume",
        scale    = 264.172052,
        default  = "/l",
        link     = "US gallon",
        customary= 2,
    },
    ["/usgal"] = {
        target   = "/USgal",
    },
    ["bhp"] = {
        name1    = "brake horsepower",
        name2    = "brake horsepower",
        symbol   = "bhp",
        utype    = "power",
        scale    = 745.69987158227022,
        default  = "kW",
```

```
        link     = "Horsepower#Brake horsepower",
    },
    ["Cal/d"] = {
        name1    = "large calorie per day",
        name2    = "large calories per day",
        symbol   = "Cal/d",
        utype    = "power",
        scale    = 0.048425925925925928,
        default  = "kJ/d",
        link     = "Calorie",
    },
    ["Cal/h"] = {
        name1    = "large calorie per hour",
        name2    = "large calories per hour",
        symbol   = "Cal/h",
        utype    = "power",
        scale    = 1.1622222222222223,
        default  = "kJ/h",
        link     = "Calorie",
    },
    ["cal/h"] = {
        name1    = "calorie per hour",
        name2    = "calories per hour",
        symbol   = "cal/h",
        utype    = "power",
        scale    = 0.0011622222222222223,
        default  = "W",
        link     = "Calorie",
    },
    ["CV"] = {
        name1    = "metric horsepower",
        name2    = "metric horsepower",
        symbol   = "CV",
        utype    = "power",
        scale    = 735.49875,
        default  = "kW",
    },
    ["hk"] = {
        name1    = "metric horsepower",
        name2    = "metric horsepower",
        symbol   = "hk",
        utype    = "power",
        scale    = 735.49875,
        default  = "kW",
    },
    ["hp"] = {
        name1    = "horsepower",
        name2    = "horsepower",
        symbol   = "hp",
        utype    = "power",
        scale    = 745.69987158227022,
        default  = "kW",
    },
    ["hp-electric"] = {
        name1    = "electric horsepower",
        name2    = "electric horsepower",
        symbol   = "hp",
        utype    = "power",
        scale    = 746,
        default  = "kW",
        link     = "Horsepower#Electrical horsepower",
    },
    ["hp-electrical"] = {
        name1    = "electrical horsepower",
```

```
        name2    = "electrical horsepower",
        symbol   = "hp",
        utype    = "power",
        scale    = 746,
        default  = "kW",
        link     = "Horsepower#Electrical horsepower",
    },
    ["hp-metric"] = {
        name1    = "metric horsepower",
        name2    = "metric horsepower",
        symbol   = "hp",
        utype    = "power",
        scale    = 735.49875,
        default  = "kW",
    },
    ["ihp"] = {
        name1    = "indicated horsepower",
        name2    = "indicated horsepower",
        symbol   = "ihp",
        utype    = "power",
        scale    = 745.69987158227022,
        default  = "kW",
        link     = "Horsepower#Indicated horsepower",
    },
    ["kcal/h"] = {
        name1    = "kilocalorie per hour",
        name2    = "kilocalories per hour",
        symbol   = "kcal/h",
        utype    = "power",
        scale    = 1.1622222222222223,
        default  = "kW",
        link     = "Calorie",
    },
    ["kJ/d"] = {
        name1    = "kilojoule per day",
        name2    = "kilojoules per day",
        symbol   = "kJ/d",
        utype    = "power",
        scale    = 0.011574074074074073,
        default  = "Cal/d",
        link     = "Kilojoule",
    },
    ["kJ/h"] = {
        name1    = "kilojoule per hour",
        name2    = "kilojoules per hour",
        symbol   = "kJ/h",
        utype    = "power",
        scale    = 0.27777777777777779,
        default  = "W",
        link     = "Kilojoule",
    },
    ["PS"] = {
        name1    = "metric horsepower",
        name2    = "metric horsepower",
        symbol   = "PS",
        utype    = "power",
        scale    = 735.49875,
        default  = "kW",
    },
    ["shp"] = {
        name1    = "shaft horsepower",
        name2    = "shaft horsepower",
        symbol   = "shp",
        utype    = "power",
```

```
        scale    = 745.69987158227022,
        default  = "kW",
        link     = "Horsepower#Shaft horsepower",
    },
    ["W"] = {
        _name1   = "watt",
        _symbol  = "W",
        utype    = "power",
        scale    = 1,
        prefixes = 1,
        default  = "hp",
        link     = "Watt",
    },
    ["BTU/h"] = {
        per      = { "BTU", "h" },
        utype    = "power",
        default  = "W",
    },
    ["Btu/h"] = {
        per      = { "Btu", "h" },
        utype    = "power",
        default  = "W",
    },
    ["BHP"] = {
        target   = "bhp",
    },
    ["btu/h"] = {
        target   = "BTU/h",
    },
    ["HP"] = {
        target   = "hp",
    },
    ["Hp"] = {
        target   = "hp",
    },
    ["hp-mechanical"] = {
        target   = "hp",
    },
    ["IHP"] = {
        target   = "ihp",
    },
    ["SHP"] = {
        target   = "shp",
    },
    ["whp"] = {
        target   = "hp",
    },
    ["hp/lb"] = {
        name1    = "horsepower per pound",
        name2    = "horsepower per pound",
        symbol   = "hp/lb",
        utype    = "power per unit mass",
        scale    = 1643.986806,
        default  = "kW/kg",
        link     = "Power-to-weight ratio",
    },
    ["hp/LT"] = {
        name1    = "horsepower per long ton",
        name2    = "horsepower per long ton",
        symbol   = "hp/LT",
        utype    = "power per unit mass",
        scale    = 0.73392268125000004,
        default  = "kW/t",
        link     = "Power-to-weight ratio",
```

```
    },
    ["hp/ST"] = {
        name1    = "horsepower per short ton",
        name2    = "horsepower per short ton",
        symbol   = "hp/ST",
        utype    = "power per unit mass",
        scale    = 0.821993403,
        default  = "kW/t",
        link     = "Power-to-weight ratio",
    },
    ["hp/t"] = {
        name1    = "horsepower per tonne",
        name2    = "horsepower per tonne",
        symbol   = "hp/t",
        utype    = "power per unit mass",
        scale    = 0.74569987158227022,
        default  = "kW/t",
        link     = "Power-to-weight ratio",
    },
    ["kW/kg"] = {
        name1    = "kilowatt per kilogram",
        name2    = "kilowatts per kilogram",
        symbol   = "kW/kg",
        utype    = "power per unit mass",
        scale    = 1000,
        default  = "hp/lb",
        link     = "Power-to-weight ratio",
    },
    ["kW/t"] = {
        name1    = "kilowatt per tonne",
        name2    = "kilowatts per tonne",
        symbol   = "kW/t",
        utype    = "power per unit mass",
        scale    = 1,
        default  = "PS/t",
        link     = "Power-to-weight ratio",
    },
    ["PS/t"] = {
        name1    = "metric horsepower per tonne",
        name2    = "metric horsepower per tonne",
        symbol   = "PS/t",
        utype    = "power per unit mass",
        scale    = 0.73549875,
        default  = "kW/t",
        link     = "Power-to-weight ratio",
    },
    ["shp/lb"] = {
        name1    = "shaft horsepower per pound",
        name2    = "shaft horsepower per pound",
        symbol   = "shp/lb",
        utype    = "power per unit mass",
        scale    = 1643.986806,
        default  = "kW/kg",
        link     = "Power-to-weight ratio",
    },
    ["hp/tonne"] = {
        target   = "hp/t",
        symbol   = "hp/tonne",
        default  = "kW/tonne",
    },
    ["kW/tonne"] = {
        target   = "kW/t",
        symbol   = "kW/tonne",
    },
```

```
    ["-lb/in2"] = {
        name1    = "pound per square inch",
        name2    = "pounds per square inch",
        symbol   = "lb/in<sup>2</sup>",
        utype    = "pressure",
        scale    = 6894.7572931683608,
        default  = "kPa kgf/cm2",
    },
    ["atm"] = {
        name1    = "standard atmosphere",
        symbol   = "atm",
        utype    = "pressure",
        scale    = 101325,
        default  = "kPa",
        link     = "Atmosphere (unit)",
    },
    ["Ba"] = {
        name1    = "barye",
        symbol   = "Ba",
        utype    = "pressure",
        scale    = 0.1,
        default  = "Pa",
    },
    ["bar"] = {
        symbol   = "bar",
        utype    = "pressure",
        scale    = 100000,
        default  = "kPa",
        link     = "Bar (unit)",
    },
    ["dbar"] = {
        name1    = "decibar",
        symbol   = "dbar",
        utype    = "pressure",
        scale    = 10000,
        default  = "kPa",
        link     = "Bar (unit)",
    },
    ["inHg"] = {
        name1    = "inch of mercury",
        name2    = "inches of mercury",
        symbol   = "inHg",
        utype    = "pressure",
        scale    = 3386.388640341,
        default  = "kPa",
    },
    ["kBa"] = {
        name1    = "kilobarye",
        symbol   = "kBa",
        utype    = "pressure",
        scale    = 100,
        default  = "hPa",
        link     = "Barye",
    },
    ["kg-f/cm2"] = {
        name1    = "kilogram-force per square centimetre",
        name1_us = "kilogram-force per square centimeter",
        name2    = "kilograms-force per square centimetre",
        name2_us = "kilograms-force per square centimeter",
        symbol   = "kg<sub>f</sub>/cm<sup>2</sup>",
        utype    = "pressure",
        scale    = 98066.5,
        default  = "psi",
        link     = "Kilogram-force",
```

```
    },
    ["kg/cm2"] = {
        name1    = "kilogram per square centimetre",
        name1_us = "kilogram per square centimeter",
        name2    = "kilograms per square centimetre",
        name2_us = "kilograms per square centimeter",
        symbol   = "kg/cm<sup>2</sup>",
        utype    = "pressure",
        scale    = 98066.5,
        default  = "psi",
        link     = "Kilogram-force",
    },
    ["kgf/cm2"] = {
        name1    = "kilogram-force per square centimetre",
        name1_us = "kilogram-force per square centimeter",
        name2    = "kilograms-force per square centimetre",
        name2_us = "kilograms-force per square centimeter",
        symbol   = "kgf/cm<sup>2</sup>",
        utype    = "pressure",
        scale    = 98066.5,
        default  = "psi",
        link     = "Kilogram-force",
    },
    ["ksi"] = {
        name1    = "kilopound per square inch",
        name2    = "kilopounds per square inch",
        symbol   = "ksi",
        utype    = "pressure",
        scale    = 6894757.2931683613,
        default  = "MPa",
        link     = "Pound per square inch",
    },
    ["lbf/in2"] = {
        name1    = "pound-force per square inch",
        name2    = "pounds-force per square inch",
        symbol   = "lbf/in<sup>2</sup>",
        utype    = "pressure",
        scale    = 6894.7572931683608,
        default  = "kPa kgf/cm2",
    },
    ["mb"] = {
        name1    = "millibar",
        symbol   = "mb",
        utype    = "pressure",
        scale    = 100,
        default  = "hPa",
        link     = "Bar (unit)",
    },
    ["mbar"] = {
        name1    = "millibar",
        symbol   = "mbar",
        utype    = "pressure",
        scale    = 100,
        default  = "hPa",
        link     = "Bar (unit)",
    },
    ["mmHg"] = {
        name1    = "millimetre of mercury",
        name1_us = "millimeter of mercury",
        name2    = "millimetres of mercury",
        name2_us = "millimeters of mercury",
        symbol   = "mmHg",
        utype    = "pressure",
        scale    = 133.322387415,
```

```
        default  = "kPa",
    },
    ["Pa"] = {
        _name1   = "pascal",
        _symbol  = "Pa",
        utype    = "pressure",
        scale    = 1,
        prefixes = 1,
        default  = "psi",
        link     = "Pascal (unit)",
    },
    ["psf"] = {
        name1    = "pound per square foot",
        name2    = "pounds per square foot",
        symbol   = "psf",
        utype    = "pressure",
        scale    = 47.880258980335839,
        default  = "kPa",
        link     = "Pound per square inch",
    },
    ["psi"] = {
        name1    = "pound per square inch",
        name2    = "pounds per square inch",
        symbol   = "psi",
        utype    = "pressure",
        scale    = 6894.7572931683608,
        default  = "kPa",
    },
    ["Torr"] = {
        name1    = "torr",
        symbol   = "Torr",
        utype    = "pressure",
        scale    = 133.32236842105263,
        default  = "kPa",
    },
    ["N/cm2"] = {
        per      = { "N", "cm2" },
        utype    = "pressure",
        default  = "psi",
    },
    ["N/m2"] = {
        per      = { "N", "m2" },
        utype    = "pressure",
        default  = "psi",
    },
    ["g/cm2"] = {
        per      = { "g", "cm2" },
        utype    = "pressure",
        default  = "lb/sqft",
        multiplier= 9.80665,
    },
    ["g/m2"] = {
        per      = { "g", "m2" },
        utype    = "pressure",
        default  = "lb/sqft",
        multiplier= 9.80665,
    },
    ["kg/ha"] = {
        per      = { "kg", "ha" },
        utype    = "pressure",
        default  = "lb/acre",
        multiplier= 9.80665,
    },
    ["kg/m2"] = {
```

```
        per      = { "kg", "m2" },
        utype    = "pressure",
        default  = "lb/sqft",
        multiplier= 9.80665,
    },
    ["lb/1000sqft"] = {
        per      = { "lb", "1000sqft" },
        utype    = "pressure",
        default  = "g/m2",
        multiplier= 9.80665,
    },
    ["lb/acre"] = {
        per      = { "lb", "acre" },
        utype    = "pressure",
        default  = "kg/ha",
        multiplier= 9.80665,
    },
    ["lb/sqft"] = {
        per      = { "lb", "sqft" },
        utype    = "pressure",
        default  = "kg/m2",
        multiplier= 9.80665,
    },
    ["lb/sqyd"] = {
        per      = { "lb", "sqyd" },
        utype    = "pressure",
        default  = "kg/m2",
        multiplier= 9.80665,
    },
    ["LT/acre"] = {
        per      = { "LT", "acre" },
        utype    = "pressure",
        default  = "t/ha",
        multiplier= 9.80665,
    },
    ["MT/ha"] = {
        per      = { "MT", "ha" },
        utype    = "pressure",
        default  = "LT/acre ST/acre",
        multiplier= 9.80665,
    },
    ["oz/sqft"] = {
        per      = { "oz", "sqft" },
        utype    = "pressure",
        default  = "g/m2",
        multiplier= 9.80665,
    },
    ["oz/sqyd"] = {
        per      = { "oz", "sqyd" },
        utype    = "pressure",
        default  = "g/m2",
        multiplier= 9.80665,
    },
    ["ST/acre"] = {
        per      = { "ST", "acre" },
        utype    = "pressure",
        default  = "t/ha",
        multiplier= 9.80665,
    },
    ["t/ha"] = {
        per      = { "t", "ha" },
        utype    = "pressure",
        default  = "LT/acre ST/acre",
        multiplier= 9.80665,
```

```
    },
    ["tonne/acre"] = {
        per      = { "tonne", "acre" },
        utype    = "pressure",
        default  = "tonne/ha",
        multiplier= 9.80665,
    },
    ["tonne/ha"] = {
        per      = { "tonne", "ha" },
        utype    = "pressure",
        default  = "tonne/acre",
        multiplier= 9.80665,
    },
    ["kgfpsqcm"] = {
        target   = "kgf/cm2",
    },
    ["kgpsqcm"] = {
        target   = "kg/cm2",
    },
    ["kN/m2"] = {
        target   = "kPa",
    },
    ["lb/in2"] = {
        target   = "lbf/in2",
    },
    ["torr"] = {
        target   = "Torr",
    },
    ["Bq"] = {
        _name1   = "becquerel",
        _symbol  = "Bq",
        utype    = "radioactivity",
        scale    = 1,
        prefixes = 1,
        default  = "pCi",
        link     = "Becquerel",
    },
    ["Ci"] = {
        _name1   = "curie",
        _symbol  = "Ci",
        utype    = "radioactivity",
        scale    = 3.7e10,
        prefixes = 1,
        default  = "GBq",
        link     = "Curie (unit)",
    },
    ["Rd"] = {
        _name1   = "rutherford",
        _symbol  = "Rd",
        utype    = "radioactivity",
        scale    = 1e6,
        prefixes = 1,
        default  = "MBq",
        link     = "Rutherford (unit)",
    },
    ["cm/h"] = {
        name1    = "centimetre per hour",
        name1_us = "centimeter per hour",
        name2    = "centimetres per hour",
        name2_us = "centimeters per hour",
        symbol   = "cm/h",
        utype    = "speed",
        scale    = 2.7777777777777775e-6,
        default  = "in/h",
```

```
        link     = "Metre per second",
    },
    ["cm/s"] = {
        name1    = "centimetre per second",
        name1_us = "centimeter per second",
        name2    = "centimetres per second",
        name2_us = "centimeters per second",
        symbol   = "cm/s",
        utype    = "speed",
        scale    = 0.01,
        default  = "in/s",
        link     = "Metre per second",
    },
    ["cm/year"] = {
        name1    = "centimetre per year",
        name1_us = "centimeter per year",
        name2    = "centimetres per year",
        name2_us = "centimeters per year",
        symbol   = "cm/year",
        utype    = "speed",
        scale    = 3.168873850681143e-10,
        default  = "in/year",
        link     = "Orders of magnitude (speed)",
    },
    ["foot/s"] = {
        name1    = "foot per second",
        name2    = "foot per second",
        symbol   = "ft/s",
        utype    = "speed",
        scale    = 0.3048,
        default  = "m/s",
    },
    ["ft/min"] = {
        name1    = "foot per minute",
        name2    = "feet per minute",
        symbol   = "ft/min",
        utype    = "speed",
        scale    = 0.00508,
        default  = "m/min",
        link     = "Feet per second",
    },
    ["ft/s"] = {
        name1    = "foot per second",
        name2    = "feet per second",
        symbol   = "ft/s",
        utype    = "speed",
        scale    = 0.3048,
        default  = "m/s",
        link     = "Feet per second",
    },
    ["furlong per fortnight"] = {
        name2    = "furlongs per fortnight",
        symbol   = "furlong per fortnight",
        usename  = 1,
        utype    = "speed",
        scale    = 0.00016630952380952381,
        default  = "km/h mph",
        link     = "FFF system",
    },
    ["in/h"] = {
        name1    = "inch per hour",
        name2    = "inches per hour",
        symbol   = "in/h",
        utype    = "speed",
```

```
        scale    = 7.0555555555555559e-6,
        default  = "cm/h",
        link     = "Inch",
    },
    ["in/s"] = {
        name1    = "inch per second",
        name2    = "inches per second",
        symbol   = "in/s",
        utype    = "speed",
        scale    = 0.0254,
        default  = "cm/s",
        link     = "Inch",
    },
    ["in/year"] = {
        name1    = "inch per year",
        name2    = "inches per year",
        symbol   = "in/year",
        utype    = "speed",
        scale    = 8.0489395807301024e-10,
        default  = "cm/year",
        link     = "Orders of magnitude (speed)",
    },
    ["isp"] = {
        name1    = "second",
        symbol   = "s",
        utype    = "speed",
        scale    = 9.80665,
        default  = "km/s",
        link     = "Specific impulse",
    },
    ["km/d"] = {
        name1    = "kilometre per day",
        name1_us = "kilometer per day",
        name2    = "kilometres per day",
        name2_us = "kilometers per day",
        symbol   = "km/d",
        utype    = "speed",
        scale    = 1.1574074074074074e-2,
        default  = "mi/d",
        link     = "Orders of magnitude (speed)",
    },
    ["km/h"] = {
        name1    = "kilometre per hour",
        name1_us = "kilometer per hour",
        name2    = "kilometres per hour",
        name2_us = "kilometers per hour",
        symbol   = "km/h",
        utype    = "speed",
        scale    = 0.27777777777777779,
        default  = "mph",
        link     = "Kilometres per hour",
    },
    ["km/s"] = {
        name1    = "kilometre per second",
        name1_us = "kilometer per second",
        name2    = "kilometres per second",
        name2_us = "kilometers per second",
        symbol   = "km/s",
        utype    = "speed",
        scale    = 1000,
        default  = "mi/s",
        link     = "Metre per second",
    },
    ["kn"] = {
```

```
        name1    = "knot",
        symbol   = "kn",
        utype    = "speed",
        scale    = 0.51444444444444448,
        default  = "km/h mph",
        link     = "Knot (unit)",
    },
    ["kNs/kg"] = {
        name2    = "kN&#8209;s/kg",
        symbol   = "kN&#8209;s/kg",
        utype    = "speed",
        scale    = 1000,
        default  = "isp",
        link     = "Specific impulse",
    },
    ["m/min"] = {
        name1    = "metre per minute",
        name1_us = "meter per minute",
        name2    = "metres per minute",
        name2_us = "meters per minute",
        symbol   = "m/min",
        utype    = "speed",
        scale    = 0.016666666666666666,
        default  = "ft/min",
        link     = "Metre per second",
    },
    ["m/s"] = {
        name1    = "metre per second",
        name1_us = "meter per second",
        name2    = "metres per second",
        name2_us = "meters per second",
        symbol   = "m/s",
        utype    = "speed",
        scale    = 1,
        default  = "ft/s",
    },
    ["Mach"] = {
        name2    = "Mach",
        symbol   = "Mach",
        utype    = "speed",
        builtin  = "mach",
        scale    = 0,
        iscomplex= true,
        default  = "km/h mph",
        link     = "Mach number",
    },
    ["mi/d"] = {
        name1    = "mile per day",
        name2    = "miles per day",
        symbol   = "mi/d",
        utype    = "speed",
        scale    = 1.8626666666666667e-2,
        default  = "km/d",
        link     = "Orders of magnitude (speed)",
    },
    ["mi/s"] = {
        name1    = "mile per second",
        name2    = "miles per second",
        symbol   = "mi/s",
        utype    = "speed",
        scale    = 1609.344,
        default  = "km/s",
        link     = "Mile",
    },
```

```
    ["mm/h"] = {
        name1    = "millimetre per hour",
        name1_us = "millimeter per hour",
        name2    = "millimetres per hour",
        name2_us = "millimeters per hour",
        symbol   = "mm/h",
        utype    = "speed",
        scale    = 2.7777777777777781e-7,
        default  = "in/h",
        link     = "Metre per second",
    },
    ["mph"] = {
        name1    = "mile per hour",
        name2    = "miles per hour",
        symbol   = "mph",
        utype    = "speed",
        scale    = 0.44704,
        default  = "km/h",
        link     = "Miles per hour",
    },
    ["Ns/kg"] = {
        name2    = "N&#8209;s/kg",
        symbol   = "N&#8209;s/kg",
        utype    = "speed",
        scale    = 1,
        default  = "isp",
        link     = "Specific impulse",
    },
    ["si tsfc"] = {
        name2    = "g/(kN·s)",
        symbol   = "g/(kN·s)",
        utype    = "speed",
        scale    = 9.9999628621379242e-7,
        invert   = -1,
        iscomplex= true,
        default  = "tsfc",
        link     = "Thrust specific fuel consumption",
    },
    ["tsfc"] = {
        name2    = "lb/(lbf·h)",
        symbol   = "lb/(lbf·h)",
        utype    = "speed",
        scale    = 2.832545036049801e-5,
        invert   = -1,
        iscomplex= true,
        default  = "si tsfc",
        link     = "Thrust specific fuel consumption",
    },
    ["cm/y"] = {
        target   = "cm/year",
    },
    ["cm/yr"] = {
        target   = "cm/year",
    },
    ["in/y"] = {
        target   = "in/year",
    },
    ["in/yr"] = {
        target   = "in/year",
    },
    ["knot"] = {
        target   = "kn",
    },
    ["knots"] = {
```

```
        target   = "kn",
    },
    ["kph"] = {
        target   = "km/h",
    },
    ["mi/h"] = {
        target   = "mph",
    },
    ["mm/s"] = {
        per      = { "mm", "s" },
        utype    = "speed",
        default  = "in/s",
        link     = "Metre per second",
    },
    ["C"] = {
        name1    = "degree Celsius",
        name2    = "degrees Celsius",
        symbol   = "°C",
        usesymbol= 1,
        utype    = "temperature",
        scale    = 1,
        offset   = -273.15,
        iscomplex= true,
        istemperature= true,
        default  = "F",
        link     = "Celsius",
    },
    ["F"] = {
        name1    = "degree Fahrenheit",
        name2    = "degrees Fahrenheit",
        symbol   = "°F",
        usesymbol= 1,
        utype    = "temperature",
        scale    = 0.55555555555555558,
        offset   = 32-273.15*(9/5),
        iscomplex= true,
        istemperature= true,
        default  = "C",
        link     = "Fahrenheit",
    },
    ["K"] = {
        _name1   = "kelvin",
        _symbol  = "K",
        usesymbol= 1,
        utype    = "temperature",
        scale    = 1,
        offset   = 0,
        iscomplex= true,
        istemperature= true,
        prefixes = 1,
        default  = "C F",
        link     = "Kelvin",
    },
    ["keVT"] = {
        name1    = "kiloelectronvolt",
        symbol   = "keV",
        utype    = "temperature",
        scale    = 11.604505e6,
        offset   = 0,
        iscomplex= true,
        default  = "MK",
        link     = "Electronvolt",
    },
    ["R"] = {
```

```
        name1    = "degree Rankine",
        name2    = "degrees Rankine",
        symbol   = "°R",
        usesymbol= 1,
        utype    = "temperature",
        scale    = 0.55555555555555558,
        offset   = 0,
        iscomplex= true,
        istemperature= true,
        default  = "K F C",
        link     = "Rankine scale",
    },
    ["Celsius"] = {
        target   = "C",
    },
    ["°C"] = {
        target   = "C",
    },
    ["°F"] = {
        target   = "F",
    },
    ["°R"] = {
        target   = "R",
    },
    ["C-change"] = {
        name1    = "degree Celsius change",
        name2    = "degrees Celsius change",
        symbol   = "°C",
        usesymbol= 1,
        utype    = "temperature change",
        scale    = 1,
        default  = "F-change",
        link     = "Celsius",
    },
    ["F-change"] = {
        name1    = "degree Fahrenheit change",
        name2    = "degrees Fahrenheit change",
        symbol   = "°F",
        usesymbol= 1,
        utype    = "temperature change",
        scale    = 0.55555555555555558,
        default  = "C-change",
        link     = "Fahrenheit",
    },
    ["K-change"] = {
        name1    = "kelvin change",
        name2    = "kelvins change",
        symbol   = "K",
        usesymbol= 1,
        utype    = "temperature change",
        scale    = 1,
        default  = "F-change",
        link     = "Kelvin",
    },
    ["°C-change"] = {
        target   = "C-change",
    },
    ["°F-change"] = {
        target   = "F-change",
    },
    ["century"] = {
        name1    = "century",
        name2    = "centuries",
        symbol   = "ha",
```

```
        utype    = "time",
        scale    = 3155760000,
        default  = "Gs",
    },
    ["d"] = {
        name1    = "day",
        symbol   = "d",
        utype    = "time",
        scale    = 86400,
        default  = "ks",
    },
    ["decade"] = {
        name1    = "decade",
        symbol   = "daa",
        utype    = "time",
        scale    = 315576000,
        default  = "Ms",
    },
    ["dog year"] = {
        name1    = "dog year",
        symbol   = "dog yr",
        utype    = "time",
        scale    = 220903200,
        default  = "years",
        link     = "List of unusual units of measurement#Dog year",
    },
    ["fortnight"] = {
        symbol   = "fortnight",
        usename  = 1,
        utype    = "time",
        scale    = 1209600,
        default  = "week",
    },
    ["h"] = {
        name1    = "hour",
        symbol   = "h",
        utype    = "time",
        scale    = 3600,
        default  = "ks",
    },
    ["long billion year"] = {
        name1    = "billion years",
        name2    = "billion years",
        symbol   = "Ta",
        utype    = "time",
        scale    = 31557600000000000000,
        default  = "Es",
        link     = "Annum",
    },
    ["millennium"] = {
        name1    = "millennium",
        name2    = "millennia",
        symbol   = "ka",
        utype    = "time",
        scale    = 31557600000,
        default  = "Gs",
    },
    ["milliard year"] = {
        name1    = "milliard years",
        name2    = "milliard years",
        symbol   = "Ga",
        utype    = "time",
        scale    = 31557600000000000,
        default  = "Ps",
```

```
        link     = "Annum",
    },
    ["million year"] = {
        name1    = "million years",
        name2    = "million years",
        symbol   = "Ma",
        utype    = "time",
        scale    = 31557600000000,
        default  = "Ts",
        link     = "Annum",
    },
    ["min"] = {
        name1    = "minute",
        symbol   = "min",
        utype    = "time",
        scale    = 60,
        default  = "s",
    },
    ["month"] = {
        symbol   = "month",
        usename  = 1,
        utype    = "time",
        scale    = 2629800,
        default  = "Ms",
    },
    ["months"] = {
        name1    = "month",
        symbol   = "mo",
        utype    = "time",
        scale    = 2629800,
        default  = "year",
    },
    ["s"] = {
        _name1   = "second",
        _symbol  = "s",
        utype    = "time",
        scale    = 1,
        prefixes = 1,
        default  = "min",
        link     = "Second",
    },
    ["short billion year"] = {
        name1    = "billion years",
        name2    = "billion years",
        symbol   = "Ga",
        utype    = "time",
        scale    = 31557600000000000,
        default  = "Ps",
        link     = "Annum",
    },
    ["short trillion year"] = {
        name1    = "trillion years",
        name2    = "trillion years",
        symbol   = "Ta",
        utype    = "time",
        scale    = 31557600000000000000,
        default  = "Es",
        link     = "Annum",
    },
    ["thousand million year"] = {
        name1    = "thousand million years",
        name2    = "thousand million years",
        symbol   = "Ga",
        utype    = "time",
```

```
        scale    = 31557600000000000,
        default  = "Ps",
        link     = "Annum",
    },
    ["wk"] = {
        symbol   = "week",
        usename  = 1,
        utype    = "time",
        scale    = 604800,
        default  = "Ms",
    },
    ["year"] = {
        name1    = "year",
        symbol   = "a",
        utype    = "time",
        scale    = 31557600,
        default  = "Ms",
        link     = "Annum",
    },
    ["years"] = {
        name1    = "year",
        symbol   = "yr",
        utype    = "time",
        scale    = 31557600,
        default  = "Ms",
        link     = "Annum",
    },
    ["byr"] = {
        target   = "short billion year",
    },
    ["day"] = {
        target   = "d",
    },
    ["days"] = {
        target   = "d",
    },
    ["dog yr"] = {
        target   = "dog year",
    },
    ["Gyr"] = {
        target   = "thousand million year",
    },
    ["hour"] = {
        target   = "h",
    },
    ["hours"] = {
        target   = "h",
    },
    ["kMyr"] = {
        target   = "thousand million year",
    },
    ["kmyr"] = {
        target   = "thousand million year",
    },
    ["kyr"] = {
        target   = "millennium",
    },
    ["long byr"] = {
        target   = "long billion year",
    },
    ["minute"] = {
        target   = "min",
    },
    ["minutes"] = {
```

```
        target   = "min",
    },
    ["mth"] = {
        target   = "month",
    },
    ["Myr"] = {
        target   = "million year",
    },
    ["myr"] = {
        target   = "million year",
    },
    ["second"] = {
        target   = "s",
    },
    ["seconds"] = {
        target   = "s",
    },
    ["tmyr"] = {
        target   = "thousand million year",
    },
    ["tryr"] = {
        target   = "short trillion year",
    },
    ["tyr"] = {
        target   = "millennium",
    },
    ["week"] = {
        target   = "wk",
    },
    ["weeks"] = {
        target   = "wk",
    },
    ["yr"] = {
        target   = "year",
    },
    ["kg.m"] = {
        name1    = "kilogram metre",
        name1_us = "kilogram meter",
        symbol   = "kg·m",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbft",
        link     = "Kilogram metre (torque)",
    },
    ["kgf.m"] = {
        name1    = "kilogram force-metre",
        name1_us = "kilogram force-meter",
        symbol   = "kgf·m",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbfft",
        link     = "Kilogram metre (torque)",
    },
    ["kgm"] = {
        name1    = "kilogram metre",
        name1_us = "kilogram meter",
        symbol   = "kg·m",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbfft",
        link     = "Kilogram metre (torque)",
    },
    ["kpm"] = {
        name1    = "kilopond metre",
```

```
        name1_us = "kilopond meter",
        symbol   = "kp·m",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbft",
        link     = "Kilogram metre (torque)",
    },
    ["lb-fft"] = {
        name1    = "pound force-foot",
        name2    = "pound force-feet",
        symbol   = "ft·lb<sub>f</sub>",
        utype    = "torque",
        scale    = 1.3558179483314004,
        default  = "Nm",
        link     = "Pound-foot (torque)",
    },
    ["lb.ft"] = {
        name1    = "pound force-foot",
        name2    = "pound force-feet",
        symbol   = "lb·ft",
        utype    = "torque",
        scale    = 1.3558179483314004,
        default  = "Nm",
        link     = "Pound-foot (torque)",
    },
    ["lb.in"] = {
        name1    = "pound force-inch",
        symbol   = "lb·in",
        utype    = "torque",
        scale    = 0.1129848290276167,
        default  = "mN.m",
        link     = "Pound-foot (torque)",
    },
    ["lbfft"] = {
        name1    = "pound force-foot",
        name2    = "pound force-feet",
        symbol   = "lbf·ft",
        utype    = "torque",
        scale    = 1.3558179483314004,
        default  = "Nm",
        link     = "Pound-foot (torque)",
    },
    ["lbft"] = {
        name1    = "pound-foot",
        name2    = "pound-feet",
        symbol   = "lb·ft",
        utype    = "torque",
        scale    = 1.3558179483314004,
        default  = "Nm",
        link     = "Pound-foot (torque)",
    },
    ["m.kg-f"] = {
        name1    = "metre kilogram-force",
        name1_us = "meter kilogram-force",
        name2    = "metre kilograms-force",
        name2_us = "meter kilograms-force",
        symbol   = "m·kg<sub>f</sub>",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbfft",
        link     = "Kilogram metre (torque)",
    },
    ["m.kgf"] = {
        name1    = "metre kilogram-force",
```

```
        name1_us = "meter kilogram-force",
        name2    = "metre kilograms-force",
        name2_us = "meter kilograms-force",
        symbol   = "m·kgf",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbfft",
        link     = "Kilogram metre (torque)",
    },
    ["mN.m"] = {
        name1    = "millinewton-metre",
        name1_us = "millinewton-meter",
        symbol   = "mN·m",
        utype    = "torque",
        scale    = 0.001,
        default  = "lb.in",
        link     = "Newton-metre",
    },
    ["Nm"] = {
        _name1   = "newton-metre",
        _name1_us= "newton-meter",
        _symbol  = "N·m",
        utype    = "torque",
        alttype  = "energy",
        scale    = 1,
        prefixes = 1,
        default  = "lbfft",
        link     = "Newton-metre",
    },
    ["kN/m"] = {
        per      = { "kN", "-m-stiff" },
        utype    = "torque",
        default  = "lbf/in",
    },
    ["lbf/in"] = {
        per      = { "lbf", "-in-stiff" },
        utype    = "torque",
        default  = "kN/m",
    },
    ["lb-f.ft"] = {
        target   = "lb-fft",
    },
    ["lbf.ft"] = {
        target   = "lbfft",
    },
    ["lbf·ft"] = {
        target   = "lbfft",
    },
    ["lb·ft"] = {
        target   = "lb.ft",
    },
    ["mkg-f"] = {
        target   = "m.kg-f",
    },
    ["mkgf"] = {
        target   = "m.kgf",
    },
    ["N.m"] = {
        target   = "Nm",
    },
    ["N·m"] = {
        target   = "Nm",
    },
    ["ton-mile"] = {
```

```
        symbol   = "ton-mile",
        usename  = 1,
        utype    = "transportation",
        scale    = 1.4599723182105602,
        default  = "tkm",
    },
    ["tkm"] = {
        name1    = "tonne-kilometre",
        name1_us = "tonne-kilometer",
        symbol   = "tkm",
        utype    = "transportation",
        scale    = 1,
        default  = "ton-mile",
    },
    ["-12USoz(mL)serve"] = {
        name1_us = "12 U.S. fl oz (355 mL) serving",
        symbol   = "12 US fl oz (355 mL) serving",
        sym_us   = "12 U.S. fl oz (355 mL) serving",
        utype    = "volume",
        scale    = 0.00035488235475000004,
        default  = "mL",
        link     = "Beverage can#Standard sizes",
    },
    ["-12USoz(ml)serve"] = {
        name1_us = "12 U.S. fl oz (355 ml) serving",
        symbol   = "12 US fl oz (355 ml) serving",
        sym_us   = "12 U.S. fl oz (355 ml) serving",
        utype    = "volume",
        scale    = 0.00035488235475000004,
        default  = "ml",
        link     = "Beverage can#Standard sizes",
    },
    ["-12USozserve"] = {
        name1_us = "12 U.S. fl oz serving",
        symbol   = "12 US fl oz serving",
        sym_us   = "12 U.S. fl oz serving",
        utype    = "volume",
        scale    = 0.00035488235475000004,
        default  = "mL",
        link     = "Beverage can#Standard sizes",
    },
    ["acre-foot"] = {
        name1    = "acre-foot",
        name2    = "acre-foot",
        symbol   = "acre·ft",
        utype    = "volume",
        scale    = 1233.48183754752,
        default  = "m3",
    },
    ["acre-ft"] = {
        name1    = "acre-foot",
        name2    = "acre-feet",
        symbol   = "acre·ft",
        utype    = "volume",
        scale    = 1233.48183754752,
        default  = "m3",
    },
    ["AUtbsp"] = {
        name1    = "Australian tablespoon",
        symbol   = "AU tbsp",
        utype    = "volume",
        scale    = 0.000020,
        default  = "ml",
    },
```

```
    ["Bcuft"] = {
        name1    = "billion cubic foot",
        name2    = "billion cubic feet",
        symbol   = "billion cu ft",
        utype    = "volume",
        scale    = 28316846.592,
        default  = "Gl",
        link     = "Cubic foot",
    },
    ["bdft"] = {
        name1    = "board foot",
        name2    = "board feet",
        symbol   = "bd ft",
        utype    = "volume",
        scale    = 0.0023597372167,
        default  = "m3",
    },
    ["board feet"] = {
        name2    = "board feet",
        symbol   = "board foot",
        usename  = 1,
        utype    = "volume",
        scale    = 0.0023597372167,
        default  = "m3",
    },
    ["board foot"] = {
        name2    = "board foot",
        symbol   = "board foot",
        usename  = 1,
        utype    = "volume",
        scale    = 0.0023597372167,
        default  = "m3",
    },
    ["cc"] = {
        name1    = "cubic centimetre",
        name1_us = "cubic centimeter",
        symbol   = "cc",
        utype    = "volume",
        scale    = 0.000001,
        default  = "cuin",
    },
    ["CID"] = {
        name1    = "cubic inch",
        name2    = "cubic inches",
        symbol   = "cu in",
        utype    = "volume",
        scale    = 0.000016387064,
        default  = "cc",
        link     = "Cubic inch#Engine displacement",
    },
    ["cord"] = {
        symbol   = "cord",
        utype    = "volume",
        scale    = 3.624556363776,
        default  = "m3",
        link     = "Cord (unit)",
    },
    ["cufoot"] = {
        name1    = "cubic foot",
        name2    = "cubic foot",
        symbol   = "cu ft",
        utype    = "volume",
        scale    = 0.028316846592,
        default  = "m3",
```

```
    },
    ["cuft"] = {
        name1    = "cubic foot",
        name2    = "cubic feet",
        symbol   = "cu ft",
        utype    = "volume",
        scale    = 0.028316846592,
        default  = "m3",
    },
    ["cuin"] = {
        name1    = "cubic inch",
        name2    = "cubic inches",
        symbol   = "cu in",
        utype    = "volume",
        scale    = 0.000016387064,
        default  = "cm3",
    },
    ["cumi"] = {
        name1    = "cubic mile",
        symbol   = "cu mi",
        utype    = "volume",
        scale    = 4168181825.440579584,
        default  = "km3",
    },
    ["cuyd"] = {
        name1    = "cubic yard",
        symbol   = "cu yd",
        utype    = "volume",
        scale    = 0.764554857984,
        default  = "m3",
    },
    ["firkin"] = {
        symbol   = "firkin",
        usename  = 1,
        utype    = "volume",
        scale    = 0.04091481,
        default  = "l impgal USgal",
        link     = "Firkin (unit)",
    },
    ["foot3"] = {
        target   = "cufoot",
    },
    ["Goilbbl"] = {
        name1    = "billion barrels",
        name2    = "billion barrels",
        symbol   = "Gbbl",
        utype    = "volume",
        scale    = 158987294.928,
        default  = "v * 1.58987294928 < 10 ! e6 ! e9 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["gr water"] = {
        name1    = "grains water",
        name2    = "grains water",
        symbol   = "gr H<sub>2</sub>O",
        utype    = "volume",
        scale    = 0.00000006479891,
        default  = "cm3",
        link     = "Grain (unit)",
    },
    ["grt"] = {
        name1    = "gross register ton",
        symbol   = "grt",
        utype    = "volume",
```

```
        scale    = 2.8316846592,
        default  = "m3",
        link     = "Gross register tonnage",
    },
    ["impbbl"] = {
        name1    = "imperial barrel",
        symbol   = "imp bbl",
        utype    = "volume",
        scale    = 0.16365924,
        default  = "l impgal USgal",
        link     = "Barrel (unit)",
    },
    ["impbsh"] = {
        name1    = "imperial bushel",
        symbol   = "imp bsh",
        utype    = "volume",
        scale    = 0.03636872,
        default  = "l impgal USdrygal",
    },
    ["impbu"] = {
        name1    = "imperial bushel",
        symbol   = "imp bu",
        utype    = "volume",
        scale    = 0.03636872,
        default  = "m3",
    },
    ["impgal"] = {
        name1    = "imperial gallon",
        symbol   = "imp gal",
        utype    = "volume",
        scale    = 0.00454609,
        default  = "l USgal",
    },
    ["impgi"] = {
        name1    = "gill",
        symbol   = "gi",
        utype    = "volume",
        scale    = 0.0001420653125,
        default  = "ml USoz",
        link     = "Gill (unit)",
    },
    ["impkenning"] = {
        name1    = "imperial kenning",
        symbol   = "kenning",
        utype    = "volume",
        scale    = 0.01818436,
        default  = "l USdrygal",
        link     = "Kenning (unit)",
    },
    ["impoz"] = {
        name1    = "imperial fluid ounce",
        symbol   = "imp fl oz",
        utype    = "volume",
        scale    = 0.0000284130625,
        default  = "ml USoz",
    },
    ["imppk"] = {
        name1    = "imperial peck",
        symbol   = "pk",
        utype    = "volume",
        scale    = 0.00909218,
        default  = "l USdrygal",
        link     = "Peck",
    },
```

```
    ["imppt"] = {
        name1    = "imperial pint",
        symbol   = "imp pt",
        utype    = "volume",
        scale    = 0.00056826125,
        default  = "l",
    },
    ["impqt"] = {
        name1    = "imperial quart",
        symbol   = "imp qt",
        utype    = "volume",
        scale    = 0.0011365225,
        default  = "ml USoz",
        customary= 3,
    },
    ["kilderkin"] = {
        symbol   = "kilderkin",
        usename  = 1,
        utype    = "volume",
        scale    = 0.08182962,
        default  = "l impgal USgal",
    },
    ["koilbbl"] = {
        name1    = "thousand barrels",
        name2    = "thousand barrels",
        symbol   = "kbbl",
        utype    = "volume",
        scale    = 158.987294928,
        default  = "v * 1.58987294928 < 10 ! ! e3 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["L"] = {
        _name1   = "litre",
        _name1_us= "liter",
        _symbol  = "L",
        utype    = "volume",
        scale    = 0.001,
        prefixes = 1,
        default  = "impgal USgal",
        link     = "Litre",
    },
    ["l"] = {
        _name1   = "litre",
        _name1_us= "liter",
        _symbol  = "l",
        utype    = "volume",
        scale    = 0.001,
        prefixes = 1,
        default  = "impgal USgal",
        link     = "Litre",
    },
    ["m3"] = {
        _name1   = "cubic metre",
        _name1_us= "cubic meter",
        _symbol  = "m<sup>3</sup>",
        prefix_position= 7,
        utype    = "volume",
        scale    = 1,
        prefixes = 3,
        default  = "cuft",
        link     = "Cubic metre",
    },
    ["Mbbl"] = {
        name1    = "thousand barrels",
```

```
        name2    = "thousand barrels",
        symbol   = "Mbbl",
        utype    = "volume",
        scale    = 158.987294928,
        default  = "v * 1.58987294928 < 10 ! e3 ! ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["MMoilbbl"] = {
        name1    = "million barrels",
        name2    = "million barrels",
        symbol   = "MMbbl",
        utype    = "volume",
        scale    = 158987.294928,
        default  = "v * 1.58987294928 < 10 ! e3 ! e6 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["Moilbbl"] = {
        name1    = "million barrels",
        name2    = "million barrels",
        symbol   = "Mbbl",
        utype    = "volume",
        scale    = 158987.294928,
        default  = "v * 1.58987294928 < 10 ! e3 ! e6 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["MTON"] = {
        name1    = "measurement ton",
        symbol   = "MTON",
        utype    = "volume",
        scale    = 1.13267386368,
        default  = "m3",
    },
    ["MUSgal"] = {
        name1    = "million US gallons",
        name1_us = "million U.S. gallons",
        name2    = "million US gallons",
        name2_us = "million U.S. gallons",
        symbol   = "million US gal",
        sym_us   = "million U.S. gal",
        utype    = "volume",
        scale    = 3785.411784,
        default  = "Ml",
        link     = "US gallon",
    },
    ["oilbbl"] = {
        name1    = "barrel",
        symbol   = "bbl",
        utype    = "volume",
        scale    = 0.158987294928,
        default  = "m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["stere"] = {
        symbol   = "stere",
        usename  = 1,
        utype    = "volume",
        scale    = 1,
        default  = "cuft",
    },
    ["Toilbbl"] = {
        name1    = "trillion barrels",
        name2    = "trillion barrels",
        symbol   = "Tbbl",
        utype    = "volume",
```

```
        scale    = 158987294928,
        default  = "v * 1.58987294928 < 10 ! e9 ! e12 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["USbbl"] = {
        name1    = "US barrel",
        name1_us = "U.S. barrel",
        symbol   = "US bbl",
        sym_us   = "U.S. bbl",
        utype    = "volume",
        scale    = 0.119240471196,
        default  = "l USgal impgal",
        link     = "Barrel (unit)",
    },
    ["USbeerbbl"] = {
        name1    = "US beer barrel",
        name1_us = "U.S. beer barrel",
        symbol   = "US bbl",
        sym_us   = "U.S. bbl",
        utype    = "volume",
        scale    = 0.117347765304,
        default  = "l USgal impgal",
        link     = "Barrel (unit)",
    },
    ["USbsh"] = {
        name1    = "US bushel",
        name1_us = "U.S. bushel",
        symbol   = "US bsh",
        sym_us   = "U.S. bsh",
        utype    = "volume",
        scale    = 0.03523907016688,
        default  = "l USdrygal impgal",
        link     = "Bushel",
    },
    ["USbu"] = {
        name1    = "US bushel",
        name1_us = "U.S. bushel",
        symbol   = "US bu",
        sym_us   = "U.S. bu",
        utype    = "volume",
        scale    = 0.03523907016688,
        default  = "l USdrygal impgal",
        link     = "Bushel",
    },
    ["USdrybbl"] = {
        name1    = "US dry barrel",
        name1_us = "U.S. dry barrel",
        symbol   = "US dry bbl",
        sym_us   = "U.S. dry bbl",
        utype    = "volume",
        scale    = 0.11562819898508,
        default  = "m3",
        link     = "Barrel (unit)",
    },
    ["USdrygal"] = {
        name1    = "US dry gallon",
        name1_us = "U.S. dry gallon",
        symbol   = "US dry gal",
        sym_us   = "U.S. dry gal",
        utype    = "volume",
        scale    = 0.00440488377086,
        default  = "l",
        link     = "Gallon",
    },
```

```
    ["USdrypt"] = {
        name1    = "US dry pint",
        name1_us = "U.S. dry pint",
        symbol   = "US dry pt",
        sym_us   = "U.S. dry pt",
        utype    = "volume",
        scale    = 0.0005506104713575,
        default  = "ml",
        link     = "Pint",
    },
    ["USdryqt"] = {
        name1    = "US dry quart",
        name1_us = "U.S. dry quart",
        symbol   = "US dry qt",
        sym_us   = "U.S. dry qt",
        utype    = "volume",
        scale    = 0.001101220942715,
        default  = "ml",
        link     = "Quart",
    },
    ["USflgal"] = {
        name1    = "US gallon",
        name1_us = "U.S. gallon",
        symbol   = "US fl gal",
        sym_us   = "U.S. fl gal",
        utype    = "volume",
        scale    = 0.003785411784,
        default  = "l impgal",
        link     = "Gallon",
    },
    ["USgal"] = {
        name1    = "US gallon",
        name1_us = "U.S. gallon",
        symbol   = "US gal",
        sym_us   = "U.S. gal",
        utype    = "volume",
        scale    = 0.003785411784,
        default  = "l impgal",
    },
    ["USgi"] = {
        name1    = "gill",
        symbol   = "gi",
        utype    = "volume",
        scale    = 0.0001182941183,
        default  = "ml impoz",
        link     = "Gill (unit)",
    },
    ["USkenning"] = {
        name1    = "US kenning",
        name1_us = "U.S. kenning",
        symbol   = "US kenning",
        sym_us   = "U.S. kenning",
        utype    = "volume",
        scale    = 0.01761953508344,
        default  = "l impgal",
        link     = "Kenning (unit)",
    },
    ["USmin"] = {
        name1    = "US minim",
        name1_us = "U.S. minim",
        symbol   = "US min",
        sym_us   = "U.S. min",
        utype    = "volume",
        scale    = 0.00000061611519921875,
```

```
        default  = "ml",
        link     = "Minim (unit)",
    },
    ["USoz"] = {
        name1    = "US fluid ounce",
        name1_us = "U.S. fluid ounce",
        symbol   = "US fl oz",
        sym_us   = "U.S. fl oz",
        utype    = "volume",
        scale    = 0.0000295735295625,
        default  = "ml",
    },
    ["USpk"] = {
        name1    = "US peck",
        name1_us = "U.S. peck",
        symbol   = "US pk",
        sym_us   = "U.S. pk",
        utype    = "volume",
        scale    = 0.00880976754172,
        default  = "l impgal",
        link     = "Peck",
    },
    ["USpt"] = {
        name1    = "US pint",
        name1_us = "U.S. pint",
        symbol   = "US pt",
        sym_us   = "U.S. pt",
        utype    = "volume",
        scale    = 0.000473176473,
        default  = "l imppt",
        link     = "Pint",
    },
    ["USqt"] = {
        name1    = "US quart",
        name1_us = "U.S. quart",
        symbol   = "US qt",
        sym_us   = "U.S. qt",
        utype    = "volume",
        scale    = 0.000946352946,
        default  = "ml",
        link     = "Quart",
        customary= 1,
    },
    ["USquart"] = {
        name1    = "US quart",
        name1_us = "U.S. quart",
        symbol   = "US qt",
        sym_us   = "U.S. qt",
        utype    = "volume",
        scale    = 0.000946352946,
        default  = "ml impoz",
        link     = "Quart",
    },
    ["USTbsp"] = {
        name1    = "US tablespoon",
        name1_us = "U.S. tablespoon",
        symbol   = "US tbsp",
        sym_us   = "U.S. tbsp",
        utype    = "volume",
        scale    = 1.4786764781250001e-5,
        default  = "ml",
    },
    ["winecase"] = {
        symbol   = "case",
```

```
        usename  = 1,
        utype    = "volume",
        scale    = 0.009,
        default  = "l",
        link     = "Case (goods)",
    },
    ["*U.S.drygal"] = {
        target   = "USdrygal",
        sp_us    = true,
        customary= 2,
    },
    ["*U.S.gal"] = {
        target   = "USgal",
        sp_us    = true,
        default  = "L impgal",
        customary= 2,
    },
    ["+USdrygal"] = {
        target   = "USdrygal",
        customary= 1,
    },
    ["+usfloz"] = {
        target   = "USoz",
        link     = "Fluid ounce",
        customary= 1,
    },
    ["+USgal"] = {
        target   = "USgal",
        customary= 1,
    },
    ["+USoz"] = {
        target   = "USoz",
        customary= 1,
    },
    ["@impgal"] = {
        target   = "impgal",
        link     = "Gallon",
        customary= 3,
    },
    ["acre feet"] = {
        target   = "acre-ft",
    },
    ["acre foot"] = {
        target   = "acre-foot",
    },
    ["acre ft"] = {
        target   = "acre-ft",
    },
    ["acre-feet"] = {
        target   = "acre-ft",
    },
    ["acre.foot"] = {
        target   = "acre-foot",
    },
    ["acre.ft"] = {
        target   = "acre-ft",
    },
    ["acre·ft"] = {
        target   = "acre-ft",
    },
    ["bushels"] = {
        target   = "USbsh",
    },
    ["cid"] = {
```

```
        target   = "CID",
    },
    ["ft3"] = {
        target   = "cuft",
    },
    ["gal"] = {
        target   = "USgal",
    },
    ["gallon"] = {
        shouldbe = "Use %{USgal%} for US gallons or %{impgal%} for imperial gallo
    },
    ["gallons"] = {
        shouldbe = "Use %{USgal%} for US gallons or %{impgal%} for imperial gallo
    },
    ["Gcuft"] = {
        target   = "e9cuft",
    },
    ["impfloz"] = {
        target   = "impoz",
    },
    ["Impgal"] = {
        target   = "impgal",
    },
    ["in3"] = {
        target   = "cuin",
        symbol   = "in<sup>3</sup>",
    },
    ["kcuft"] = {
        target   = "e3cuft",
    },
    ["kcum"] = {
        target   = "e3m3",
    },
    ["km³"] = {
        target   = "km3",
    },
    ["liter"] = {
        target   = "L",
        sp_us    = true,
    },
    ["liters"] = {
        target   = "L",
        sp_us    = true,
    },
    ["litre"] = {
        target   = "L",
    },
    ["litres"] = {
        target   = "L",
    },
    ["Mcuft"] = {
        target   = "e6cuft",
    },
    ["Mcum"] = {
        target   = "e6m3",
    },
    ["Mft3"] = {
        target   = "e6cuft",
    },
    ["mi3"] = {
        target   = "cumi",
    },
    ["m³"] = {
        target   = "m3",
```

```
    },
    ["Pcuft"] = {
        target   = "e15cuft",
    },
    ["pt"] = {
        shouldbe = "Use %{USpt%} for US pints or %{imppt%} for imperial pints (nc
    },
    ["qt"] = {
        shouldbe = "Use %{USqt%} for US quarts or %{impqt%} for imperial quarts (
    },
    ["Tcuft"] = {
        target   = "e12cuft",
    },
    ["Tft3"] = {
        target   = "e12cuft",
    },
    ["U.S.bbl"] = {
        target   = "USbbl",
        sp_us    = true,
        default  = "l U.S.gal impgal",
    },
    ["U.S.beerbbl"] = {
        target   = "USbeerbbl",
        sp_us    = true,
        default  = "l U.S.gal impgal",
    },
    ["U.S.bsh"] = {
        target   = "USbsh",
        sp_us    = true,
        default  = "l U.S.drygal impgal",
    },
    ["U.S.bu"] = {
        target   = "USbu",
        sp_us    = true,
        default  = "l U.S.drygal impgal",
    },
    ["U.S.drybbl"] = {
        target   = "USdrybbl",
        sp_us    = true,
    },
    ["U.S.drygal"] = {
        target   = "USdrygal",
        sp_us    = true,
    },
    ["U.S.drypt"] = {
        target   = "USdrypt",
        sp_us    = true,
    },
    ["U.S.dryqt"] = {
        target   = "USdryqt",
        sp_us    = true,
    },
    ["U.S.flgal"] = {
        target   = "USflgal",
        sp_us    = true,
    },
    ["U.S.floz"] = {
        target   = "USoz",
        sp_us    = true,
    },
    ["U.S.gal"] = {
        target   = "USgal",
        sp_us    = true,
        default  = "L impgal",
```

```
        link     = "U.S. gallon",
    },
    ["u.s.gal"] = {
        target   = "USgal",
        sp_us    = true,
        default  = "L impgal",
        link     = "U.S. gallon",
    },
    ["U.S.gi"] = {
        target   = "USgi",
        sp_us    = true,
    },
    ["U.S.kenning"] = {
        target   = "USkenning",
        sp_us    = true,
    },
    ["U.S.oz"] = {
        target   = "USoz",
        sp_us    = true,
    },
    ["U.S.pk"] = {
        target   = "USpk",
        sp_us    = true,
    },
    ["U.S.pt"] = {
        target   = "USpt",
        sp_us    = true,
    },
    ["U.S.qt"] = {
        target   = "USqt",
        sp_us    = true,
        default  = "L impqt",
        customary= 2,
    },
    ["usbbl"] = {
        target   = "USbbl",
    },
    ["usbeerbbl"] = {
        target   = "USbeerbbl",
    },
    ["usbsh"] = {
        target   = "USbsh",
    },
    ["usbu"] = {
        target   = "USbu",
    },
    ["usdrybbl"] = {
        target   = "USdrybbl",
    },
    ["usdrygal"] = {
        target   = "USdrygal",
    },
    ["usdrypt"] = {
        target   = "USdrypt",
    },
    ["usdryqt"] = {
        target   = "USdryqt",
    },
    ["USfloz"] = {
        target   = "USoz",
    },
    ["usfloz"] = {
        target   = "USoz",
    },
```

```
    ["USGAL"] = {
        target   = "USgal",
    },
    ["usgal"] = {
        target   = "USgal",
    },
    ["usgi"] = {
        target   = "USgi",
    },
    ["uskenning"] = {
        target   = "USkenning",
    },
    ["usoz"] = {
        target   = "USoz",
    },
    ["uspk"] = {
        target   = "USpk",
    },
    ["uspt"] = {
        target   = "USpt",
    },
    ["usqt"] = {
        target   = "USqt",
    },
    ["yd3"] = {
        target   = "cuyd",
    },
    ["cuft/sqmi"] = {
        per      = { "cuft", "sqmi" },
        utype    = "volume per unit area",
        default  = "m3/km2",
    },
    ["m3/ha"] = {
        name1    = "cubic metre per hectare",
        name1_us = "cubic meter per hectare",
        name2    = "cubic metres per hectare",
        name2_us = "cubic meters per hectare",
        symbol   = "m<sup>3</sup>/ha",
        utype    = "volume per unit area",
        scale    = 0.0001,
        default  = "USbu/acre",
        link     = "Hectare",
    },
    ["m3/km2"] = {
        per      = { "m3", "km2" },
        utype    = "volume per unit area",
        default  = "cuft/sqmi",
    },
    ["U.S.gal/acre"] = {
        per      = { "U.S.gal", "acre" },
        utype    = "volume per unit area",
        default  = "m3/km2",
    },
    ["USbu/acre"] = {
        name2    = "US bushels per acre",
        symbol   = "US bushel per acre",
        usename  = 1,
        utype    = "volume per unit area",
        scale    = 8.7077638761350888e-6,
        default  = "m3/ha",
        link     = "Bushel",
    },
    ["USgal/acre"] = {
        per      = { "USgal", "acre" },
```

```
        utype    = "volume per unit area",
        default  = "m3/km2",
    },
    ["cuyd/mi"] = {
        per      = { "cuyd", "mi" },
        utype    = "volume per unit length",
        default  = "m3/km",
    },
    ["m3/km"] = {
        per      = { "m3", "km" },
        utype    = "volume per unit length",
        default  = "cuyd/mi",
    },
    ["mich"] = {
        combination= { "ch", "mi" },
        multiple = { 80 },
        utype    = "length",
    },
    ["michlk"] = {
        combination= { "chlk", "mi" },
        multiple = { 80 },
        utype    = "length",
    },
    ["michainlk"] = {
        combination= { "chainlk", "mi" },
        multiple = { 80 },
        utype    = "length",
    },
    ["miyd"] = {
        combination= { "yd", "mi" },
        multiple = { 1760 },
        utype    = "length",
    },
    ["miydftin"] = {
        combination= { "in", "ft", "yd", "mi" },
        multiple = { 12, 3, 1760 },
        utype    = "length",
    },
    ["mift"] = {
        combination= { "ft", "mi" },
        multiple = { 5280 },
        utype    = "length",
    },
    ["ydftin"] = {
        combination= { "in", "ft", "yd" },
        multiple = { 12, 3 },
        utype    = "length",
    },
    ["ydft"] = {
        combination= { "ft", "yd" },
        multiple = { 3 },
        utype    = "length",
    },
    ["ftin"] = {
        combination= { "in", "ft" },
        multiple = { 12 },
        utype    = "length",
    },
    ["footin"] = {
        combination= { "in", "foot" },
        multiple = { 12 },
        utype    = "length",
    },
    ["handin"] = {
```

```
        combination= { "in", "hand" },
        multiple = { 4 },
        utype    = "length",
    },
    ["lboz"] = {
        combination= { "oz", "lb" },
        multiple = { 16 },
        utype    = "mass",
    },
    ["stlb"] = {
        combination= { "lb", "st" },
        multiple = { 14 },
        utype    = "mass",
    },
    ["stlboz"] = {
        combination= { "oz", "lb", "st" },
        multiple = { 16, 14 },
        utype    = "mass",
    },
    ["st and lb"] = {
        combination= { "lb", "st" },
        multiple = { 14 },
        utype    = "mass",
    },
    ["GN LTf"] = {
        combination= { "GN", "-LTf" },
        utype    = "force",
    },
    ["GN LTf STf"] = {
        combination= { "GN", "-LTf", "-STf" },
        utype    = "force",
    },
    ["GN STf"] = {
        combination= { "GN", "-STf" },
        utype    = "force",
    },
    ["GN STf LTf"] = {
        combination= { "GN", "-STf", "-LTf" },
        utype    = "force",
    },
    ["kN LTf"] = {
        combination= { "kN", "-LTf" },
        utype    = "force",
    },
    ["kN LTf STf"] = {
        combination= { "kN", "-LTf", "-STf" },
        utype    = "force",
    },
    ["kN STf"] = {
        combination= { "kN", "-STf" },
        utype    = "force",
    },
    ["kN STf LTf"] = {
        combination= { "kN", "-STf", "-LTf" },
        utype    = "force",
    },
    ["LTf STf"] = {
        combination= { "-LTf", "-STf" },
        utype    = "force",
    },
    ["MN LTf"] = {
        combination= { "MN", "-LTf" },
        utype    = "force",
    },
```

```
    ["MN LTf STf"] = {
        combination= { "MN", "-LTf", "-STf" },
        utype    = "force",
    },
    ["MN STf"] = {
        combination= { "MN", "-STf" },
        utype    = "force",
    },
    ["MN STf LTf"] = {
        combination= { "MN", "-STf", "-LTf" },
        utype    = "force",
    },
    ["STf LTf"] = {
        combination= { "-STf", "-LTf" },
        utype    = "force",
    },
    ["L/100 km mpgimp"] = {
        combination= { "L/100 km", "mpgimp" },
        utype    = "fuel efficiency",
    },
    ["l/100 km mpgimp"] = {
        combination= { "l/100 km", "mpgimp" },
        utype    = "fuel efficiency",
    },
    ["L/100 km mpgUS"] = {
        combination= { "L/100 km", "mpgus" },
        utype    = "fuel efficiency",
    },
    ["L/100 km mpgus"] = {
        combination= { "L/100 km", "mpgus" },
        utype    = "fuel efficiency",
    },
    ["l/100 km mpgus"] = {
        combination= { "l/100 km", "mpgus" },
        utype    = "fuel efficiency",
    },
    ["mpgimp L/100 km"] = {
        combination= { "mpgimp", "L/100 km" },
        utype    = "fuel efficiency",
    },
    ["LT ST t"] = {
        combination= { "lt", "-ST", "t" },
        utype    = "mass",
    },
    ["LT t ST"] = {
        combination= { "lt", "t", "-ST" },
        utype    = "mass",
    },
    ["ST LT t"] = {
        combination= { "-ST", "lt", "t" },
        utype    = "mass",
    },
    ["ST t LT"] = {
        combination= { "-ST", "t", "lt" },
        utype    = "mass",
    },
    ["t LT ST"] = {
        combination= { "t", "lt", "-ST" },
        utype    = "mass",
    },
    ["ton"] = {
        combination= { "LT", "ST" },
        utype    = "mass",
    },
```

```
    ["kPa kg/cm2"] = {
        combination= { "kPa", "kgf/cm2" },
        utype    = "pressure",
    },
    ["kPa lb/in2"] = {
        combination= { "kPa", "-lb/in2" },
        utype    = "pressure",
    },
    ["floz"] = {
        combination= { "impoz", "USoz" },
        utype    = "volume",
    },
}

-------------------------------------------------------------------------------
-- Do not change the data in this table because it is created by running --
-- a script that reads the wikitext from a wiki page (see note above).   --
-------------------------------------------------------------------------------
local default_exceptions = {
        -- Prefixed units with a default different from that of the base unit.
        -- Each key item is a prefixed symbol (unitcode for engineering notation)
        ["cm<sup>2</sup>"] = "sqin",
        ["dm<sup>2</sup>"] = "sqin",
        ["e3acre"] = "km2",
        ["e3m2"] = "e6sqft",
        ["e6acre"] = "km2",
        ["e6ha"] = "e6acre",
        ["e6km2"] = "e6sqmi",
        ["e6m2"] = "e6sqft",
        ["e6sqft"] = "v * 9.290304 < 100 ! e3 ! e6 ! m2",
        ["e6sqmi"] = "e6km2",
        ["hm<sup>2</sup>"] = "acre",
        ["km<sup>2</sup>"] = "sqmi",
        ["mm<sup>2</sup>"] = "sqin",
        ["aJ"] = "eV",
        ["e3BTU"] = "MJ",
        ["e6BTU"] = "GJ",
        ["EJ"] = "kWh",
        ["fJ"] = "keV",
        ["GJ"] = "kWh",
        ["MJ"] = "kWh",
        ["PJ"] = "kWh",
        ["pJ"] = "MeV",
        ["TJ"] = "kWh",
        ["YJ"] = "kWh",
        ["yJ"] = "µeV",
        ["ZJ"] = "kWh",
        ["zJ"] = "meV",
        ["e12cuft/a"] = "v * 2.8316846592 < 100 ! e9 ! e12 ! m3/a",
        ["e12cuft/d"] = "v * 2.8316846592 < 100 ! e9 ! e12 ! m3/d",
        ["e12m3/a"] = "Tcuft/a",
        ["e12m3/d"] = "Tcuft/d",
        ["e3cuft/a"] = "v * 2.8316846592 < 100 ! ! e3 ! m3/a",
        ["e3cuft/d"] = "v * 2.8316846592 < 100 ! ! e3 ! m3/d",
        ["e3cuft/s"] = "v * 2.8316846592 < 100 ! ! e3 ! m3/s",
        ["e3m3/a"] = "v < 28.316846592 ! k ! M ! cuft/a",
        ["e3m3/d"] = "v < 28.316846592 ! k ! M ! cuft/d",
        ["e3m3/s"] = "v < 28.316846592 ! k ! M ! cuft/s",
        ["e3USgal/a"] = "v * 3.785411784 < 1000 ! ! e3 ! m3/a",
        ["e6cuft/a"] = "v * 2.8316846592 < 100 ! e3 ! e6 ! m3/a",
        ["e6cuft/d"] = "v * 2.8316846592 < 100 ! e3 ! e6 ! m3/d",
        ["e6cuft/s"] = "v * 2.8316846592 < 100 ! e3 ! e6 ! m3/s",
        ["e6m3/a"] = "v < 28.316846592 ! M ! G ! cuft/a",
        ["e6m3/d"] = "v < 28.316846592 ! M ! G ! cuft/d",
```

```
        ["e6m3/s"] = "v < 28.316846592 ! e6 ! e9 ! cuft/s",
        ["e6USgal/a"] = "v * 3.785411784 < 1000 ! e3 ! e6 ! m3/a",
        ["e9cuft/a"] = "m3/a",
        ["e9cuft/d"] = "v * 2.8316846592 < 100 ! e6 ! e9 ! m3/d",
        ["e9m3/a"] = "v < 28.316846592 ! G ! T ! cuft/a",
        ["e9m3/d"] = "v < 28.316846592 ! G ! T ! cuft/d",
        ["e9m3/s"] = "v < 28.316846592 ! e9 ! e12 ! cuft/s",
        ["e9USgal/a"] = "v * 3.785411784 < 1000 ! e6 ! e9 ! m3/a",
        ["e9USgal/s"] = "v * 3.785411784 < 1000 ! e6 ! e9 ! m3/s",
        ["nN"] = "gr-f",
        ["µN"] = "gr-f",
        ["mN"] = "oz-f",
        ["am"] = "in",
        ["cm"] = "in",
        ["dam"] = "ft",
        ["dm"] = "in",
        ["e12km"] = "e12mi",
        ["e12mi"] = "e12km",
        ["e3AU"] = "ly",
        ["e3km"] = "e3mi",
        ["e3mi"] = "e3km",
        ["e6km"] = "e6mi",
        ["e6mi"] = "e6km",
        ["e9km"] = "AU",
        ["e9mi"] = "e9km",
        ["Em"] = "mi",
        ["fm"] = "in",
        ["Gm"] = "mi",
        ["hm"] = "ft",
        ["km"] = "mi",
        ["mm"] = "in",
        ["Mm"] = "mi",
        ["nm"] = "in",
        ["Pm"] = "mi",
        ["pm"] = "in",
        ["Tm"] = "mi",
        ["Ym"] = "mi",
        ["ym"] = "in",
        ["Zm"] = "mi",
        ["zm"] = "in",
        ["µm"] = "in",
        ["e12lb"] = "v * 4.5359237 < 10 ! Mt ! Gt",
        ["e3lb"] = "v * 4.5359237 < 10 ! kg ! t",
        ["e3ozt"] = "v * 0.311034768 < 10 ! kg ! t",
        ["e3t"] = "LT ST",
        ["e6carat"] = "t",
        ["e6lb"] = "v * 4.5359237 < 10 ! t ! kilotonne",
        ["e6ozt"] = "lb kg",
        ["e6ST"] = "Mt",
        ["e6t"] = "LT ST",
        ["e9lb"] = "v * 4.5359237 < 10 ! kilotonne ! Mt",
        ["e9t"] = "LT ST",
        ["Gg"] = "lb",
        ["kg"] = "lb",
        ["mg"] = "gr",
        ["Mg"] = "LT ST",
        ["ng"] = "gr",
        ["µg"] = "gr",
        ["mBq"] = "fCi",
        ["kBq"] = "nCi",
        ["MBq"] = "µCi",
        ["GBq"] = "mCi",
        ["TBq"] = "Ci",
        ["PBq"] = "kCi",
```

```
        ["EBq"] = "kCi",
        ["fCi"] = "mBq",
        ["pCi"] = "Bq",
        ["nCi"] = "Bq",
        ["µCi"] = "kBq",
        ["mCi"] = "MBq",
        ["kCi"] = "TBq",
        ["MCi"] = "PBq",
        ["ns"] = "µs",
        ["µs"] = "ms",
        ["ms"] = "s",
        ["ks"] = "h",
        ["Ms"] = "week",
        ["Gs"] = "decade",
        ["Ts"] = "millennium",
        ["Ps"] = "million year",
        ["Es"] = "thousand million year",
        ["MK"] = "keVT",
        ["cL"] = "impoz usoz",
        ["cl"] = "impoz usoz",
        ["cm<sup>3</sup>"] = "cuin",
        ["dL"] = "impoz usoz",
        ["dl"] = "impoz usoz",
        ["mm<sup>3</sup>"] = "cuin",
        ["dm<sup>3</sup>"] = "cuin",
        ["e12cuft"] = "v * 2.8316846592 < 100 ! e9 ! e12 ! m3",
        ["e12impgal"] = "v * 4.54609 < 1000 ! T ! P ! l",
        ["e12m3"] = "v < 28.316846592 ! T ! P ! cuft",
        ["e12U.S.gal"] = "v * 3.785411784 < 1000 ! T ! P ! l",
        ["e12USgal"] = "v * 3.785411784 < 1000 ! T ! P ! l",
        ["e15cuft"] = "v * 2.8316846592 < 100 ! e12 ! e15 ! m3",
        ["e15m3"] = "Pcuft",
        ["e3bdft"] = "v * 0.23597372167 < 100 ! e3 ! e6 ! m3",
        ["e3cuft"] = "v * 2.8316846592 < 100 ! ! e3 ! m3",
        ["e3impgal"] = "v * 4.54609 < 1000 ! k ! M ! l",
        ["e3m3"] = "v < 28.316846592 ! k ! M ! cuft",
        ["e3U.S.gal"] = "v * 3.785411784 < 1000 ! k ! M ! l",
        ["e3USgal"] = "v * 3.785411784 < 1000 ! k ! M ! l",
        ["e6bdft"] = "v * 0.23597372167 < 100 ! e3 ! e6 ! m3",
        ["e6cuft"] = "v * 2.8316846592 < 100 ! e3 ! e6 ! m3",
        ["e6cuyd"] = "v * 7.64554857984 < 10 ! e3 ! e6 ! m3",
        ["e6impgal"] = "v * 4.54609 < 1000 ! M ! G ! l",
        ["e6L"] = "USgal",
        ["e6m3"] = "v < 28.316846592 ! M ! G ! cuft",
        ["e6U.S.gal"] = "v * 3.785411784 < 1000 ! M ! G ! l",
        ["e6USgal"] = "v * 3.785411784 < 1000 ! M ! G ! l",
        ["e9bdft"] = "v * 0.23597372167 < 100 ! e6 ! e9 ! m3",
        ["e9cuft"] = "v * 2.8316846592 < 100 ! e6 ! e9 ! m3",
        ["e9impgal"] = "v * 4.54609 < 1000 ! G ! T ! l",
        ["e9m3"] = "v < 28.316846592 ! G ! T ! cuft",
        ["e9U.S.gal"] = "v * 3.785411784 < 1000 ! G ! T ! l",
        ["e9USgal"] = "v * 3.785411784 < 1000 ! G ! T ! l",
        ["GL"] = "cuft",
        ["Gl"] = "cuft",
        ["kL"] = "cuft",
        ["kl"] = "cuft",
        ["km<sup>3</sup>"] = "cumi",
        ["mL"] = "impoz usoz",
        ["ml"] = "impoz usoz",
        ["Ml"] = "v < 28.316846592 ! e3 ! e6 ! cuft",
        ["ML"] = "v < 28.316846592 ! e3 ! e6 ! cuft",
        ["TL"] = "cumi",
        ["Tl"] = "cumi",
        ["µL"] = "cuin",
```

```
        ["µl"] = "cuin",
}

--------------------------------------------------------------------------------
-- Do not change the data in this table because it is created by running --
-- a script that reads the wikitext from a wiki page (see note above).   --
--------------------------------------------------------------------------------
local link_exceptions = {
        -- Prefixed units with a linked article different from that of the base u
        -- Each key item is a prefixed symbol (not unitcode).
        ["mm<sup>2</sup>"] = "Square millimetre",
        ["cm<sup>2</sup>"] = "Square centimetre",
        ["dm<sup>2</sup>"] = "Square decimetre",
        ["km<sup>2</sup>"] = "Square kilometre",
        ["kJ"] = "Kilojoule",
        ["MJ"] = "Megajoule",
        ["GJ"] = "Gigajoule",
        ["TJ"] = "Terajoule",
        ["fm"] = "Femtometre",
        ["pm"] = "Picometre",
        ["nm"] = "Nanometre",
        ["µm"] = "Micrometre",
        ["mm"] = "Millimetre",
        ["cm"] = "Centimetre",
        ["dm"] = "Decimetre",
        ["dam"] = "Decametre",
        ["hm"] = "Hectometre",
        ["km"] = "Kilometre",
        ["Mm"] = "Megametre",
        ["Gm"] = "Gigametre",
        ["Tm"] = "Terametre",
        ["Pm"] = "Petametre",
        ["Em"] = "Exametre",
        ["Zm"] = "Zettametre",
        ["Ym"] = "Yottametre",
        ["µg"] = "Microgram",
        ["mg"] = "Milligram",
        ["kg"] = "Kilogram",
        ["Mg"] = "Tonne",
        ["yW"] = "Yoctowatt",
        ["zW"] = "Zeptowatt",
        ["aW"] = "Attowatt",
        ["fW"] = "Femtowatt",
        ["pW"] = "Picowatt",
        ["nW"] = "Nanowatt",
        ["µW"] = "Microwatt",
        ["mW"] = "Milliwatt",
        ["kW"] = "Kilowatt",
        ["MW"] = "Megawatt",
        ["GW"] = "Gigawatt",
        ["TW"] = "Terawatt",
        ["PW"] = "Petawatt",
        ["EW"] = "Exawatt",
        ["ZW"] = "Zettawatt",
        ["YW"] = "Yottawatt",
        ["as"] = "Attosecond",
        ["fs"] = "Femtosecond",
        ["ps"] = "Picosecond",
        ["ns"] = "Nanosecond",
        ["µs"] = "Microsecond",
        ["ms"] = "Millisecond",
        ["ks"] = "Kilosecond",
        ["Ms"] = "Megasecond",
        ["Gs"] = "Gigasecond",
```

```
        ["Ts"] = "Terasecond",
        ["Ps"] = "Petasecond",
        ["Es"] = "Exasecond",
        ["Zs"] = "Zettasecond",
        ["Ys"] = "Yottasecond",
        ["mm<sup>3</sup>"] = "Cubic millimetre",
        ["cm<sup>3</sup>"] = "Cubic centimetre",
        ["dm<sup>3</sup>"] = "Cubic decimetre",
        ["dam<sup>3</sup>"] = "Cubic decametre",
        ["km<sup>3</sup>"] = "Cubic kilometre",
        ["µL"] = "Microlitre",
        ["µl"] = "Microlitre",
        ["mL"] = "Millilitre",
        ["ml"] = "Millilitre",
        ["cL"] = "Centilitre",
        ["cl"] = "Centilitre",
        ["dL"] = "Decilitre",
        ["dl"] = "Decilitre",
        ["daL"] = "Decalitre",
        ["dal"] = "Decalitre",
        ["hL"] = "Hectolitre",
        ["hl"] = "Hectolitre",
        ["kL"] = "Kilolitre",
        ["kl"] = "Kilolitre",
        ["ML"] = "Megalitre",
        ["Ml"] = "Megalitre",
        ["GL"] = "Gigalitre",
        ["Gl"] = "Gigalitre",
        ["TL"] = "Teralitre",
        ["Tl"] = "Teralitre",
        ["PL"] = "Petalitre",
        ["Pl"] = "Petalitre",
}

--------------------------------------------------------------------------------
-- Do not change the data in this table because it is created by running --
-- a script that reads the wikitext from a wiki page (see note above).   --
--------------------------------------------------------------------------------
local per_unit_fixups = {
        -- Automatically created per units of form "x/y" may have their unit type
        -- changed, for example, "length/time" is changed to "speed".
        -- Other adjustments can also be specified.
        ["/area"] = "per unit area",
        ["/volume"] = "per unit volume",
        ["area/area"] = "area per unit area",
        ["energy/length"] = "energy per unit length",
        ["energy/mass"] = "energy per unit mass",
        ["energy/time"] = { utype = "power", link = "Power (physics)" },
        ["energy/volume"] = "energy per unit volume",
        ["force/area"] = { utype = "pressure", link = "Pressure" },
        ["length/length"] = { utype = "gradient", link = "Grade (slope)" },
        ["length/time"] = { utype = "speed", link = "Speed" },
        ["length/time/time"] = { utype = "acceleration", link = "Acceleration" },
        ["mass/area"] = { utype = "pressure", multiplier = 9.80665 },
        ["mass/length"] = "linear density",
        ["mass/mass"] = "concentration",
        ["mass/power"] = "mass per unit power",
        ["mass/time"] = "mass per unit time",
        ["mass/volume"] = { utype = "density", link = "Density" },
        ["power/mass"] = "power per unit mass",
        ["power/volume"] = { link = "Power density" },
        ["pressure/length"] = "fracture gradient",
        ["speed/time"] = { utype = "acceleration", link = "Acceleration" },
        ["volume/area"] = "volume per unit area",
```

```
        ["volume/length"] = "volume per unit length",
        ["volume/time"] = "flow",
}

return {
        all_units = all_units,
        default_exceptions = default_exceptions,
        link_exceptions = link_exceptions,
        per_unit_fixups = per_unit_fixups,
}
```

Modul:Convert/data/Doku

Dies ist die Dokumentationsseite für Modul:Convert/data

This page defines the conversion data used by Module:Convert. All documentation (from Module:Convert/doc) is at that page.

Do not manually add units to this page. First add the unit definitions in Module:Convert/documentation/conversion data. And then update this page by copying the results from Module:Convert/makeunits (those results appear at Module talk:Convert/makeunits).

Any changes should first be tested at Module:Convert/data/sandbox—see Module:Convert/sandbox/testcases.

New units can be manually added at Module:Convert/extra as a temporary measure before being incorporated into this main table.

Modul:Convert/data/sandbox

This page defines the conversion data used by Module:Convert. All documentation (from Module:Convert/doc) is at that page.

Do not manually add units to this page. First add the unit definitions in Module:Convert/documentation/conversion data. And then update this page by copying the results from Module:Convert/makeunits (those results appear at Module talk:Convert/makeunits).

Any changes should first be tested at Module:Convert/data/sandbox—see Module:Convert/sandbox/testcases.

New units can be manually added at Module:Convert/extra as a temporary measure before being incorporated into this main table.

```
-- Conversion data used by [[Module:Convert]] which uses mw.loadData() for
-- read-only access to this module so that it is loaded only once per page.
-- See [[:en:Template:Convert/Transwiki guide]] if copying to another wiki.
--
-- These data tables follow:
--   all_units           all properties for a unit, including default output
--   default_exceptions  exceptions for default output ('kg' and 'g' have differe
--   link_exceptions     exceptions for links ('kg' and 'g' have different links)
--
-- These tables are generated by a script which reads the wikitext of a page that
-- documents the required properties of each unit; see [[:en:Module:Convert/doc]]

------------------------------------------------------------------------------
-- Do not change the data in this table because it is created by running --
-- a script that reads the wikitext from a wiki page (see note above).   --
------------------------------------------------------------------------------
local all_units = {
    ["Gy"] = {
        _name1   = "gray",
        _symbol  = "Gy",
        utype    = "absorbed radiation dose",
        scale    = 1,
        prefixes = 1,
        default  = "rad",
        link     = "Gray (unit)",
    },
    ["rad"] = {
        _name1   = "rad",
        _symbol  = "rad",
        utype    = "absorbed radiation dose",
        scale    = 0.01,
        prefixes = 1,
        default  = "Gy",
        link     = "Rad (unit)",
    },
    ["cm/s2"] = {
        name1    = "centimetre per second squared",
        name1_us = "centimeter per second squared",
        name2    = "centimetres per second squared",
        name2_us = "centimeters per second squared",
        symbol   = "cm/s<sup>2</sup>",
        utype    = "acceleration",
```

```
        scale    = 0.01,
        default  = "ft/s2",
        link     = "Gal (unit)",
    },
    ["ft/s2"] = {
        name1    = "foot per second squared",
        name2    = "feet per second squared",
        symbol   = "ft/s<sup>2</sup>",
        utype    = "acceleration",
        scale    = 0.3048,
        default  = "m/s2",
    },
    ["g0"] = {
        name1    = "standard gravity",
        name2    = "standard gravities",
        symbol   = "''g''<sub>0</sub>",
        utype    = "acceleration",
        scale    = 9.80665,
        default  = "m/s2",
    },
    ["g-force"] = {
        name2    = "''g''",
        symbol   = "''g''",
        utype    = "acceleration",
        scale    = 9.80665,
        default  = "m/s2",
        link     = "g-force",
    },
    ["km/hs"] = {
        name1    = "kilometre per hour per second",
        name1_us = "kilometer per hour per second",
        name2    = "kilometres per hour per second",
        name2_us = "kilometers per hour per second",
        symbol   = "km/(h·s)",
        utype    = "acceleration",
        scale    = 0.27777777777777779,
        default  = "mph/s",
        link     = "Acceleration",
    },
    ["km/s2"] = {
        name1    = "kilometre per second squared",
        name1_us = "kilometer per second squared",
        name2    = "kilometres per second squared",
        name2_us = "kilometers per second squared",
        symbol   = "km/s<sup>2</sup>",
        utype    = "acceleration",
        scale    = 1000,
        default  = "mph/s",
        link     = "Acceleration",
    },
    ["m/s2"] = {
        name1    = "metre per second squared",
        name1_us = "meter per second squared",
        name2    = "metres per second squared",
        name2_us = "meters per second squared",
        symbol   = "m/s<sup>2</sup>",
        utype    = "acceleration",
        scale    = 1,
        default  = "ft/s2",
    },
    ["mph/s"] = {
        name1    = "mile per hour per second",
        name2    = "miles per hour per second",
        symbol   = "mph/s",
```

```
        utype    = "acceleration",
        scale    = 0.44704,
        default  = "km/hs",
        link     = "Acceleration",
    },
    ["km/h/s"] = {
        target   = "km/hs",
    },
    ["standard gravity"] = {
        target   = "g0",
    },
    ["1000sqft"] = {
        name1    = "thousand square feet",
        name2    = "thousand square feet",
        symbol   = "1000 sq ft",
        utype    = "area",
        scale    = 92.90304,
        default  = "m2",
        link     = "Square foot",
    },
    ["a"] = {
        _name1   = "are",
        _symbol  = "a",
        utype    = "area",
        scale    = 100,
        prefixes = 1,
        default  = "sqft",
        link     = "Hectare#Are",
    },
    ["acre"] = {
        symbol   = "acre",
        usename  = 1,
        utype    = "area",
        scale    = 4046.8564224,
        default  = "ha",
        subdivs  = { ["rood"] = { 4, default = "ha" }, ["sqperch"] = { 160, defau
    },
    ["acre-sing"] = {
        target   = "acre",
    },
    ["arpent"] = {
        symbol   = "arpent",
        usename  = 1,
        utype    = "area",
        scale    = 3418.89,
        default  = "ha",
    },
    ["cda"] = {
        name1    = "cuerda",
        symbol   = "cda",
        utype    = "area",
        scale    = 3930.395625,
        default  = "ha acre",
    },
    ["daa"] = {
        name1    = "decare",
        symbol   = "daa",
        utype    = "area",
        scale    = 1000,
        default  = "km2 sqmi",
    },
    ["dunam"] = {
        symbol   = "dunam",
        usename  = 1,
```

```
        utype    = "area",
        scale    = 1000,
        default  = "km2 sqmi",
    },
    ["dunum"] = {
        symbol   = "dunum",
        usename  = 1,
        utype    = "area",
        scale    = 1000,
        default  = "km2 sqmi",
        link     = "Dunam",
    },
    ["ha"] = {
        name1    = "hectare",
        symbol   = "ha",
        utype    = "area",
        scale    = 10000,
        default  = "acre",
    },
    ["hectare"] = {
        name1    = "hectare",
        symbol   = "ha",
        usename  = 1,
        utype    = "area",
        scale    = 10000,
        default  = "acre",
    },
    ["Irish acre"] = {
        name1    = "Irish acre",
        symbol   = "Irish acres",
        utype    = "area",
        scale    = 6555.2385024,
        default  = "ha",
        link     = "Acre (Irish)",
    },
    ["m2"] = {
        _name1   = "square metre",
        _name1_us= "square meter",
        _symbol  = "m<sup>2</sup>",
        prefix_position= 8,
        utype    = "area",
        scale    = 1,
        prefixes = 2,
        default  = "sqft",
        link     = "Square metre",
    },
    ["pondemaat"] = {
        name1    = "pondemaat",
        name2    = "pondemaat",
        symbol   = "pond",
        utype    = "area",
        scale    = 3674.363358816,
        default  = "m2",
        link     = ":nl:pondemaat",
    },
    ["pyeong"] = {
        name2    = "pyeong",
        symbol   = "pyeong",
        usename  = 1,
        utype    = "area",
        scale    = 3.3057851239669422,
        default  = "m2",
    },
    ["rai"] = {
```

```
        name2    = "rai",
        symbol   = "rai",
        utype    = "area",
        scale    = 1600,
        default  = "m2",
        link     = "Rai (unit)",
    },
    ["rood"] = {
        symbol   = "rood",
        usename  = 1,
        utype    = "area",
        scale    = 1011.7141056,
        default  = "sqft m2",
        subdivs  = { ["sqperch"] = { 40, default = "m2" } },
        link     = "Rood (unit)",
    },
    ["sqfoot"] = {
        name1    = "square foot",
        name2    = "square foot",
        symbol   = "sq ft",
        utype    = "area",
        scale    = 0.09290304,
        default  = "m2",
    },
    ["sqft"] = {
        name1    = "square foot",
        name2    = "square feet",
        symbol   = "sq ft",
        utype    = "area",
        scale    = 0.09290304,
        default  = "m2",
    },
    ["sqin"] = {
        name1    = "square inch",
        name2    = "square inches",
        symbol   = "sq in",
        utype    = "area",
        scale    = 0.00064516,
        default  = "cm2",
    },
    ["sqmi"] = {
        name1    = "square mile",
        symbol   = "sq mi",
        utype    = "area",
        scale    = 2589988.110336,
        default  = "km2",
    },
    ["sqnmi"] = {
        name1    = "square nautical mile",
        symbol   = "sq nmi",
        utype    = "area",
        scale    = 3429904,
        default  = "km2 sqmi",
        link     = "Nautical mile",
    },
    ["sqperch"] = {
        name2    = "perches",
        symbol   = "perch",
        usename  = 1,
        utype    = "area",
        scale    = 25.29285264,
        default  = "m2",
        link     = "Rod (unit)#Area and volume",
    },
```

```
    ["sqverst"] = {
        symbol   = "square verst",
        usename  = 1,
        utype    = "area",
        scale    = 1138062.24,
        default  = "km2 sqmi",
        link     = "Verst",
    },
    ["sqyd"] = {
        name1    = "square yard",
        symbol   = "sq yd",
        utype    = "area",
        scale    = 0.83612736,
        default  = "m2",
    },
    ["tsubo"] = {
        name2    = "tsubo",
        symbol   = "tsubo",
        usename  = 1,
        utype    = "area",
        scale    = 3.3057851239669422,
        default  = "m2",
        link     = "Japanese units of measurement#Area",
    },
    ["acres"] = {
        target   = "acre",
    },
    ["are"] = {
        target   = "a",
    },
    ["decare"] = {
        target   = "daa",
    },
    ["foot2"] = {
        target   = "sqfoot",
    },
    ["ft2"] = {
        target   = "sqft",
    },
    ["in2"] = {
        target   = "sqin",
        symbol   = "in<sup>2</sup>",
    },
    ["km²"] = {
        target   = "km2",
    },
    ["mi2"] = {
        target   = "sqmi",
    },
    ["million acre"] = {
        target   = "e6acre",
    },
    ["million acres"] = {
        target   = "e6acre",
    },
    ["million hectares"] = {
        target   = "e6ha",
    },
    ["m²"] = {
        target   = "m2",
    },
    ["nmi2"] = {
        target   = "sqnmi",
    },
```

```
    ["pond"] = {
        target   = "pondemaat",
    },
    ["sq arp"] = {
        target   = "arpent",
    },
    ["sqkm"] = {
        target   = "km2",
    },
    ["sqm"] = {
        target   = "m2",
    },
    ["square verst"] = {
        target   = "sqverst",
    },
    ["verst2"] = {
        target   = "sqverst",
    },
    ["yd2"] = {
        target   = "sqyd",
    },
    ["m2/ha"] = {
        name1    = "square metre per hectare",
        name1_us = "square meter per hectare",
        name2    = "square metres per hectare",
        name2_us = "square meters per hectare",
        symbol   = "m<sup>2</sup>/ha",
        utype    = "area per unit area",
        scale    = 0.0001,
        default  = "sqft/acre",
        link     = "Basal area",
    },
    ["sqft/acre"] = {
        name1    = "square foot per acre",
        name2    = "square feet per acre",
        symbol   = "sq ft/acre",
        utype    = "area per unit area",
        scale    = 2.295684113865932e-5,
        default  = "m2/ha",
        link     = "Basal area",
    },
    ["cent"] = {
        name1    = "cent",
        symbol   = "¢",
        utype    = "cent",
        scale    = 1,
        default  = "cent",
        link     = "Cent (currency)",
    },
    ["¢"] = {
        target   = "cent",
    },
    ["A.h"] = {
        name1    = "ampere hour",
        symbol   = "A·h",
        utype    = "charge",
        scale    = 3600,
        default  = "coulomb",
    },
    ["coulomb"] = {
        _name1   = "coulomb",
        _symbol  = "C",
        utype    = "charge",
        scale    = 1,
```

```
        prefixes = 1,
        default  = "e",
        link     = "Coulomb",
    },
    ["e"] = {
        name1    = "elementary charge",
        symbol   = "''e''",
        utype    = "charge",
        scale    = 1.602176487e-19,
        default  = "coulomb",
    },
    ["g-mol"] = {
        name1    = "gram-mole",
        symbol   = "g&#8209;mol",
        utype    = "chemical amount",
        scale    = 1,
        default  = "lbmol",
        link     = "Mole (unit)",
    },
    ["gmol"] = {
        name1    = "gram-mole",
        symbol   = "gmol",
        utype    = "chemical amount",
        scale    = 1,
        default  = "lbmol",
        link     = "Mole (unit)",
    },
    ["kmol"] = {
        name1    = "kilomole",
        symbol   = "kmol",
        utype    = "chemical amount",
        scale    = 1000,
        default  = "lbmol",
        link     = "Mole (unit)",
    },
    ["lb-mol"] = {
        name1    = "pound-mole",
        symbol   = "lb&#8209;mol",
        utype    = "chemical amount",
        scale    = 453.59237,
        default  = "mol",
    },
    ["lbmol"] = {
        name1    = "pound-mole",
        symbol   = "lbmol",
        utype    = "chemical amount",
        scale    = 453.59237,
        default  = "mol",
    },
    ["mol"] = {
        name1    = "mole",
        symbol   = "mol",
        utype    = "chemical amount",
        scale    = 1,
        default  = "lbmol",
        link     = "Mole (unit)",
    },
    ["kgCO2/L"] = {
        name1    = "kilogram per litre",
        name1_us = "kilogram per liter",
        name2    = "kilograms per litre",
        name2_us = "kilograms per liter",
        symbol   = "kg(CO<sub>2</sub>)/L",
        utype    = "co2 per unit volume",
```

```
        scale    = 1000,
        default  = "lbCO2/USgal",
        link     = "Exhaust gas",
    },
    ["lbCO2/USgal"] = {
        name1    = "pound per US gallon",
        name2    = "pounds per US gallon",
        symbol   = "lbCO2/US gal",
        utype    = "co2 per unit volume",
        scale    = 119.82642731689663,
        default  = "kgCO2/L",
        link     = "Exhaust gas",
    },
    ["oz/lb"] = {
        per      = { "oz", "lb" },
        utype    = "concentration",
        default  = "mg/kg",
    },
    ["mg/kg"] = {
        per      = { "mg", "kg" },
        utype    = "concentration",
        default  = "oz/lb",
    },
    ["g/dm3"] = {
        name1    = "gram per cubic decimetre",
        name1_us = "gram per cubic decimeter",
        name2    = "grams per cubic decimetre",
        name2_us = "grams per cubic decimeter",
        symbol   = "g/dm<sup>3</sup>",
        utype    = "density",
        scale    = 1,
        default  = "kg/m3",
        link     = "Density",
    },
    ["g/L"] = {
        name1    = "gram per litre",
        name1_us = "gram per liter",
        name2    = "grams per litre",
        name2_us = "grams per liter",
        symbol   = "g/L",
        utype    = "density",
        scale    = 1,
        default  = "lb/cuin",
        link     = "Density",
    },
    ["g/mL"] = {
        name1    = "gram per millilitre",
        name1_us = "gram per milliliter",
        name2    = "grams per millilitre",
        name2_us = "grams per milliliter",
        symbol   = "g/mL",
        utype    = "density",
        scale    = 1000,
        default  = "lb/cuin",
        link     = "Density",
    },
    ["g/ml"] = {
        name1    = "gram per millilitre",
        name1_us = "gram per milliliter",
        name2    = "grams per millilitre",
        name2_us = "grams per milliliter",
        symbol   = "g/ml",
        utype    = "density",
        scale    = 1000,
```

```
        default  = "lb/cuin",
        link     = "Density",
    },
    ["kg/dm3"] = {
        name1    = "kilogram per cubic decimetre",
        name1_us = "kilogram per cubic decimeter",
        name2    = "kilograms per cubic decimetre",
        name2_us = "kilograms per cubic decimeter",
        symbol   = "kg/dm<sup>3</sup>",
        utype    = "density",
        scale    = 1000,
        default  = "lb/cuft",
        link     = "Density",
    },
    ["kg/L"] = {
        name1    = "kilogram per litre",
        name1_us = "kilogram per liter",
        name2    = "kilograms per litre",
        name2_us = "kilograms per liter",
        symbol   = "kg/L",
        utype    = "density",
        scale    = 1000,
        default  = "lb/USgal",
        link     = "Density",
    },
    ["kg/l"] = {
        name1    = "kilogram per litre",
        name1_us = "kilogram per liter",
        name2    = "kilograms per litre",
        name2_us = "kilograms per liter",
        symbol   = "kg/l",
        utype    = "density",
        scale    = 1000,
        default  = "lb/USgal",
        link     = "Density",
    },
    ["kg/m3"] = {
        name1    = "kilogram per cubic metre",
        name1_us = "kilogram per cubic meter",
        name2    = "kilograms per cubic metre",
        name2_us = "kilograms per cubic meter",
        symbol   = "kg/m<sup>3</sup>",
        utype    = "density",
        scale    = 1,
        default  = "lb/cuyd",
        link     = "Density",
    },
    ["lb/cuft"] = {
        name1    = "pound per cubic foot",
        name2    = "pounds per cubic foot",
        symbol   = "lb/cu ft",
        utype    = "density",
        scale    = 16.018463373960142,
        default  = "g/cm3",
        link     = "Density",
    },
    ["lb/cuin"] = {
        name1    = "pound per cubic inch",
        name2    = "pounds per cubic inch",
        symbol   = "lb/cu in",
        utype    = "density",
        scale    = 27679.904710203122,
        default  = "g/cm3",
        link     = "Density",
```

```
    },
    ["lb/cuyd"] = {
        name1    = "pound per cubic yard",
        name2    = "pounds per cubic yard",
        symbol   = "lb/cu yd",
        utype    = "density",
        scale    = 0.5932764212577829,
        default  = "kg/m3",
        link     = "Density",
    },
    ["lb/impgal"] = {
        name1    = "pound per imperial gallon",
        name2    = "pounds per imperial gallon",
        symbol   = "lb/imp gal",
        utype    = "density",
        scale    = 99.776372663101697,
        default  = "kg/L",
        link     = "Density",
    },
    ["lb/in3"] = {
        name1    = "pound per cubic inch",
        name2    = "pounds per cubic inch",
        symbol   = "lb/cu in",
        utype    = "density",
        scale    = 27679.904710203122,
        default  = "g/cm3",
        link     = "Density",
    },
    ["lb/U.S.gal"] = {
        name1    = "pound per U.S. gallon",
        name2    = "pounds per U.S. gallon",
        symbol   = "lb/U.S. gal",
        utype    = "density",
        scale    = 119.82642731689663,
        default  = "kg/L",
        link     = "Density",
    },
    ["lb/USbu"] = {
        name1    = "pound per US bushel",
        name2    = "pounds per US bushel",
        symbol   = "lb/US bu",
        utype    = "density",
        scale    = 12.871859780974471,
        default  = "kg/m3",
        link     = "Bushel",
    },
    ["lb/USgal"] = {
        name1    = "pound per US gallon",
        name2    = "pounds per US gallon",
        symbol   = "lb/US gal",
        utype    = "density",
        scale    = 119.82642731689663,
        default  = "kg/L",
        link     = "Density",
    },
    ["lbm/cuin"] = {
        name1    = "pound mass per cubic inch",
        name2    = "pounds mass per cubic inch",
        symbol   = "lbm/cu in",
        utype    = "density",
        scale    = 27679.904710203122,
        default  = "g/cm3",
        link     = "Density",
    },
```

```
    ["mg/L"] = {
        name1    = "milligram per litre",
        name1_us = "milligram per liter",
        name2    = "milligrams per litre",
        name2_us = "milligrams per liter",
        symbol   = "mg/L",
        utype    = "density",
        scale    = 0.001,
        default  = "lb/cuin",
        link     = "Density",
    },
    ["oz/cuin"] = {
        name1    = "ounce per cubic inch",
        name2    = "ounces per cubic inch",
        symbol   = "oz/cu in",
        utype    = "density",
        scale    = 1729.9940443876951,
        default  = "g/cm3",
        link     = "Density",
    },
    ["g/cm3"] = {
        per      = { "g", "cm3" },
        utype    = "density",
        default  = "lb/cuin",
    },
    ["g/m3"] = {
        per      = { "g", "m3" },
        utype    = "density",
        default  = "lb/cuyd",
        link     = "Density",
    },
    ["Mg/m3"] = {
        per      = { "Mg", "m3" },
        utype    = "density",
        default  = "lb/cuft",
    },
    ["mg/l"] = {
        per      = { "mg", "l" },
        utype    = "density",
        default  = "oz/cuin",
    },
    ["µg/dL"] = {
        per      = { "µg", "dL" },
        utype    = "density",
        default  = "lb/cuin",
    },
    ["µg/l"] = {
        per      = { "µg", "l" },
        utype    = "density",
        default  = "oz/cuin",
    },
    ["lb/ft3"] = {
        target   = "lb/cuft",
    },
    ["lb/yd3"] = {
        target   = "lb/cuyd",
    },
    ["lbm/in3"] = {
        target   = "lbm/cuin",
    },
    ["mcg/dL"] = {
        target   = "µg/dL",
    },
    ["oz/in3"] = {
```

```
        target   = "oz/cuin",
    },
    ["ug/dL"] = {
        target   = "µg/dL",
    },
    ["ug/l"] = {
        target   = "µg/l",
    },
    ["B.O.T.U."] = {
        name1    = "Board of Trade Unit",
        symbol   = "B.O.T.U.",
        utype    = "energy",
        scale    = 3600000,
        default  = "MJ",
        link     = "Kilowatt-hour",
    },
    ["bboe"] = {
        name1    = "barrel of oil equivalent",
        name2    = "barrels of oil equivalent",
        symbol   = "bboe",
        utype    = "energy",
        scale    = 6117863200,
        default  = "GJ",
    },
    ["BOE"] = {
        name1    = "barrel of oil equivalent",
        name2    = "barrels of oil equivalent",
        symbol   = "BOE",
        utype    = "energy",
        scale    = 6117863200,
        default  = "GJ",
    },
    ["BTU"] = {
        name1    = "British thermal unit",
        symbol   = "BTU",
        utype    = "energy",
        scale    = 1055.05585262,
        default  = "kJ",
    },
    ["Btu"] = {
        name1    = "British thermal unit",
        symbol   = "Btu",
        utype    = "energy",
        scale    = 1055.05585262,
        default  = "kJ",
    },
    ["BTU-39F"] = {
        name1    = "British thermal unit (39°F)",
        name2    = "British thermal units (39°F)",
        symbol   = "BTU<sub>39°F</sub>",
        utype    = "energy",
        scale    = 1059.67,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-39F"] = {
        name1    = "British thermal unit (39°F)",
        name2    = "British thermal units (39°F)",
        symbol   = "Btu<sub>39°F</sub>",
        utype    = "energy",
        scale    = 1059.67,
        default  = "kJ",
        link     = "British thermal unit",
    },
```

```
    ["BTU-59F"] = {
        name1    = "British thermal unit (59°F)",
        name2    = "British thermal units (59°F)",
        symbol   = "BTU<sub>59°F</sub>",
        utype    = "energy",
        scale    = 1054.804,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-59F"] = {
        name1    = "British thermal unit (59°F)",
        name2    = "British thermal units (59°F)",
        symbol   = "Btu<sub>59°F</sub>",
        utype    = "energy",
        scale    = 1054.804,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-60F"] = {
        name1    = "British thermal unit (60°F)",
        name2    = "British thermal units (60°F)",
        symbol   = "BTU<sub>60°F</sub>",
        utype    = "energy",
        scale    = 1054.68,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-60F"] = {
        name1    = "British thermal unit (60°F)",
        name2    = "British thermal units (60°F)",
        symbol   = "Btu<sub>60°F</sub>",
        utype    = "energy",
        scale    = 1054.68,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-63F"] = {
        name1    = "British thermal unit (63°F)",
        name2    = "British thermal units (63°F)",
        symbol   = "BTU<sub>63°F</sub>",
        utype    = "energy",
        scale    = 1054.6,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-63F"] = {
        name1    = "British thermal unit (63°F)",
        name2    = "British thermal units (63°F)",
        symbol   = "Btu<sub>63°F</sub>",
        utype    = "energy",
        scale    = 1054.6,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-ISO"] = {
        name1    = "British thermal unit (ISO)",
        name2    = "British thermal units (ISO)",
        symbol   = "BTU<sub>ISO</sub>",
        utype    = "energy",
        scale    = 1055.056,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-ISO"] = {
```

```
        target   = "BTU-ISO",
    },
    ["BTU-IT"] = {
        name1    = "British thermal unit (IT)",
        name2    = "British thermal units (IT)",
        symbol   = "BTU<sub>IT</sub>",
        utype    = "energy",
        scale    = 1055.05585262,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-IT"] = {
        name1    = "British thermal unit (IT)",
        name2    = "British thermal units (IT)",
        symbol   = "Btu<sub>IT</sub>",
        utype    = "energy",
        scale    = 1055.05585262,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-mean"] = {
        name1    = "British thermal unit (mean)",
        name2    = "British thermal units (mean)",
        symbol   = "BTU<sub>mean</sub>",
        utype    = "energy",
        scale    = 1055.87,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-mean"] = {
        name1    = "British thermal unit (mean)",
        name2    = "British thermal units (mean)",
        symbol   = "Btu<sub>mean</sub>",
        utype    = "energy",
        scale    = 1055.87,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["BTU-th"] = {
        name1    = "British thermal unit (thermochemical)",
        name2    = "British thermal units (thermochemical)",
        symbol   = "BTU<sub>th</sub>",
        utype    = "energy",
        scale    = 1054.35026444,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Btu-th"] = {
        name1    = "British thermal unit (thermochemical)",
        name2    = "British thermal units (thermochemical)",
        symbol   = "Btu<sub>th</sub>",
        utype    = "energy",
        scale    = 1054.35026444,
        default  = "kJ",
        link     = "British thermal unit",
    },
    ["Cal"] = {
        name1    = "calorie",
        symbol   = "Cal",
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
    },
    ["cal"] = {
```

```
        name1    = "calorie",
        symbol   = "cal",
        utype    = "energy",
        scale    = 4.184,
        default  = "J",
    },
    ["Cal-15"] = {
        name1    = "Calorie (15°C)",
        name2    = "Calories (15°C)",
        symbol   = "Cal<sub>15</sub>",
        utype    = "energy",
        scale    = 4185.8,
        default  = "kJ",
        link     = "Calorie",
    },
    ["cal-15"] = {
        name1    = "calorie (15°C)",
        name2    = "calories (15°C)",
        symbol   = "cal<sub>15</sub>",
        utype    = "energy",
        scale    = 4.1858,
        default  = "J",
        link     = "Calorie",
    },
    ["Cal-IT"] = {
        name1    = "Calorie (International Steam Table)",
        name2    = "Calories (International Steam Table)",
        symbol   = "Cal<sub>IT</sub>",
        utype    = "energy",
        scale    = 4186.8,
        default  = "kJ",
        link     = "Calorie",
    },
    ["cal-IT"] = {
        name1    = "calorie (International Steam Table)",
        name2    = "calories (International Steam Table)",
        symbol   = "cal<sub>IT</sub>",
        utype    = "energy",
        scale    = 4.1868,
        default  = "J",
        link     = "Calorie",
    },
    ["Cal-th"] = {
        name1    = "Calorie (thermochemical)",
        name2    = "Calories (thermochemical)",
        symbol   = "Cal<sub>th</sub>",
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
        link     = "Calorie",
    },
    ["cal-th"] = {
        name1    = "calorie (thermochemical)",
        name2    = "calories (thermochemical)",
        symbol   = "cal<sub>th</sub>",
        utype    = "energy",
        scale    = 4.184,
        default  = "J",
        link     = "Calorie",
    },
    ["CHU-IT"] = {
        name1    = "Celsius heat unit (International Table)",
        name2    = "Celsius heat units (International Table)",
        symbol   = "CHU<sub>IT</sub>",
```

```
        utype    = "energy",
        scale    = 1899.100534716,
        default  = "kJ",
        link     = "Conversion of units#Energy",
    },
    ["cufootnaturalgas"] = {
        name1    = "cubic foot of natural gas",
        name2    = "cubic foot of natural gas",
        symbol   = "cuftnaturalgas",
        usename  = 1,
        utype    = "energy",
        scale    = 1055055.85262,
        default  = "MJ",
        link     = "Conversion of units#Energy",
    },
    ["cuftnaturalgas"] = {
        name1    = "cubic foot of natural gas",
        name2    = "cubic feet of natural gas",
        symbol   = "cuftnaturalgas",
        usename  = 1,
        utype    = "energy",
        scale    = 1055055.85262,
        default  = "MJ",
        link     = "Conversion of units#Energy",
    },
    ["Eh"] = {
        name1    = "Hartree",
        symbol   = "''E''<sub>h</sub>",
        utype    = "energy",
        scale    = 4.35974417e-18,
        default  = "eV",
    },
    ["erg"] = {
        symbol   = "erg",
        utype    = "energy",
        scale    = 0.0000001,
        default  = "µJ",
    },
    ["eV"] = {
        name1    = "electronvolt",
        symbol   = "eV",
        utype    = "energy",
        scale    = 1.602176487e-19,
        default  = "aJ",
    },
    ["feV"] = {
        name1    = "femtoelectronvolt",
        symbol   = "feV",
        utype    = "energy",
        scale    = 1.602176487e-34,
        default  = "yJ",
        link     = "Electronvolt",
    },
    ["foe"] = {
        symbol   = "foe",
        utype    = "energy",
        scale    = 1e44,
        default  = "YJ",
        link     = "Foe (unit)",
    },
    ["ftlb"] = {
        name1    = "foot-pound",
        symbol   = "ft·lb",
        utype    = "energy",
```

```
        alttype  = "torque",
        scale    = 1.3558179483314004,
        default  = "J",
        link     = "Foot-pound (energy)",
    },
    ["ftlb-f"] = {
        name1    = "foot-pound force",
        name2    = "foot-pounds force",
        symbol   = "ft·lb<sub>f</sub>",
        utype    = "energy",
        alttype  = "torque",
        scale    = 1.3558179483314004,
        default  = "J",
        link     = "Foot-pound (energy)",
    },
    ["ftlbf"] = {
        name1    = "foot-pound force",
        name2    = "foot-pounds force",
        symbol   = "ft·lbf",
        utype    = "energy",
        alttype  = "torque",
        scale    = 1.3558179483314004,
        default  = "J",
        link     = "Foot-pound (energy)",
    },
    ["ftpdl"] = {
        name1    = "foot-poundal",
        symbol   = "ft·pdl",
        utype    = "energy",
        scale    = 0.0421401100938048,
        default  = "J",
    },
    ["GeV"] = {
        name1    = "gigaelectronvolt",
        symbol   = "GeV",
        utype    = "energy",
        scale    = 1.602176487e-10,
        default  = "nJ",
        link     = "Electronvolt",
    },
    ["gTNT"] = {
        name2    = "grams of TNT",
        symbol   = "gram of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
        link     = "TNT equivalent",
    },
    ["Gtoe"] = {
        name1    = "gigatonne of oil equivalent",
        name2    = "gigatonnes of oil equivalent",
        symbol   = "Gtoe",
        utype    = "energy",
        scale    = 4.1868e19,
        default  = "EJ",
        link     = "Tonne of oil equivalent",
    },
    ["GtonTNT"] = {
        name2    = "gigatons of TNT",
        symbol   = "gigaton of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e18,
```

```
        default  = "EJ",
        link     = "TNT equivalent",
    },
    ["GtTNT"] = {
        name2    = "gigatonnes of TNT",
        symbol   = "gigatonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e18,
        default  = "EJ",
        link     = "TNT equivalent",
    },
    ["GW.h"] = {
        name1    = "gigawatt-hour",
        symbol   = "GW·h",
        utype    = "energy",
        scale    = 3.6e12,
        default  = "TJ",
        link     = "Kilowatt-hour",
    },
    ["GWh"] = {
        name1    = "gigawatt-hour",
        symbol   = "GWh",
        utype    = "energy",
        scale    = 3.6e12,
        default  = "TJ",
        link     = "Kilowatt-hour",
    },
    ["hph"] = {
        name1    = "horsepower-hour",
        symbol   = "hp·h",
        utype    = "energy",
        scale    = 2684519.537696172792,
        default  = "kWh",
        link     = "Horsepower",
    },
    ["inlb"] = {
        name1    = "inch-pound",
        symbol   = "in·lb",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.1129848290276167,
        default  = "mJ",
        link     = "Foot-pound (energy)",
    },
    ["inlb-f"] = {
        name1    = "inch-pound force",
        name2    = "inch-pounds force",
        symbol   = "in·lb<sub>f</sub>",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.1129848290276167,
        default  = "mJ",
        link     = "Foot-pound (energy)",
    },
    ["inlbf"] = {
        name1    = "inch-pound force",
        name2    = "inch-pounds force",
        symbol   = "in·lbf",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.1129848290276167,
        default  = "mJ",
        link     = "Foot-pound (energy)",
```

```
    },
    ["inoz-f"] = {
        name1    = "inch-ounce force",
        name2    = "inch-ounces force",
        symbol   = "in·oz<sub>f</sub>",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.00706155181422604375,
        default  = "mJ",
        link     = "Foot-pound (energy)",
    },
    ["inozf"] = {
        name1    = "inch-ounce force",
        name2    = "inch-ounces force",
        symbol   = "in·ozf",
        utype    = "energy",
        alttype  = "torque",
        scale    = 0.00706155181422604375,
        default  = "mJ",
        link     = "Foot-pound (energy)",
    },
    ["J"] = {
        _name1   = "joule",
        _symbol  = "J",
        utype    = "energy",
        scale    = 1,
        prefixes = 1,
        default  = "cal",
        link     = "Joule",
    },
    ["kBOE"] = {
        name1    = "kilo barrel of oil equivalent",
        name2    = "kilo barrels of oil equivalent",
        symbol   = "kBOE",
        utype    = "energy",
        scale    = 6.1178632e12,
        default  = "TJ",
        link     = "Barrel of oil equivalent",
    },
    ["kcal"] = {
        name1    = "kilocalorie",
        symbol   = "kcal",
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
        link     = "Calorie",
    },
    ["kcal-15"] = {
        name1    = "kilocalorie (15°C)",
        name2    = "kilocalories (15°C)",
        symbol   = "kcal<sub>15</sub>",
        utype    = "energy",
        scale    = 4185.8,
        default  = "kJ",
        link     = "Calorie",
    },
    ["kcal-IT"] = {
        name1    = "kilocalorie (International Steam Table)",
        name2    = "kilocalories (International Steam Table)",
        symbol   = "kcal<sub>IT</sub>",
        utype    = "energy",
        scale    = 4186.8,
        default  = "kJ",
        link     = "Calorie",
```

```
    },
    ["kcal-th"] = {
        name1    = "kilocalorie (thermochemical)",
        name2    = "kilocalories (thermochemical)",
        symbol   = "kcal<sub>th</sub>",
        utype    = "energy",
        scale    = 4184,
        default  = "kJ",
        link     = "Calorie",
    },
    ["kerg"] = {
        name1    = "kiloerg",
        symbol   = "kerg",
        utype    = "energy",
        scale    = 0.0001,
        default  = "mJ",
        link     = "Erg",
    },
    ["keV"] = {
        name1    = "kiloelectronvolt",
        symbol   = "keV",
        utype    = "energy",
        scale    = 1.602176487e-16,
        default  = "fJ",
        link     = "Electronvolt",
    },
    ["kgTNT"] = {
        name2    = "kilograms of TNT",
        symbol   = "kilogram of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "TNT equivalent",
    },
    ["kt(TNT)"] = {
        name1    = "kilotonne",
        name1_us = "kiloton",
        symbol   = "kt",
        utype    = "energy",
        scale    = 4.184e12,
        default  = "TJ",
        link     = "TNT equivalent",
    },
    ["ktoe"] = {
        name1    = "kilotonne of oil equivalent",
        name2    = "kilotonnes of oil equivalent",
        symbol   = "ktoe",
        utype    = "energy",
        scale    = 4.1868e13,
        default  = "TJ",
        link     = "Tonne of oil equivalent",
    },
    ["ktonTNT"] = {
        name1    = "kiloton of TNT",
        name2    = "kilotons of TNT",
        symbol   = "kt",
        utype    = "energy",
        scale    = 4.184e12,
        default  = "TJ",
        link     = "TNT equivalent",
    },
    ["ktTNT"] = {
        name2    = "kilotonnes of TNT",
```

```
        symbol   = "kilotonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e12,
        default  = "TJ",
        link     = "TNT equivalent",
    },
    ["kW.h"] = {
        name1    = "kilowatt-hour",
        symbol   = "kW·h",
        utype    = "energy",
        scale    = 3600000,
        default  = "MJ",
    },
    ["kWh"] = {
        name1    = "kilowatt-hour",
        symbol   = "kWh",
        utype    = "energy",
        scale    = 3600000,
        default  = "MJ",
    },
    ["Mcal"] = {
        name1    = "megacalorie",
        symbol   = "Mcal",
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "Calorie",
    },
    ["mcal"] = {
        name1    = "millicalorie",
        symbol   = "mcal",
        utype    = "energy",
        scale    = 0.004184,
        default  = "mJ",
        link     = "Calorie",
    },
    ["Mcal-15"] = {
        name1    = "megacalorie (15°C)",
        name2    = "megacalories (15°C)",
        symbol   = "Mcal<sub>15</sub>",
        utype    = "energy",
        scale    = 4185800,
        default  = "MJ",
        link     = "Calorie",
    },
    ["mcal-15"] = {
        name1    = "millicalorie (15°C)",
        name2    = "millicalories (15°C)",
        symbol   = "mcal<sub>15</sub>",
        utype    = "energy",
        scale    = 0.0041858,
        default  = "mJ",
        link     = "Calorie",
    },
    ["Mcal-IT"] = {
        name1    = "megacalorie (International Steam Table)",
        name2    = "megacalories (International Steam Table)",
        symbol   = "Mcal<sub>IT</sub>",
        utype    = "energy",
        scale    = 4186800,
        default  = "MJ",
        link     = "Calorie",
    },
```

```
    ["mcal-IT"] = {
        name1    = "millicalorie (International Steam Table)",
        name2    = "millicalories (International Steam Table)",
        symbol   = "mcal<sub>IT</sub>",
        utype    = "energy",
        scale    = 0.0041868,
        default  = "mJ",
        link     = "Calorie",
    },
    ["Mcal-th"] = {
        name1    = "megacalorie (thermochemical)",
        name2    = "megacalories (thermochemical)",
        symbol   = "Mcal<sub>th</sub>",
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "Calorie",
    },
    ["mcal-th"] = {
        name1    = "millicalorie (thermochemical)",
        name2    = "millicalories (thermochemical)",
        symbol   = "mcal<sub>th</sub>",
        utype    = "energy",
        scale    = 0.004184,
        default  = "mJ",
        link     = "Calorie",
    },
    ["Merg"] = {
        name1    = "megaerg",
        symbol   = "Merg",
        utype    = "energy",
        scale    = 0.1,
        default  = "J",
        link     = "Erg",
    },
    ["merg"] = {
        name1    = "millierg",
        symbol   = "merg",
        utype    = "energy",
        scale    = 0.0000000001,
        default  = "µJ",
        link     = "Erg",
    },
    ["MeV"] = {
        name1    = "megaelectronvolt",
        symbol   = "MeV",
        utype    = "energy",
        scale    = 1.602176487e-13,
        default  = "pJ",
        link     = "Electronvolt",
    },
    ["meV"] = {
        name1    = "millielectronvolt",
        symbol   = "meV",
        utype    = "energy",
        scale    = 1.602176487e-22,
        default  = "zJ",
        link     = "Electronvolt",
    },
    ["MMBtu"] = {
        name1    = "million British thermal units",
        name2    = "million British thermal units",
        symbol   = "MMBtu",
        utype    = "energy",
```

```
        scale    = 1055055852.62,
        default  = "GJ",
        link     = "British thermal unit",
    },
    ["Mt(TNT)"] = {
        name1    = "megatonne",
        name1_us = "megaton",
        symbol   = "Mt",
        utype    = "energy",
        scale    = 4.184e15,
        default  = "PJ",
        link     = "TNT equivalent",
    },
    ["Mtoe"] = {
        name1    = "megatonne of oil equivalent",
        name2    = "megatonnes of oil equivalent",
        symbol   = "Mtoe",
        utype    = "energy",
        scale    = 4.1868e16,
        default  = "PJ",
        link     = "Tonne of oil equivalent",
    },
    ["MtonTNT"] = {
        name1    = "megaton of TNT",
        name2    = "megatons of TNT",
        symbol   = "Mt",
        utype    = "energy",
        scale    = 4.184e15,
        default  = "PJ",
        link     = "TNT equivalent",
    },
    ["mtonTNT"] = {
        name2    = "millitons of TNT",
        symbol   = "milliton of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "TNT equivalent",
    },
    ["MtTNT"] = {
        name2    = "megatonnes of TNT",
        symbol   = "megatonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e15,
        default  = "PJ",
        link     = "TNT equivalent",
    },
    ["mtTNT"] = {
        name2    = "millitonnes of TNT",
        symbol   = "millitonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000,
        default  = "MJ",
        link     = "TNT equivalent",
    },
    ["MW.h"] = {
        name1    = "megawatt-hour",
        symbol   = "MW·h",
        utype    = "energy",
        scale    = 3600000000,
        default  = "GJ",
```

```
        link     = "Kilowatt-hour",
    },
    ["mW.h"] = {
        name1    = "milliwatt-hour",
        symbol   = "mW·h",
        utype    = "energy",
        scale    = 3.6,
        default  = "J",
        link     = "Kilowatt-hour",
    },
    ["MWh"] = {
        name1    = "megawatt-hour",
        symbol   = "MWh",
        utype    = "energy",
        scale    = 3600000000,
        default  = "GJ",
        link     = "Kilowatt-hour",
    },
    ["mWh"] = {
        name1    = "milliwatt-hour",
        symbol   = "mWh",
        utype    = "energy",
        scale    = 3.6,
        default  = "J",
        link     = "Kilowatt-hour",
    },
    ["neV"] = {
        name1    = "nanoelectronvolt",
        symbol   = "neV",
        utype    = "energy",
        scale    = 1.602176487e-28,
        default  = "yJ",
        link     = "Electronvolt",
    },
    ["PeV"] = {
        name1    = "petaelectronvolt",
        symbol   = "PeV",
        utype    = "energy",
        scale    = 0.0001602176487,
        default  = "mJ",
        link     = "Electronvolt",
    },
    ["peV"] = {
        name1    = "picoelectronvolt",
        symbol   = "peV",
        utype    = "energy",
        scale    = 1.602176487e-31,
        default  = "yJ",
        link     = "Electronvolt",
    },
    ["PSh"] = {
        name1    = "Pferdestärkenstunde",
        symbol   = "PSh",
        utype    = "energy",
        scale    = 2647795.5,
        default  = "kWh",
    },
    ["quad"] = {
        name1    = "quadrillion British thermal units",
        name2    = "quadrillion British thermal units",
        symbol   = "quad",
        utype    = "energy",
        scale    = 1.054804e18,
        default  = "EJ",
```

```
        link     = "Quad (unit)",
    },
    ["Ry"] = {
        name1    = "rydberg",
        symbol   = "Ry",
        utype    = "energy",
        scale    = 2.1798741e-18,
        default  = "eV",
        link     = "Rydberg constant",
    },
    ["scf"] = {
        name1    = "standard cubic foot",
        name2    = "standard cubic feet",
        symbol   = "scf",
        utype    = "energy",
        scale    = 2869.2044809344,
        default  = "kJ",
    },
    ["scfoot"] = {
        name1    = "standard cubic foot",
        name2    = "standard cubic foot",
        symbol   = "scf",
        utype    = "energy",
        scale    = 2869.2044809344,
        default  = "kJ",
    },
    ["t(TNT)"] = {
        name1    = "tonne",
        name1_us = "ton",
        symbol   = "t",
        utype    = "energy",
        scale    = 4184000000,
        default  = "GJ",
        link     = "TNT equivalent",
    },
    ["TeV"] = {
        name1    = "teraelectronvolt",
        symbol   = "TeV",
        utype    = "energy",
        scale    = 1.602176487e-7,
        default  = "µJ",
        link     = "Electronvolt",
    },
    ["th"] = {
        name1    = "thermie",
        symbol   = "th",
        utype    = "energy",
        scale    = 4186800,
        default  = "MJ",
        link     = "Conversion of units#Energy",
    },
    ["thm-EC"] = {
        name1    = "therm (EC)",
        name2    = "therms (EC)",
        symbol   = "thm (EC)",
        utype    = "energy",
        scale    = 105506000,
        default  = "MJ",
        link     = "Therm",
    },
    ["thm-UK"] = {
        name1    = "therm (UK)",
        name2    = "therms (UK)",
        symbol   = "thm (UK)",
```

```
        utype    = "energy",
        scale    = 105505585.257348,
        default  = "MJ",
        link     = "Therm",
    },
    ["thm-US"] = {
        name1    = "therm (US)",
        name1_us = "therm (U.S.)",
        name2    = "therms (US)",
        name2_us = "therms (U.S.)",
        symbol   = "thm (US)",
        sym_us   = "thm (U.S.)",
        utype    = "energy",
        scale    = 105480400,
        default  = "MJ",
        link     = "Therm",
    },
    ["toe"] = {
        name1    = "tonne of oil equivalent",
        name2    = "tonnes of oil equivalent",
        symbol   = "toe",
        utype    = "energy",
        scale    = 41868000000,
        default  = "GJ",
    },
    ["tonTNT"] = {
        name2    = "tons of TNT",
        symbol   = "ton of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000000,
        default  = "GJ",
        link     = "TNT equivalent",
    },
    ["tTNT"] = {
        name2    = "tonnes of TNT",
        symbol   = "tonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4184000000,
        default  = "GJ",
        link     = "TNT equivalent",
    },
    ["TtonTNT"] = {
        name2    = "teratons of TNT",
        symbol   = "teraton of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e21,
        default  = "ZJ",
        link     = "TNT equivalent",
    },
    ["TtTNT"] = {
        name2    = "teratonnes of TNT",
        symbol   = "teratonne of TNT",
        usename  = 1,
        utype    = "energy",
        scale    = 4.184e21,
        default  = "ZJ",
        link     = "TNT equivalent",
    },
    ["TW.h"] = {
        name1    = "terawatt-hour",
        symbol   = "TW·h",
```

```
        utype    = "energy",
        scale    = 3.6e15,
        default  = "PJ",
        link     = "Kilowatt-hour",
    },
    ["TWh"] = {
        name1    = "terawatt-hour",
        symbol   = "TWh",
        utype    = "energy",
        scale    = 3.6e15,
        default  = "PJ",
        link     = "Kilowatt-hour",
    },
    ["W.h"] = {
        name1    = "watt-hour",
        symbol   = "W·h",
        utype    = "energy",
        scale    = 3600,
        default  = "kJ",
        link     = "Kilowatt-hour",
    },
    ["Wh"] = {
        name1    = "watt-hour",
        symbol   = "Wh",
        utype    = "energy",
        scale    = 3600,
        default  = "kJ",
        link     = "Kilowatt-hour",
    },
    ["µerg"] = {
        name1    = "microerg",
        symbol   = "µerg",
        utype    = "energy",
        scale    = 1e-13,
        default  = "nJ",
        link     = "Erg",
    },
    ["µeV"] = {
        name1    = "microelectronvolt",
        symbol   = "µeV",
        utype    = "energy",
        scale    = 1.602176487e-25,
        default  = "yJ",
        link     = "Electronvolt",
    },
    ["µW.h"] = {
        name1    = "microwatt-hour",
        symbol   = "µW·h",
        utype    = "energy",
        scale    = 0.0036,
        default  = "mJ",
        link     = "Kilowatt-hour",
    },
    ["µWh"] = {
        name1    = "microwatt-hour",
        symbol   = "µWh",
        utype    = "energy",
        scale    = 0.0036,
        default  = "mJ",
        link     = "Kilowatt-hour",
    },
    ["-kW.h"] = {
        target   = "kW.h",
        link     = "Kilowatt hour",
```

```
    },
    ["btu"] = {
        target   = "BTU",
    },
    ["Calorie"] = {
        target   = "Cal",
    },
    ["ft.lbf"] = {
        target   = "ftlbf",
    },
    ["ft·lbf"] = {
        target   = "ftlbf",
    },
    ["g-cal-15"] = {
        target   = "cal-15",
    },
    ["g-cal-IT"] = {
        target   = "cal-IT",
    },
    ["g-cal-th"] = {
        target   = "cal-th",
    },
    ["g-kcal-15"] = {
        target   = "kcal-15",
    },
    ["g-kcal-IT"] = {
        target   = "kcal-IT",
    },
    ["g-kcal-th"] = {
        target   = "kcal-th",
    },
    ["g-Mcal-15"] = {
        target   = "Mcal-15",
    },
    ["g-mcal-15"] = {
        target   = "mcal-15",
    },
    ["g-Mcal-IT"] = {
        target   = "Mcal-IT",
    },
    ["g-mcal-IT"] = {
        target   = "mcal-IT",
    },
    ["g-Mcal-th"] = {
        target   = "Mcal-th",
    },
    ["g-mcal-th"] = {
        target   = "mcal-th",
    },
    ["GW-h"] = {
        target   = "GW.h",
    },
    ["GW·h"] = {
        target   = "GW.h",
    },
    ["Hartree"] = {
        target   = "Eh",
    },
    ["hp.h"] = {
        target   = "hph",
    },
    ["in.lb-f"] = {
        target   = "inlb-f",
    },
```

```
    ["in.lbf"] = {
        target   = "inlbf",
    },
    ["in.oz-f"] = {
        target   = "inoz-f",
    },
    ["in.ozf"] = {
        target   = "inozf",
    },
    ["kbboe"] = {
        target   = "kBOE",
        symbol   = "kbboe",
    },
    ["kg-cal-15"] = {
        target   = "Cal-15",
    },
    ["kg-cal-IT"] = {
        target   = "Cal-IT",
    },
    ["kg-cal-th"] = {
        target   = "Cal-th",
    },
    ["kW-h"] = {
        target   = "kW.h",
    },
    ["kW·h"] = {
        target   = "kW.h",
    },
    ["MW-h"] = {
        target   = "MW.h",
    },
    ["mW-h"] = {
        target   = "mW.h",
    },
    ["MW·h"] = {
        target   = "MW.h",
    },
    ["TW-h"] = {
        target   = "TW.h",
    },
    ["uerg"] = {
        target   = "µerg",
    },
    ["ueV"] = {
        target   = "µeV",
    },
    ["uW-h"] = {
        target   = "µW.h",
    },
    ["uW.h"] = {
        target   = "µW.h",
    },
    ["uWh"] = {
        target   = "µWh",
    },
    ["W-h"] = {
        target   = "W.h",
    },
    ["eVpar"] = {
        _name1   = "electronvolt",
        _symbol  = "eV",
        utype    = "energy per chemical amount",
        scale    = 96485.329522144166,
        prefixes = 1,
```

```
        default  = "kcal/mol",
        link     = "Electronvolt",
    },
    ["kcal/mol"] = {
        per      = { "kcal", "mol" },
        utype    = "energy per chemical amount",
        default  = "kJ/mol",
        link     = "Kilocalorie per mole",
    },
    ["kJ/mol"] = {
        per      = { "kJ", "mol" },
        utype    = "energy per chemical amount",
        default  = "kcal/mol",
        link     = "Joule per mole",
    },
    ["kWh/100 km"] = {
        name1    = "kilowatt-hour per 100 kilometres",
        name1_us = "kilowatt-hour per 100 kilometers",
        name2    = "kilowatt-hours per 100 kilometres",
        name2_us = "kilowatt-hours per 100 kilometers",
        symbol   = "kW·h/100 km",
        utype    = "energy per unit length",
        scale    = 36,
        default  = "MJ/km kWh/mi",
        link     = "Kilowatt-hour",
    },
    ["kWh/100 mi"] = {
        name1    = "kilowatt-hour per 100 miles",
        name2    = "kilowatt-hours per 100 miles",
        symbol   = "kW·h/100 mi",
        utype    = "energy per unit length",
        scale    = 22.3694,
        default  = "mpge",
        link     = "Miles per gallon gasoline equivalent",
    },
    ["MJ/100 km"] = {
        name1    = "megajoule per 100 kilometres",
        name1_us = "megajoule per 100 kilometers",
        name2    = "megajoules per 100 kilometres",
        name2_us = "megajoules per 100 kilometers",
        symbol   = "MJ/100 km",
        utype    = "energy per unit length",
        scale    = 10,
        default  = "BTU/mi",
        link     = "British thermal unit",
    },
    ["mpge"] = {
        name1    = "mile per gallon gasoline equivalent",
        name2    = "miles per gallon gasoline equivalent",
        symbol   = "mpg&#8209;e",
        utype    = "energy per unit length",
        scale    = 13e-6,
        invert   = -1,
        iscomplex= true,
        default  = "kWh/100 mi",
        link     = "Miles per gallon gasoline equivalent",
    },
    ["BTU/mi"] = {
        per      = { "BTU", "mi" },
        utype    = "energy per unit length",
        default  = "v > 1525 ! M ! k ! J/km",
    },
    ["kJ/km"] = {
        per      = { "kJ", "km" },
```

```
        utype    = "energy per unit length",
        default  = "BTU/mi",
    },
    ["kWh/km"] = {
        per      = { "-kW.h", "km" },
        utype    = "energy per unit length",
        default  = "MJ/km kWh/mi",
    },
    ["kWh/mi"] = {
        per      = { "-kW.h", "mi" },
        utype    = "energy per unit length",
        default  = "kWh/km MJ/km",
    },
    ["MJ/km"] = {
        per      = { "MJ", "km" },
        utype    = "energy per unit length",
        default  = "BTU/mi",
    },
    ["mpg-e"] = {
        target   = "mpge",
    },
    ["BTU/lb"] = {
        name1    = "British thermal unit per pound",
        name2    = "British thermal units per pound",
        symbol   = "BTU/lb",
        utype    = "energy per unit mass",
        scale    = 429.92261414790346,
        default  = "kJ/kg",
        link     = "British thermal unit",
    },
    ["cal/g"] = {
        name1    = "calorie per gram",
        name2    = "calories per gram",
        symbol   = "cal/g",
        utype    = "energy per unit mass",
        scale    = 4184,
        default  = "J/g",
    },
    ["GJ/kg"] = {
        name1    = "gigajoule per kilogram",
        name2    = "gigajoules per kilogram",
        symbol   = "GJ/kg",
        utype    = "energy per unit mass",
        scale    = 1e9,
        default  = "ktTNT/t",
        link     = "Specific energy",
    },
    ["J/g"] = {
        name1    = "joule per gram",
        name2    = "joules per gram",
        symbol   = "J/g",
        utype    = "energy per unit mass",
        scale    = 1000,
        default  = "kcal/g",
        link     = "Specific energy",
    },
    ["kcal/g"] = {
        name1    = "kilocalorie per gram",
        name2    = "kilocalories per gram",
        symbol   = "kcal/g",
        utype    = "energy per unit mass",
        scale    = 4184000,
        default  = "kJ/g",
    },
```

```
    ["kJ/g"] = {
        name1    = "kilojoule per gram",
        name2    = "kilojoules per gram",
        symbol   = "kJ/g",
        utype    = "energy per unit mass",
        scale    = 1000000,
        default  = "kcal/g",
        link     = "Specific energy",
    },
    ["kJ/kg"] = {
        name1    = "kilojoule per kilogram",
        name2    = "kilojoules per kilogram",
        symbol   = "kJ/kg",
        utype    = "energy per unit mass",
        scale    = 1000,
        default  = "BTU/lb",
        link     = "Specific energy",
    },
    ["ktonTNT/MT"] = {
        name2    = "kilotons of TNT per metric ton",
        symbol   = "kiloton of TNT per metric ton",
        usename  = 1,
        utype    = "energy per unit mass",
        scale    = 4184000000,
        default  = "GJ/kg",
        link     = "TNT equivalent",
    },
    ["ktTNT/t"] = {
        name2    = "kilotonnes of TNT per tonne",
        symbol   = "kilotonne of TNT per tonne",
        usename  = 1,
        utype    = "energy per unit mass",
        scale    = 4184000000,
        default  = "GJ/kg",
        link     = "TNT equivalent",
    },
    ["MtonTNT/MT"] = {
        name2    = "megatons of TNT per metric ton",
        symbol   = "megaton of TNT per metric ton",
        usename  = 1,
        utype    = "energy per unit mass",
        scale    = 4.184e12,
        default  = "TJ/kg",
        link     = "TNT equivalent",
    },
    ["MtTNT/MT"] = {
        name2    = "megatonnes of TNT per tonne",
        symbol   = "megatonne of TNT per tonne",
        usename  = 1,
        utype    = "energy per unit mass",
        scale    = 4.184e12,
        default  = "TJ/kg",
        link     = "TNT equivalent",
    },
    ["TJ/kg"] = {
        name1    = "terajoule per kilogram",
        name2    = "terajoules per kilogram",
        symbol   = "TJ/kg",
        utype    = "energy per unit mass",
        scale    = 1e12,
        default  = "MtTNT/MT",
        link     = "Specific energy",
    },
    ["Cal/g"] = {
```

```
        per      = { "Cal", "g" },
        utype    = "energy per unit mass",
        default  = "kJ/g",
    },
    ["BTU/cuft"] = {
        per      = { "BTU", "cuft" },
        utype    = "energy per unit volume",
        default  = "kJ/L",
    },
    ["Cal/12USoz(mL)serve"] = {
        per      = { "Cal", "-12USoz(mL)serve" },
        utype    = "energy per unit volume",
        default  = "kJ/L",
    },
    ["Cal/12USoz(ml)serve"] = {
        per      = { "Cal", "-12USoz(ml)serve" },
        utype    = "energy per unit volume",
        default  = "kJ/l",
    },
    ["Cal/12USozserve"] = {
        per      = { "Cal", "-12USozserve" },
        utype    = "energy per unit volume",
        default  = "kJ/L",
    },
    ["Cal/USoz"] = {
        per      = { "Cal", "USoz" },
        utype    = "energy per unit volume",
        default  = "kJ/ml",
    },
    ["kJ/L"] = {
        per      = { "kJ", "L" },
        utype    = "energy per unit volume",
        default  = "BTU/cuft",
    },
    ["kJ/l"] = {
        per      = { "kJ", "l" },
        utype    = "energy per unit volume",
        default  = "BTU/cuft",
    },
    ["kJ/ml"] = {
        per      = { "kJ", "ml" },
        utype    = "energy per unit volume",
        default  = "Cal/USoz",
    },
    ["MJ/m3"] = {
        per      = { "MJ", "m3" },
        utype    = "energy per unit volume",
        default  = "BTU/cuft",
    },
    ["Sv"] = {
        _name1   = "sievert",
        _symbol  = "Sv",
        utype    = "equivalent radiation dose",
        scale    = 1,
        prefixes = 1,
        default  = "rem",
        link     = "Sievert",
    },
    ["rem"] = {
        _name1   = "rem",
        _symbol  = "rem",
        utype    = "equivalent radiation dose",
        scale    = 0.01,
        prefixes = 1,
```

```
        default  = "Sv",
        link     = "Roentgen equivalent man",
    },
    ["g/km"] = {
        name1    = "gram per kilometre",
        name1_us = "gram per kilometer",
        name2    = "grams per kilometre",
        name2_us = "grams per kilometer",
        symbol   = "g/km",
        utype    = "exhaust emission",
        scale    = 1e-6,
        default  = "oz/mi",
        link     = "Exhaust gas",
    },
    ["g/mi"] = {
        name1    = "gram per mile",
        name2    = "grams per mile",
        symbol   = "g/mi",
        utype    = "exhaust emission",
        scale    = 6.2137119223733397e-7,
        default  = "g/km",
        link     = "Exhaust gas",
    },
    ["gCO2/km"] = {
        name1    = "gram of CO<sub>2</sub> per kilometre",
        name1_us = "gram of CO<sub>2</sub> per kilometer",
        name2    = "grams of CO<sub>2</sub> per kilometre",
        name2_us = "grams of CO<sub>2</sub> per kilometer",
        symbol   = "g(CO<sub>2</sub>)/km",
        utype    = "exhaust emission",
        scale    = 1e-6,
        default  = "ozCO2/mi",
        link     = "Exhaust gas",
    },
    ["gCO2/mi"] = {
        name1    = "gram of CO<sub>2</sub> per mile",
        name2    = "grams of CO<sub>2</sub> per mile",
        symbol   = "g(CO<sub>2</sub>)/mi",
        utype    = "exhaust emission",
        scale    = 6.2137119223733397e-7,
        default  = "gCO2/km",
        link     = "Exhaust gas",
    },
    ["kg/km"] = {
        name1    = "kilogram per kilometre",
        name1_us = "kilogram per kilometer",
        name2    = "kilograms per kilometre",
        name2_us = "kilograms per kilometer",
        symbol   = "kg/km",
        utype    = "exhaust emission",
        scale    = 0.001,
        default  = "lb/mi",
        link     = "Exhaust gas",
    },
    ["kgCO2/km"] = {
        name1    = "kilogram of CO<sub>2</sub> per kilometre",
        name1_us = "kilogram of CO<sub>2</sub> per kilometer",
        name2    = "kilograms of CO<sub>2</sub> per kilometre",
        name2_us = "kilograms of CO<sub>2</sub> per kilometer",
        symbol   = "kg(CO<sub>2</sub>)/km",
        utype    = "exhaust emission",
        scale    = 0.001,
        default  = "lbCO2/mi",
        link     = "Exhaust gas",
```

```
    },
    ["lb/mi"] = {
        name1    = "pound per mile",
        name2    = "pounds per mile",
        symbol   = "lb/mi",
        utype    = "exhaust emission",
        scale    = 0.00028184923173665794,
        default  = "kg/km",
        link     = "Exhaust gas",
    },
    ["lbCO2/mi"] = {
        name1    = "pound of CO<sub>2</sub> per mile",
        name2    = "pounds of CO<sub>2</sub> per mile",
        symbol   = "lb(CO<sub>2</sub>)/mi",
        utype    = "exhaust emission",
        scale    = 0.00028184923173665794,
        default  = "kgCO2/km",
        link     = "Exhaust gas",
    },
    ["oz/mi"] = {
        name1    = "ounce per mile",
        name2    = "ounces per mile",
        symbol   = "oz/mi",
        utype    = "exhaust emission",
        scale    = 1.7615576983541121e-5,
        default  = "g/km",
        link     = "Exhaust gas",
    },
    ["ozCO2/mi"] = {
        name1    = "ounce of CO<sub>2</sub> per mile",
        name2    = "ounces of CO<sub>2</sub> per mile",
        symbol   = "oz(CO<sub>2</sub>)/mi",
        utype    = "exhaust emission",
        scale    = 1.7615576983541121e-5,
        default  = "gCO2/km",
        link     = "Exhaust gas",
    },
    ["cuft/a"] = {
        name1    = "cubic foot per annum",
        name2    = "cubic feet per annum",
        symbol   = "cu ft/a",
        utype    = "flow",
        scale    = 8.9730672142368242e-10,
        default  = "m3/a",
        link     = "Cubic foot per second",
    },
    ["cuft/d"] = {
        name1    = "cubic foot per day",
        name2    = "cubic feet per day",
        symbol   = "cu ft/d",
        utype    = "flow",
        scale    = 3.2774128000000003e-7,
        default  = "m3/d",
        link     = "Cubic foot per second",
    },
    ["cuft/h"] = {
        name1    = "cubic foot per hour",
        name2    = "cubic feet per hour",
        symbol   = "cu ft/h",
        utype    = "flow",
        scale    = 7.8657907200000004e-6,
        default  = "m3/h",
        link     = "Cubic foot per second",
    },
```

```
    ["cuft/min"] = {
        name1    = "cubic foot per minute",
        name2    = "cubic feet per minute",
        symbol   = "cu ft/min",
        utype    = "flow",
        scale    = 0.00047194744319999999,
        default  = "m3/min",
    },
    ["cuft/s"] = {
        name1    = "cubic foot per second",
        name2    = "cubic feet per second",
        symbol   = "cu ft/s",
        utype    = "flow",
        scale    = 28316846592e-12,
        default  = "m3/s",
    },
    ["cumi/a"] = {
        name1    = "cubic mile per annum",
        name2    = "cubic miles per annum",
        symbol   = "cu mi/a",
        utype    = "flow",
        scale    = 132.08171170940057,
        default  = "km3/a",
        link     = "Cubic foot per second",
    },
    ["cuyd/h"] = {
        name1    = "cubic yard per hour",
        name2    = "cubic yards per hour",
        symbol   = "cuyd/h",
        utype    = "flow",
        scale    = 0.00021237634944000001,
        default  = "m3/h",
        link     = "Cubic foot per second",
    },
    ["cuyd/s"] = {
        name1    = "cubic yard per second",
        name2    = "cubic yards per second",
        symbol   = "cu yd/s",
        utype    = "flow",
        scale    = 0.76455485798400002,
        default  = "m3/s",
    },
    ["Goilbbl/a"] = {
        name1    = "billion barrels per year",
        name2    = "billion barrels per year",
        symbol   = "Gbbl/a",
        utype    = "flow",
        scale    = 5.0380033629933836,
        default  = "v * 1.58987294928 < 10 ! e6 ! e9 ! m3/a",
        link     = "Barrel per day",
    },
    ["impgal/h"] = {
        name1    = "imperial gallon per hour",
        name2    = "imperial gallons per hour",
        symbol   = "imp gal/h",
        utype    = "flow",
        scale    = 1.2628027777777779e-6,
        default  = "m3/h",
        link     = "Gallon",
    },
    ["impgal/min"] = {
        name1    = "imperial gallon per minute",
        name2    = "imperial gallons per minute",
        symbol   = "imp gal/min",
```

```
        utype    = "flow",
        scale    = 7.5768166666666671e-5,
        default  = "m3/s",
        link     = "Gallon",
    },
    ["impgal/s"] = {
        name1    = "imperial gallon per second",
        name2    = "imperial gallons per second",
        symbol   = "impgal/s",
        utype    = "flow",
        scale    = 0.00454609,
        default  = "m3/s",
        link     = "Imperial gallons per second",
    },
    ["km3/a"] = {
        name1    = "cubic kilometre per annum",
        name1_us = "cubic kilometer per annum",
        name2    = "cubic kilometres per annum",
        name2_us = "cubic kilometers per annum",
        symbol   = "km<sup>3</sup>/a",
        utype    = "flow",
        scale    = 31.68808781402895,
        default  = "cumi/a",
        link     = "Cubic metre per second",
    },
    ["km3/d"] = {
        name1    = "cubic kilometre per day",
        name1_us = "cubic kilometer per day",
        name2    = "cubic kilometres per day",
        name2_us = "cubic kilometers per day",
        symbol   = "km<sup>3</sup>/d",
        utype    = "flow",
        scale    = 11574.074074074075,
        default  = "cuft/d",
        link     = "Cubic metre per second",
    },
    ["koilbbl/a"] = {
        name1    = "thousand barrels per year",
        name2    = "thousand barrels per year",
        symbol   = "kbbl/a",
        utype    = "flow",
        scale    = 5.0380033629933841e-6,
        default  = "v * 1.58987294928 < 10 ! ! e3 ! m3/a",
        link     = "Barrel per day",
    },
    ["koilbbl/d"] = {
        name1    = "thousand barrels per day",
        name2    = "thousand barrels per day",
        symbol   = "kbbl/d",
        utype    = "flow",
        scale    = 0.0018401307283333335,
        default  = "v * 1.58987294928 < 10 ! ! e3 ! m3/d",
        link     = "Barrel per day",
    },
    ["L/h"] = {
        name1    = "litre per hour",
        name1_us = "liter per hour",
        name2    = "litres per hour",
        name2_us = "liters per hour",
        symbol   = "L/h",
        utype    = "flow",
        scale    = 2.7777777777777776e-7,
        default  = "impgal/h USgal/h",
        link     = "Cubic metre per second",
```

```
    },
    ["L/min"] = {
        name1    = "litre per minute",
        name1_us = "liter per minute",
        name2    = "litres per minute",
        name2_us = "liters per minute",
        symbol   = "L/min",
        utype    = "flow",
        scale    = 1.6666666666666667e-5,
        default  = "impgal/min USgal/min",
        link     = "Cubic metre per second",
    },
    ["L/s"] = {
        name1    = "litre per second",
        name1_us = "liter per second",
        name2    = "litres per second",
        name2_us = "liters per second",
        symbol   = "L/s",
        utype    = "flow",
        scale    = 0.001,
        default  = "cuft/s",
        link     = "Cubic metre per second",
    },
    ["m3/a"] = {
        name1    = "cubic metre per annum",
        name1_us = "cubic meter per annum",
        name2    = "cubic metres per annum",
        name2_us = "cubic meters per annum",
        symbol   = "m<sup>3</sup>/a",
        utype    = "flow",
        scale    = 3.1688087814028947e-8,
        default  = "cuft/a",
        link     = "Cubic metre per second",
    },
    ["m3/d"] = {
        name1    = "cubic metre per day",
        name1_us = "cubic meter per day",
        name2    = "cubic metres per day",
        name2_us = "cubic meters per day",
        symbol   = "m<sup>3</sup>/d",
        utype    = "flow",
        scale    = 1.1574074074074073e-5,
        default  = "cuft/d",
        link     = "Cubic metre per second",
    },
    ["m3/h"] = {
        name1    = "cubic metre per hour",
        name1_us = "cubic meter per hour",
        name2    = "cubic metres per hour",
        name2_us = "cubic meters per hour",
        symbol   = "m<sup>3</sup>/h",
        utype    = "flow",
        scale    = 0.00027777777777777778,
        default  = "cuft/h",
        link     = "Cubic metre per second",
    },
    ["m3/min"] = {
        name1    = "cubic metre per minute",
        name1_us = "cubic meter per minute",
        name2    = "cubic metres per minute",
        name2_us = "cubic meters per minute",
        symbol   = "m<sup>3</sup>/min",
        utype    = "flow",
        scale    = 0.016666666666666666,
```

```
        default  = "cuft/min",
        link     = "Cubic metre per second",
    },
    ["m3/s"] = {
        name1    = "cubic metre per second",
        name1_us = "cubic meter per second",
        name2    = "cubic metres per second",
        name2_us = "cubic meters per second",
        symbol   = "m<sup>3</sup>/s",
        utype    = "flow",
        scale    = 1,
        default  = "cuft/s",
    },
    ["Moilbbl/a"] = {
        name1    = "million barrels per year",
        name2    = "million barrels per year",
        symbol   = "Mbbl/a",
        utype    = "flow",
        scale    = 0.0050380033629933837,
        default  = "v * 1.58987294928 < 10 ! e3 ! e6 ! m3/a",
        link     = "Barrel per day",
    },
    ["Moilbbl/d"] = {
        name1    = "million barrels per day",
        name2    = "million barrels per day",
        symbol   = "Mbbl/d",
        utype    = "flow",
        scale    = 1.8401307283333335,
        default  = "v * 1.58987294928 < 10 ! e3 ! e6 ! m3/d",
        link     = "Barrel per day",
    },
    ["oilbbl/a"] = {
        name1    = "barrel per year",
        name2    = "barrels per year",
        symbol   = "bbl/a",
        utype    = "flow",
        scale    = 5.0380033629933841e-9,
        default  = "m3/a",
        link     = "Barrel per day",
    },
    ["oilbbl/d"] = {
        name1    = "barrel per day",
        name2    = "barrels per day",
        symbol   = "bbl/d",
        utype    = "flow",
        scale    = 1.8401307283333336e-6,
        default  = "m3/d",
    },
    ["Toilbbl/a"] = {
        name1    = "trillion barrels per year",
        name2    = "trillion barrels per year",
        symbol   = "Tbbl/a",
        utype    = "flow",
        scale    = 5038.0033629933832,
        default  = "v * 1.58987294928 < 10 ! e9 ! e12 ! m3/a",
        link     = "Barrel per day",
    },
    ["U.S.gal/d"] = {
        name1    = "U.S. gallon per day",
        name2    = "U.S. gallons per day",
        symbol   = "U.S. gal/d",
        utype    = "flow",
        scale    = 4.3812636388888893e-8,
        default  = "m3/s",
```

```
        customary= 1,
    },
    ["U.S.gal/h"] = {
        name1    = "gallon per hour",
        name2    = "gallons per hour",
        symbol   = "gal/h",
        utype    = "flow",
        scale    = 1.0515032733333334e-6,
        default  = "m3/h",
        link     = "Gallon",
        customary= 2,
    },
    ["U.S.gal/min"] = {
        name1    = "U.S. gallon per minute",
        name2    = "U.S. gallons per minute",
        symbol   = "U.S. gal/min",
        utype    = "flow",
        scale    = 6.3090196400000003e-5,
        default  = "m3/s",
        link     = "Gallon",
    },
    ["USgal/a"] = {
        name1    = "US gallon per year",
        name2    = "US gallons per year",
        symbol   = "US gal/a",
        utype    = "flow",
        scale    = 1.1995246102365199e-10,
        default  = "m3/s",
    },
    ["USgal/d"] = {
        name1    = "US gallon per day",
        name2    = "US gallons per day",
        symbol   = "US gal/d",
        utype    = "flow",
        scale    = 4.3812636388888893e-8,
        default  = "m3/s",
    },
    ["USgal/h"] = {
        name1    = "gallon per hour",
        name2    = "gallons per hour",
        symbol   = "gal/h",
        utype    = "flow",
        scale    = 1.0515032733333334e-6,
        default  = "m3/h",
        link     = "Gallon",
        customary= 1,
    },
    ["USgal/min"] = {
        name1    = "US gallon per minute",
        name2    = "US gallons per minute",
        symbol   = "US gal/min",
        utype    = "flow",
        scale    = 6.3090196400000003e-5,
        default  = "m3/s",
        link     = "Gallon",
    },
    ["USgal/s"] = {
        name1    = "US gallon per second",
        name1_us = "U.S. gallon per second",
        name2    = "US gallons per second",
        name2_us = "U.S. gallons per second",
        symbol   = "USgal/s",
        utype    = "flow",
        scale    = 0.003785411784,
```

```
        default  = "m3/s",
        link     = "US gallons per second",
    },
    ["ft3/a"] = {
        target   = "cuft/a",
    },
    ["ft3/d"] = {
        target   = "cuft/d",
    },
    ["ft3/h"] = {
        target   = "cuft/h",
    },
    ["ft3/s"] = {
        target   = "cuft/s",
    },
    ["Gcuft/a"] = {
        target   = "e9cuft/a",
    },
    ["Gcuft/d"] = {
        target   = "e9cuft/d",
    },
    ["kcuft/a"] = {
        target   = "e3cuft/a",
    },
    ["kcuft/d"] = {
        target   = "e3cuft/d",
    },
    ["kcuft/s"] = {
        target   = "e3cuft/s",
    },
    ["Mcuft/a"] = {
        target   = "e6cuft/a",
    },
    ["Mcuft/d"] = {
        target   = "e6cuft/d",
    },
    ["Mcuft/s"] = {
        target   = "e6cuft/s",
    },
    ["m³/s"] = {
        target   = "m3/s",
    },
    ["Tcuft/a"] = {
        target   = "e12cuft/a",
    },
    ["Tcuft/d"] = {
        target   = "e12cuft/d",
    },
    ["u.s.gal/min"] = {
        target   = "U.S.gal/min",
    },
    ["usgal/min"] = {
        target   = "USgal/min",
    },
    ["-LTf"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "LTf",
        utype    = "force",
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["-STf"] = {
        name1    = "short ton-force",
```

```
        name2    = "short tons-force",
        symbol   = "STf",
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
    ["dyn"] = {
        name1    = "dyne",
        symbol   = "dyn",
        utype    = "force",
        scale    = 0.00001,
        default  = "gr-f",
    },
    ["g-f"] = {
        name1    = "gram-force",
        name2    = "grams-force",
        symbol   = "g<sub>f</sub>",
        utype    = "force",
        scale    = 0.00980665,
        default  = "mN oz-f",
        link     = "Kilogram-force",
    },
    ["gf"] = {
        name1    = "gram-force",
        name2    = "grams-force",
        symbol   = "gf",
        utype    = "force",
        scale    = 0.00980665,
        default  = "mN ozf",
        link     = "Kilogram-force",
    },
    ["gr-f"] = {
        name1    = "grain-force",
        name2    = "grains-force",
        symbol   = "gr<sub>f</sub>",
        utype    = "force",
        scale    = 0.0006354602307515,
        default  = "µN",
        link     = "Pound (force)",
    },
    ["grf"] = {
        name1    = "grain-force",
        name2    = "grains-force",
        symbol   = "grf",
        utype    = "force",
        scale    = 0.0006354602307515,
        default  = "µN",
        link     = "Pound (force)",
    },
    ["kdyn"] = {
        name1    = "kilodyne",
        symbol   = "kdyn",
        utype    = "force",
        scale    = 0.01,
        default  = "oz-f",
        link     = "Dyne",
    },
    ["kg-f"] = {
        name1    = "kilogram-force",
        name2    = "kilograms-force",
        symbol   = "kg<sub>f</sub>",
        utype    = "force",
        scale    = 9.80665,
        default  = "N lb-f",
```

```
    },
    ["kgf"] = {
        name1    = "kilogram-force",
        name2    = "kilograms-force",
        symbol   = "kgf",
        utype    = "force",
        scale    = 9.80665,
        default  = "N lbf",
    },
    ["kp"] = {
        name1    = "kilopond",
        symbol   = "kp",
        utype    = "force",
        scale    = 9.80665,
        default  = "N lb-f",
        link     = "Kilogram-force",
    },
    ["L/T-f"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "L/T<sub>f</sub>",
        utype    = "force",
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["L/Tf"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "L/Tf",
        utype    = "force",
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["lb-f"] = {
        name1    = "pound-force",
        name2    = "pounds-force",
        symbol   = "lb<sub>f</sub>",
        utype    = "force",
        scale    = 4.4482216152605,
        default  = "N",
        link     = "Pound (force)",
    },
    ["lbf"] = {
        name1    = "pound-force",
        name2    = "pounds-force",
        symbol   = "lbf",
        utype    = "force",
        scale    = 4.4482216152605,
        default  = "N",
        link     = "Pound (force)",
    },
    ["lb(f)"] = {
        name1    = "pound",
        symbol   = "lb",
        utype    = "force",
        scale    = 4.4482216152605,
        default  = "N",
        link     = "Pound (force)",
    },
    ["LT-f"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "LT<sub>f</sub>",
        utype    = "force",
```

```
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["LTf"] = {
        name1    = "long ton-force",
        name2    = "long tons-force",
        symbol   = "LTf",
        usename  = 1,
        utype    = "force",
        scale    = 9964.01641818352,
        default  = "kN",
    },
    ["Mdyn"] = {
        name1    = "megadyne",
        symbol   = "Mdyn",
        utype    = "force",
        scale    = 10,
        default  = "lb-f",
        link     = "Dyne",
    },
    ["mdyn"] = {
        name1    = "millidyne",
        symbol   = "mdyn",
        utype    = "force",
        scale    = 0.00000001,
        default  = "gr-f",
        link     = "Dyne",
    },
    ["mg-f"] = {
        name1    = "milligram-force",
        name2    = "milligrams-force",
        symbol   = "mg<sub>f</sub>",
        utype    = "force",
        scale    = 0.00000980665,
        default  = "µN gr-f",
        link     = "Kilogram-force",
    },
    ["mgf"] = {
        name1    = "milligram-force",
        name2    = "milligrams-force",
        symbol   = "mgf",
        utype    = "force",
        scale    = 0.00000980665,
        default  = "µN grf",
        link     = "Kilogram-force",
    },
    ["Mp"] = {
        name1    = "megapond",
        symbol   = "Mp",
        utype    = "force",
        scale    = 9806.65,
        default  = "kN LT-f ST-f",
        link     = "Kilogram-force",
    },
    ["mp"] = {
        name1    = "millipond",
        symbol   = "mp",
        utype    = "force",
        scale    = 0.00000980665,
        default  = "µN gr-f",
        link     = "Kilogram-force",
    },
    ["N"] = {
        _name1   = "newton",
```

```
        _symbol  = "N",
        utype    = "force",
        scale    = 1,
        prefixes = 1,
        default  = "lb-f",
        link     = "Newton (unit)",
    },
    ["oz-f"] = {
        name1    = "ounce-force",
        name2    = "ounces-force",
        symbol   = "oz<sub>f</sub>",
        utype    = "force",
        scale    = 0.2780138203095378125,
        default  = "mN",
        link     = "Pound (force)",
    },
    ["ozf"] = {
        name1    = "ounce-force",
        name2    = "ounces-force",
        symbol   = "ozf",
        utype    = "force",
        scale    = 0.2780138203095378125,
        default  = "mN",
        link     = "Pound (force)",
    },
    ["p"] = {
        name1    = "pond",
        symbol   = "p",
        utype    = "force",
        scale    = 0.00980665,
        default  = "mN oz-f",
        link     = "Kilogram-force",
    },
    ["pdl"] = {
        name1    = "poundal",
        symbol   = "pdl",
        utype    = "force",
        scale    = 0.138254954376,
        default  = "N",
    },
    ["S/T-f"] = {
        name1    = "short ton-force",
        name2    = "short tons-force",
        symbol   = "S/T<sub>f</sub>",
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
    ["S/Tf"] = {
        name1    = "short ton-force",
        name2    = "short tons-force",
        symbol   = "S/Tf",
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
    ["ST-f"] = {
        name1    = "short ton-force",
        name2    = "short tons-force",
        symbol   = "ST<sub>f</sub>",
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
```

```
    ["STf"] = {
        name1    = "short ton-force",
        name2    = "short tons-force",
        symbol   = "STf",
        usename  = 1,
        utype    = "force",
        scale    = 8896.443230521,
        default  = "kN",
    },
    ["t-f"] = {
        name1    = "tonne-force",
        name2    = "tonnes-force",
        symbol   = "t<sub>f</sub>",
        utype    = "force",
        scale    = 9806.65,
        default  = "kN LT-f ST-f",
        link     = "Ton-force#Tonne-force",
    },
    ["tf"] = {
        name1    = "tonne-force",
        name2    = "tonnes-force",
        symbol   = "tf",
        utype    = "force",
        scale    = 9806.65,
        default  = "kN LTf STf",
        link     = "Ton-force#Tonne-force",
    },
    ["dyne"] = {
        target   = "dyn",
    },
    ["newtons"] = {
        target   = "N",
    },
    ["poundal"] = {
        target   = "pdl",
    },
    ["tonne-force"] = {
        target   = "tf",
    },
    ["impgal/mi"] = {
        per      = { "@impgal", "mi" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "l/km USgal/mi",
    },
    ["km/L"] = {
        per      = { "km", "L" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "mpgimp mpgus",
    },
    ["km/l"] = {
        per      = { "km", "l" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "mpgimp mpgus",
    },
    ["L/100 km"] = {
        per      = { "L", "100km" },
        utype    = "fuel efficiency",
        invert   = 1,
```

```
        iscomplex= true,
        default  = "mpgimp mpgus",
        symlink  = "[[Fuel economy in automobiles#Units of measure|L/100 km]
    },
    ["l/100 km"] = {
        per      = { "l", "100km" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "mpgimp mpgus",
        symlink  = "[[Fuel economy in automobiles#Units of measure|l/100 km]
    },
    ["L/km"] = {
        per      = { "L", "km" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "mpgimp mpgus",
    },
    ["l/km"] = {
        per      = { "l", "km" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "mpgimp mpgus",
    },
    ["mi/impqt"] = {
        per      = { "mi", "impqt" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "km/L",
    },
    ["mi/U.S.qt"] = {
        per      = { "mi", "U.S.qt" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "km/L",
    },
    ["mi/USqt"] = {
        per      = { "mi", "USqt" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "km/L",
    },
    ["mi/usqt"] = {
        per      = { "mi", "usqt" },
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "km/L",
    },
    ["mpgimp"] = {
        per      = { "mi", "@impgal" },
        symbol   = "mpg<sub>&#8209;imp</sub>",
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "L/100 km+mpgus",
        symlink  = "[[Fuel economy in automobiles#Units of measure|mpg]]<sub>&#82
    },
    ["mpgus"] = {
```

```
        per      = { "mi", "+USgal" },
        symbol   = "mpg<sub>&#8209;US</sub>",
        utype    = "fuel efficiency",
        invert   = -1,
        iscomplex= true,
        default  = "L/100 km+mpgimp",
        symlink  = "[[Fuel economy in automobiles#Units of measure|mpg]]<sub>&#82
    },
    ["U.S.gal/mi"] = {
        per      = { "*U.S.gal", "mi" },
        sp_us    = true,
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "l/km impgal/mi",
    },
    ["usgal/mi"] = {
        per      = { "+USgal", "mi" },
        utype    = "fuel efficiency",
        invert   = 1,
        iscomplex= true,
        default  = "l/km impgal/mi",
    },
    ["L/100km"] = {
        target   = "L/100 km",
    },
    ["l/100km"] = {
        target   = "l/100 km",
    },
    ["mpg"] = {
        shouldbe = "Use %{mpgus%} for miles per US gallon or %{mpgimp%} for miles
    },
    ["mpgU.S."] = {
        target   = "mpgus",
        symbol   = "mpg<sub>&#8209;U.S.</sub>",
        sp_us    = true,
        symlink  = "[[Fuel economy in automobiles#Units of measure|mpg]]<sub>&#82
    },
    ["mpgu.s."] = {
        target   = "mpgus",
        symbol   = "mpg<sub>&#8209;U.S.</sub>",
        sp_us    = true,
        symlink  = "[[Fuel economy in automobiles#Units of measure|mpg]]<sub>&#82
    },
    ["mpgUS"] = {
        target   = "mpgus",
    },
    ["USgal/mi"] = {
        target   = "usgal/mi",
    },
    ["kPa/m"] = {
        per      = { "kPa", "-m-frac" },
        utype    = "fracture gradient",
        default  = "psi/ft",
    },
    ["psi/ft"] = {
        per      = { "psi", "-ft-frac" },
        utype    = "fracture gradient",
        default  = "kPa/m",
    },
    ["cm/km"] = {
        name1    = "centimetre per kilometre",
        name1_us = "centimeter per kilometer",
        name2    = "centimetres per kilometre",
```

```
        name2_us = "centimeters per kilometer",
        symbol   = "cm/km",
        utype    = "gradient",
        scale    = 0.00001,
        default  = "ft/mi",
        link     = "Grade (slope)",
    },
    ["ft/mi"] = {
        name1    = "foot per mile",
        name2    = "feet per mile",
        symbol   = "ft/mi",
        utype    = "gradient",
        scale    = 0.00018939393939393939,
        default  = "v < 5.28 ! c ! ! m/km",
        link     = "Grade (slope)",
    },
    ["ft/nmi"] = {
        name1    = "foot per nautical mile",
        name2    = "feet per nautical mile",
        symbol   = "ft/nmi",
        utype    = "gradient",
        scale    = 0.00016457883369330455,
        default  = "v < 6.076 ! c ! ! m/km",
        link     = "Grade (slope)",
    },
    ["in/ft"] = {
        name1    = "inch per foot",
        name2    = "inches per foot",
        symbol   = "in/ft",
        utype    = "gradient",
        scale    = 0.083333333333333329,
        default  = "mm/m",
        link     = "Grade (slope)",
    },
    ["in/mi"] = {
        name1    = "inch per mile",
        name2    = "inches per mile",
        symbol   = "in/mi",
        utype    = "gradient",
        scale    = 1.5782828282828283e-5,
        default  = "v < 0.6336 ! m ! c ! m/km",
        link     = "Grade (slope)",
    },
    ["m/km"] = {
        name1    = "metre per kilometre",
        name1_us = "meter per kilometer",
        name2    = "metres per kilometre",
        name2_us = "meters per kilometer",
        symbol   = "m/km",
        utype    = "gradient",
        scale    = 0.001,
        default  = "ft/mi",
        link     = "Grade (slope)",
    },
    ["mm/km"] = {
        name1    = "millimetre per kilometre",
        name1_us = "millimeter per kilometer",
        name2    = "millimetres per kilometre",
        name2_us = "millimeters per kilometer",
        symbol   = "mm/km",
        utype    = "gradient",
        scale    = 0.000001,
        default  = "in/mi",
        link     = "Grade (slope)",
```

```
    },
    ["mm/m"] = {
        name1    = "millimetre per metre",
        name1_us = "millimeter per meter",
        name2    = "millimetres per metre",
        name2_us = "millimeters per meter",
        symbol   = "mm/m",
        utype    = "gradient",
        scale    = 0.001,
        default  = "in/ft",
        link     = "Grade (slope)",
    },
    ["admi"] = {
        name1    = "admiralty mile",
        symbol   = "nmi (admiralty)",
        utype    = "length",
        scale    = 1853.184,
        default  = "km mi",
        link     = "Nautical mile",
    },
    ["AU"] = {
        name1    = "astronomical unit",
        symbol   = "AU",
        utype    = "length",
        scale    = 149597870700,
        default  = "km mi",
    },
    ["Brnmi"] = {
        name1    = "British nautical mile",
        symbol   = "(Brit) nmi",
        utype    = "length",
        scale    = 1853.184,
        default  = "km mi",
        link     = "Nautical mile",
    },
    ["bu"] = {
        name2    = "bu",
        symbol   = "bu",
        usename  = 1,
        utype    = "length",
        scale    = 0.0030303030303030303,
        default  = "mm",
        link     = "Japanese units of measurement#Length",
    },
    ["ch"] = {
        name1    = "chain",
        symbol   = "ch",
        utype    = "length",
        scale    = 20.1168,
        default  = "ft m",
        subdivs  = { ["ft"] = { 66, default = "m" }, ["yd"] = { 22, default = "m"
        link     = "Chain (unit)",
    },
    ["chlk"] = {
        name1    = "[[Chain (unit)|chain]]",
        symbol   = "[[Chain (unit)|ch]]",
        utype    = "length",
        scale    = 20.1168,
        default  = "ft m",
        link     = "",
    },
    ["chain"] = {
        symbol   = "chain",
        usename  = 1,
```

```
        utype    = "length",
        scale    = 20.1168,
        default  = "ft m",
        subdivs  = { ["ft"] = { 66, default = "m" }, ["yd"] = { 22, default = "m"
        link     = "Chain (unit)",
    },
    ["chainlk"] = {
        symbol   = "[[Chain (unit)|chain]]",
        usename  = 1,
        utype    = "length",
        scale    = 20.1168,
        default  = "ft m",
        link     = "",
    },
    ["dpcm"] = {
        name2    = "dot/cm",
        symbol   = "dot/cm",
        utype    = "length",
        scale    = 100,
        invert   = -1,
        iscomplex= true,
        default  = "dpi",
        link     = "Dots per inch",
    },
    ["dpi"] = {
        name2    = "DPI",
        symbol   = "DPI",
        utype    = "length",
        scale    = 39.370078740157481,
        invert   = -1,
        iscomplex= true,
        default  = "pitch",
        link     = "Dots per inch",
    },
    ["fathom"] = {
        symbol   = "fathom",
        usename  = 1,
        utype    = "length",
        scale    = 1.8288,
        default  = "ft m",
    },
    ["foot"] = {
        name1    = "foot",
        name2    = "foot",
        symbol   = "ft",
        utype    = "length",
        scale    = 0.3048,
        default  = "m",
        subdivs  = { ["in"] = { 12, default = "m" } },
        link     = "Foot (unit)",
    },
    ["ft"] = {
        name1    = "foot",
        name2    = "feet",
        symbol   = "ft",
        utype    = "length",
        scale    = 0.3048,
        exception= "integer_more_precision",
        default  = "m",
        subdivs  = { ["in"] = { 12, default = "m" } },
        link     = "Foot (unit)",
    },
    ["furlong"] = {
        symbol   = "furlong",
```

```
        usename  = 1,
        utype    = "length",
        scale    = 201.168,
        default  = "ft m",
    },
    ["Gly"] = {
        name1    = "gigalight-year",
        symbol   = "Gly",
        utype    = "length",
        scale    = 9.4607304725808e24,
        default  = "Mpc",
        link     = "Light-year#Definitions",
    },
    ["Gpc"] = {
        name1    = "gigaparsec",
        symbol   = "Gpc",
        utype    = "length",
        scale    = 3.0856775814671916e25,
        default  = "Gly",
        link     = "Parsec#Megaparsecs and gigaparsecs",
    },
    ["hand"] = {
        name1    = "hand",
        symbol   = "h",
        utype    = "length",
        builtin  = "hand",
        scale    = 0.1016,
        iscomplex= true,
        default  = "in cm",
        link     = "Hand (unit)",
    },
    ["in"] = {
        name1    = "inch",
        name2    = "inches",
        symbol   = "in",
        utype    = "length",
        scale    = 0.0254,
        exception= "subunit_more_precision",
        default  = "mm",
    },
    ["inabbreviated"] = {
        name2    = "in",
        symbol   = "in",
        utype    = "length",
        scale    = 0.0254,
        default  = "mm",
        link     = "Inch",
    },
    ["kly"] = {
        name1    = "kilolight-year",
        symbol   = "kly",
        utype    = "length",
        scale    = 9.4607304725808e18,
        default  = "pc",
        link     = "Light-year#Definitions",
    },
    ["kpc"] = {
        name1    = "kiloparsec",
        symbol   = "kpc",
        utype    = "length",
        scale    = 3.0856775814671916e19,
        default  = "kly",
        link     = "Parsec#Parsecs and kiloparsecs",
    },
```

```
    ["LD"] = {
        name1    = "lunar distance",
        symbol   = "LD",
        utype    = "length",
        scale    = 384403000,
        default  = "km mi",
        link     = "Lunar distance (astronomy)",
    },
    ["league"] = {
        symbol   = "league",
        usename  = 1,
        utype    = "length",
        scale    = 4828.032,
        default  = "km",
        link     = "League (unit)",
    },
    ["ly"] = {
        name1    = "light-year",
        symbol   = "ly",
        utype    = "length",
        scale    = 9.4607304725808e15,
        default  = "AU",
    },
    ["m"] = {
        _name1   = "metre",
        _name1_us= "meter",
        _symbol  = "m",
        utype    = "length",
        scale    = 1,
        prefixes = 1,
        default  = "v > 0 and v < 3 ! ftin ! ft",
        link     = "Metre",
    },
    ["mi"] = {
        name1    = "mile",
        symbol   = "mi",
        utype    = "length",
        scale    = 1609.344,
        default  = "km",
        subdivs  = { ["ch"] = { 80, default = "km" }, ["chlk"] = { 80, default =
    },
    ["mil"] = {
        symbol   = "mil",
        usename  = 1,
        utype    = "length",
        scale    = 0.0000254,
        default  = "mm",
        link     = "Thousandth of an inch",
    },
    ["Mly"] = {
        name1    = "megalight-year",
        symbol   = "Mly",
        utype    = "length",
        scale    = 9.4607304725808e21,
        default  = "kpc",
        link     = "Light-year#Definitions",
    },
    ["Mpc"] = {
        name1    = "megaparsec",
        symbol   = "Mpc",
        utype    = "length",
        scale    = 3.0856775814671916e22,
        default  = "Mly",
        link     = "Parsec#Megaparsecs and gigaparsecs",
```

```
    },
    ["NM"] = {
        name1    = "nautical mile",
        symbol   = "NM",
        utype    = "length",
        scale    = 1852,
        default  = "km mi",
    },
    ["nmi"] = {
        name1    = "nautical mile",
        symbol   = "nmi",
        utype    = "length",
        scale    = 1852,
        default  = "km mi",
    },
    ["oldUKnmi"] = {
        name1    = "nautical mile",
        symbol   = "nmi",
        utype    = "length",
        scale    = 1853.184,
        default  = "km mi",
    },
    ["oldUSnmi"] = {
        name1    = "nautical mile",
        symbol   = "nmi",
        utype    = "length",
        scale    = 1853.24496,
        default  = "km mi",
    },
    ["pc"] = {
        name1    = "parsec",
        symbol   = "pc",
        utype    = "length",
        scale    = 3.0856775814671916e16,
        default  = "ly",
    },
    ["perch"] = {
        name2    = "perches",
        symbol   = "perch",
        usename  = 1,
        utype    = "length",
        scale    = 5.0292,
        default  = "ft m",
        link     = "Rod (unit)",
    },
    ["pitch"] = {
        name2    = "µm",
        symbol   = "µm",
        utype    = "length",
        scale    = 1e-6,
        default  = "dpi",
        defkey   = "pitch",
        linkey   = "pitch",
        link     = "Dots per inch",
    },
    ["pole"] = {
        symbol   = "pole",
        usename  = 1,
        utype    = "length",
        scale    = 5.0292,
        default  = "ft m",
        link     = "Rod (unit)",
    },
    ["pre1954U.S.nmi"] = {
```

```
        name1    = "(pre-1954 U.S.) nautical mile",
        symbol   = "(pre&#8209;1954 U.S.) nmi",
        utype    = "length",
        scale    = 1853.24496,
        default  = "km mi",
        link     = "Nautical mile",
    },
    ["pre1954USnmi"] = {
        name1    = "(pre-1954 US) nautical mile",
        name1_us = "(pre-1954 U.S.) nautical mile",
        symbol   = "(pre&#8209;1954 US) nmi",
        sym_us   = "(pre&#8209;1954 U.S.) nmi",
        utype    = "length",
        scale    = 1853.24496,
        default  = "km mi",
        link     = "Nautical mile",
    },
    ["rd"] = {
        name1    = "rod",
        symbol   = "rd",
        utype    = "length",
        scale    = 5.0292,
        default  = "ft m",
        link     = "Rod (unit)",
    },
    ["royal cubit"] = {
        name1    = "royal cubit",
        symbol   = "cu",
        utype    = "length",
        scale    = 0.524,
        default  = "mm",
    },
    ["rtkm"] = {
        name1    = "route kilometre",
        name1_us = "route kilometer",
        symbol   = "km",
        utype    = "length",
        scale    = 1000,
        default  = "mi",
        link     = "Kilometre",
    },
    ["rtmi"] = {
        name1    = "route mile",
        symbol   = "mi",
        utype    = "length",
        scale    = 1609.344,
        default  = "km",
        link     = "Mile",
    },
    ["shaku"] = {
        name2    = "shaku",
        symbol   = "shaku",
        usename  = 1,
        utype    = "length",
        scale    = 0.30303030303030304,
        default  = "m",
        link     = "Shaku (unit)",
    },
    ["sm"] = {
        name1    = "smoot",
        symbol   = "sm",
        utype    = "length",
        scale    = 1.70180,
        default  = "m",
```

```
        link     = "Smoot (unit)",
    },
    ["smi"] = {
        name1    = "statute mile",
        symbol   = "mi",
        utype    = "length",
        scale    = 1609.344,
        default  = "km",
        subdivs  = { ["chain"] = { 80, default = "km" } },
    },
    ["solar radius"] = {
        name1    = "solar radius",
        name2    = "solar radii",
        symbol   = "''R''<sub>⊙</sub>",
        utype    = "length",
        scale    = 695700e3,
        default  = "km",
    },
    ["sun"] = {
        name2    = "sun",
        symbol   = "sun",
        usename  = 1,
        utype    = "length",
        scale    = 0.030303030303030304,
        default  = "mm",
        link     = "Japanese units of measurement#Length",
    },
    ["thou"] = {
        name2    = "thou",
        symbol   = "thou",
        usename  = 1,
        utype    = "length",
        scale    = 0.0000254,
        default  = "mm",
        link     = "Thousandth of an inch",
    },
    ["verst"] = {
        symbol   = "verst",
        usename  = 1,
        utype    = "length",
        scale    = 1066.8,
        default  = "km mi",
    },
    ["yd"] = {
        name1    = "yard",
        symbol   = "yd",
        utype    = "length",
        scale    = 0.9144,
        default  = "m",
        subdivs  = { ["ft"] = { 3, default = "m" } },
    },
    ["µin"] = {
        name1    = "microinch",
        name2    = "microinches",
        symbol   = "µin",
        utype    = "length",
        scale    = 0.0000000254,
        default  = "nm",
        link     = "SI prefix#Non-metric units",
    },
    ["Å"] = {
        name1    = "ångström",
        symbol   = "Å",
        utype    = "length",
```

```
        scale    = 0.0000000001,
        default  = "in",
    },
    ["Hz"] = {
        _name1   = "hertz",
        _name2   = "hertz",
        _symbol  = "Hz",
        utype    = "length",
        scale    = 3.3356409519815204e-9,
        invert   = -1,
        iscomplex= true,
        prefixes = 1,
        default  = "m",
        link     = "Hertz",
    },
    ["rpm"] = {
        name1    = "revolution per minute",
        name2    = "revolutions per minute",
        symbol   = "rpm",
        utype    = "length",
        scale    = 5.5594015866358675e-11,
        invert   = -1,
        iscomplex= true,
        default  = "Hz",
        link     = "Revolutions per minute",
    },
    ["-ft-frac"] = {
        target   = "ft",
        link     = "Fracture gradient",
    },
    ["-in-stiff"] = {
        target   = "in",
        link     = "Stiffness",
    },
    ["-m-frac"] = {
        target   = "m",
        link     = "Fracture gradient",
    },
    ["-m-stiff"] = {
        target   = "m",
        link     = "Stiffness",
    },
    ["100km"] = {
        target   = "km",
        multiplier= 100,
    },
    ["100mi"] = {
        target   = "mi",
        multiplier= 100,
    },
    ["100miles"] = {
        target   = "mi",
        symbol   = "miles",
        multiplier= 100,
    },
    ["admiralty nmi"] = {
        target   = "oldUKnmi",
    },
    ["angstrom"] = {
        target   = "Å",
    },
    ["au"] = {
        target   = "AU",
        symbol   = "au",
```

```
    },
    ["feet"] = {
        target   = "ft",
    },
    ["hands"] = {
        target   = "hand",
    },
    ["inch"] = {
        target   = "in",
    },
    ["light-year"] = {
        target   = "ly",
    },
    ["meter"] = {
        target   = "m",
        sp_us    = true,
    },
    ["meters"] = {
        target   = "m",
        sp_us    = true,
    },
    ["metre"] = {
        target   = "m",
    },
    ["metres"] = {
        target   = "m",
    },
    ["micrometre"] = {
        target   = "µm",
    },
    ["micron"] = {
        target   = "µm",
        default  = "µin",
    },
    ["mile"] = {
        target   = "mi",
    },
    ["miles"] = {
        target   = "mi",
    },
    ["parsec"] = {
        target   = "pc",
    },
    ["rod"] = {
        target   = "rd",
    },
    ["smoot"] = {
        target   = "sm",
    },
    ["uin"] = {
        target   = "µin",
    },
    ["yard"] = {
        target   = "yd",
    },
    ["yards"] = {
        target   = "yd",
    },
    ["yds"] = {
        target   = "yd",
    },
    ["dtex"] = {
        name1    = "decitex",
        name2    = "decitex",
```

```
        symbol   = "dtex",
        utype    = "linear density",
        scale    = 1e-7,
        default  = "lb/yd",
        link     = "Units of textile measurement#Units",
    },
    ["kg/cm"] = {
        name1    = "kilogram per centimetre",
        name1_us = "kilogram per centimeter",
        name2    = "kilograms per centimetre",
        name2_us = "kilograms per centimeter",
        symbol   = "kg/cm",
        utype    = "linear density",
        scale    = 100,
        default  = "lb/yd",
        link     = "Linear density",
    },
    ["kg/m"] = {
        name1    = "kilogram per metre",
        name1_us = "kilogram per meter",
        name2    = "kilograms per metre",
        name2_us = "kilograms per meter",
        symbol   = "kg/m",
        utype    = "linear density",
        scale    = 1,
        default  = "lb/yd",
        link     = "Linear density",
    },
    ["lb/ft"] = {
        name1    = "pound per foot",
        name2    = "pounds per foot",
        symbol   = "lb/ft",
        utype    = "linear density",
        scale    = 1.4881639435695539,
        default  = "kg/m",
        link     = "Linear density",
    },
    ["lb/yd"] = {
        name1    = "pound per yard",
        name2    = "pounds per yard",
        symbol   = "lb/yd",
        utype    = "linear density",
        scale    = 0.49605464785651798,
        default  = "kg/m",
        link     = "Linear density",
    },
    ["G"] = {
        _name1   = "gauss",
        _name2   = "gauss",
        _symbol  = "G",
        utype    = "magnetic field strength",
        scale    = 0.0001,
        prefixes = 1,
        default  = "T",
        link     = "Gauss (unit)",
    },
    ["T"] = {
        _name1   = "tesla",
        _symbol  = "T",
        utype    = "magnetic field strength",
        scale    = 1,
        prefixes = 1,
        default  = "G",
        link     = "Tesla (unit)",
```

```
    },
    ["A/m"] = {
        name1    = "ampere per metre",
        name1_us = "ampere per meter",
        name2    = "amperes per metre",
        name2_us = "amperes per meter",
        symbol   = "A/m",
        utype    = "magnetizing field",
        scale    = 1,
        default  = "Oe",
    },
    ["kA/m"] = {
        name1    = "kiloampere per metre",
        name1_us = "kiloampere per meter",
        name2    = "kiloamperes per metre",
        name2_us = "kiloamperes per meter",
        symbol   = "kA/m",
        utype    = "magnetizing field",
        scale    = 1000,
        default  = "kOe",
        link     = "Ampere per metre",
    },
    ["MA/m"] = {
        name1    = "megaampere per metre",
        name1_us = "megaampere per meter",
        name2    = "megaamperes per metre",
        name2_us = "megaamperes per meter",
        symbol   = "MA/m",
        utype    = "magnetizing field",
        scale    = 1e6,
        default  = "kOe",
        link     = "Ampere per metre",
    },
    ["Oe"] = {
        _name1   = "oersted",
        _symbol  = "Oe",
        utype    = "magnetizing field",
        scale    = 79.5774715,
        prefixes = 1,
        default  = "kA/m",
        link     = "Oersted",
    },
    ["-Lcwt"] = {
        name1    = "hundredweight",
        name2    = "hundredweight",
        symbol   = "cwt",
        utype    = "mass",
        scale    = 50.80234544,
        default  = "lb",
    },
    ["-Scwt"] = {
        name1    = "hundredweight",
        name2    = "hundredweight",
        symbol   = "cwt",
        utype    = "mass",
        scale    = 45.359237,
        default  = "lb",
    },
    ["-ST"] = {
        name1    = "short ton",
        symbol   = "ST",
        utype    = "mass",
        scale    = 907.18474,
        default  = "t",
```

```
    },
    ["carat"] = {
        symbol   = "carat",
        usename  = 1,
        utype    = "mass",
        scale    = 0.0002,
        default  = "g",
        link     = "Carat (mass)",
    },
    ["drachm"] = {
        name1_us = "dram",
        symbol   = "drachm",
        usename  = 1,
        utype    = "mass",
        scale    = 0.001771845195,
        default  = "g",
        link     = "Dram (unit)",
    },
    ["dram"] = {
        target   = "drachm",
    },
    ["dwt"] = {
        name1    = "pennyweight",
        symbol   = "dwt",
        utype    = "mass",
        scale    = 0.00155517384,
        default  = "oz g",
    },
    ["DWton"] = {
        symbol   = "deadweight ton",
        usename  = 1,
        utype    = "mass",
        scale    = 1016.0469088,
        default  = "DWtonne",
        link     = "Deadweight tonnage",
    },
    ["DWtonne"] = {
        symbol   = "deadweight tonne",
        usename  = 1,
        utype    = "mass",
        scale    = 1000,
        default  = "DWton",
        link     = "Deadweight tonnage",
    },
    ["g"] = {
        _name1   = "gram",
        _symbol  = "g",
        utype    = "mass",
        scale    = 0.001,
        prefixes = 1,
        default  = "oz",
        link     = "Gram",
    },
    ["gr"] = {
        name1    = "grain",
        symbol   = "gr",
        utype    = "mass",
        scale    = 0.00006479891,
        default  = "g",
        link     = "Grain (unit)",
    },
    ["Gt"] = {
        name1    = "gigatonne",
        symbol   = "Gt",
```

```
        utype    = "mass",
        scale    = 1000000000000,
        default  = "LT ST",
        link     = "Tonne",
    },
    ["impgalh2o"] = {
        name1    = "imperial gallon of water",
        name2    = "imperial gallons of water",
        symbol   = "imp gal H<sub>2</sub>O",
        utype    = "mass",
        scale    = 4.5359236999999499,
        default  = "lb kg",
        link     = "Imperial gallon",
    },
    ["kt"] = {
        name1    = "kilotonne",
        symbol   = "kt",
        utype    = "mass",
        scale    = 1000000,
        default  = "LT ST",
        link     = "Tonne",
    },
    ["lb"] = {
        name1    = "pound",
        symbol   = "lb",
        utype    = "mass",
        scale    = 0.45359237,
        exception= "integer_more_precision",
        default  = "kg",
        subdivs  = { ["oz"] = { 16, default = "kg" } },
        link     = "Pound (mass)",
    },
    ["Lcwt"] = {
        name1    = "long hundredweight",
        name2    = "long hundredweight",
        symbol   = "Lcwt",
        usename  = 1,
        utype    = "mass",
        scale    = 50.80234544,
        default  = "lb",
        subdivs  = { ["qtr"] = { 4, default = "kg" }, ["st"] = { 8, default = "kg
        link     = "Hundredweight",
    },
    ["long cwt"] = {
        name1    = "long hundredweight",
        name2    = "long hundredweight",
        symbol   = "long cwt",
        utype    = "mass",
        scale    = 50.80234544,
        default  = "lb kg",
        subdivs  = { ["qtr"] = { 4, default = "kg" } },
        link     = "Hundredweight",
    },
    ["long qtr"] = {
        name1    = "long quarter",
        symbol   = "long qtr",
        utype    = "mass",
        scale    = 12.70058636,
        default  = "lb kg",
    },
    ["LT"] = {
        symbol   = "long ton",
        usename  = 1,
        utype    = "mass",
```

```
        scale    = 1016.0469088,
        default  = "t",
        subdivs  = { ["Lcwt"] = { 20, default = "t", unit = "-Lcwt" } },
    },
    ["lt"] = {
        name1    = "long ton",
        symbol   = "LT",
        utype    = "mass",
        scale    = 1016.0469088,
        default  = "t",
        subdivs  = { ["Lcwt"] = { 20, default = "t", unit = "-Lcwt" } },
    },
    ["metric ton"] = {
        symbol   = "metric ton",
        usename  = 1,
        utype    = "mass",
        scale    = 1000,
        default  = "long ton",
        link     = "Tonne",
    },
    ["MT"] = {
        name1    = "metric ton",
        symbol   = "t",
        utype    = "mass",
        scale    = 1000,
        default  = "LT ST",
        link     = "Tonne",
    },
    ["Mt"] = {
        name1    = "megatonne",
        symbol   = "Mt",
        utype    = "mass",
        scale    = 1000000000,
        default  = "LT ST",
        link     = "Tonne",
    },
    ["oz"] = {
        name1    = "ounce",
        symbol   = "oz",
        utype    = "mass",
        scale    = 0.028349523125,
        default  = "g",
    },
    ["ozt"] = {
        name1    = "troy ounce",
        symbol   = "ozt",
        utype    = "mass",
        scale    = 0.0311034768,
        default  = "oz g",
    },
    ["pdr"] = {
        name1    = "pounder",
        symbol   = "pdr",
        utype    = "mass",
        scale    = 0.45359237,
        default  = "kg",
        link     = "Pound (mass)",
    },
    ["qtr"] = {
        name1    = "quarter",
        symbol   = "qtr",
        utype    = "mass",
        scale    = 12.70058636,
        default  = "lb kg",
```

```
        subdivs  = { ["lb"] = { 28, default = "kg" } },
        link     = "Long quarter",
    },
    ["Scwt"] = {
        name1    = "short hundredweight",
        name2    = "short hundredweight",
        symbol   = "Scwt",
        usename  = 1,
        utype    = "mass",
        scale    = 45.359237,
        default  = "lb",
        link     = "Hundredweight",
    },
    ["short cwt"] = {
        name1    = "short hundredweight",
        name2    = "short hundredweight",
        symbol   = "short cwt",
        utype    = "mass",
        scale    = 45.359237,
        default  = "lb kg",
        link     = "Hundredweight",
    },
    ["short qtr"] = {
        name1    = "short quarter",
        symbol   = "short qtr",
        utype    = "mass",
        scale    = 11.33980925,
        default  = "lb kg",
    },
    ["ST"] = {
        symbol   = "short ton",
        usename  = 1,
        utype    = "mass",
        scale    = 907.18474,
        default  = "t",
        subdivs  = { ["Scwt"] = { 20, default = "t", unit = "-Scwt" } },
    },
    ["shtn"] = {
        name1    = "short ton",
        symbol   = "sh tn",
        utype    = "mass",
        scale    = 907.18474,
        default  = "t",
    },
    ["shton"] = {
        symbol   = "ton",
        usename  = 1,
        utype    = "mass",
        scale    = 907.18474,
        default  = "t",
    },
    ["solar mass"] = {
        name1    = "solar mass",
        name2    = "solar masses",
        symbol   = "''M''<sub>☉</sub>",
        utype    = "mass",
        scale    = 1.98855e30,
        default  = "kg",
    },
    ["st"] = {
        name1    = "stone",
        name2    = "stone",
        symbol   = "st",
        utype    = "mass",
```

```
        scale    = 6.35029318,
        default  = "lb kg",
        subdivs  = { ["lb"] = { 14, default = "kg lb" } },
        link     = "Stone (unit)",
    },
    ["t"] = {
        name1    = "tonne",
        name1_us = "metric ton",
        symbol   = "t",
        utype    = "mass",
        scale    = 1000,
        default  = "LT ST",
    },
    ["tonne"] = {
        name1    = "tonne",
        name1_us = "metric ton",
        symbol   = "t",
        utype    = "mass",
        scale    = 1000,
        default  = "shton",
    },
    ["troy pound"] = {
        symbol   = "troy pound",
        usename  = 1,
        utype    = "mass",
        scale    = 0.3732417216,
        default  = "lb kg",
        link     = "Troy weight",
    },
    ["usgalh2o"] = {
        name1    = "US gallon of water",
        name1_us = "U.S. gallon of water",
        name2    = "US gallons of water",
        name2_us = "U.S. gallons of water",
        symbol   = "US gal H<sub>2</sub>O",
        utype    = "mass",
        scale    = 3.7776215836051126,
        default  = "lb kg",
        link     = "United States customary units#Fluid volume",
    },
    ["viss"] = {
        name2    = "viss",
        symbol   = "viss",
        utype    = "mass",
        scale    = 1.632932532,
        default  = "kg",
        link     = "Myanmar units of measurement#Mass",
    },
    ["billion tonne"] = {
        target   = "e9t",
    },
    ["kilogram"] = {
        target   = "kg",
    },
    ["kilotonne"] = {
        target   = "kt",
    },
    ["lbs"] = {
        target   = "lb",
    },
    ["lbt"] = {
        target   = "troy pound",
    },
    ["lcwt"] = {
```

```
        target   = "Lcwt",
    },
    ["long ton"] = {
        target   = "LT",
    },
    ["mcg"] = {
        target   = "µg",
    },
    ["million tonne"] = {
        target   = "e6t",
    },
    ["scwt"] = {
        target   = "Scwt",
    },
    ["short ton"] = {
        target   = "ST",
    },
    ["stone"] = {
        target   = "st",
    },
    ["thousand tonne"] = {
        target   = "e3t",
    },
    ["tonnes"] = {
        target   = "t",
    },
    ["kg/kW"] = {
        name1    = "kilogram per kilowatt",
        name2    = "kilograms per kilowatt",
        symbol   = "kg/kW",
        utype    = "mass per unit power",
        scale    = 0.001,
        default  = "lb/hp",
        link     = "Kilowatt",
    },
    ["lb/hp"] = {
        name1    = "pound per horsepower",
        name2    = "pounds per horsepower",
        symbol   = "lb/hp",
        utype    = "mass per unit power",
        scale    = 0.00060827738784176115,
        default  = "kg/kW",
        link     = "Horsepower",
    },
    ["kg/h"] = {
        per      = { "kg", "h" },
        utype    = "mass per unit time",
        default  = "lb/h",
    },
    ["lb/h"] = {
        per      = { "lb", "h" },
        utype    = "mass per unit time",
        default  = "kg/h",
    },
    ["g-mol/d"] = {
        name1    = "gram-mole per day",
        name2    = "gram-moles per day",
        symbol   = "g&#8209;mol/d",
        utype    = "molar rate",
        scale    = 1.1574074074074073e-5,
        default  = "µmol/s",
        link     = "Mole (unit)",
    },
    ["g-mol/h"] = {
```

```
        name1    = "gram-mole per hour",
        name2    = "gram-moles per hour",
        symbol   = "g&#8209;mol/h",
        utype    = "molar rate",
        scale    = 0.00027777777777777778,
        default  = "mmol/s",
        link     = "Mole (unit)",
    },
    ["g-mol/min"] = {
        name1    = "gram-mole per minute",
        name2    = "gram-moles per minute",
        symbol   = "g&#8209;mol/min",
        utype    = "molar rate",
        scale    = 0.016666666666666666,
        default  = "g-mol/s",
        link     = "Mole (unit)",
    },
    ["g-mol/s"] = {
        name1    = "gram-mole per second",
        name2    = "gram-moles per second",
        symbol   = "g&#8209;mol/s",
        utype    = "molar rate",
        scale    = 1,
        default  = "lb-mol/min",
        link     = "Mole (unit)",
    },
    ["gmol/d"] = {
        name1    = "gram-mole per day",
        name2    = "gram-moles per day",
        symbol   = "gmol/d",
        utype    = "molar rate",
        scale    = 1.1574074074074073e-5,
        default  = "µmol/s",
        link     = "Mole (unit)",
    },
    ["gmol/h"] = {
        name1    = "gram-mole per hour",
        name2    = "gram-moles per hour",
        symbol   = "gmol/h",
        utype    = "molar rate",
        scale    = 0.00027777777777777778,
        default  = "mmol/s",
        link     = "Mole (unit)",
    },
    ["gmol/min"] = {
        name1    = "gram-mole per minute",
        name2    = "gram-moles per minute",
        symbol   = "gmol/min",
        utype    = "molar rate",
        scale    = 0.016666666666666666,
        default  = "gmol/s",
        link     = "Mole (unit)",
    },
    ["gmol/s"] = {
        name1    = "gram-mole per second",
        name2    = "gram-moles per second",
        symbol   = "gmol/s",
        utype    = "molar rate",
        scale    = 1,
        default  = "lbmol/min",
        link     = "Mole (unit)",
    },
    ["kmol/d"] = {
        name1    = "kilomole per day",
```

```
        name2    = "kilomoles per day",
        symbol   = "kmol/d",
        utype    = "molar rate",
        scale    = 0.011574074074074073,
        default  = "mmol/s",
        link     = "Mole (unit)",
    },
    ["kmol/h"] = {
        name1    = "kilomole per hour",
        name2    = "kilomoles per hour",
        symbol   = "kmol/h",
        utype    = "molar rate",
        scale    = 0.27777777777777779,
        default  = "mol/s",
        link     = "Mole (unit)",
    },
    ["kmol/min"] = {
        name1    = "kilomole per minute",
        name2    = "kilomoles per minute",
        symbol   = "kmol/min",
        utype    = "molar rate",
        scale    = 16.666666666666668,
        default  = "mol/s",
        link     = "Kilomole (unit)",
    },
    ["kmol/s"] = {
        name1    = "kilomole per second",
        name2    = "kilomoles per second",
        symbol   = "kmol/s",
        utype    = "molar rate",
        scale    = 1000,
        default  = "lb-mol/s",
        link     = "Mole (unit)",
    },
    ["lb-mol/d"] = {
        name1    = "pound-mole per day",
        name2    = "pound-moles per day",
        symbol   = "lb&#8209;mol/d",
        utype    = "molar rate",
        scale    = 0.0052499116898148141,
        default  = "mmol/s",
        link     = "Pound-mole",
    },
    ["lb-mol/h"] = {
        name1    = "pound-mole per hour",
        name2    = "pound-moles per hour",
        symbol   = "lb&#8209;mol/h",
        utype    = "molar rate",
        scale    = 0.12599788055555555,
        default  = "mol/s",
        link     = "Pound-mole",
    },
    ["lb-mol/min"] = {
        name1    = "pound-mole per minute",
        name2    = "pound-moles per minute",
        symbol   = "lb&#8209;mol/min",
        utype    = "molar rate",
        scale    = 7.5598728333333334,
        default  = "mol/s",
        link     = "Pound-mole",
    },
    ["lb-mol/s"] = {
        name1    = "pound-mole per second",
        name2    = "pound-moles per second",
```

```
        symbol   = "lb&#8209;mol/s",
        utype    = "molar rate",
        scale    = 453.59237,
        default  = "kmol/s",
        link     = "Pound-mole",
    },
    ["lbmol/d"] = {
        name1    = "pound-mole per day",
        name2    = "pound-moles per day",
        symbol   = "lbmol/d",
        utype    = "molar rate",
        scale    = 0.0052499116898148141,
        default  = "mmol/s",
        link     = "Pound-mole",
    },
    ["lbmol/h"] = {
        name1    = "pound-mole per hour",
        name2    = "pound-moles per hour",
        symbol   = "lbmol/h",
        utype    = "molar rate",
        scale    = 0.12599788055555555,
        default  = "mol/s",
        link     = "Pound-mole",
    },
    ["lbmol/min"] = {
        name1    = "pound-mole per minute",
        name2    = "pound-moles per minute",
        symbol   = "lbmol/min",
        utype    = "molar rate",
        scale    = 7.5598728333333334,
        default  = "mol/s",
        link     = "Pound-mole",
    },
    ["lbmol/s"] = {
        name1    = "pound-mole per second",
        name2    = "pound-moles per second",
        symbol   = "lbmol/s",
        utype    = "molar rate",
        scale    = 453.59237,
        default  = "kmol/s",
        link     = "Pound-mole",
    },
    ["mmol/s"] = {
        name1    = "millimole per second",
        name2    = "millimoles per second",
        symbol   = "mmol/s",
        utype    = "molar rate",
        scale    = 0.001,
        default  = "lb-mol/d",
        link     = "Mole (unit)",
    },
    ["mol/d"] = {
        name1    = "mole per day",
        name2    = "moles per day",
        symbol   = "mol/d",
        utype    = "molar rate",
        scale    = 1.1574074074074073e-5,
        default  = "µmol/s",
        link     = "Mole (unit)",
    },
    ["mol/h"] = {
        name1    = "mole per hour",
        name2    = "moles per hour",
        symbol   = "mol/h",
```

```
        utype    = "molar rate",
        scale    = 0.00027777777777777778,
        default  = "mmol/s",
        link     = "Mole (unit)",
    },
    ["mol/min"] = {
        name1    = "mole per minute",
        name2    = "moles per minute",
        symbol   = "mol/min",
        utype    = "molar rate",
        scale    = 0.016666666666666666,
        default  = "mol/s",
        link     = "Mole (unit)",
    },
    ["mol/s"] = {
        name1    = "mole per second",
        name2    = "moles per second",
        symbol   = "mol/s",
        utype    = "molar rate",
        scale    = 1,
        default  = "lb-mol/min",
        link     = "Mole (unit)",
    },
    ["µmol/s"] = {
        name1    = "micromole per second",
        name2    = "micromoles per second",
        symbol   = "µmol/s",
        utype    = "molar rate",
        scale    = 0.000001,
        default  = "lb-mol/d",
        link     = "Mole (unit)",
    },
    ["umol/s"] = {
        target   = "µmol/s",
    },
    ["/acre"] = {
        name1    = "per acre",
        name2    = "per acre",
        symbol   = "/acre",
        utype    = "per unit area",
        scale    = 0.00024710538146716532,
        default  = "/ha",
        link     = "Acre",
    },
    ["/ha"] = {
        name1    = "per hectare",
        name2    = "per hectare",
        symbol   = "/ha",
        utype    = "per unit area",
        scale    = 100e-6,
        default  = "/acre",
        link     = "Hectare",
    },
    ["/sqcm"] = {
        name1    = "per square centimetre",
        name1_us = "per square centimeter",
        name2    = "per square centimetre",
        name2_us = "per square centimeter",
        symbol   = "/cm<sup>2</sup>",
        utype    = "per unit area",
        scale    = 1e4,
        default  = "/sqin",
        link     = "Square centimetre",
    },
```

```
    ["/sqin"] = {
        name1    = "per square inch",
        name2    = "per square inch",
        symbol   = "/in<sup>2</sup>",
        utype    = "per unit area",
        scale    = 1550.0031000062002,
        default  = "/sqcm",
        link     = "Square inch",
    },
    ["/sqkm"] = {
        name1    = "per square kilometre",
        name1_us = "per square kilometer",
        name2    = "per square kilometre",
        name2_us = "per square kilometer",
        symbol   = "/km<sup>2</sup>",
        utype    = "per unit area",
        scale    = 1e-6,
        default  = "/sqmi",
        link     = "Square kilometre",
    },
    ["/sqmi"] = {
        name1    = "per square mile",
        name2    = "per square mile",
        symbol   = "/sq mi",
        utype    = "per unit area",
        scale    = 3.8610215854244582e-7,
        default  = "/sqkm",
        link     = "Square mile",
    },
    ["PD/acre"] = {
        name1    = "inhabitant per acre",
        name2    = "inhabitants per acre",
        symbol   = "/acre",
        utype    = "per unit area",
        scale    = 0.00024710538146716532,
        default  = "PD/ha",
        link     = "Acre",
    },
    ["PD/ha"] = {
        name1    = "inhabitant per hectare",
        name2    = "inhabitants per hectare",
        symbol   = "/ha",
        utype    = "per unit area",
        scale    = 100e-6,
        default  = "PD/acre",
        link     = "Hectare",
    },
    ["PD/sqkm"] = {
        name1    = "inhabitant per square kilometre",
        name1_us = "inhabitant per square kilometer",
        name2    = "inhabitants per square kilometre",
        name2_us = "inhabitants per square kilometer",
        symbol   = "/km<sup>2</sup>",
        utype    = "per unit area",
        scale    = 1e-6,
        default  = "PD/sqmi",
        link     = "Square kilometre",
    },
    ["PD/sqmi"] = {
        name1    = "inhabitant per square mile",
        name2    = "inhabitants per square mile",
        symbol   = "/sq mi",
        utype    = "per unit area",
        scale    = 3.8610215854244582e-7,
```

```
        default  = "PD/sqkm",
        link     = "Square mile",
    },
    ["/cm2"] = {
        target   = "/sqcm",
    },
    ["/in2"] = {
        target   = "/sqin",
    },
    ["/km2"] = {
        target   = "/sqkm",
    },
    ["pd/acre"] = {
        target   = "PD/acre",
    },
    ["pd/ha"] = {
        target   = "PD/ha",
    },
    ["PD/km2"] = {
        target   = "PD/sqkm",
    },
    ["pd/km2"] = {
        target   = "PD/sqkm",
    },
    ["PD/km²"] = {
        target   = "PD/sqkm",
    },
    ["pd/sqkm"] = {
        target   = "PD/sqkm",
    },
    ["pd/sqmi"] = {
        target   = "PD/sqmi",
    },
    ["/l"] = {
        name1    = "per litre",
        name1_us = "per liter",
        name2    = "per litre",
        name2_us = "per liter",
        symbol   = "/l",
        utype    = "per unit volume",
        scale    = 1000,
        default  = "/usgal",
        link     = "Litre",
    },
    ["/USgal"] = {
        name1    = "per gallon",
        name2    = "per gallon",
        symbol   = "/gal",
        utype    = "per unit volume",
        scale    = 264.172052,
        default  = "/l",
        link     = "US gallon",
        customary= 2,
    },
    ["/usgal"] = {
        target   = "/USgal",
    },
    ["bhp"] = {
        name1    = "brake horsepower",
        name2    = "brake horsepower",
        symbol   = "bhp",
        utype    = "power",
        scale    = 745.69987158227022,
        default  = "kW",
```

```
        link     = "Horsepower#Brake horsepower",
    },
    ["Cal/d"] = {
        name1    = "large calorie per day",
        name2    = "large calories per day",
        symbol   = "Cal/d",
        utype    = "power",
        scale    = 0.048425925925925928,
        default  = "kJ/d",
        link     = "Calorie",
    },
    ["Cal/h"] = {
        name1    = "large calorie per hour",
        name2    = "large calories per hour",
        symbol   = "Cal/h",
        utype    = "power",
        scale    = 1.1622222222222223,
        default  = "kJ/h",
        link     = "Calorie",
    },
    ["cal/h"] = {
        name1    = "calorie per hour",
        name2    = "calories per hour",
        symbol   = "cal/h",
        utype    = "power",
        scale    = 0.0011622222222222223,
        default  = "W",
        link     = "Calorie",
    },
    ["CV"] = {
        name1    = "metric horsepower",
        name2    = "metric horsepower",
        symbol   = "CV",
        utype    = "power",
        scale    = 735.49875,
        default  = "kW",
    },
    ["hk"] = {
        name1    = "metric horsepower",
        name2    = "metric horsepower",
        symbol   = "hk",
        utype    = "power",
        scale    = 735.49875,
        default  = "kW",
    },
    ["hp"] = {
        name1    = "horsepower",
        name2    = "horsepower",
        symbol   = "hp",
        utype    = "power",
        scale    = 745.69987158227022,
        default  = "kW",
    },
    ["hp-electric"] = {
        name1    = "electric horsepower",
        name2    = "electric horsepower",
        symbol   = "hp",
        utype    = "power",
        scale    = 746,
        default  = "kW",
        link     = "Horsepower#Electrical horsepower",
    },
    ["hp-electrical"] = {
        name1    = "electrical horsepower",
```

```
        name2    = "electrical horsepower",
        symbol   = "hp",
        utype    = "power",
        scale    = 746,
        default  = "kW",
        link     = "Horsepower#Electrical horsepower",
    },
    ["hp-metric"] = {
        name1    = "metric horsepower",
        name2    = "metric horsepower",
        symbol   = "hp",
        utype    = "power",
        scale    = 735.49875,
        default  = "kW",
    },
    ["ihp"] = {
        name1    = "indicated horsepower",
        name2    = "indicated horsepower",
        symbol   = "ihp",
        utype    = "power",
        scale    = 745.69987158227022,
        default  = "kW",
        link     = "Horsepower#Indicated horsepower",
    },
    ["kcal/h"] = {
        name1    = "kilocalorie per hour",
        name2    = "kilocalories per hour",
        symbol   = "kcal/h",
        utype    = "power",
        scale    = 1.1622222222222223,
        default  = "kW",
        link     = "Calorie",
    },
    ["kJ/d"] = {
        name1    = "kilojoule per day",
        name2    = "kilojoules per day",
        symbol   = "kJ/d",
        utype    = "power",
        scale    = 0.011574074074074073,
        default  = "Cal/d",
        link     = "Kilojoule",
    },
    ["kJ/h"] = {
        name1    = "kilojoule per hour",
        name2    = "kilojoules per hour",
        symbol   = "kJ/h",
        utype    = "power",
        scale    = 0.27777777777777779,
        default  = "W",
        link     = "Kilojoule",
    },
    ["PS"] = {
        name1    = "metric horsepower",
        name2    = "metric horsepower",
        symbol   = "PS",
        utype    = "power",
        scale    = 735.49875,
        default  = "kW",
    },
    ["shp"] = {
        name1    = "shaft horsepower",
        name2    = "shaft horsepower",
        symbol   = "shp",
        utype    = "power",
```

```
        scale    = 745.69987158227022,
        default  = "kW",
        link     = "Horsepower#Shaft horsepower",
    },
    ["W"] = {
        _name1   = "watt",
        _symbol  = "W",
        utype    = "power",
        scale    = 1,
        prefixes = 1,
        default  = "hp",
        link     = "Watt",
    },
    ["BTU/h"] = {
        per      = { "BTU", "h" },
        utype    = "power",
        default  = "W",
    },
    ["Btu/h"] = {
        per      = { "Btu", "h" },
        utype    = "power",
        default  = "W",
    },
    ["BHP"] = {
        target   = "bhp",
    },
    ["btu/h"] = {
        target   = "BTU/h",
    },
    ["HP"] = {
        target   = "hp",
    },
    ["Hp"] = {
        target   = "hp",
    },
    ["hp-mechanical"] = {
        target   = "hp",
    },
    ["IHP"] = {
        target   = "ihp",
    },
    ["SHP"] = {
        target   = "shp",
    },
    ["whp"] = {
        target   = "hp",
    },
    ["hp/lb"] = {
        name1    = "horsepower per pound",
        name2    = "horsepower per pound",
        symbol   = "hp/lb",
        utype    = "power per unit mass",
        scale    = 1643.986806,
        default  = "kW/kg",
        link     = "Power-to-weight ratio",
    },
    ["hp/LT"] = {
        name1    = "horsepower per long ton",
        name2    = "horsepower per long ton",
        symbol   = "hp/LT",
        utype    = "power per unit mass",
        scale    = 0.73392268125000004,
        default  = "kW/t",
        link     = "Power-to-weight ratio",
```

```
    },
    ["hp/ST"] = {
        name1    = "horsepower per short ton",
        name2    = "horsepower per short ton",
        symbol   = "hp/ST",
        utype    = "power per unit mass",
        scale    = 0.821993403,
        default  = "kW/t",
        link     = "Power-to-weight ratio",
    },
    ["hp/t"] = {
        name1    = "horsepower per tonne",
        name2    = "horsepower per tonne",
        symbol   = "hp/t",
        utype    = "power per unit mass",
        scale    = 0.74569987158227022,
        default  = "kW/t",
        link     = "Power-to-weight ratio",
    },
    ["kW/kg"] = {
        name1    = "kilowatt per kilogram",
        name2    = "kilowatts per kilogram",
        symbol   = "kW/kg",
        utype    = "power per unit mass",
        scale    = 1000,
        default  = "hp/lb",
        link     = "Power-to-weight ratio",
    },
    ["kW/t"] = {
        name1    = "kilowatt per tonne",
        name2    = "kilowatts per tonne",
        symbol   = "kW/t",
        utype    = "power per unit mass",
        scale    = 1,
        default  = "PS/t",
        link     = "Power-to-weight ratio",
    },
    ["PS/t"] = {
        name1    = "metric horsepower per tonne",
        name2    = "metric horsepower per tonne",
        symbol   = "PS/t",
        utype    = "power per unit mass",
        scale    = 0.73549875,
        default  = "kW/t",
        link     = "Power-to-weight ratio",
    },
    ["shp/lb"] = {
        name1    = "shaft horsepower per pound",
        name2    = "shaft horsepower per pound",
        symbol   = "shp/lb",
        utype    = "power per unit mass",
        scale    = 1643.986806,
        default  = "kW/kg",
        link     = "Power-to-weight ratio",
    },
    ["hp/tonne"] = {
        target   = "hp/t",
        symbol   = "hp/tonne",
        default  = "kW/tonne",
    },
    ["kW/tonne"] = {
        target   = "kW/t",
        symbol   = "kW/tonne",
    },
```

```
    ["-lb/in2"] = {
        name1    = "pound per square inch",
        name2    = "pounds per square inch",
        symbol   = "lb/in<sup>2</sup>",
        utype    = "pressure",
        scale    = 6894.7572931683608,
        default  = "kPa kgf/cm2",
    },
    ["atm"] = {
        name1    = "standard atmosphere",
        symbol   = "atm",
        utype    = "pressure",
        scale    = 101325,
        default  = "kPa",
        link     = "Atmosphere (unit)",
    },
    ["Ba"] = {
        name1    = "barye",
        symbol   = "Ba",
        utype    = "pressure",
        scale    = 0.1,
        default  = "Pa",
    },
    ["bar"] = {
        symbol   = "bar",
        utype    = "pressure",
        scale    = 100000,
        default  = "kPa",
        link     = "Bar (unit)",
    },
    ["dbar"] = {
        name1    = "decibar",
        symbol   = "dbar",
        utype    = "pressure",
        scale    = 10000,
        default  = "kPa",
        link     = "Bar (unit)",
    },
    ["inHg"] = {
        name1    = "inch of mercury",
        name2    = "inches of mercury",
        symbol   = "inHg",
        utype    = "pressure",
        scale    = 3386.388640341,
        default  = "kPa",
    },
    ["kBa"] = {
        name1    = "kilobarye",
        symbol   = "kBa",
        utype    = "pressure",
        scale    = 100,
        default  = "hPa",
        link     = "Barye",
    },
    ["kg-f/cm2"] = {
        name1    = "kilogram-force per square centimetre",
        name1_us = "kilogram-force per square centimeter",
        name2    = "kilograms-force per square centimetre",
        name2_us = "kilograms-force per square centimeter",
        symbol   = "kg<sub>f</sub>/cm<sup>2</sup>",
        utype    = "pressure",
        scale    = 98066.5,
        default  = "psi",
        link     = "Kilogram-force",
```

```
    },
    ["kg/cm2"] = {
        name1    = "kilogram per square centimetre",
        name1_us = "kilogram per square centimeter",
        name2    = "kilograms per square centimetre",
        name2_us = "kilograms per square centimeter",
        symbol   = "kg/cm<sup>2</sup>",
        utype    = "pressure",
        scale    = 98066.5,
        default  = "psi",
        link     = "Kilogram-force",
    },
    ["kgf/cm2"] = {
        name1    = "kilogram-force per square centimetre",
        name1_us = "kilogram-force per square centimeter",
        name2    = "kilograms-force per square centimetre",
        name2_us = "kilograms-force per square centimeter",
        symbol   = "kgf/cm<sup>2</sup>",
        utype    = "pressure",
        scale    = 98066.5,
        default  = "psi",
        link     = "Kilogram-force",
    },
    ["ksi"] = {
        name1    = "kilopound per square inch",
        name2    = "kilopounds per square inch",
        symbol   = "ksi",
        utype    = "pressure",
        scale    = 6894757.2931683613,
        default  = "MPa",
        link     = "Pound per square inch",
    },
    ["lbf/in2"] = {
        name1    = "pound-force per square inch",
        name2    = "pounds-force per square inch",
        symbol   = "lbf/in<sup>2</sup>",
        utype    = "pressure",
        scale    = 6894.7572931683608,
        default  = "kPa kgf/cm2",
    },
    ["mb"] = {
        name1    = "millibar",
        symbol   = "mb",
        utype    = "pressure",
        scale    = 100,
        default  = "hPa",
        link     = "Bar (unit)",
    },
    ["mbar"] = {
        name1    = "millibar",
        symbol   = "mbar",
        utype    = "pressure",
        scale    = 100,
        default  = "hPa",
        link     = "Bar (unit)",
    },
    ["mmHg"] = {
        name1    = "millimetre of mercury",
        name1_us = "millimeter of mercury",
        name2    = "millimetres of mercury",
        name2_us = "millimeters of mercury",
        symbol   = "mmHg",
        utype    = "pressure",
        scale    = 133.322387415,
```

```
        default  = "kPa",
    },
    ["Pa"] = {
        _name1   = "pascal",
        _symbol  = "Pa",
        utype    = "pressure",
        scale    = 1,
        prefixes = 1,
        default  = "psi",
        link     = "Pascal (unit)",
    },
    ["psf"] = {
        name1    = "pound per square foot",
        name2    = "pounds per square foot",
        symbol   = "psf",
        utype    = "pressure",
        scale    = 47.880258980335839,
        default  = "kPa",
        link     = "Pound per square inch",
    },
    ["psi"] = {
        name1    = "pound per square inch",
        name2    = "pounds per square inch",
        symbol   = "psi",
        utype    = "pressure",
        scale    = 6894.7572931683608,
        default  = "kPa",
    },
    ["Torr"] = {
        name1    = "torr",
        symbol   = "Torr",
        utype    = "pressure",
        scale    = 133.32236842105263,
        default  = "kPa",
    },
    ["N/cm2"] = {
        per      = { "N", "cm2" },
        utype    = "pressure",
        default  = "psi",
    },
    ["N/m2"] = {
        per      = { "N", "m2" },
        utype    = "pressure",
        default  = "psi",
    },
    ["g/cm2"] = {
        per      = { "g", "cm2" },
        utype    = "pressure",
        default  = "lb/sqft",
        multiplier= 9.80665,
    },
    ["g/m2"] = {
        per      = { "g", "m2" },
        utype    = "pressure",
        default  = "lb/sqft",
        multiplier= 9.80665,
    },
    ["kg/ha"] = {
        per      = { "kg", "ha" },
        utype    = "pressure",
        default  = "lb/acre",
        multiplier= 9.80665,
    },
    ["kg/m2"] = {
```

```
        per      = { "kg", "m2" },
        utype    = "pressure",
        default  = "lb/sqft",
        multiplier= 9.80665,
    },
    ["lb/1000sqft"] = {
        per      = { "lb", "1000sqft" },
        utype    = "pressure",
        default  = "g/m2",
        multiplier= 9.80665,
    },
    ["lb/acre"] = {
        per      = { "lb", "acre" },
        utype    = "pressure",
        default  = "kg/ha",
        multiplier= 9.80665,
    },
    ["lb/sqft"] = {
        per      = { "lb", "sqft" },
        utype    = "pressure",
        default  = "kg/m2",
        multiplier= 9.80665,
    },
    ["lb/sqyd"] = {
        per      = { "lb", "sqyd" },
        utype    = "pressure",
        default  = "kg/m2",
        multiplier= 9.80665,
    },
    ["LT/acre"] = {
        per      = { "LT", "acre" },
        utype    = "pressure",
        default  = "t/ha",
        multiplier= 9.80665,
    },
    ["MT/ha"] = {
        per      = { "MT", "ha" },
        utype    = "pressure",
        default  = "LT/acre ST/acre",
        multiplier= 9.80665,
    },
    ["oz/sqft"] = {
        per      = { "oz", "sqft" },
        utype    = "pressure",
        default  = "g/m2",
        multiplier= 9.80665,
    },
    ["oz/sqyd"] = {
        per      = { "oz", "sqyd" },
        utype    = "pressure",
        default  = "g/m2",
        multiplier= 9.80665,
    },
    ["ST/acre"] = {
        per      = { "ST", "acre" },
        utype    = "pressure",
        default  = "t/ha",
        multiplier= 9.80665,
    },
    ["t/ha"] = {
        per      = { "t", "ha" },
        utype    = "pressure",
        default  = "LT/acre ST/acre",
        multiplier= 9.80665,
```

```
    },
    ["tonne/acre"] = {
        per      = { "tonne", "acre" },
        utype    = "pressure",
        default  = "tonne/ha",
        multiplier= 9.80665,
    },
    ["tonne/ha"] = {
        per      = { "tonne", "ha" },
        utype    = "pressure",
        default  = "tonne/acre",
        multiplier= 9.80665,
    },
    ["kgfpsqcm"] = {
        target   = "kgf/cm2",
    },
    ["kgpsqcm"] = {
        target   = "kg/cm2",
    },
    ["kN/m2"] = {
        target   = "kPa",
    },
    ["lb/in2"] = {
        target   = "lbf/in2",
    },
    ["torr"] = {
        target   = "Torr",
    },
    ["Bq"] = {
        _name1   = "becquerel",
        _symbol  = "Bq",
        utype    = "radioactivity",
        scale    = 1,
        prefixes = 1,
        default  = "pCi",
        link     = "Becquerel",
    },
    ["Ci"] = {
        _name1   = "curie",
        _symbol  = "Ci",
        utype    = "radioactivity",
        scale    = 3.7e10,
        prefixes = 1,
        default  = "GBq",
        link     = "Curie (unit)",
    },
    ["Rd"] = {
        _name1   = "rutherford",
        _symbol  = "Rd",
        utype    = "radioactivity",
        scale    = 1e6,
        prefixes = 1,
        default  = "MBq",
        link     = "Rutherford (unit)",
    },
    ["cm/h"] = {
        name1    = "centimetre per hour",
        name1_us = "centimeter per hour",
        name2    = "centimetres per hour",
        name2_us = "centimeters per hour",
        symbol   = "cm/h",
        utype    = "speed",
        scale    = 2.7777777777777775e-6,
        default  = "in/h",
```

```
        link     = "Metre per second",
    },
    ["cm/s"] = {
        name1    = "centimetre per second",
        name1_us = "centimeter per second",
        name2    = "centimetres per second",
        name2_us = "centimeters per second",
        symbol   = "cm/s",
        utype    = "speed",
        scale    = 0.01,
        default  = "in/s",
        link     = "Metre per second",
    },
    ["cm/year"] = {
        name1    = "centimetre per year",
        name1_us = "centimeter per year",
        name2    = "centimetres per year",
        name2_us = "centimeters per year",
        symbol   = "cm/year",
        utype    = "speed",
        scale    = 3.168873850681143e-10,
        default  = "in/year",
        link     = "Orders of magnitude (speed)",
    },
    ["foot/s"] = {
        name1    = "foot per second",
        name2    = "foot per second",
        symbol   = "ft/s",
        utype    = "speed",
        scale    = 0.3048,
        default  = "m/s",
    },
    ["ft/min"] = {
        name1    = "foot per minute",
        name2    = "feet per minute",
        symbol   = "ft/min",
        utype    = "speed",
        scale    = 0.00508,
        default  = "m/min",
        link     = "Feet per second",
    },
    ["ft/s"] = {
        name1    = "foot per second",
        name2    = "feet per second",
        symbol   = "ft/s",
        utype    = "speed",
        scale    = 0.3048,
        default  = "m/s",
        link     = "Feet per second",
    },
    ["furlong per fortnight"] = {
        name2    = "furlongs per fortnight",
        symbol   = "furlong per fortnight",
        usename  = 1,
        utype    = "speed",
        scale    = 0.00016630952380952381,
        default  = "km/h mph",
        link     = "FFF system",
    },
    ["in/h"] = {
        name1    = "inch per hour",
        name2    = "inches per hour",
        symbol   = "in/h",
        utype    = "speed",
```

```
        scale    = 7.0555555555555559e-6,
        default  = "cm/h",
        link     = "Inch",
    },
    ["in/s"] = {
        name1    = "inch per second",
        name2    = "inches per second",
        symbol   = "in/s",
        utype    = "speed",
        scale    = 0.0254,
        default  = "cm/s",
        link     = "Inch",
    },
    ["in/year"] = {
        name1    = "inch per year",
        name2    = "inches per year",
        symbol   = "in/year",
        utype    = "speed",
        scale    = 8.0489395807301024e-10,
        default  = "cm/year",
        link     = "Orders of magnitude (speed)",
    },
    ["isp"] = {
        name1    = "second",
        symbol   = "s",
        utype    = "speed",
        scale    = 9.80665,
        default  = "km/s",
        link     = "Specific impulse",
    },
    ["km/d"] = {
        name1    = "kilometre per day",
        name1_us = "kilometer per day",
        name2    = "kilometres per day",
        name2_us = "kilometers per day",
        symbol   = "km/d",
        utype    = "speed",
        scale    = 1.1574074074074074e-2,
        default  = "mi/d",
        link     = "Orders of magnitude (speed)",
    },
    ["km/h"] = {
        name1    = "kilometre per hour",
        name1_us = "kilometer per hour",
        name2    = "kilometres per hour",
        name2_us = "kilometers per hour",
        symbol   = "km/h",
        utype    = "speed",
        scale    = 0.27777777777777779,
        default  = "mph",
        link     = "Kilometres per hour",
    },
    ["km/s"] = {
        name1    = "kilometre per second",
        name1_us = "kilometer per second",
        name2    = "kilometres per second",
        name2_us = "kilometers per second",
        symbol   = "km/s",
        utype    = "speed",
        scale    = 1000,
        default  = "mi/s",
        link     = "Metre per second",
    },
    ["kn"] = {
```

```
        name1    = "knot",
        symbol   = "kn",
        utype    = "speed",
        scale    = 0.51444444444444448,
        default  = "km/h mph",
        link     = "Knot (unit)",
    },
    ["kNs/kg"] = {
        name2    = "kN&#8209;s/kg",
        symbol   = "kN&#8209;s/kg",
        utype    = "speed",
        scale    = 1000,
        default  = "isp",
        link     = "Specific impulse",
    },
    ["m/min"] = {
        name1    = "metre per minute",
        name1_us = "meter per minute",
        name2    = "metres per minute",
        name2_us = "meters per minute",
        symbol   = "m/min",
        utype    = "speed",
        scale    = 0.016666666666666666,
        default  = "ft/min",
        link     = "Metre per second",
    },
    ["m/s"] = {
        name1    = "metre per second",
        name1_us = "meter per second",
        name2    = "metres per second",
        name2_us = "meters per second",
        symbol   = "m/s",
        utype    = "speed",
        scale    = 1,
        default  = "ft/s",
    },
    ["Mach"] = {
        name2    = "Mach",
        symbol   = "Mach",
        utype    = "speed",
        builtin  = "mach",
        scale    = 0,
        iscomplex= true,
        default  = "km/h mph",
        link     = "Mach number",
    },
    ["mi/d"] = {
        name1    = "mile per day",
        name2    = "miles per day",
        symbol   = "mi/d",
        utype    = "speed",
        scale    = 1.8626666666666667e-2,
        default  = "km/d",
        link     = "Orders of magnitude (speed)",
    },
    ["mi/s"] = {
        name1    = "mile per second",
        name2    = "miles per second",
        symbol   = "mi/s",
        utype    = "speed",
        scale    = 1609.344,
        default  = "km/s",
        link     = "Mile",
    },
```

```
    ["mm/h"] = {
        name1    = "millimetre per hour",
        name1_us = "millimeter per hour",
        name2    = "millimetres per hour",
        name2_us = "millimeters per hour",
        symbol   = "mm/h",
        utype    = "speed",
        scale    = 2.7777777777777781e-7,
        default  = "in/h",
        link     = "Metre per second",
    },
    ["mph"] = {
        name1    = "mile per hour",
        name2    = "miles per hour",
        symbol   = "mph",
        utype    = "speed",
        scale    = 0.44704,
        default  = "km/h",
        link     = "Miles per hour",
    },
    ["Ns/kg"] = {
        name2    = "N&#8209;s/kg",
        symbol   = "N&#8209;s/kg",
        utype    = "speed",
        scale    = 1,
        default  = "isp",
        link     = "Specific impulse",
    },
    ["si tsfc"] = {
        name2    = "g/(kN·s)",
        symbol   = "g/(kN·s)",
        utype    = "speed",
        scale    = 9.9999628621379242e-7,
        invert   = -1,
        iscomplex= true,
        default  = "tsfc",
        link     = "Thrust specific fuel consumption",
    },
    ["tsfc"] = {
        name2    = "lb/(lbf·h)",
        symbol   = "lb/(lbf·h)",
        utype    = "speed",
        scale    = 2.832545036049801e-5,
        invert   = -1,
        iscomplex= true,
        default  = "si tsfc",
        link     = "Thrust specific fuel consumption",
    },
    ["cm/y"] = {
        target   = "cm/year",
    },
    ["cm/yr"] = {
        target   = "cm/year",
    },
    ["in/y"] = {
        target   = "in/year",
    },
    ["in/yr"] = {
        target   = "in/year",
    },
    ["knot"] = {
        target   = "kn",
    },
    ["knots"] = {
```

```
        target   = "kn",
    },
    ["kph"] = {
        target   = "km/h",
    },
    ["mi/h"] = {
        target   = "mph",
    },
    ["mm/s"] = {
        per      = { "mm", "s" },
        utype    = "speed",
        default  = "in/s",
        link     = "Metre per second",
    },
    ["C"] = {
        name1    = "degree Celsius",
        name2    = "degrees Celsius",
        symbol   = "°C",
        usesymbol= 1,
        utype    = "temperature",
        scale    = 1,
        offset   = -273.15,
        iscomplex= true,
        istemperature= true,
        default  = "F",
        link     = "Celsius",
    },
    ["F"] = {
        name1    = "degree Fahrenheit",
        name2    = "degrees Fahrenheit",
        symbol   = "°F",
        usesymbol= 1,
        utype    = "temperature",
        scale    = 0.55555555555555558,
        offset   = 32-273.15*(9/5),
        iscomplex= true,
        istemperature= true,
        default  = "C",
        link     = "Fahrenheit",
    },
    ["K"] = {
        _name1   = "kelvin",
        _symbol  = "K",
        usesymbol= 1,
        utype    = "temperature",
        scale    = 1,
        offset   = 0,
        iscomplex= true,
        istemperature= true,
        prefixes = 1,
        default  = "C F",
        link     = "Kelvin",
    },
    ["keVT"] = {
        name1    = "kiloelectronvolt",
        symbol   = "keV",
        utype    = "temperature",
        scale    = 11.604505e6,
        offset   = 0,
        iscomplex= true,
        default  = "MK",
        link     = "Electronvolt",
    },
    ["R"] = {
```

```
        name1    = "degree Rankine",
        name2    = "degrees Rankine",
        symbol   = "°R",
        usesymbol= 1,
        utype    = "temperature",
        scale    = 0.55555555555555558,
        offset   = 0,
        iscomplex= true,
        istemperature= true,
        default  = "K F C",
        link     = "Rankine scale",
    },
    ["Celsius"] = {
        target   = "C",
    },
    ["°C"] = {
        target   = "C",
    },
    ["°F"] = {
        target   = "F",
    },
    ["°R"] = {
        target   = "R",
    },
    ["C-change"] = {
        name1    = "degree Celsius change",
        name2    = "degrees Celsius change",
        symbol   = "°C",
        usesymbol= 1,
        utype    = "temperature change",
        scale    = 1,
        default  = "F-change",
        link     = "Celsius",
    },
    ["F-change"] = {
        name1    = "degree Fahrenheit change",
        name2    = "degrees Fahrenheit change",
        symbol   = "°F",
        usesymbol= 1,
        utype    = "temperature change",
        scale    = 0.55555555555555558,
        default  = "C-change",
        link     = "Fahrenheit",
    },
    ["K-change"] = {
        name1    = "kelvin change",
        name2    = "kelvins change",
        symbol   = "K",
        usesymbol= 1,
        utype    = "temperature change",
        scale    = 1,
        default  = "F-change",
        link     = "Kelvin",
    },
    ["°C-change"] = {
        target   = "C-change",
    },
    ["°F-change"] = {
        target   = "F-change",
    },
    ["century"] = {
        name1    = "century",
        name2    = "centuries",
        symbol   = "ha",
```

```
        utype    = "time",
        scale    = 3155760000,
        default  = "Gs",
    },
    ["d"] = {
        name1    = "day",
        symbol   = "d",
        utype    = "time",
        scale    = 86400,
        default  = "ks",
    },
    ["decade"] = {
        name1    = "decade",
        symbol   = "daa",
        utype    = "time",
        scale    = 315576000,
        default  = "Ms",
    },
    ["dog year"] = {
        name1    = "dog year",
        symbol   = "dog yr",
        utype    = "time",
        scale    = 220903200,
        default  = "years",
        link     = "List of unusual units of measurement#Dog year",
    },
    ["fortnight"] = {
        symbol   = "fortnight",
        usename  = 1,
        utype    = "time",
        scale    = 1209600,
        default  = "week",
    },
    ["h"] = {
        name1    = "hour",
        symbol   = "h",
        utype    = "time",
        scale    = 3600,
        default  = "ks",
    },
    ["long billion year"] = {
        name1    = "billion years",
        name2    = "billion years",
        symbol   = "Ta",
        utype    = "time",
        scale    = 31557600000000000000,
        default  = "Es",
        link     = "Annum",
    },
    ["millennium"] = {
        name1    = "millennium",
        name2    = "millennia",
        symbol   = "ka",
        utype    = "time",
        scale    = 31557600000,
        default  = "Gs",
    },
    ["milliard year"] = {
        name1    = "milliard years",
        name2    = "milliard years",
        symbol   = "Ga",
        utype    = "time",
        scale    = 31557600000000000,
        default  = "Ps",
```

```
        link     = "Annum",
    },
    ["million year"] = {
        name1    = "million years",
        name2    = "million years",
        symbol   = "Ma",
        utype    = "time",
        scale    = 31557600000000,
        default  = "Ts",
        link     = "Annum",
    },
    ["min"] = {
        name1    = "minute",
        symbol   = "min",
        utype    = "time",
        scale    = 60,
        default  = "s",
    },
    ["month"] = {
        symbol   = "month",
        usename  = 1,
        utype    = "time",
        scale    = 2629800,
        default  = "Ms",
    },
    ["months"] = {
        name1    = "month",
        symbol   = "mo",
        utype    = "time",
        scale    = 2629800,
        default  = "year",
    },
    ["s"] = {
        _name1   = "second",
        _symbol  = "s",
        utype    = "time",
        scale    = 1,
        prefixes = 1,
        default  = "min",
        link     = "Second",
    },
    ["short billion year"] = {
        name1    = "billion years",
        name2    = "billion years",
        symbol   = "Ga",
        utype    = "time",
        scale    = 31557600000000000,
        default  = "Ps",
        link     = "Annum",
    },
    ["short trillion year"] = {
        name1    = "trillion years",
        name2    = "trillion years",
        symbol   = "Ta",
        utype    = "time",
        scale    = 31557600000000000000,
        default  = "Es",
        link     = "Annum",
    },
    ["thousand million year"] = {
        name1    = "thousand million years",
        name2    = "thousand million years",
        symbol   = "Ga",
        utype    = "time",
```

```
        scale    = 31557600000000000,
        default  = "Ps",
        link     = "Annum",
    },
    ["wk"] = {
        symbol   = "week",
        usename  = 1,
        utype    = "time",
        scale    = 604800,
        default  = "Ms",
    },
    ["year"] = {
        name1    = "year",
        symbol   = "a",
        utype    = "time",
        scale    = 31557600,
        default  = "Ms",
        link     = "Annum",
    },
    ["years"] = {
        name1    = "year",
        symbol   = "yr",
        utype    = "time",
        scale    = 31557600,
        default  = "Ms",
        link     = "Annum",
    },
    ["byr"] = {
        target   = "short billion year",
    },
    ["day"] = {
        target   = "d",
    },
    ["days"] = {
        target   = "d",
    },
    ["dog yr"] = {
        target   = "dog year",
    },
    ["Gyr"] = {
        target   = "thousand million year",
    },
    ["hour"] = {
        target   = "h",
    },
    ["hours"] = {
        target   = "h",
    },
    ["kMyr"] = {
        target   = "thousand million year",
    },
    ["kmyr"] = {
        target   = "thousand million year",
    },
    ["kyr"] = {
        target   = "millennium",
    },
    ["long byr"] = {
        target   = "long billion year",
    },
    ["minute"] = {
        target   = "min",
    },
    ["minutes"] = {
```

```
        target   = "min",
    },
    ["mth"] = {
        target   = "month",
    },
    ["Myr"] = {
        target   = "million year",
    },
    ["myr"] = {
        target   = "million year",
    },
    ["second"] = {
        target   = "s",
    },
    ["seconds"] = {
        target   = "s",
    },
    ["tmyr"] = {
        target   = "thousand million year",
    },
    ["tryr"] = {
        target   = "short trillion year",
    },
    ["tyr"] = {
        target   = "millennium",
    },
    ["week"] = {
        target   = "wk",
    },
    ["weeks"] = {
        target   = "wk",
    },
    ["yr"] = {
        target   = "year",
    },
    ["kg.m"] = {
        name1    = "kilogram metre",
        name1_us = "kilogram meter",
        symbol   = "kg·m",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbft",
        link     = "Kilogram metre (torque)",
    },
    ["kgf.m"] = {
        name1    = "kilogram force-metre",
        name1_us = "kilogram force-meter",
        symbol   = "kgf·m",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbfft",
        link     = "Kilogram metre (torque)",
    },
    ["kgm"] = {
        name1    = "kilogram metre",
        name1_us = "kilogram meter",
        symbol   = "kg·m",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbfft",
        link     = "Kilogram metre (torque)",
    },
    ["kpm"] = {
        name1    = "kilopond metre",
```

```
        name1_us = "kilopond meter",
        symbol   = "kp·m",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbft",
        link     = "Kilogram metre (torque)",
    },
    ["lb-fft"] = {
        name1    = "pound force-foot",
        name2    = "pound force-feet",
        symbol   = "ft·lb<sub>f</sub>",
        utype    = "torque",
        scale    = 1.3558179483314004,
        default  = "Nm",
        link     = "Pound-foot (torque)",
    },
    ["lb.ft"] = {
        name1    = "pound force-foot",
        name2    = "pound force-feet",
        symbol   = "lb·ft",
        utype    = "torque",
        scale    = 1.3558179483314004,
        default  = "Nm",
        link     = "Pound-foot (torque)",
    },
    ["lb.in"] = {
        name1    = "pound force-inch",
        symbol   = "lb·in",
        utype    = "torque",
        scale    = 0.1129848290276167,
        default  = "mN.m",
        link     = "Pound-foot (torque)",
    },
    ["lbfft"] = {
        name1    = "pound force-foot",
        name2    = "pound force-feet",
        symbol   = "lbf·ft",
        utype    = "torque",
        scale    = 1.3558179483314004,
        default  = "Nm",
        link     = "Pound-foot (torque)",
    },
    ["lbft"] = {
        name1    = "pound-foot",
        name2    = "pound-feet",
        symbol   = "lb·ft",
        utype    = "torque",
        scale    = 1.3558179483314004,
        default  = "Nm",
        link     = "Pound-foot (torque)",
    },
    ["m.kg-f"] = {
        name1    = "metre kilogram-force",
        name1_us = "meter kilogram-force",
        name2    = "metre kilograms-force",
        name2_us = "meter kilograms-force",
        symbol   = "m·kg<sub>f</sub>",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbfft",
        link     = "Kilogram metre (torque)",
    },
    ["m.kgf"] = {
        name1    = "metre kilogram-force",
```

```
        name1_us = "meter kilogram-force",
        name2    = "metre kilograms-force",
        name2_us = "meter kilograms-force",
        symbol   = "m·kgf",
        utype    = "torque",
        scale    = 9.80665,
        default  = "Nm lbfft",
        link     = "Kilogram metre (torque)",
    },
    ["mN.m"] = {
        name1    = "millinewton-metre",
        name1_us = "millinewton-meter",
        symbol   = "mN·m",
        utype    = "torque",
        scale    = 0.001,
        default  = "lb.in",
        link     = "Newton-metre",
    },
    ["Nm"] = {
        _name1   = "newton-metre",
        _name1_us= "newton-meter",
        _symbol  = "N·m",
        utype    = "torque",
        alttype  = "energy",
        scale    = 1,
        prefixes = 1,
        default  = "lbfft",
        link     = "Newton-metre",
    },
    ["kN/m"] = {
        per      = { "kN", "-m-stiff" },
        utype    = "torque",
        default  = "lbf/in",
    },
    ["lbf/in"] = {
        per      = { "lbf", "-in-stiff" },
        utype    = "torque",
        default  = "kN/m",
    },
    ["lb-f.ft"] = {
        target   = "lb-fft",
    },
    ["lbf.ft"] = {
        target   = "lbfft",
    },
    ["lbf·ft"] = {
        target   = "lbfft",
    },
    ["lb·ft"] = {
        target   = "lb.ft",
    },
    ["mkg-f"] = {
        target   = "m.kg-f",
    },
    ["mkgf"] = {
        target   = "m.kgf",
    },
    ["N.m"] = {
        target   = "Nm",
    },
    ["N·m"] = {
        target   = "Nm",
    },
    ["ton-mile"] = {
```

```
        symbol   = "ton-mile",
        usename  = 1,
        utype    = "transportation",
        scale    = 1.4599723182105602,
        default  = "tkm",
    },
    ["tkm"] = {
        name1    = "tonne-kilometre",
        name1_us = "tonne-kilometer",
        symbol   = "tkm",
        utype    = "transportation",
        scale    = 1,
        default  = "ton-mile",
    },
    ["-12USoz(mL)serve"] = {
        name1_us = "12 U.S. fl oz (355 mL) serving",
        symbol   = "12 US fl oz (355 mL) serving",
        sym_us   = "12 U.S. fl oz (355 mL) serving",
        utype    = "volume",
        scale    = 0.00035488235475000004,
        default  = "mL",
        link     = "Beverage can#Standard sizes",
    },
    ["-12USoz(ml)serve"] = {
        name1_us = "12 U.S. fl oz (355 ml) serving",
        symbol   = "12 US fl oz (355 ml) serving",
        sym_us   = "12 U.S. fl oz (355 ml) serving",
        utype    = "volume",
        scale    = 0.00035488235475000004,
        default  = "ml",
        link     = "Beverage can#Standard sizes",
    },
    ["-12USozserve"] = {
        name1_us = "12 U.S. fl oz serving",
        symbol   = "12 US fl oz serving",
        sym_us   = "12 U.S. fl oz serving",
        utype    = "volume",
        scale    = 0.00035488235475000004,
        default  = "mL",
        link     = "Beverage can#Standard sizes",
    },
    ["acre-foot"] = {
        name1    = "acre-foot",
        name2    = "acre-foot",
        symbol   = "acre·ft",
        utype    = "volume",
        scale    = 1233.48183754752,
        default  = "m3",
    },
    ["acre-ft"] = {
        name1    = "acre-foot",
        name2    = "acre-feet",
        symbol   = "acre·ft",
        utype    = "volume",
        scale    = 1233.48183754752,
        default  = "m3",
    },
    ["AUtbsp"] = {
        name1    = "Australian tablespoon",
        symbol   = "AU tbsp",
        utype    = "volume",
        scale    = 0.000020,
        default  = "ml",
    },
```

```
    ["Bcuft"] = {
        name1    = "billion cubic foot",
        name2    = "billion cubic feet",
        symbol   = "billion cu ft",
        utype    = "volume",
        scale    = 28316846.592,
        default  = "Gl",
        link     = "Cubic foot",
    },
    ["bdft"] = {
        name1    = "board foot",
        name2    = "board feet",
        symbol   = "bd ft",
        utype    = "volume",
        scale    = 0.0023597372167,
        default  = "m3",
    },
    ["board feet"] = {
        name2    = "board feet",
        symbol   = "board foot",
        usename  = 1,
        utype    = "volume",
        scale    = 0.0023597372167,
        default  = "m3",
    },
    ["board foot"] = {
        name2    = "board foot",
        symbol   = "board foot",
        usename  = 1,
        utype    = "volume",
        scale    = 0.0023597372167,
        default  = "m3",
    },
    ["cc"] = {
        name1    = "cubic centimetre",
        name1_us = "cubic centimeter",
        symbol   = "cc",
        utype    = "volume",
        scale    = 0.000001,
        default  = "cuin",
    },
    ["CID"] = {
        name1    = "cubic inch",
        name2    = "cubic inches",
        symbol   = "cu in",
        utype    = "volume",
        scale    = 0.000016387064,
        default  = "cc",
        link     = "Cubic inch#Engine displacement",
    },
    ["cord"] = {
        symbol   = "cord",
        utype    = "volume",
        scale    = 3.624556363776,
        default  = "m3",
        link     = "Cord (unit)",
    },
    ["cufoot"] = {
        name1    = "cubic foot",
        name2    = "cubic foot",
        symbol   = "cu ft",
        utype    = "volume",
        scale    = 0.028316846592,
        default  = "m3",
```

```
    },
    ["cuft"] = {
        name1    = "cubic foot",
        name2    = "cubic feet",
        symbol   = "cu ft",
        utype    = "volume",
        scale    = 0.028316846592,
        default  = "m3",
    },
    ["cuin"] = {
        name1    = "cubic inch",
        name2    = "cubic inches",
        symbol   = "cu in",
        utype    = "volume",
        scale    = 0.000016387064,
        default  = "cm3",
    },
    ["cumi"] = {
        name1    = "cubic mile",
        symbol   = "cu mi",
        utype    = "volume",
        scale    = 4168181825.440579584,
        default  = "km3",
    },
    ["cuyd"] = {
        name1    = "cubic yard",
        symbol   = "cu yd",
        utype    = "volume",
        scale    = 0.764554857984,
        default  = "m3",
    },
    ["firkin"] = {
        symbol   = "firkin",
        usename  = 1,
        utype    = "volume",
        scale    = 0.04091481,
        default  = "l impgal USgal",
        link     = "Firkin (unit)",
    },
    ["foot3"] = {
        target   = "cufoot",
    },
    ["Goilbbl"] = {
        name1    = "billion barrels",
        name2    = "billion barrels",
        symbol   = "Gbbl",
        utype    = "volume",
        scale    = 158987294.928,
        default  = "v * 1.58987294928 < 10 ! e6 ! e9 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["gr water"] = {
        name1    = "grains water",
        name2    = "grains water",
        symbol   = "gr H<sub>2</sub>O",
        utype    = "volume",
        scale    = 0.00000006479891,
        default  = "cm3",
        link     = "Grain (unit)",
    },
    ["grt"] = {
        name1    = "gross register ton",
        symbol   = "grt",
        utype    = "volume",
```

```
        scale    = 2.8316846592,
        default  = "m3",
        link     = "Gross register tonnage",
    },
    ["impbbl"] = {
        name1    = "imperial barrel",
        symbol   = "imp bbl",
        utype    = "volume",
        scale    = 0.16365924,
        default  = "l impgal USgal",
        link     = "Barrel (unit)",
    },
    ["impbsh"] = {
        name1    = "imperial bushel",
        symbol   = "imp bsh",
        utype    = "volume",
        scale    = 0.03636872,
        default  = "l impgal USdrygal",
    },
    ["impbu"] = {
        name1    = "imperial bushel",
        symbol   = "imp bu",
        utype    = "volume",
        scale    = 0.03636872,
        default  = "m3",
    },
    ["impgal"] = {
        name1    = "imperial gallon",
        symbol   = "imp gal",
        utype    = "volume",
        scale    = 0.00454609,
        default  = "l USgal",
    },
    ["impgi"] = {
        name1    = "gill",
        symbol   = "gi",
        utype    = "volume",
        scale    = 0.0001420653125,
        default  = "ml USoz",
        link     = "Gill (unit)",
    },
    ["impkenning"] = {
        name1    = "imperial kenning",
        symbol   = "kenning",
        utype    = "volume",
        scale    = 0.01818436,
        default  = "l USdrygal",
        link     = "Kenning (unit)",
    },
    ["impoz"] = {
        name1    = "imperial fluid ounce",
        symbol   = "imp fl oz",
        utype    = "volume",
        scale    = 0.0000284130625,
        default  = "ml USoz",
    },
    ["imppk"] = {
        name1    = "imperial peck",
        symbol   = "pk",
        utype    = "volume",
        scale    = 0.00909218,
        default  = "l USdrygal",
        link     = "Peck",
    },
```

```
    ["imppt"] = {
        name1    = "imperial pint",
        symbol   = "imp pt",
        utype    = "volume",
        scale    = 0.00056826125,
        default  = "l",
    },
    ["impqt"] = {
        name1    = "imperial quart",
        symbol   = "imp qt",
        utype    = "volume",
        scale    = 0.0011365225,
        default  = "ml USoz",
        customary= 3,
    },
    ["kilderkin"] = {
        symbol   = "kilderkin",
        usename  = 1,
        utype    = "volume",
        scale    = 0.08182962,
        default  = "l impgal USgal",
    },
    ["koilbbl"] = {
        name1    = "thousand barrels",
        name2    = "thousand barrels",
        symbol   = "kbbl",
        utype    = "volume",
        scale    = 158.987294928,
        default  = "v * 1.58987294928 < 10 ! ! e3 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["L"] = {
        _name1   = "litre",
        _name1_us= "liter",
        _symbol  = "L",
        utype    = "volume",
        scale    = 0.001,
        prefixes = 1,
        default  = "impgal USgal",
        link     = "Litre",
    },
    ["l"] = {
        _name1   = "litre",
        _name1_us= "liter",
        _symbol  = "l",
        utype    = "volume",
        scale    = 0.001,
        prefixes = 1,
        default  = "impgal USgal",
        link     = "Litre",
    },
    ["m3"] = {
        _name1   = "cubic metre",
        _name1_us= "cubic meter",
        _symbol  = "m<sup>3</sup>",
        prefix_position= 7,
        utype    = "volume",
        scale    = 1,
        prefixes = 3,
        default  = "cuft",
        link     = "Cubic metre",
    },
    ["Mbbl"] = {
        name1    = "thousand barrels",
```

```
        name2    = "thousand barrels",
        symbol   = "Mbbl",
        utype    = "volume",
        scale    = 158.987294928,
        default  = "v * 1.58987294928 < 10 ! e3 ! ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["MMoilbbl"] = {
        name1    = "million barrels",
        name2    = "million barrels",
        symbol   = "MMbbl",
        utype    = "volume",
        scale    = 158987.294928,
        default  = "v * 1.58987294928 < 10 ! e3 ! e6 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["Moilbbl"] = {
        name1    = "million barrels",
        name2    = "million barrels",
        symbol   = "Mbbl",
        utype    = "volume",
        scale    = 158987.294928,
        default  = "v * 1.58987294928 < 10 ! e3 ! e6 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["MTON"] = {
        name1    = "measurement ton",
        symbol   = "MTON",
        utype    = "volume",
        scale    = 1.13267386368,
        default  = "m3",
    },
    ["MUSgal"] = {
        name1    = "million US gallons",
        name1_us = "million U.S. gallons",
        name2    = "million US gallons",
        name2_us = "million U.S. gallons",
        symbol   = "million US gal",
        sym_us   = "million U.S. gal",
        utype    = "volume",
        scale    = 3785.411784,
        default  = "Ml",
        link     = "US gallon",
    },
    ["oilbbl"] = {
        name1    = "barrel",
        symbol   = "bbl",
        utype    = "volume",
        scale    = 0.158987294928,
        default  = "m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["stere"] = {
        symbol   = "stere",
        usename  = 1,
        utype    = "volume",
        scale    = 1,
        default  = "cuft",
    },
    ["Toilbbl"] = {
        name1    = "trillion barrels",
        name2    = "trillion barrels",
        symbol   = "Tbbl",
        utype    = "volume",
```

```
        scale    = 158987294928,
        default  = "v * 1.58987294928 < 10 ! e9 ! e12 ! m3",
        link     = "Barrel (unit)#Oil barrel",
    },
    ["USbbl"] = {
        name1    = "US barrel",
        name1_us = "U.S. barrel",
        symbol   = "US bbl",
        sym_us   = "U.S. bbl",
        utype    = "volume",
        scale    = 0.119240471196,
        default  = "l USgal impgal",
        link     = "Barrel (unit)",
    },
    ["USbeerbbl"] = {
        name1    = "US beer barrel",
        name1_us = "U.S. beer barrel",
        symbol   = "US bbl",
        sym_us   = "U.S. bbl",
        utype    = "volume",
        scale    = 0.117347765304,
        default  = "l USgal impgal",
        link     = "Barrel (unit)",
    },
    ["USbsh"] = {
        name1    = "US bushel",
        name1_us = "U.S. bushel",
        symbol   = "US bsh",
        sym_us   = "U.S. bsh",
        utype    = "volume",
        scale    = 0.03523907016688,
        default  = "l USdrygal impgal",
        link     = "Bushel",
    },
    ["USbu"] = {
        name1    = "US bushel",
        name1_us = "U.S. bushel",
        symbol   = "US bu",
        sym_us   = "U.S. bu",
        utype    = "volume",
        scale    = 0.03523907016688,
        default  = "l USdrygal impgal",
        link     = "Bushel",
    },
    ["USdrybbl"] = {
        name1    = "US dry barrel",
        name1_us = "U.S. dry barrel",
        symbol   = "US dry bbl",
        sym_us   = "U.S. dry bbl",
        utype    = "volume",
        scale    = 0.11562819898508,
        default  = "m3",
        link     = "Barrel (unit)",
    },
    ["USdrygal"] = {
        name1    = "US dry gallon",
        name1_us = "U.S. dry gallon",
        symbol   = "US dry gal",
        sym_us   = "U.S. dry gal",
        utype    = "volume",
        scale    = 0.00440488377086,
        default  = "l",
        link     = "Gallon",
    },
```

```
    ["USdrypt"] = {
        name1    = "US dry pint",
        name1_us = "U.S. dry pint",
        symbol   = "US dry pt",
        sym_us   = "U.S. dry pt",
        utype    = "volume",
        scale    = 0.0005506104713575,
        default  = "ml",
        link     = "Pint",
    },
    ["USdryqt"] = {
        name1    = "US dry quart",
        name1_us = "U.S. dry quart",
        symbol   = "US dry qt",
        sym_us   = "U.S. dry qt",
        utype    = "volume",
        scale    = 0.001101220942715,
        default  = "ml",
        link     = "Quart",
    },
    ["USflgal"] = {
        name1    = "US gallon",
        name1_us = "U.S. gallon",
        symbol   = "US fl gal",
        sym_us   = "U.S. fl gal",
        utype    = "volume",
        scale    = 0.003785411784,
        default  = "l impgal",
        link     = "Gallon",
    },
    ["USgal"] = {
        name1    = "US gallon",
        name1_us = "U.S. gallon",
        symbol   = "US gal",
        sym_us   = "U.S. gal",
        utype    = "volume",
        scale    = 0.003785411784,
        default  = "l impgal",
    },
    ["USgi"] = {
        name1    = "gill",
        symbol   = "gi",
        utype    = "volume",
        scale    = 0.0001182941183,
        default  = "ml impoz",
        link     = "Gill (unit)",
    },
    ["USkenning"] = {
        name1    = "US kenning",
        name1_us = "U.S. kenning",
        symbol   = "US kenning",
        sym_us   = "U.S. kenning",
        utype    = "volume",
        scale    = 0.01761953508344,
        default  = "l impgal",
        link     = "Kenning (unit)",
    },
    ["USmin"] = {
        name1    = "US minim",
        name1_us = "U.S. minim",
        symbol   = "US min",
        sym_us   = "U.S. min",
        utype    = "volume",
        scale    = 0.00000061611519921875,
```

```
        default  = "ml",
        link     = "Minim (unit)",
    },
    ["USoz"] = {
        name1    = "US fluid ounce",
        name1_us = "U.S. fluid ounce",
        symbol   = "US fl oz",
        sym_us   = "U.S. fl oz",
        utype    = "volume",
        scale    = 0.0000295735295625,
        default  = "ml",
    },
    ["USpk"] = {
        name1    = "US peck",
        name1_us = "U.S. peck",
        symbol   = "US pk",
        sym_us   = "U.S. pk",
        utype    = "volume",
        scale    = 0.00880976754172,
        default  = "l impgal",
        link     = "Peck",
    },
    ["USpt"] = {
        name1    = "US pint",
        name1_us = "U.S. pint",
        symbol   = "US pt",
        sym_us   = "U.S. pt",
        utype    = "volume",
        scale    = 0.000473176473,
        default  = "l imppt",
        link     = "Pint",
    },
    ["USqt"] = {
        name1    = "US quart",
        name1_us = "U.S. quart",
        symbol   = "US qt",
        sym_us   = "U.S. qt",
        utype    = "volume",
        scale    = 0.000946352946,
        default  = "ml",
        link     = "Quart",
        customary= 1,
    },
    ["USquart"] = {
        name1    = "US quart",
        name1_us = "U.S. quart",
        symbol   = "US qt",
        sym_us   = "U.S. qt",
        utype    = "volume",
        scale    = 0.000946352946,
        default  = "ml impoz",
        link     = "Quart",
    },
    ["UStbsp"] = {
        name1    = "US tablespoon",
        name1_us = "U.S. tablespoon",
        symbol   = "US tbsp",
        sym_us   = "U.S. tbsp",
        utype    = "volume",
        scale    = 1.4786764781250001e-5,
        default  = "ml",
    },
    ["winecase"] = {
        symbol   = "case",
```

```
        usename  = 1,
        utype    = "volume",
        scale    = 0.009,
        default  = "l",
        link     = "Case (goods)",
    },
    ["*U.S.drygal"] = {
        target   = "USdrygal",
        sp_us    = true,
        customary= 2,
    },
    ["*U.S.gal"] = {
        target   = "USgal",
        sp_us    = true,
        default  = "L impgal",
        customary= 2,
    },
    ["+USdrygal"] = {
        target   = "USdrygal",
        customary= 1,
    },
    ["+usfloz"] = {
        target   = "USoz",
        link     = "Fluid ounce",
        customary= 1,
    },
    ["+USgal"] = {
        target   = "USgal",
        customary= 1,
    },
    ["+USoz"] = {
        target   = "USoz",
        customary= 1,
    },
    ["@impgal"] = {
        target   = "impgal",
        link     = "Gallon",
        customary= 3,
    },
    ["acre feet"] = {
        target   = "acre-ft",
    },
    ["acre foot"] = {
        target   = "acre-foot",
    },
    ["acre ft"] = {
        target   = "acre-ft",
    },
    ["acre-feet"] = {
        target   = "acre-ft",
    },
    ["acre.foot"] = {
        target   = "acre-foot",
    },
    ["acre.ft"] = {
        target   = "acre-ft",
    },
    ["acre·ft"] = {
        target   = "acre-ft",
    },
    ["bushels"] = {
        target   = "USbsh",
    },
    ["cid"] = {
```

```
        target   = "CID",
    },
    ["ft3"] = {
        target   = "cuft",
    },
    ["gal"] = {
        target   = "USgal",
    },
    ["gallon"] = {
        shouldbe = "Use %{USgal%} for US gallons or %{impgal%} for imperial gallo
    },
    ["gallons"] = {
        shouldbe = "Use %{USgal%} for US gallons or %{impgal%} for imperial gallo
    },
    ["Gcuft"] = {
        target   = "e9cuft",
    },
    ["impfloz"] = {
        target   = "impoz",
    },
    ["Impgal"] = {
        target   = "impgal",
    },
    ["in3"] = {
        target   = "cuin",
        symbol   = "in<sup>3</sup>",
    },
    ["kcuft"] = {
        target   = "e3cuft",
    },
    ["kcum"] = {
        target   = "e3m3",
    },
    ["km³"] = {
        target   = "km3",
    },
    ["liter"] = {
        target   = "L",
        sp_us    = true,
    },
    ["liters"] = {
        target   = "L",
        sp_us    = true,
    },
    ["litre"] = {
        target   = "L",
    },
    ["litres"] = {
        target   = "L",
    },
    ["Mcuft"] = {
        target   = "e6cuft",
    },
    ["Mcum"] = {
        target   = "e6m3",
    },
    ["Mft3"] = {
        target   = "e6cuft",
    },
    ["mi3"] = {
        target   = "cumi",
    },
    ["m³"] = {
        target   = "m3",
```

```
    },
    ["Pcuft"] = {
        target   = "e15cuft",
    },
    ["pt"] = {
        shouldbe = "Use %{USpt%} for US pints or %{imppt%} for imperial pints (nc
    },
    ["qt"] = {
        shouldbe = "Use %{USqt%} for US quarts or %{impqt%} for imperial quarts (
    },
    ["Tcuft"] = {
        target   = "e12cuft",
    },
    ["Tft3"] = {
        target   = "e12cuft",
    },
    ["U.S.bbl"] = {
        target   = "USbbl",
        sp_us    = true,
        default  = "l U.S.gal impgal",
    },
    ["U.S.beerbbl"] = {
        target   = "USbeerbbl",
        sp_us    = true,
        default  = "l U.S.gal impgal",
    },
    ["U.S.bsh"] = {
        target   = "USbsh",
        sp_us    = true,
        default  = "l U.S.drygal impgal",
    },
    ["U.S.bu"] = {
        target   = "USbu",
        sp_us    = true,
        default  = "l U.S.drygal impgal",
    },
    ["U.S.drybbl"] = {
        target   = "USdrybbl",
        sp_us    = true,
    },
    ["U.S.drygal"] = {
        target   = "USdrygal",
        sp_us    = true,
    },
    ["U.S.drypt"] = {
        target   = "USdrypt",
        sp_us    = true,
    },
    ["U.S.dryqt"] = {
        target   = "USdryqt",
        sp_us    = true,
    },
    ["U.S.flgal"] = {
        target   = "USflgal",
        sp_us    = true,
    },
    ["U.S.floz"] = {
        target   = "USoz",
        sp_us    = true,
    },
    ["U.S.gal"] = {
        target   = "USgal",
        sp_us    = true,
        default  = "L impgal",
```

```
        link     = "U.S. gallon",
    },
    ["u.s.gal"] = {
        target   = "USgal",
        sp_us    = true,
        default  = "L impgal",
        link     = "U.S. gallon",
    },
    ["U.S.gi"] = {
        target   = "USgi",
        sp_us    = true,
    },
    ["U.S.kenning"] = {
        target   = "USkenning",
        sp_us    = true,
    },
    ["U.S.oz"] = {
        target   = "USoz",
        sp_us    = true,
    },
    ["U.S.pk"] = {
        target   = "USpk",
        sp_us    = true,
    },
    ["U.S.pt"] = {
        target   = "USpt",
        sp_us    = true,
    },
    ["U.S.qt"] = {
        target   = "USqt",
        sp_us    = true,
        default  = "L impqt",
        customary= 2,
    },
    ["usbbl"] = {
        target   = "USbbl",
    },
    ["usbeerbbl"] = {
        target   = "USbeerbbl",
    },
    ["usbsh"] = {
        target   = "USbsh",
    },
    ["usbu"] = {
        target   = "USbu",
    },
    ["usdrybbl"] = {
        target   = "USdrybbl",
    },
    ["usdrygal"] = {
        target   = "USdrygal",
    },
    ["usdrypt"] = {
        target   = "USdrypt",
    },
    ["usdryqt"] = {
        target   = "USdryqt",
    },
    ["USfloz"] = {
        target   = "USoz",
    },
    ["usfloz"] = {
        target   = "USoz",
    },
```

```
    ["USGAL"] = {
        target   = "USgal",
    },
    ["usgal"] = {
        target   = "USgal",
    },
    ["usgi"] = {
        target   = "USgi",
    },
    ["uskenning"] = {
        target   = "USkenning",
    },
    ["usoz"] = {
        target   = "USoz",
    },
    ["uspk"] = {
        target   = "USpk",
    },
    ["uspt"] = {
        target   = "USpt",
    },
    ["usqt"] = {
        target   = "USqt",
    },
    ["yd3"] = {
        target   = "cuyd",
    },
    ["cuft/sqmi"] = {
        per      = { "cuft", "sqmi" },
        utype    = "volume per unit area",
        default  = "m3/km2",
    },
    ["m3/ha"] = {
        name1    = "cubic metre per hectare",
        name1_us = "cubic meter per hectare",
        name2    = "cubic metres per hectare",
        name2_us = "cubic meters per hectare",
        symbol   = "m<sup>3</sup>/ha",
        utype    = "volume per unit area",
        scale    = 0.0001,
        default  = "USbu/acre",
        link     = "Hectare",
    },
    ["m3/km2"] = {
        per      = { "m3", "km2" },
        utype    = "volume per unit area",
        default  = "cuft/sqmi",
    },
    ["U.S.gal/acre"] = {
        per      = { "U.S.gal", "acre" },
        utype    = "volume per unit area",
        default  = "m3/km2",
    },
    ["USbu/acre"] = {
        name2    = "US bushels per acre",
        symbol   = "US bushel per acre",
        usename  = 1,
        utype    = "volume per unit area",
        scale    = 8.7077638761350888e-6,
        default  = "m3/ha",
        link     = "Bushel",
    },
    ["USgal/acre"] = {
        per      = { "USgal", "acre" },
```

```
        utype    = "volume per unit area",
        default  = "m3/km2",
    },
    ["cuyd/mi"] = {
        per      = { "cuyd", "mi" },
        utype    = "volume per unit length",
        default  = "m3/km",
    },
    ["m3/km"] = {
        per      = { "m3", "km" },
        utype    = "volume per unit length",
        default  = "cuyd/mi",
    },
    ["mich"] = {
        combination= { "ch", "mi" },
        multiple = { 80 },
        utype    = "length",
    },
    ["michlk"] = {
        combination= { "chlk", "mi" },
        multiple = { 80 },
        utype    = "length",
    },
    ["michainlk"] = {
        combination= { "chainlk", "mi" },
        multiple = { 80 },
        utype    = "length",
    },
    ["miyd"] = {
        combination= { "yd", "mi" },
        multiple = { 1760 },
        utype    = "length",
    },
    ["miydftin"] = {
        combination= { "in", "ft", "yd", "mi" },
        multiple = { 12, 3, 1760 },
        utype    = "length",
    },
    ["mift"] = {
        combination= { "ft", "mi" },
        multiple = { 5280 },
        utype    = "length",
    },
    ["ydftin"] = {
        combination= { "in", "ft", "yd" },
        multiple = { 12, 3 },
        utype    = "length",
    },
    ["ydft"] = {
        combination= { "ft", "yd" },
        multiple = { 3 },
        utype    = "length",
    },
    ["ftin"] = {
        combination= { "in", "ft" },
        multiple = { 12 },
        utype    = "length",
    },
    ["footin"] = {
        combination= { "in", "foot" },
        multiple = { 12 },
        utype    = "length",
    },
    ["handin"] = {
```

```
        combination= { "in", "hand" },
        multiple = { 4 },
        utype    = "length",
    },
    ["lboz"] = {
        combination= { "oz", "lb" },
        multiple = { 16 },
        utype    = "mass",
    },
    ["stlb"] = {
        combination= { "lb", "st" },
        multiple = { 14 },
        utype    = "mass",
    },
    ["stlboz"] = {
        combination= { "oz", "lb", "st" },
        multiple = { 16, 14 },
        utype    = "mass",
    },
    ["st and lb"] = {
        combination= { "lb", "st" },
        multiple = { 14 },
        utype    = "mass",
    },
    ["GN LTf"] = {
        combination= { "GN", "-LTf" },
        utype    = "force",
    },
    ["GN LTf STf"] = {
        combination= { "GN", "-LTf", "-STf" },
        utype    = "force",
    },
    ["GN STf"] = {
        combination= { "GN", "-STf" },
        utype    = "force",
    },
    ["GN STf LTf"] = {
        combination= { "GN", "-STf", "-LTf" },
        utype    = "force",
    },
    ["kN LTf"] = {
        combination= { "kN", "-LTf" },
        utype    = "force",
    },
    ["kN LTf STf"] = {
        combination= { "kN", "-LTf", "-STf" },
        utype    = "force",
    },
    ["kN STf"] = {
        combination= { "kN", "-STf" },
        utype    = "force",
    },
    ["kN STf LTf"] = {
        combination= { "kN", "-STf", "-LTf" },
        utype    = "force",
    },
    ["LTf STf"] = {
        combination= { "-LTf", "-STf" },
        utype    = "force",
    },
    ["MN LTf"] = {
        combination= { "MN", "-LTf" },
        utype    = "force",
    },
```

```
    ["MN LTf STf"] = {
        combination= { "MN", "-LTf", "-STf" },
        utype    = "force",
    },
    ["MN STf"] = {
        combination= { "MN", "-STf" },
        utype    = "force",
    },
    ["MN STf LTf"] = {
        combination= { "MN", "-STf", "-LTf" },
        utype    = "force",
    },
    ["STf LTf"] = {
        combination= { "-STf", "-LTf" },
        utype    = "force",
    },
    ["L/100 km mpgimp"] = {
        combination= { "L/100 km", "mpgimp" },
        utype    = "fuel efficiency",
    },
    ["l/100 km mpgimp"] = {
        combination= { "l/100 km", "mpgimp" },
        utype    = "fuel efficiency",
    },
    ["L/100 km mpgUS"] = {
        combination= { "L/100 km", "mpgus" },
        utype    = "fuel efficiency",
    },
    ["L/100 km mpgus"] = {
        combination= { "L/100 km", "mpgus" },
        utype    = "fuel efficiency",
    },
    ["l/100 km mpgus"] = {
        combination= { "l/100 km", "mpgus" },
        utype    = "fuel efficiency",
    },
    ["mpgimp L/100 km"] = {
        combination= { "mpgimp", "L/100 km" },
        utype    = "fuel efficiency",
    },
    ["LT ST t"] = {
        combination= { "lt", "-ST", "t" },
        utype    = "mass",
    },
    ["LT t ST"] = {
        combination= { "lt", "t", "-ST" },
        utype    = "mass",
    },
    ["ST LT t"] = {
        combination= { "-ST", "lt", "t" },
        utype    = "mass",
    },
    ["ST t LT"] = {
        combination= { "-ST", "t", "lt" },
        utype    = "mass",
    },
    ["t LT ST"] = {
        combination= { "t", "lt", "-ST" },
        utype    = "mass",
    },
    ["ton"] = {
        combination= { "LT", "ST" },
        utype    = "mass",
    },
```

```
    ["kPa kg/cm2"] = {
        combination= { "kPa", "kgf/cm2" },
        utype    = "pressure",
    },
    ["kPa lb/in2"] = {
        combination= { "kPa", "-lb/in2" },
        utype    = "pressure",
    },
    ["floz"] = {
        combination= { "impoz", "USoz" },
        utype    = "volume",
    },
}

-------------------------------------------------------------------------------
-- Do not change the data in this table because it is created by running --
-- a script that reads the wikitext from a wiki page (see note above).   --
-------------------------------------------------------------------------------
local default_exceptions = {
        -- Prefixed units with a default different from that of the base unit.
        -- Each key item is a prefixed symbol (unitcode for engineering notation)
        ["cm<sup>2</sup>"] = "sqin",
        ["dm<sup>2</sup>"] = "sqin",
        ["e3acre"] = "km2",
        ["e3m2"] = "e6sqft",
        ["e6acre"] = "km2",
        ["e6ha"] = "e6acre",
        ["e6km2"] = "e6sqmi",
        ["e6m2"] = "e6sqft",
        ["e6sqft"] = "v * 9.290304 < 100 ! e3 ! e6 ! m2",
        ["e6sqmi"] = "e6km2",
        ["hm<sup>2</sup>"] = "acre",
        ["km<sup>2</sup>"] = "sqmi",
        ["mm<sup>2</sup>"] = "sqin",
        ["aJ"] = "eV",
        ["e3BTU"] = "MJ",
        ["e6BTU"] = "GJ",
        ["EJ"] = "kWh",
        ["fJ"] = "keV",
        ["GJ"] = "kWh",
        ["MJ"] = "kWh",
        ["PJ"] = "kWh",
        ["pJ"] = "MeV",
        ["TJ"] = "kWh",
        ["YJ"] = "kWh",
        ["yJ"] = "µeV",
        ["ZJ"] = "kWh",
        ["zJ"] = "meV",
        ["e12cuft/a"] = "v * 2.8316846592 < 100 ! e9 ! e12 ! m3/a",
        ["e12cuft/d"] = "v * 2.8316846592 < 100 ! e9 ! e12 ! m3/d",
        ["e12m3/a"] = "Tcuft/a",
        ["e12m3/d"] = "Tcuft/d",
        ["e3cuft/a"] = "v * 2.8316846592 < 100 ! ! e3 ! m3/a",
        ["e3cuft/d"] = "v * 2.8316846592 < 100 ! ! e3 ! m3/d",
        ["e3cuft/s"] = "v * 2.8316846592 < 100 ! ! e3 ! m3/s",
        ["e3m3/a"] = "v < 28.316846592 ! k ! M ! cuft/a",
        ["e3m3/d"] = "v < 28.316846592 ! k ! M ! cuft/d",
        ["e3m3/s"] = "v < 28.316846592 ! k ! M ! cuft/s",
        ["e3USgal/a"] = "v * 3.785411784 < 1000 ! ! e3 ! m3/a",
        ["e6cuft/a"] = "v * 2.8316846592 < 100 ! e3 ! e6 ! m3/a",
        ["e6cuft/d"] = "v * 2.8316846592 < 100 ! e3 ! e6 ! m3/d",
        ["e6cuft/s"] = "v * 2.8316846592 < 100 ! e3 ! e6 ! m3/s",
        ["e6m3/a"] = "v < 28.316846592 ! M ! G ! cuft/a",
        ["e6m3/d"] = "v < 28.316846592 ! M ! G ! cuft/d",
```

```
        ["e6m3/s"] = "v < 28.316846592 ! e6 ! e9 ! cuft/s",
        ["e6USgal/a"] = "v * 3.785411784 < 1000 ! e3 ! e6 ! m3/a",
        ["e9cuft/a"] = "m3/a",
        ["e9cuft/d"] = "v * 2.8316846592 < 100 ! e6 ! e9 ! m3/d",
        ["e9m3/a"] = "v < 28.316846592 ! G ! T ! cuft/a",
        ["e9m3/d"] = "v < 28.316846592 ! G ! T ! cuft/d",
        ["e9m3/s"] = "v < 28.316846592 ! e9 ! e12 ! cuft/s",
        ["e9USgal/a"] = "v * 3.785411784 < 1000 ! e6 ! e9 ! m3/a",
        ["e9USgal/s"] = "v * 3.785411784 < 1000 ! e6 ! e9 ! m3/s",
        ["nN"] = "gr-f",
        ["µN"] = "gr-f",
        ["mN"] = "oz-f",
        ["am"] = "in",
        ["cm"] = "in",
        ["dam"] = "ft",
        ["dm"] = "in",
        ["e12km"] = "e12mi",
        ["e12mi"] = "e12km",
        ["e3AU"] = "ly",
        ["e3km"] = "e3mi",
        ["e3mi"] = "e3km",
        ["e6km"] = "e6mi",
        ["e6mi"] = "e6km",
        ["e9km"] = "AU",
        ["e9mi"] = "e9km",
        ["Em"] = "mi",
        ["fm"] = "in",
        ["Gm"] = "mi",
        ["hm"] = "ft",
        ["km"] = "mi",
        ["mm"] = "in",
        ["Mm"] = "mi",
        ["nm"] = "in",
        ["Pm"] = "mi",
        ["pm"] = "in",
        ["Tm"] = "mi",
        ["Ym"] = "mi",
        ["ym"] = "in",
        ["Zm"] = "mi",
        ["zm"] = "in",
        ["µm"] = "in",
        ["e12lb"] = "v * 4.5359237 < 10 ! Mt ! Gt",
        ["e3lb"] = "v * 4.5359237 < 10 ! kg ! t",
        ["e3ozt"] = "v * 0.311034768 < 10 ! kg ! t",
        ["e3t"] = "LT ST",
        ["e6carat"] = "t",
        ["e6lb"] = "v * 4.5359237 < 10 ! t ! kilotonne",
        ["e6ozt"] = "lb kg",
        ["e6ST"] = "Mt",
        ["e6t"] = "LT ST",
        ["e9lb"] = "v * 4.5359237 < 10 ! kilotonne ! Mt",
        ["e9t"] = "LT ST",
        ["Gg"] = "lb",
        ["kg"] = "lb",
        ["mg"] = "gr",
        ["Mg"] = "LT ST",
        ["ng"] = "gr",
        ["µg"] = "gr",
        ["mBq"] = "fCi",
        ["kBq"] = "nCi",
        ["MBq"] = "µCi",
        ["GBq"] = "mCi",
        ["TBq"] = "Ci",
        ["PBq"] = "kCi",
```

```
        ["EBq"] = "kCi",
        ["fCi"] = "mBq",
        ["pCi"] = "Bq",
        ["nCi"] = "Bq",
        ["µCi"] = "kBq",
        ["mCi"] = "MBq",
        ["kCi"] = "TBq",
        ["MCi"] = "PBq",
        ["ns"] = "µs",
        ["µs"] = "ms",
        ["ms"] = "s",
        ["ks"] = "h",
        ["Ms"] = "week",
        ["Gs"] = "decade",
        ["Ts"] = "millennium",
        ["Ps"] = "million year",
        ["Es"] = "thousand million year",
        ["MK"] = "keVT",
        ["cL"] = "impoz usoz",
        ["cl"] = "impoz usoz",
        ["cm<sup>3</sup>"] = "cuin",
        ["dL"] = "impoz usoz",
        ["dl"] = "impoz usoz",
        ["mm<sup>3</sup>"] = "cuin",
        ["dm<sup>3</sup>"] = "cuin",
        ["e12cuft"] = "v * 2.8316846592 < 100 ! e9 ! e12 ! m3",
        ["e12impgal"] = "v * 4.54609 < 1000 ! T ! P ! l",
        ["e12m3"] = "v < 28.316846592 ! T ! P ! cuft",
        ["e12U.S.gal"] = "v * 3.785411784 < 1000 ! T ! P ! l",
        ["e12USgal"] = "v * 3.785411784 < 1000 ! T ! P ! l",
        ["e15cuft"] = "v * 2.8316846592 < 100 ! e12 ! e15 ! m3",
        ["e15m3"] = "Pcuft",
        ["e3bdft"] = "v * 0.23597372167 < 100 ! e3 ! e6 ! m3",
        ["e3cuft"] = "v * 2.8316846592 < 100 ! ! e3 ! m3",
        ["e3impgal"] = "v * 4.54609 < 1000 ! k ! M ! l",
        ["e3m3"] = "v < 28.316846592 ! k ! M ! cuft",
        ["e3U.S.gal"] = "v * 3.785411784 < 1000 ! k ! M ! l",
        ["e3USgal"] = "v * 3.785411784 < 1000 ! k ! M ! l",
        ["e6bdft"] = "v * 0.23597372167 < 100 ! e3 ! e6 ! m3",
        ["e6cuft"] = "v * 2.8316846592 < 100 ! e3 ! e6 ! m3",
        ["e6cuyd"] = "v * 7.64554857984 < 10 ! e3 ! e6 ! m3",
        ["e6impgal"] = "v * 4.54609 < 1000 ! M ! G ! l",
        ["e6L"] = "USgal",
        ["e6m3"] = "v < 28.316846592 ! M ! G ! cuft",
        ["e6U.S.gal"] = "v * 3.785411784 < 1000 ! M ! G ! l",
        ["e6USgal"] = "v * 3.785411784 < 1000 ! M ! G ! l",
        ["e9bdft"] = "v * 0.23597372167 < 100 ! e6 ! e9 ! m3",
        ["e9cuft"] = "v * 2.8316846592 < 100 ! e6 ! e9 ! m3",
        ["e9impgal"] = "v * 4.54609 < 1000 ! G ! T ! l",
        ["e9m3"] = "v < 28.316846592 ! G ! T ! cuft",
        ["e9U.S.gal"] = "v * 3.785411784 < 1000 ! G ! T ! l",
        ["e9USgal"] = "v * 3.785411784 < 1000 ! G ! T ! l",
        ["GL"] = "cuft",
        ["Gl"] = "cuft",
        ["kL"] = "cuft",
        ["kl"] = "cuft",
        ["km<sup>3</sup>"] = "cumi",
        ["mL"] = "impoz usoz",
        ["ml"] = "impoz usoz",
        ["Ml"] = "v < 28.316846592 ! e3 ! e6 ! cuft",
        ["ML"] = "v < 28.316846592 ! e3 ! e6 ! cuft",
        ["TL"] = "cumi",
        ["Tl"] = "cumi",
        ["µL"] = "cuin",
```

```
        ["µl"] = "cuin",
}

--------------------------------------------------------------------------------
-- Do not change the data in this table because it is created by running --
-- a script that reads the wikitext from a wiki page (see note above).   --
--------------------------------------------------------------------------------
local link_exceptions = {
        -- Prefixed units with a linked article different from that of the base u
        -- Each key item is a prefixed symbol (not unitcode).
        ["mm<sup>2</sup>"] = "Square millimetre",
        ["cm<sup>2</sup>"] = "Square centimetre",
        ["dm<sup>2</sup>"] = "Square decimetre",
        ["km<sup>2</sup>"] = "Square kilometre",
        ["kJ"] = "Kilojoule",
        ["MJ"] = "Megajoule",
        ["GJ"] = "Gigajoule",
        ["TJ"] = "Terajoule",
        ["fm"] = "Femtometre",
        ["pm"] = "Picometre",
        ["nm"] = "Nanometre",
        ["µm"] = "Micrometre",
        ["mm"] = "Millimetre",
        ["cm"] = "Centimetre",
        ["dm"] = "Decimetre",
        ["dam"] = "Decametre",
        ["hm"] = "Hectometre",
        ["km"] = "Kilometre",
        ["Mm"] = "Megametre",
        ["Gm"] = "Gigametre",
        ["Tm"] = "Terametre",
        ["Pm"] = "Petametre",
        ["Em"] = "Exametre",
        ["Zm"] = "Zettametre",
        ["Ym"] = "Yottametre",
        ["µg"] = "Microgram",
        ["mg"] = "Milligram",
        ["kg"] = "Kilogram",
        ["Mg"] = "Tonne",
        ["yW"] = "Yoctowatt",
        ["zW"] = "Zeptowatt",
        ["aW"] = "Attowatt",
        ["fW"] = "Femtowatt",
        ["pW"] = "Picowatt",
        ["nW"] = "Nanowatt",
        ["µW"] = "Microwatt",
        ["mW"] = "Milliwatt",
        ["kW"] = "Kilowatt",
        ["MW"] = "Megawatt",
        ["GW"] = "Gigawatt",
        ["TW"] = "Terawatt",
        ["PW"] = "Petawatt",
        ["EW"] = "Exawatt",
        ["ZW"] = "Zettawatt",
        ["YW"] = "Yottawatt",
        ["as"] = "Attosecond",
        ["fs"] = "Femtosecond",
        ["ps"] = "Picosecond",
        ["ns"] = "Nanosecond",
        ["µs"] = "Microsecond",
        ["ms"] = "Millisecond",
        ["ks"] = "Kilosecond",
        ["Ms"] = "Megasecond",
        ["Gs"] = "Gigasecond",
```

```
        ["Ts"] = "Terasecond",
        ["Ps"] = "Petasecond",
        ["Es"] = "Exasecond",
        ["Zs"] = "Zettasecond",
        ["Ys"] = "Yottasecond",
        ["mm<sup>3</sup>"] = "Cubic millimetre",
        ["cm<sup>3</sup>"] = "Cubic centimetre",
        ["dm<sup>3</sup>"] = "Cubic decimetre",
        ["dam<sup>3</sup>"] = "Cubic decametre",
        ["km<sup>3</sup>"] = "Cubic kilometre",
        ["µL"] = "Microlitre",
        ["µl"] = "Microlitre",
        ["mL"] = "Millilitre",
        ["ml"] = "Millilitre",
        ["cL"] = "Centilitre",
        ["cl"] = "Centilitre",
        ["dL"] = "Decilitre",
        ["dl"] = "Decilitre",
        ["daL"] = "Decalitre",
        ["dal"] = "Decalitre",
        ["hL"] = "Hectolitre",
        ["hl"] = "Hectolitre",
        ["kL"] = "Kilolitre",
        ["kl"] = "Kilolitre",
        ["ML"] = "Megalitre",
        ["Ml"] = "Megalitre",
        ["GL"] = "Gigalitre",
        ["Gl"] = "Gigalitre",
        ["TL"] = "Teralitre",
        ["Tl"] = "Teralitre",
        ["PL"] = "Petalitre",
        ["Pl"] = "Petalitre",
}

--------------------------------------------------------------------------------
-- Do not change the data in this table because it is created by running --
-- a script that reads the wikitext from a wiki page (see note above).   --
--------------------------------------------------------------------------------
local per_unit_fixups = {
        -- Automatically created per units of form "x/y" may have their unit type
        -- changed, for example, "length/time" is changed to "speed".
        -- Other adjustments can also be specified.
        ["/area"] = "per unit area",
        ["/volume"] = "per unit volume",
        ["area/area"] = "area per unit area",
        ["energy/length"] = "energy per unit length",
        ["energy/mass"] = "energy per unit mass",
        ["energy/time"] = { utype = "power", link = "Power (physics)" },
        ["energy/volume"] = "energy per unit volume",
        ["force/area"] = { utype = "pressure", link = "Pressure" },
        ["length/length"] = { utype = "gradient", link = "Grade (slope)" },
        ["length/time"] = { utype = "speed", link = "Speed" },
        ["length/time/time"] = { utype = "acceleration", link = "Acceleration" },
        ["mass/area"] = { utype = "pressure", multiplier = 9.80665 },
        ["mass/length"] = "linear density",
        ["mass/mass"] = "concentration",
        ["mass/power"] = "mass per unit power",
        ["mass/time"] = "mass per unit time",
        ["mass/volume"] = { utype = "density", link = "Density" },
        ["power/mass"] = "power per unit mass",
        ["power/volume"] = { link = "Power density" },
        ["pressure/length"] = "fracture gradient",
        ["speed/time"] = { utype = "acceleration", link = "Acceleration" },
        ["volume/area"] = "volume per unit area",
```

```
        ["volume/length"] = "volume per unit length",
        ["volume/time"] = "flow",
}

return {
        all_units = all_units,
        default_exceptions = default_exceptions,
        link_exceptions = link_exceptions,
        per_unit_fixups = per_unit_fixups,
}
```

Modul:Convert/data/sandbox/Doku

Dies ist die Dokumentationsseite für Modul:Convert/data/sandbox

This page defines the conversion data used by Module:Convert. All documentation (from Module:Convert/doc) is at that page.

Do not manually add units to this page. First add the unit definitions in Module:Convert/documentation/conversion data. And then update this page by copying the results from Module:Convert/makeunits (those results appear at Module talk:Convert/makeunits).

Any changes should first be tested at Module:Convert/data/sandbox—see Module:Convert/sandbox/testcases.

New units can be manually added at Module:Convert/extra as a temporary measure before being incorporated into this main table.

Modul:Convert/extra

This module can be used to quickly add a new unit for use with Vorlage:Tl. When satisfied that a unit is working correctly, ask at Module talk:Convert for the unit to be moved to the permanent list of units.

See Template:Convert/unit sandbox for a good way to prepare unit definitions that can be copied into this page.

The following extracts from Module:Convert/data show examples that could be used to define a new unit. Any number of spaces can be used where blanks are shown in the following.

Vorlage:Collapse top

```
-- These are EXAMPLES on the documentation page. Scroll down to see the module co
local extra_units = {
    -- Similar to a redirect: "sqm" is an alias for "m2".
    -- {{convert|1.5|m2|sp=us}}  → 1.5 square meters (16 sq ft)
    -- {{convert|1.5|sqm|sp=us}} → 1.5 square meters (16 sq ft)
    ["sqm"] = {
        target   = "m2",
    },
    -- A simple unit, showing the minimum that is required.
    -- The "ha" is the unit code used to identify the unit:
    -- {{convert|1.5|ha}} → 1.5 hectares (3.7 acres)
    ["ha"] = {
        name1    = "hectare",
        symbol   = "ha",
        utype    = "area",
        scale    = 10000,
        default  = "acre",
    },
    -- A unit which accepts an SI prefix. There is no "name1" field because it
    -- has to be constructed (mJ gives "millijoule"; MJ gives "megajoule").
    -- {{convert|125|kJ}} → 125 kilojoules (30,000 cal)
    ["J"] = {
        _name1   = "joule",
        _symbol  = "J",
        utype    = "energy",
        scale    = 1,
        prefixes = 1,
        default  = "cal",
        link     = "Joule",
    },
    -- A unit where US and plural names are required.
    -- {{convert|125|cm/s2}} → 125 centimetres per second squared (4.1 ft/s²)
    ["cm/s2"] = {
        name1    = "centimetre per second squared",
        name1_us = "centimeter per second squared",
        name2    = "centimetres per second squared",
        name2_us = "centimeters per second squared",
        symbol   = "cm/s<sup>2</sup>",
        utype    = "acceleration",
        scale    = 0.01,
        default  = "ft/s2",
        link     = "Gal (unit)",
    },
    -- A "per" unit is defined as the ratio of two other units.
```

```
    -- {{convert|125|g/cm3}} → 125 grams per cubic centimetre (4.5 lb/cu in)
    ["g/cm3"] = {
        per      = { "g", "cm3" },
        utype    = "density",
        default  = "lb/cuin",
    },
    -- If the automatic "per" link is not wanted, a link can be specified.
    -- {{convert|125|g/cm3|lk=on|disp=unit}} → [[gram]]s per [[cubic centimetre]]
    -- {{convert|125|g/m3|lk=on|disp=unit}} → [[density|grams per cubic metre]]
    ["g/m3"] = {
  per  = { "g", "m3" },
  utype  = "density",
  default  = "lb/cuyd",
  link  = "density",
    },
    -- Characters "$" and "£" are recognized as currency symbols.
    -- {{convert|125|$/acre}} → $125 per acre ($310/ha)
    ["$/acre"] = {
        per      = { "$", "acre" },
        utype    = "cost $ per unit area",
        default  = "$/ha",
    },
    -- An output unit can be defined as a combination of existing units.
    -- {{convert|2|ha|ft2 m2}} → 2 hectares (220,000 sq ft; 20,000 m²)
    -- Any number of output units can be specified.
    -- NOTE: There may be no need to define a combination because a convert
    --       can specify the output by joining unit codes with "+":
    -- {{convert|1.2|acre|ft2+yd2+m2}} → 1.2 acres (52,000 sq ft; 5,800 sq yd; 4,
    ["ft2 m2"] = {
        combination = { "ft2", "m2" },
        utype    = "area",
    },
    -- An output unit can be defined using subunits (from least to most significa
    -- {{convert|90|in|ydftin}} → 90 inches (2 yd 1 ft 6 in)
    ["ydftin"] = {
        combination = { "in", "ft", "yd" },
        multiple = { 12, 3 },
        utype    = "length",
    },
}
```

Vorlage:Collapse bottom

Field	Description
symbol	Unit identifier used when abbr=on is in effect.
name1	Singular name of the unit used when abbr=off is in effect.
name2	Plural name of the unit; not required if it is the same as name1 plus "s".
name1_us	Singular name when sp=us is in effect; not required if the same as name1.
name2_us	Plural name when sp=us is in effect; not required if the same as name1_us plus "s".
utype	Unit type; must be exactly the same as the utype of any other unit used in a conversion.
scale	Number of base units in the unit being defined.

Field	Description
default	Unit code of the default output used when no output unit is specified in a conversion.
target	Unit code of an existing unit (the unit being defined "redirects" to the existing unit).
prefixes	Use 1 if an SI prefix is accepted; 2 is used for m^2, and 3 is used for m^3.
link	Article title used when lk=on is in effect; not required if it is the same as name1.

Vorlage:Anchor

```
-- Extra conversion data used by Module:Convert.
--
-- [[Module:Convert/data]] defines all units and is transcluded in all pages
-- where [[Module:Convert]] is used. Testing new units by editing that module
-- would invalidate the cache for all affected pages.
--
-- For quick changes and experiments with new units, this module can be edited.
-- Since this module is transcluded in only a small number of pages, changes
-- should cause little server overhead and should propagate quickly.
--
-- If a unit is defined in the data module, any definition here is ignored,
-- so defining the same unit in both modules is not an error.
-- A unit defined here can refer to units that are also defined here, and
-- can refer to units defined in the data module.
--
-- Periodically, those extra units that are wanted permanently can be removed
-- from here after being added to [[Module:Convert/data]].

local extra_units = {
}

return { extra_units = extra_units }
```

Modul:Convert/extra/Doku

Dies ist die Dokumentationsseite für Modul:Convert/extra

This module can be used to quickly add a new unit for use with Vorlage:Tl. When satisfied that a unit is working correctly, ask at Module talk:Convert for the unit to be moved to the permanent list of units.

See Template:Convert/unit sandbox for a good way to prepare unit definitions that can be copied into this page.

The following extracts from Module:Convert/data show examples that could be used to define a new unit. Any number of spaces can be used where blanks are shown in the following.

Vorlage:Collapse top

```
-- These are EXAMPLES on the documentation page. Scroll down to see the module co
local extra_units = {
    -- Similar to a redirect: "sqm" is an alias for "m2".
    -- {{convert|1.5|m2|sp=us}}  → 1.5 square meters (16 sq ft)
    -- {{convert|1.5|sqm|sp=us}} → 1.5 square meters (16 sq ft)
    ["sqm"] = {
        target   = "m2",
    },
    -- A simple unit, showing the minimum that is required.
    -- The "ha" is the unit code used to identify the unit:
    -- {{convert|1.5|ha}} → 1.5 hectares (3.7 acres)
    ["ha"] = {
        name1    = "hectare",
        symbol   = "ha",
        utype    = "area",
        scale    = 10000,
        default  = "acre",
    },
    -- A unit which accepts an SI prefix. There is no "name1" field because it
    -- has to be constructed (mJ gives "millijoule"; MJ gives "megajoule").
    -- {{convert|125|kJ}} → 125 kilojoules (30,000 cal)
    ["J"] = {
        _name1   = "joule",
        _symbol  = "J",
        utype    = "energy",
        scale    = 1,
        prefixes = 1,
        default  = "cal",
        link     = "Joule",
    },
    -- A unit where US and plural names are required.
    -- {{convert|125|cm/s2}} → 125 centimetres per second squared (4.1 ft/s²)
    ["cm/s2"] = {
        name1    = "centimetre per second squared",
        name1_us = "centimeter per second squared",
        name2    = "centimetres per second squared",
        name2_us = "centimeters per second squared",
        symbol   = "cm/s<sup>2</sup>",
        utype    = "acceleration",
        scale    = 0.01,
        default  = "ft/s2",
```

```
        link     = "Gal (unit)",
    },
    -- A "per" unit is defined as the ratio of two other units.
    -- {{convert|125|g/cm3}} → 125 grams per cubic centimetre (4.5 lb/cu in)
    ["g/cm3"] = {
        per      = { "g", "cm3" },
        utype    = "density",
        default  = "lb/cuin",
    },
    -- If the automatic "per" link is not wanted, a link can be specified.
    -- {{convert|125|g/cm3|lk=on|disp=unit}} → [[gram]]s per [[cubic centimetre]]
    -- {{convert|125|g/m3|lk=on|disp=unit}} → [[density|grams per cubic metre]]
    ["g/m3"] = {
  per  = { "g", "m3" },
  utype  = "density",
  default  = "lb/cuyd",
  link  = "density",
    },
    -- Characters "$" and "£" are recognized as currency symbols.
    -- {{convert|125|$/acre}} → $125 per acre ($310/ha)
    ["$/acre"] = {
        per      = { "$", "acre" },
        utype    = "cost $ per unit area",
        default  = "$/ha",
    },
    -- An output unit can be defined as a combination of existing units.
    -- {{convert|2|ha|ft2 m2}} → 2 hectares (220,000 sq ft; 20,000 m²)
    -- Any number of output units can be specified.
    -- NOTE: There may be no need to define a combination because a convert
    --       can specify the output by joining unit codes with "+":
    -- {{convert|1.2|acre|ft2+yd2+m2}} → 1.2 acres (52,000 sq ft; 5,800 sq yd; 4,
    ["ft2 m2"] = {
        combination = { "ft2", "m2" },
        utype    = "area",
    },
    -- An output unit can be defined using subunits (from least to most significa
    -- {{convert|90|in|ydftin}} → 90 inches (2 yd 1 ft 6 in)
    ["ydftin"] = {
        combination = { "in", "ft", "yd" },
        multiple = { 12, 3 },
        utype    = "length",
    },
}
```

Vorlage:Collapse bottom

Field	Description
symbol	Unit identifier used when abbr=on is in effect.
name1	Singular name of the unit used when abbr=off is in effect.
name2	Plural name of the unit; not required if it is the same as name1 plus "s".
name1_us	Singular name when sp=us is in effect; not required if the same as name1.
name2_us	Plural name when sp=us is in effect; not required if the same as name1_us plus "s".
utype	Unit type; must be exactly the same as the utype of any other unit used in a conversion.

Field	Description
`scale`	Number of base units in the unit being defined.
`default`	Unit code of the default output used when no output unit is specified in a conversion.
`target`	Unit code of an existing unit (the unit being defined "redirects" to the existing unit).
`prefixes`	Use 1 if an SI prefix is accepted; 2 is used for m^2, and 3 is used for m^3.
`link`	Article title used when `lk=on` is in effect; not required if it is the same as `name1`.

Vorlage:Anchor

Modul:Convert/extra/sandbox

Die Dokumentation für dieses Modul kann unter Modul:Convert/extra/sandbox/Doku erstellt werden

```
-- Extra conversion data used by Module:Convert.
--
-- [[Module:Convert/data]] defines all units and is transcluded in all pages
-- where [[Module:Convert]] is used. Testing new units by editing that module
-- would invalidate the cache for all affected pages.
--
-- For quick changes and experiments with new units, this module can be edited.
-- Since this module is transcluded in only a small number of pages, changes
-- should cause little server overhead and should propagate quickly.
--
-- If a unit is defined in the data module, any definition here is ignored,
-- so defining the same unit in both modules is not an error.
-- A unit defined here can refer to units that are also defined here, and
-- can refer to units defined in the data module.
--
-- Periodically, those extra units that are wanted permanently can be removed
-- from here after being added to [[Module:Convert/data]].

local extra_units = {
}

return { extra_units = extra_units }
```

Modul:Convert/sandbox

When making a change, copy the current modules to the sandbox pages, then edit the sandbox copies.

If wanted, use the purge link just above to update the following status report.

- Module:Convert • Module:Convert/sandbox • same content
- Module:Convert/data • Module:Convert/data/sandbox • same content
- Module:Convert/text • Module:Convert/text/sandbox • same content
- Module:Convert/extra • Module:Convert/extra/sandbox • same content
- Module:Convert/wikidata • Module:Convert/wikidata/sandbox • same content
- Module:Convert/wikidata/data • Module:Convert/wikidata/data/sandbox • same content

Use the following template to test the results (example `{{convert/sandbox|123|lb|kg}}`):

- Template:Convert/sandbox • invokes the sandbox modules and shows all warnings

Testscases:

- Module:Convert/sandbox/testcases • templates to be tested, with expected outputs
- Module talk:Convert/sandbox/testcases • view test results
- Template:Convert/testcases#Sandbox testcases • more tests

It is not necessary to save a module before viewing test results. For example, Module:Convert /sandbox could be edited. While still editing that page, paste

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into the page title box under "Preview page with this template", then click "Show preview".

```
-- Convert a value from one unit of measurement to another.
-- Example: {{convert|123|lb|kg}} --> 123 pounds (56 kg)
-- See [[:en:Template:Convert/Transwiki guide]] if copying to another wiki.

local MINUS = '−'  -- Unicode U+2212 MINUS SIGN (UTF-8: e2 88 92)
local abs = math.abs
local floor = math.floor
local format = string.format
local log10 = math.log10
local ustring = mw.ustring
local ulen = ustring.len
local usub = ustring.sub

-- Configuration options to keep magic values in one location.
-- Conversion data and message text are defined in separate modules.
local config, maxsigfig
local numdot  -- must be '.' or ',' or a character which works in a regex
local numsep, numsep_remove, numsep_remove2
local data_code, all_units
local text_code
local varname        -- can be a code to use variable names that depend on value
local from_en_table  -- to translate an output string of en digits to local langu
```

```
local to_en_table    -- to translate an input string of digits in local language
-- Use translation_table in convert/text to change the following.
local en_default           -- true uses lang=en unless convert has lang=local or
local group_method = 3     -- code for how many digits are in a group
local per_word = 'per'     -- for units like "liters per kilometer"
local plural_suffix = 's'  -- only other useful value is probably '' to disable p
local omitsep              -- true to omit separator before local symbol/name

-- All units should be defined in the data module. However, to cater for quick ch
-- and experiments, any unknown unit is looked up in an extra data module, if it
-- That module would be transcluded in only a small number of pages, so there sho
-- little server overhead from making changes, and changes should propagate quick
local extra_module  -- name of module with extra units
local extra_units   -- nil or table of extra units from extra_module

-- Some options in the invoking template can set variables used later in the modu
local currency_text  -- for a user-defined currency symbol: {{convert|12|$/ha|$=€

local function from_en(text)
        -- Input is a string representing a number in en digits with '.' decimal
        -- without digit grouping (which is done just after calling this).
        -- Return the translation of the string with numdot and digits in local l
        if numdot ~= '.' then
                text = text:gsub('%.', numdot)
        end
        if from_en_table then
                text = text:gsub('%d', from_en_table)
        end
        return text
end

local function to_en(text)
        -- Input is a string representing a number in the local language with
        -- an optional numdot decimal mark and numsep digit grouping.
        -- Return the translation of the string with '.' mark and en digits,
        -- and no separators (they have to be removed here to handle cases like
        -- numsep = '.' and numdot = ',' with input "1.234.567,8").
        if to_en_table then
                text = ustring.gsub(text, '%d', to_en_table)
        end
        if numsep_remove then
                text = text:gsub(numsep_remove, '')
        end
        if numsep_remove2 then
                text = text:gsub(numsep_remove2, '')
        end
        if numdot ~= '.' then
                text = text:gsub(numdot, '.')
        end
        return text
end

local function decimal_mark(text)
        -- Return ',' if text probably is using comma for decimal mark, or has no
        -- Return '.' if text probably is using dot for decimal mark.
        -- Otherwise return nothing (decimal mark not known).
        if not text:find('[.,]') then return ',' end
        text = text:gsub('^%-', ''):gsub('%+%d+/%d+$', ''):gsub('[Ee]%-?%d+$', '
        local decimal =
                text:match('^0?([.,])%d+$') or
                text:match('%d([.,])%d?%d?$') or
                text:match('%d([.,])%d%d%d%d+$')
        if decimal then return decimal end
        if text:match('%.%d+%.') then return ',' end
```

```
        if text:match('%,%d+,') then return '.' end
end

local add_warning, with_separator  -- forward declarations
local function to_en_with_check(text, parms)
        -- Version of to_en() for a wiki using numdot = ',' and numsep = '.' to c
        -- text (an input number as a string) which might have been copied from e
        -- For example, in '1.234' the '.' could be a decimal mark or a group sep
        -- From viwiki.
        if to_en_table then
                text = ustring.gsub(text, '%d', to_en_table)
        end
        if decimal_mark(text) == '.' then
                local original = text
                text = text:gsub(',', '')  -- for example, interpret "1,234.5" as
                if parms then
                        add_warning(parms, 0, 'cvt_enwiki_num', original, with_se
                end
        else
                if numsep_remove then
                        text = text:gsub(numsep_remove, '')
                end
                if numsep_remove2 then
                        text = text:gsub(numsep_remove2, '')
                end
                if numdot ~= '.' then
                        text = text:gsub(numdot, '.')
                end
        end
        return text
end

local function omit_separator(id)
        -- Return true if there should be no separator before id (a unit symbol o
        -- For zhwiki, there should be no separator if id uses local characters.
        -- The following kludge should be a sufficient test.
        if omitsep then
                if id:sub(1, 2) == '-{' then  -- for "-{...}-" content language v
                        return true
                end
                if id:byte() > 127 then
                        local first = usub(id, 1, 1)
                        if first ~= 'Å' and first ~= '°' and first ~= 'µ' then
                                return true
                        end
                end
        end
        return id:sub(1, 1) == '/'  -- no separator before units like "/ha"
end

local spell_module  -- name of module that can spell numbers
local speller       -- function from that module to handle spelling (set if neede
local wikidata_module, wikidata_data_module  -- names of Wikidata modules
local wikidata_code, wikidata_data  -- exported tables from those modules (set if

local function set_config(args)
        -- Set configuration options from template #invoke or defaults.
        config = args
        maxsigfig = config.maxsigfig or 14  -- maximum number of significant figu
        local data_module, text_module
        local sandbox = config.sandbox and ('/' .. config.sandbox) or ''
        data_module = "Module:Convert/data" .. sandbox
        text_module = "Module:Convert/text" .. sandbox
        extra_module = "Module:Convert/extra" .. sandbox
```

```
	wikidata_module = "Module:Convert/wikidata" .. sandbox
	wikidata_data_module = "Module:Convert/wikidata/data" .. sandbox
	spell_module = "Module:ConvertNumeric"
	data_code = mw.loadData(data_module)
	text_code = mw.loadData(text_module)
	all_units = data_code.all_units
	local translation = text_code.translation_table
	if translation then
		numdot = translation.numdot
		numsep = translation.numsep
		if numdot == ',' and numsep == '.' then
			if text_code.all_messages.cvt_enwiki_num then
				to_en = to_en_with_check
			end
		end
		if translation.group then
			group_method = translation.group
		end
		if translation.per_word then
			per_word = translation.per_word
		end
		if translation.plural_suffix then
			plural_suffix = translation.plural_suffix
		end
		varname = translation.varname
		from_en_table = translation.from_en
		local use_workaround = true
		if use_workaround then
			-- 2013-07-05 workaround bug by making a copy of the requ
			-- mw.ustring.gsub fails with a table (to_en_table) as th
			-- if the table is accessed via mw.loadData.
			local source = translation.to_en
			if source then
				to_en_table = {}
				for k, v in pairs(source) do
					to_en_table[k] = v
				end
			end
		else
			to_en_table = translation.to_en
		end
		if translation.lang == 'en default' then
			en_default = true  -- for hiwiki
		end
		omitsep = translation.omitsep  -- for zhwiki
	end
	numdot = config.numdot or numdot or '.'  -- decimal mark before fractiona
	numsep = config.numsep or numsep or ','  -- group separator for numbers
	-- numsep should be ',' or '.' or '' or ' ' or a Unicode character.
	-- numsep_remove must work in a regex to identify separators to be remove
	if numsep ~= '' then
		numsep_remove = (numsep == '.') and '%.' or numsep
	end
	if numsep ~= ',' and numdot ~= ',' then
		numsep_remove2 = ','  -- so numbers copied from enwiki will work
	end
end

local function collection()
	-- Return a table to hold items.
	return {
		n = 0,
		add = function (self, item)
			self.n = self.n + 1
```

```
                        self[self.n] = item
                end,
        }
end

local function divide(numerator, denominator)
        -- Return integers quotient, remainder resulting from dividing the two
        -- given numbers, which should be unsigned integers.
        local quotient, remainder = floor(numerator / denominator), numerator % d
        if not (0 <= remainder and remainder < denominator) then
                -- Floating point limits may need this, as in {{convert|160.02|Yr
                remainder = 0
        end
        return quotient, remainder
end

local function split(text, delimiter)
        -- Return a numbered table with fields from splitting text.
        -- The delimiter is used in a regex without escaping (for example, '.' wo
        -- Each field has any leading/trailing whitespace removed.
        local t = {}
        text = text .. delimiter  -- to get last item
        for item in text:gmatch('%s*(.-)%s*' .. delimiter) do
                table.insert(t, item)
        end
        return t
end

local function strip(text)
        -- If text is a string, return its content with no leading/trailing
        -- whitespace. Otherwise return nil (a nil argument gives a nil result).
        if type(text) == 'string' then
                return text:match("^%s*(.-)%s*$")
        end
end

local function table_len(t)
        -- Return length (<100) of a numbered table to replace #t which is
        -- documented to not work if t is accessed via mw.loadData().
        for i = 1, 100 do
                if t[i] == nil then
                        return i - 1
                end
        end
end

local function wanted_category(catkey, catsort, want_warning)
        -- Return message category if it is wanted in current namespace,
        -- otherwise return ''.
        local cat
        local title = mw.title.getCurrentTitle()
        if title then
                local nsdefault = '0'  -- default namespace: '0' = article; '0,10
                local namespace = title.namespace
                for _, v in ipairs(split(config.nscat or nsdefault, ',')) do
                        if namespace == tonumber(v) then
                                cat = text_code.all_categories[want_warning and '
                                if catsort and catsort ~= '' and cat:sub(-2) == '
                                        cat = cat:sub(1, -3) .. '|' .. mw.text.no
                                end
                                break
                        end
                end
        end
```

```
        return cat or ''
end

local function message(parms, mcode, is_warning)
        -- Return wikitext for an error message, including category if specified
        -- for the message type.
        -- mcode = numbered table specifying the message:
        --    mcode[1] = 'cvt_xxx' (string used as a key to get message info)
        --    mcode[2] = 'parm1' (string to replace '$1' if any in message)
        --    mcode[3] = 'parm2' (string to replace '$2' if any in message)
        --    mcode[4] = 'parm3' (string to replace '$3' if any in message)
        local msg
        if type(mcode) == 'table' then
                if mcode[1] == 'cvt_no_output' then
                        -- Some errors should cause convert to output an empty st
                        -- for example, for an optional field in an infobox.
                        return ''
                end
                msg = text_code.all_messages[mcode[1]]
        end
        parms.have_problem = true
        local function subparm(fmt, ...)
                local rep = {}
                for i, v in ipairs({...}) do
                        rep['$' .. i] = v
                end
                return (fmt:gsub('$%d+', rep))
        end
        if msg then
                local parts = {}
                local regex, replace = msg.regex, msg.replace
                for i = 1, 3 do
                        local limit = 40
                        local s = mcode[i + 1]
                        if s then
                                if regex and replace then
                                        s = s:gsub(regex, replace)
                                        limit = nil  -- allow long "should be" me
                                end
                                -- Escape user input so it does not break the mes
                                -- To avoid tags (like {{convert|1<math>23</math>
                                -- the mouseover title, any strip marker starting
                                -- replaced with '...' (text not needing i18n).
                                local append
                                local pos = s:find(string.char(127), 1, true)
                                if pos then
                                        append = '...'
                                        s = s:sub(1, pos - 1)
                                end
                                if limit and ulen(s) > limit then
                                        s = usub(s, 1, limit)
                                        append = '...'
                                end
                                s = mw.text.nowiki(s) .. (append or '')
                        else
                                s = '?'
                        end
                        parts['$' .. i] = s
                end
                local function ispreview()
                        -- Return true if a prominent message should be shown.
                        if parms.test == 'preview' or parms.test == 'nopreview' t
                                -- For testing, can preview a real message or sim
                                -- when running automated tests.
```

```
                                return parms.test == 'preview'
                        end
                        local success, revid = pcall(function ()
                                return (parms.frame):preprocess('{{REVISIONID}}')
                        return success and (revid == '')
                end
                local want_warning = is_warning and
                        not config.warnings and  -- show unobtrusive warnings if
                        not msg.nowarn           -- but use msg settings, not sta
                local title = string.gsub(msg[1] or 'Missing message', '$%d+', pa
                local text = want_warning and '*' or msg[2] or 'Missing message'
                local cat = wanted_category(msg[3], mcode[2], want_warning)
                local anchor = msg[4] or ''
                local fmtkey = ispreview() and 'cvt_format_preview' or
                        (want_warning and 'cvt_format2' or msg.format or 'cvt_for
                local fmt = text_code.all_messages[fmtkey] or 'convert: bug'
                return subparm(fmt, title:gsub('"', '&quot;'), text, cat, anchor)
        end
        return 'Convert internal error: unknown message'
end

function add_warning(parms, level, key, text1, text2)  -- for forward declaration
        -- If enabled, add a warning that will be displayed after the convert res
        -- A higher level is more verbose: more kinds of warnings are displayed.
        -- To reduce output noise, only the first warning is displayed.
        if level <= (tonumber(config.warnings) or 1) then
                if parms.warnings == nil then
                        parms.warnings = message(parms, { key, text1, text2 }, tr
                end
        end
end

local function spell_number(parms, inout, number, numerator, denominator)
        -- Return result of spelling (number, numerator, denominator), or
        -- return nil if spelling is not available or not supported for given tex
        -- Examples (each value must be a string or nil):
        --   number  numerator  denominator  output
        --   ------  ---------  -----------  ------------------
        --   "1.23"    nil        nil        one point two three
        --    "1"      "2"        "3"        one and two thirds
        --    nil      "2"        "3"        two thirds
        if not speller then
                local function get_speller(module)
                        return require(module).spell_number
                end
                local success
                success, speller = pcall(get_speller, spell_module)
                if not success or type(speller) ~= 'function' then
                        add_warning(parms, 1, 'cvt_no_spell', 'spell')
                        return nil
                end
        end
        local case
        if parms.spell_upper == inout then
                case = true
                parms.spell_upper = nil  -- only uppercase first word in a multip
        end
        local sp = not parms.opt_sp_us
        local adj = parms.opt_adjectival
        return speller(number, numerator, denominator, case, sp, adj)
end

------------------------------------------------------------------------
-- BEGIN: Code required only for built-in units.
```

```
-- LATER: If need much more code, move to another module to simplify this module
local function speed_of_sound(altitude)
	-- This is for the Mach built-in unit of speed.
	-- Return speed of sound in metres per second at given altitude in feet.
	-- If no altitude given, use default (zero altitude = sea level).
	-- Table gives speed of sound in miles per hour at various altitudes:
	--   altitude = -17,499 to 402,499 feet
	-- mach_table[a + 4] = s where
	--   a = (altitude / 5000) rounded to nearest integer (-3 to 80)
	--   s = speed of sound (mph) at that altitude
	-- LATER: Should calculate result from an interpolation between the next
	-- lower and higher altitudes in table, rather than rounding to nearest.
	-- From: http://www.aerospaceweb.org/question/atmosphere/q0112.shtml
	local mach_table = {
		799.5, 787.0, 774.2, 761.207051,
		748.0, 734.6, 721.0, 707.0, 692.8, 678.3, 663.5, 660.1, 660.1, 66
		660.1, 660.1, 660.1, 662.0, 664.3, 666.5, 668.9, 671.1, 673.4, 67
		677.9, 683.7, 689.9, 696.0, 702.1, 708.1, 714.0, 719.9, 725.8, 73
		737.3, 737.7, 737.7, 736.2, 730.5, 724.6, 718.8, 712.9, 707.0, 70
		695.0, 688.9, 682.8, 676.6, 670.4, 664.1, 657.8, 652.9, 648.3, 64
		639.1, 634.4, 629.6, 624.8, 620.0, 615.2, 613.2, 613.2, 613.2, 61
		614.4, 615.3, 616.7, 619.8, 623.4, 629.7, 635.0, 641.1, 650.6, 66
		672.5, 674.3, 676.1, 677.9, 679.7, 681.5, 683.3, 685.1, 686.8, 68
	}
	altitude = altitude or 0
	local a = (altitude < 0) and -altitude or altitude
	a = floor(a / 5000 + 0.5)
	if altitude < 0 then
		a = -a
	end
	if a < -3 then
		a = -3
	elseif a > 80 then
		a = 80
	end
	return mach_table[a + 4] * 0.44704  -- mph converted to m/s
end
-- END: Code required only for built-in units.
--------------------------------------------------------------------------

local function add_style(parms, class)
	-- Add selected template style to parms if not already present.
	parms.templatestyles = parms.templatestyles or {}
	if not parms.templatestyles[class] then
		parms.templatestyles[class] = parms.frame:extensionTag({
			name = 'templatestyles', args = { src = text_code.titles
		})
	end
end

local function get_styles(parms)
	-- Return string of required template styles, empty if none.
	if parms.templatestyles then
		local t = {}
		for _, v in pairs(parms.templatestyles) do
			table.insert(t, v)
		end
		return table.concat(t)
	end
	return ''
end

local function get_range(word)
	-- Return a range (string or table) corresponding to word (like "to"),
```

```
	-- or return nil if not a range word.
	local ranges = text_code.ranges
	return ranges.types[word] or ranges.types[ranges.aliases[word]]
end

local function check_mismatch(unit1, unit2)
	-- If unit1 cannot be converted to unit2, return an error message table.
	-- This allows conversion between units of the same type, and between
	-- Nm (normally torque) and ftlb (energy), as in gun-related articles.
	-- This works because Nm is the base unit (scale = 1) for both the
	-- primary type (torque), and the alternate type (energy, where Nm = J).
	-- A match occurs if the primary types are the same, or if unit1 matches
	-- the alternate type of unit2, and vice versa. That provides a whitelist
	-- of which conversions are permitted between normally incompatible types
	if unit1.utype == unit2.utype or
		(unit1.utype == unit2.alttype and unit1.alttype == unit2.utype) t
		return nil
	end
	return { 'cvt_mismatch', unit1.utype, unit2.utype }
end

local function override_from(out_table, in_table, fields)
	-- Copy the specified fields from in_table to out_table, but do not
	-- copy nil fields (keep any corresponding field in out_table).
	for _, field in ipairs(fields) do
		if in_table[field] then
			out_table[field] = in_table[field]
		end
	end
end

local function shallow_copy(t)
	-- Return a shallow copy of table t.
	-- Do not need the features and overhead of the Scribunto mw.clone().
	local result = {}
	for k, v in pairs(t) do
		result[k] = v
	end
	return result
end

local unit_mt = {
	-- Metatable to get missing values for a unit that does not accept SI pre
	-- Warning: The boolean value 'false' is returned for any missing field
	-- so __index is not called twice for the same field in a given unit.
	__index = function (self, key)
		local value
		if key == 'name1' or key == 'sym_us' then
			value = self.symbol
		elseif key == 'name2' then
			value = self.name1 .. plural_suffix
		elseif key == 'name1_us' then
			value = self.name1
			if not rawget(self, 'name2_us') then
				-- If name1_us is 'foot', do not make name2_us by
				self.name2_us = self.name2
			end
		elseif key == 'name2_us' then
			local raw1_us = rawget(self, 'name1_us')
			if raw1_us then
				value = raw1_us .. plural_suffix
			else
				value = self.name2
			end
```

```
                elseif key == 'link' then
                        value = self.name1
                else
                        value = false
                end
                rawset(self, key, value)
                return value
        end
}

local function prefixed_name(unit, name, index)
        -- Return unit name with SI prefix inserted at correct position.
        -- index = 1 (name1), 2 (name2), 3 (name1_us), 4 (name2_us).
        -- The position is a byte (not character) index, so use Lua's sub().
        local pos = rawget(unit, 'prefix_position')
        if type(pos) == 'string' then
                pos = tonumber(split(pos, ',')[index])
        end
        if pos then
                return name:sub(1, pos - 1) .. unit.si_name .. name:sub(pos)
        end
        return unit.si_name .. name
end

local unit_prefixed_mt = {
        -- Metatable to get missing values for a unit that accepts SI prefixes.
        -- Before use, fields si_name, si_prefix must be defined.
        -- The unit must define _symbol, _name1 and
        -- may define _sym_us, _name1_us, _name2_us
        -- (_sym_us, _name2_us may be defined for a language using sp=us
        -- to refer to a variant unrelated to U.S. units).
        __index = function (self, key)
                local value
                if key == 'symbol' then
                        value = self.si_prefix .. self._symbol
                elseif key == 'sym_us' then
                        value = rawget(self, '_sym_us')
                        if value then
                                value = self.si_prefix .. value
                        else
                                value = self.symbol
                        end
                elseif key == 'name1' then
                        value = prefixed_name(self, self._name1, 1)
                elseif key == 'name2' then
                        value = rawget(self, '_name2')
                        if value then
                                value = prefixed_name(self, value, 2)
                        else
                                value = self.name1 .. plural_suffix
                        end
                elseif key == 'name1_us' then
                        value = rawget(self, '_name1_us')
                        if value then
                                value = prefixed_name(self, value, 3)
                        else
                                value = self.name1
                        end
                elseif key == 'name2_us' then
                        value = rawget(self, '_name2_us')
                        if value then
                                value = prefixed_name(self, value, 4)
                        elseif rawget(self, '_name1_us') then
                                value = self.name1_us .. plural_suffix
```

```
                        else
                                value = self.name2
                        end
                elseif key == 'link' then
                        value = self.name1
                else
                        value = false
                end
                rawset(self, key, value)
                return value
        end
}

local unit_per_mt = {
        -- Metatable to get values for a per unit of form "x/y".
        -- This is never called to determine a unit name or link because per unit
        -- are handled as a special case.
        -- Similarly, the default output is handled elsewhere, and for a symbol
        -- this is only called from get_default() for default_exceptions.
        __index = function (self, key)
                local value
                if key == 'symbol' then
                        local per = self.per
                        local unit1, unit2 = per[1], per[2]
                        if unit1 then
                                value = unit1[key] .. '/' .. unit2[key]
                        else
                                value = '/' .. unit2[key]
                        end
                elseif key == 'sym_us' then
                        value = self.symbol
                elseif key == 'scale' then
                        local per = self.per
                        local unit1, unit2 = per[1], per[2]
                        value = (unit1 and unit1.scale or 1) * self.scalemultipli
                else
                        value = false
                end
                rawset(self, key, value)
                return value
        end
}

local function make_per(unitcode, unit_table, ulookup)
        -- Return true, t where t is a per unit with unit codes expanded to unit
        -- or return false, t where t is an error message table.
        local result = {
                unitcode = unitcode,
                utype = unit_table.utype,
                per = {}
        }
        override_from(result, unit_table, { 'invert', 'iscomplex', 'default', 'li
        result.symbol_raw = (result.symbol or false)  -- to distinguish between a
        local prefix
        for i, v in ipairs(unit_table.per) do
                if i == 1 and v == '' then
                        -- First unit symbol can be empty; that gives a nil first
                elseif i == 1 and text_code.currency[v] then
                        prefix = currency_text or v
                else
                        local success, t = ulookup(v)
                        if not success then return false, t end
                        result.per[i] = t
                end
```

```
	end
	local multiplier = unit_table.multiplier
	if not result.utype then
		-- Creating an automatic per unit.
		local unit1 = result.per[1]
		local utype = (unit1 and unit1.utype or prefix or '') .. '/' .. t
		local t = data_code.per_unit_fixups[utype]
		if t then
			if type(t) == 'table' then
				utype = t.utype or utype
				result.link = result.link or t.link
				multiplier = multiplier or t.multiplier
			else
				utype = t
			end
		end
		result.utype = utype
	end
	result.scalemultiplier = multiplier or 1
	result.vprefix = prefix or false  -- set to non-nil to avoid calling __in
	return true, setmetatable(result, unit_per_mt)
end

local function lookup(parms, unitcode, what, utable, fails, depth)
	-- Return true, t where t is a copy of the unit's converter table,
	-- or return false, t where t is an error message table.
	-- Parameter 'what' determines whether combination units are accepted:
	--   'no_combination'  : single unit only
	--   'any_combination' : single unit or combination or output multiple
	--   'only_multiple'   : single unit or output multiple only
	-- Parameter unitcode is a symbol (like 'g'), with an optional SI prefix
	-- If, for example, 'kg' is in this table, that entry is used;
	-- otherwise the prefix ('k') is applied to the base unit ('g').
	-- If unitcode is a known combination code (and if allowed by what),
	-- a table of output multiple unit tables is included in the result.
	-- For compatibility with the old template, an underscore in a unitcode i
	-- replaced with a space so usage like {{convert|350|board_feet}} works.
	-- Wikignomes may also put two spaces or " " in combinations, so
	-- replace underscore, " ", and multiple spaces with a single space.
	utable = utable or parms.unittable or all_units
	fails = fails or {}
	depth = depth and depth + 1 or 1
	if depth > 9 then
		-- There are ways to mistakenly define units which result in infi
		-- recursion when lookup() is called. That gives a long delay and
		-- confusing error messages, so the depth parameter is used as a
		return false, { 'cvt_lookup', unitcode }
	end
	if unitcode == nil or unitcode == '' then
		return false, { 'cvt_no_unit' }
	end
	unitcode = unitcode:gsub('_', ' '):gsub(' ', ' '):gsub('  +', ' ')
	local function call_make_per(t)
		return make_per(unitcode, t,
			function (ucode) return lookup(parms, ucode, 'no_combinat
		)
	end
	local t = utable[unitcode]
	if t then
		if t.shouldbe then
			return false, { 'cvt_should_be', t.shouldbe }
		end
		if t.sp_us then
			parms.opt_sp_us = true
```

```
                end
                local target = t.target  -- nil, or unitcode is an alias for this
                if target then
                        local success, result = lookup(parms, target, what, utabl
                        if not success then return false, result end
                        override_from(result, t, { 'customary', 'default', 'link'
                        local multiplier = t.multiplier
                        if multiplier then
                                result.multiplier = tostring(multiplier)
                                result.scale = result.scale * multiplier
                        end
                        return true, result
                end
                if t.per then
                        return call_make_per(t)
                end
                local combo = t.combination  -- nil or a table of unitcodes
                if combo then
                        local multiple = t.multiple
                        if what == 'no_combination' or (what == 'only_multiple' a
                                return false, { 'cvt_bad_unit', unitcode }
                        end
                        -- Recursively create a combination table containing the
                        -- converter table of each unitcode.
                        local result = { utype = t.utype, multiple = multiple, co
                        local cvt = result.combination
                        for i, v in ipairs(combo) do
                                local success, t = lookup(parms, v, multiple and
                                if not success then return false, t end
                                cvt[i] = t
                        end
                        return true, result
                end
                local result = shallow_copy(t)
                result.unitcode = unitcode
                if result.prefixes then
                        result.si_name = ''
                        result.si_prefix = ''
                        return true, setmetatable(result, unit_prefixed_mt)
                end
                return true, setmetatable(result, unit_mt)
        end
        local SIprefixes = text_code.SIprefixes
        for plen = SIprefixes[1] or 2, 1, -1 do
                -- Look for an SI prefix; should never occur with an alias.
                -- Check for longer prefix first ('dam' is decametre).
                -- SIprefixes[1] = prefix maximum #characters (as seen by mw.ustr
                local prefix = usub(unitcode, 1, plen)
                local si = SIprefixes[prefix]
                if si then
                        local t = utable[usub(unitcode, plen+1)]
                        if t and t.prefixes then
                                local result = shallow_copy(t)
                                result.unitcode = unitcode
                                result.si_name = parms.opt_sp_us and si.name_us o
                                result.si_prefix = si.prefix or prefix
                                result.scale = t.scale * 10 ^ (si.exponent * t.pr
                                return true, setmetatable(result, unit_prefixed_m
                        end
                end
        end
        -- Accept user-defined combinations like "acre+m2+ha" or "acre m2 ha" for
        -- If '+' is used, each unit code can include a space, and any error is f
        -- If ' ' is used and if each space-separated word is a unit code, it is
```

```
	-- but errors are not fatal so the unit code can be looked up as an extra
	local err_is_fatal
	local combo = collection()
	if unitcode:find('+', 1, true) then
		err_is_fatal = true
		for item in (unitcode .. '+'):gmatch('%s*(.-)%s*%+') do
			if item ~= '' then
				combo:add(item)
			end
		end
	elseif unitcode:find('%s') then
		for item in unitcode:gmatch('%S+') do
			combo:add(item)
		end
	end
	if combo.n > 1 then
		local function lookup_combo()
			if what == 'no_combination' or what == 'only_multiple' th
				return false, { 'cvt_bad_unit', unitcode }
			end
			local result = { combination = {} }
			local cvt = result.combination
			for i, v in ipairs(combo) do
				local success, t = lookup(parms, v, 'only_multipl
				if not success then return false, t end
				if i == 1 then
					result.utype = t.utype
				else
					local mismatch = check_mismatch(result, t
					if mismatch then
						return false, mismatch
					end
				end
				cvt[i] = t
			end
			return true, result
		end
		local success, result = lookup_combo()
		if success or err_is_fatal then
			return success, result
		end
	end
	-- Accept any unit with an engineering notation prefix like "e6cuft"
	-- (million cubic feet), but not chained prefixes like "e3e6cuft",
	-- and not if the unit is a combination or multiple,
	-- and not if the unit has an offset or is a built-in.
	-- Only en digits are accepted.
	local exponent, baseunit = unitcode:match('^e(%d+)(.*)')
	if exponent then
		local engscale = text_code.eng_scales[exponent]
		if engscale then
			local success, result = lookup(parms, baseunit, 'no_combi
			if success and not (result.offset or result.builtin or re
				result.unitcode = unitcode  -- 'e6cuft' not 'cuft
				result.defkey = unitcode  -- key to lookup defaul
				result.engscale = engscale
				result.scale = result.scale * 10 ^ tonumber(expor
				return true, result
			end
		end
	end
	-- Look for x/y; split on right-most slash to get scale correct (x/y/z is
	local top, bottom = unitcode:match('^(.-)/([^/]+)$')
	if top and not unitcode:find('e%d') then
```

```
                -- If valid, create an automatic per unit for an "x/y" unit code
                -- The unitcode must not include extraneous spaces.
                -- Engineering notation (apart from at start and which has been s
                -- is not supported so do not make a per unit if find text like '
                local success, result = call_make_per({ per = {top, bottom} })
                if success then
                        return true, result
                end
        end
        if not parms.opt_ignore_error and not get_range(unitcode) then
                -- Want the "what links here" list for the extra_module to show c
                -- where an extra unit is used, so do not require it if invoked f
                -- or if looking up a range word which cannot be a unit.
                if not extra_units then
                        local success, extra = pcall(function () return require(e
                        if success and type(extra) == 'table' then
                                extra_units = extra
                        end
                end
                if extra_units then
                        -- A unit in one data table might refer to a unit in the
                        -- switch between them, relying on fails or depth to term
                        if not fails[unitcode] then
                                fails[unitcode] = true
                                local other = (utable == all_units) and extra_uni
                                local success, result = lookup(parms, unitcode, w
                                if success then
                                        return true, result
                                end
                        end
                end
        end
        if to_en_table then
                -- At fawiki it is common to translate all digits so a unit like
                local en_code = ustring.gsub(unitcode, '%d', to_en_table)
                if en_code ~= unitcode then
                        return lookup(parms, en_code, what, utable, fails, depth)
                end
        end
        return false, { 'cvt_unknown', unitcode }
end

local function valid_number(num)
        -- Return true if num is a valid number.
        -- In Scribunto (different from some standard Lua), when expressed as a s
        -- overflow or other problems are indicated with text like "inf" or "nan"
        -- which are regarded as invalid here (each contains "n").
        if type(num) == 'number' and tostring(num):find('n', 1, true) == nil then
                return true
        end
end

local function hyphenated(name, parts)
        -- Return a hyphenated form of given name (for adjectival usage).
        -- The name may be linked and the target of the link must not be changed,
        -- Hypothetical examples:
        --   [[long ton|ton]]         →  [[long ton|ton]]          (no change)
        --   [[tonne|long ton]]       →  [[tonne|long-ton]]
        --   [[metric ton|long ton]]  →  [[metric ton|long-ton]]
        --   [[long ton]]             →  [[long ton|long-ton]]
        -- Input can also have multiple links in a single name like:
        --   [[United States customary units|U.S.]] [[US gallon|gallon]]
        --   [[mile]]s per [[United States customary units|U.S.]] [[quart]]
        --   [[long ton]]s per [[short ton]]
```

```
	-- Assume that links cannot be nested (never like "[[abc[[def]]ghi]]").
	-- This uses a simple and efficient procedure that works for most cases.
	-- Some units (if used) would require more, and can later think about
	-- adding a method to handle exceptions.
	-- The procedure is to replace each space with a hyphen, but
	-- not a space after ')' [for "(pre-1954 US) nautical mile"], and
	-- not spaces immediately before '(' or in '(...)' [for cases like
	-- "British thermal unit (ISO)" and "Calorie (International Steam Table)"
	if name:find(' ', 1, true) then
		if parts then
			local pos
			if name:sub(1, 1) == '(' then
				pos = name:find(')', 1, true)
				if pos then
					return name:sub(1, pos+1) .. name:sub(pos
				end
			elseif name:sub(-1) == ')' then
				pos = name:find('(', 1, true)
				if pos then
					return name:sub(1, pos-2):gsub(' ', '-')
				end
			end
			return name:gsub(' ', '-')
		end
		parts = collection()
		for before, item, after in name:gmatch('([^[]*)(%[%[[^[]*%]%])([^
			if item:find(' ', 1, true) then
				local prefix
				local plen = item:find('|', 1, true)
				if plen then
					prefix = item:sub(1, plen)
					item = item:sub(plen + 1, -3)
				else
					prefix = item:sub(1, -3) .. '|'
					item = item:sub(3, -3)
				end
				item = prefix .. hyphenated(item, parts) .. ']]'
			end
			parts:add(before:gsub(' ', '-') .. item .. after:gsub('
		end
		if parts.n == 0 then
			-- No link like "[[...]]" was found in the original name
			parts:add(hyphenated(name, parts))
		end
		return table.concat(parts)
	end
	return name
end

local function hyphenated_maybe(parms, want_name, sep, id, inout)
	-- Return s, f where
	--   s = id, possibly modified
	--   f = true if hyphenated
	-- Possible modifications: hyphenate; prepend '-'; append mid text.
	if id == nil or id == '' then
		return ''
	end
	local mid = (inout == (parms.opt_flip and 'out' or 'in')) and parms.mid
	if want_name then
		if parms.opt_adjectival then
			return '-' .. hyphenated(id) .. mid, true
		end
		if parms.opt_add_s and id:sub(-1) ~= 's' then
			id = id .. 's'  -- for nowiki
```

```
                end
        end
        return sep .. id .. mid
end

local function use_minus(text)
        -- Return text with Unicode minus instead of '-', if present.
        if text:sub(1, 1) == '-' then
                return MINUS .. text:sub(2)
        end
        return text
end

local function digit_groups(parms, text, method)
        -- Return a numbered table of groups of digits (left-to-right, in local l
        -- Parameter method is a number or nil:
        --   3 for 3-digit grouping (default), or
        --   2 for 3-then-2 grouping (only for digits before decimal mark).
        local len_right
        local len_left = text:find('.', 1, true)
        if len_left then
                len_right = #text - len_left
                len_left = len_left - 1
        else
                len_left = #text
        end
        local twos = method == 2 and len_left > 5
        local groups = collection()
        local run = len_left
        local n
        if run < 4 or (run == 4 and parms.opt_comma5) then
                if parms.opt_gaps then
                        n = run
                else
                        n = #text
                end
        elseif twos then
                n = run % 2 == 0 and 1 or 2
        else
                n = run % 3 == 0 and 3 or run % 3
        end
        while run > 0 do
                groups:add(n)
                run = run - n
                n = (twos and run > 3) and 2 or 3
        end
        if len_right then
                if groups.n == 0 then
                        groups:add(0)
                end
                if parms.opt_gaps and len_right > 3 then
                        local want4 = not parms.opt_gaps3  -- true gives no gap b
                        local isfirst = true
                        run = len_right
                        while run > 0 do
                                n = (want4 and run == 4) and 4 or (run > 3 and 3
                                if isfirst then
                                        isfirst = false
                                        groups[groups.n] = groups[groups.n] + 1 +
                                else
                                        groups:add(n)
                                end
                                run = run - n
                        end
```

```
                else
                        groups[groups.n] = groups[groups.n] + 1 + len_right
                end
        end
        local pos = 1
        for i, length in ipairs(groups) do
                groups[i] = from_en(text:sub(pos, pos + length - 1))
                pos = pos + length
        end
        return groups
end

function with_separator(parms, text)  -- for forward declaration above
        -- Input text is a number in en digits with optional '.' decimal mark.
        -- Return an equivalent, formatted for display:
        --   with a custom decimal mark instead of '.', if wanted
        --   with thousand separators inserted, if wanted
        --   digits in local language
        -- The given text is like '123' or '123.' or '12345.6789'.
        -- The text has no sign (caller inserts that later, if necessary).
        -- When using gaps, they are inserted before and after the decimal mark.
        -- Separators are inserted only before the decimal mark.
        -- A trailing dot (as in '123.') is removed because their use appears to
        -- be accidental, and such a number should be shown as '123' or '123.0'.
        -- It is useful for convert to suppress the dot so, for example, '4000.'
        -- is a simple way of indicating that all the digits are significant.
        if text:sub(-1) == '.' then
                text = text:sub(1, -2)
        end
        if #text < 4 or parms.opt_nocomma or numsep == '' then
                return from_en(text)
        end
        local groups = digit_groups(parms, text, group_method)
        if parms.opt_gaps then
                if groups.n <= 1 then
                        return groups[1] or ''
                end
                local nowrap = '<span style="white-space: nowrap">'
                local gap = '<span style="margin-left: 0.25em">'
                local close = '</span>'
                return nowrap .. groups[1] .. gap .. table.concat(groups, close
        end
        return table.concat(groups, numsep)
end

-- An input value like 1.23e12 is displayed using scientific notation (1.23×10¹²)
-- That also makes the output use scientific notation, except for small values.
-- In addition, very small or very large output values use scientific notation.
-- Use format(fmtpower, significand, '10', exponent) where each argument is a str
local fmtpower = '%s<span style="margin:0 .15em 0 .25em">×</span>%s<sup>%s</sup>'

local function with_exponent(parms, show, exponent)
        -- Return wikitext to display the implied value in scientific notation.
        -- Input uses en digits; output uses digits in local language.
        return format(fmtpower, with_separator(parms, show), from_en('10'), use_n
end

local function make_sigfig(value, sigfig)
        -- Return show, exponent that are equivalent to the result of
        -- converting the number 'value' (where value >= 0) to a string,
        -- rounded to 'sigfig' significant figures.
        -- The returned items are:
        --   show: a string of digits; no sign and no dot;
        --         there is an implied dot before show.
```

```
	--   exponent: a number (an integer) to shift the implied dot.
	-- Resulting value = tonumber('.' .. show) * 10^exponent.
	-- Examples:
	--   make_sigfig(23.456, 3) returns '235', 2 (.235 * 10^2).
	--   make_sigfig(0.0023456, 3) returns '235', -2 (.235 * 10^-2).
	--   make_sigfig(0, 3) returns '000', 1 (.000 * 10^1).
	if sigfig <= 0 then
		sigfig = 1
	elseif sigfig > maxsigfig then
		sigfig = maxsigfig
	end
	if value == 0 then
		return string.rep('0', sigfig), 1
	end
	local exp, fracpart = math.modf(log10(value))
	if fracpart >= 0 then
		fracpart = fracpart - 1
		exp = exp + 1
	end
	local digits = format('%.0f', 10^(fracpart + sigfig))
	if #digits > sigfig then
		-- Overflow (for sigfig=3: like 0.9999 rounding to "1000"; need "
		digits = digits:sub(1, sigfig)
		exp = exp + 1
	end
	assert(#digits == sigfig, 'Bug: rounded number has wrong length')
	return digits, exp
end

-- Fraction output format.
local fracfmt = {
	{ -- Like {{frac}} (fraction slash).
		'<span class="frac" role="math">{SIGN}<span class="num">{NUM}</sp
		'<span class="frac" role="math">{SIGN}{WHOLE}<span class="sr-only
		style = 'frac',
	},
	{ -- Like {{sfrac}} (stacked fraction, that is, horizontal bar).
		'<span class="sfrac tion" role="math">{SIGN}<span class="num">{NU
		'<span class="sfrac" role="math">{SIGN}{WHOLE}<span class="sr-onl
		style = 'sfrac',
	},
}

local function format_fraction(parms, inout, negative, wholestr, numstr, denstr,
	-- Return wikitext for a fraction, possibly spelled.
	-- Inputs use en digits and have no sign; output uses digits in local lan
	local wikitext
	if not style then
		style = parms.opt_fraction_horizontal and 2 or 1
	end
	if wholestr == '' then
		wholestr = nil
	end
	local substitute = {
		SIGN = negative and MINUS or '',
		WHOLE = wholestr and with_separator(parms, wholestr),
		NUM = from_en(numstr),
		DEN = from_en(denstr),
	}
	wikitext = fracfmt[style][wholestr and 2 or 1]:gsub('{(%u+)}', substitute
	if do_spell then
		if negative then
			if wholestr then
				wholestr = '-' .. wholestr
```

```
                        else
                                numstr = '-' .. numstr
                        end
                end
                local s = spell_number(parms, inout, wholestr, numstr, denstr)
                if s then
                        return s
                end
        end
        add_style(parms, fracfmt[style].style)
        return wikitext
end

local function format_number(parms, show, exponent, isnegative)
        -- Parameter show is a string or a table containing strings.
        -- Each string is a formatted number in en digits and optional '.' decima
        -- A table represents a fraction: integer, numerator, denominator;
        -- if a table is given, exponent must be nil.
        -- Return t where t is a table with fields:
        --   show = wikitext formatted to display implied value
        --          (digits in local language)
        --   is_scientific = true if show uses scientific notation
        --   clean = unformatted show (possibly adjusted and with inserted '.')
        --          (en digits)
        --   sign = '' or MINUS
        --   exponent = exponent (possibly adjusted)
        -- The clean and exponent fields can be used to calculate the
        -- rounded absolute value, if needed.
        --
        -- The value implied by the arguments is found from:
        --   exponent is nil; and
        --   show is a string of digits (no sign), with an optional dot;
        --   show = '123.4' is value 123.4, '1234' is value 1234.0;
        -- or:
        --   exponent is an integer indicating where dot should be;
        --   show is a string of digits (no sign and no dot);
        --   there is an implied dot before show;
        --   show does not start with '0';
        --   show = '1234', exponent = 3 is value 0.1234*10^3 = 123.4.
        --
        -- The formatted result:
        -- * Is for an output value and is spelled if wanted and possible.
        -- * Includes a Unicode minus if isnegative and not spelled.
        -- * Uses a custom decimal mark, if wanted.
        -- * Has digits grouped where necessary, if wanted.
        -- * Uses scientific notation if requested, or for very small or large va
        --   (which forces result to not be spelled).
        -- * Has no more than maxsigfig significant digits
        --   (same as old template and {{#expr}}).
        local xhi, xlo  -- these control when scientific notation (exponent) is u
        if parms.opt_scientific then
                xhi, xlo = 4, 2  -- default for output if input uses e-notation
        elseif parms.opt_scientific_always then
                xhi, xlo = 0, 0  -- always use scientific notation (experimental)
        else
                xhi, xlo = 10, 4  -- default
        end
        local sign = isnegative and MINUS or ''
        local maxlen = maxsigfig
        local tfrac
        if type(show) == 'table' then
                tfrac = show
                show = tfrac.wholestr
                assert(exponent == nil, 'Bug: exponent given with fraction')
```

```
	end
	if not tfrac and not exponent then
		local integer, dot, decimals = show:match('^(%d*)(%.?)(.*)')
		if integer == '0' or integer == '' then
			local zeros, figs = decimals:match('^(0*)([^0]?.*)')
			if #figs == 0 then
				if #zeros > maxlen then
					show = '0.' .. zeros:sub(1, maxlen)
				end
			elseif #zeros >= xlo then
				show = figs
				exponent = -#zeros
			elseif #figs > maxlen then
				show = '0.' .. zeros .. figs:sub(1, maxlen)
			end
		elseif #integer >= xhi then
			show = integer .. decimals
			exponent = #integer
		else
			maxlen = maxlen + #dot
			if #show > maxlen then
				show = show:sub(1, maxlen)
			end
		end
	end
	if exponent then
		local function zeros(n)
			return string.rep('0', n)
		end
		if #show > maxlen then
			show = show:sub(1, maxlen)
		end
		if exponent > xhi or exponent <= -xlo or (exponent == xhi and sho
			-- When xhi, xlo = 10, 4 (the default), scientific notati
			-- rounded value satisfies: value >= 1e9 or value < 1e-4
			-- except if show is '1000000000' (1e9), for example:
			-- {{convert|1000000000|m|m|sigfig=10}} → 1,000,000,000 m
			local significand
			if #show > 1 then
				significand = show:sub(1, 1) .. '.' .. show:sub(2
			else
				significand = show
			end
			return {
				clean = '.' .. show,
				exponent = exponent,
				sign = sign,
				show = sign .. with_exponent(parms, significand,
				is_scientific = true,
			}
		end
		if exponent >= #show then
			show = show .. zeros(exponent - #show)  -- result has no
		elseif exponent <= 0 then
			show = '0.' .. zeros(-exponent) .. show
		else
			show = show:sub(1, exponent) .. '.' .. show:sub(exponent+
		end
	end
	local formatted_show
	if tfrac then
		show = tostring(tfrac.value)  -- to set clean in returned table
		formatted_show = format_fraction(parms, 'out', isnegative, tfrac
	else
```

```
                if isnegative and show:match('^0.?0*$') then
                        sign = ''  -- don't show minus if result is negative but
                end
                formatted_show = sign .. with_separator(parms, show)
                if parms.opt_spell_out then
                        formatted_show = spell_number(parms, 'out', sign .. show)
                end
        end
        return {
                clean = show,
                sign = sign,
                show = formatted_show,
                is_scientific = false,  -- to avoid calling __index
        }
end

local function extract_fraction(parms, text, negative)
        -- If text represents a fraction, return
        --   value, altvalue, show, denominator
        -- where
        --   value is a number (value of the fraction in argument text)
        --   altvalue is an alternate interpretation of any fraction for the hand
        --        unit where "12.1+3/4" means 12 hands 1.75 inches
        --   show is a string (formatted text for display of an input value,
        --        and is spelled if wanted and possible)
        --   denominator is value of the denominator in the fraction
        -- Otherwise, return nil.
        -- Input uses en digits and '.' decimal mark (input has been translated)
        -- Output uses digits in local language and local decimal mark, if any.
        ------------------------------------------------------------------------
        -- Originally this function accepted x+y/z where x, y, z were any valid
        -- numbers, possibly with a sign. For example '1.23e+2+1.2/2.4' = 123.5,
        -- and '2-3/8' = 1.625. However, such usages were found to be errors or
        -- misunderstandings, so since August 2014 the following restrictions app
        --   x (if present) is an integer or has a single digit after decimal mar
        --   y and z are unsigned integers
        --   e-notation is not accepted
        -- The overall number can start with '+' or '-' (so '12+3/4' and '+12+3/4
        -- and '-12-3/4' are valid).
        -- Any leading negative sign is removed by the caller, so only inputs
        -- like the following are accepted here (may have whitespace):
        --   negative = false       false        true (there was a leading '-')
        --   text     = '2/3'       '+2/3'       '2/3'
        --   text     = '1+2/3'     '+1+2/3'     '1-2/3'
        --   text     = '12.3+1/2'  '+12.3+1/2'  '12.3-1/2'
        -- Values like '12.3+1/2' are accepted, but are intended only for use
        -- with the hands unit (not worth adding code to enforce that).
        ------------------------------------------------------------------------
        local leading_plus, prefix, numstr, slashes, denstr =
                text:match('^%s*(%+?)%s*(.-)%s*(%d+)%s*(/+)%s*(%d+)%s*$')
        if not leading_plus then
                -- Accept a single U+2044 fraction slash because that may be past
                leading_plus, prefix, numstr, denstr =
                        text:match('^%s*(%+?)%s*(.-)%s*(%d+)%s*%s*(%d+)%s*$')
                slashes = '/'
        end
        local numerator = tonumber(numstr)
        local denominator = tonumber(denstr)
        if numerator == nil or denominator == nil or (negative and leading_plus ~
                return nil
        end
        local whole, wholestr
        if prefix == '' then
                wholestr = ''
```

```
                whole = 0
        else
                -- Any prefix must be like '12+' or '12-' (whole number and fract
                -- '12.3+' and '12.3-' are also accepted (single digit after deci
                -- because '12.3+1/2 hands' is valid (12 hands 3½ inches).
                local num1, num2, frac_sign = prefix:match('^(%d+)(%.?%d?)%s*([+%
                if num1 == nil then return nil end
                if num2 == '' then  -- num2 must be '' or like '.1' but not '.' o
                        wholestr = num1
                else
                        if #num2 ~= 2 then return nil end
                        wholestr = num1 .. num2
                end
                if frac_sign ~= (negative and '-' or '+') then return nil end
                whole = tonumber(wholestr)
                if whole == nil then return nil end
        end
        local value = whole + numerator / denominator
        if not valid_number(value) then return nil end
        local altvalue = whole + numerator / (denominator * 10)
        local style = #slashes  -- kludge: 1 or 2 slashes can be used to select s
        if style > 2 then style = 2 end
        local wikitext = format_fraction(parms, 'in', negative, leading_plus .. w
        return value, altvalue, wikitext, denominator
end

local function extract_number(parms, text, another, no_fraction)
        -- Return true, info if can extract a number from text,
        -- where info is a table with the result,
        -- or return false, t where t is an error message table.
        -- Input can use en digits or digits in local language and can
        -- have references at the end. Accepting references is intended
        -- for use in infoboxes with a field for a value passed to convert.
        -- Parameter another = true if the expected value is not the first.
        -- Before processing, the input text is cleaned:
        -- * Any thousand separators (valid or not) are removed.
        -- * Any sign is replaced with '-' (if negative) or '' (otherwise).
        --   That replaces Unicode minus with '-'.
        -- If successful, the returned info table contains named fields:
        --   value    = a valid number
        --   altvalue = a valid number, usually same as value but different
        --              if fraction used (for hands unit)
        --   singular = true if value is 1 or -1 (to use singular form of units)
        --   clean    = cleaned text with any separators and sign removed
        --              (en digits and '.' decimal mark)
        --   show     = text formatted for output, possibly with ref strip marker
        --              (digits in local language and custom decimal mark)
        -- The resulting show:
        -- * Is for an input value and is spelled if wanted and possible.
        -- * Has a rounded value, if wanted.
        -- * Has digits grouped where necessary, if wanted.
        -- * If negative, a Unicode minus is used; otherwise the sign is
        --   '+' (if the input text used '+'), or is '' (if no sign in input).
        text = strip(text or '')
        local reference
        local pos = text:find('\127', 1, true)
        if pos then
                local before = text:sub(1, pos - 1)
                local remainder = text:sub(pos)
                local refs = {}
                while #remainder > 0 do
                        local ref, spaces
                        ref, spaces, remainder = remainder:match('^(\127[^\127]*U
                        if ref then
```

```
                                table.insert(refs, ref)
                        else
                                refs = {}
                                break
                        end
                end
                if #refs > 0 then
                        text = strip(before)
                        reference = table.concat(refs)
                end
        end
        local clean = to_en(text, parms)
        if clean == '' then
                return false, { another and 'cvt_no_num2' or 'cvt_no_num' }
        end
        local isnegative, propersign = false, ''  -- most common case
        local singular, show, denominator
        local value = tonumber(clean)
        local altvalue
        if value then
                local sign = clean:sub(1, 1)
                if sign == '+' or sign == '-' then
                        propersign = (sign == '+') and '+' or MINUS
                        clean = clean:sub(2)
                end
                if value < 0 then
                        isnegative = true
                        value = -value
                end
        else
                local valstr
                for _, prefix in ipairs({ '-', MINUS, '&minus;' }) do
                        -- Including '-' sets isnegative in case input is a fract
                        local plen = #prefix
                        if clean:sub(1, plen) == prefix then
                                valstr = clean:sub(plen + 1)
                                if valstr:match('^%s') then  -- "- 1" is invalid
                                        return false, { 'cvt_bad_num', text }
                                end
                                break
                        end
                end
                if valstr then
                        isnegative = true
                        propersign = MINUS
                        clean = valstr
                        value = tonumber(clean)
                end
                if value == nil then
                        if not no_fraction then
                                value, altvalue, show, denominator = extract_frac
                        end
                        if value == nil then
                                return false, { 'cvt_bad_num', text }
                        end
                        if value <= 1 then
                                singular = true  -- for example, "½ mile" or "one
                        end
                end
        end
        if not valid_number(value) then  -- for example, "1e310" may overflow
                return false, { 'cvt_invalid_num' }
        end
        if show == nil then
```

```
                -- clean is a non-empty string with no spaces, and does not repre
                -- and value = tonumber(clean) is a number >= 0.
                -- If the input uses e-notation, show will be displayed using a p
                -- we use the number as given so it might not be normalized scien
                -- The input value is spelled if specified so any e-notation is i
                -- that allows input like 2e6 to be spelled as "two million" whic
                -- because the spell module converts '2e6' to '2000000' before sp
                local function rounded(value, default, exponent)
                        local precision = parms.opt_ri
                        if precision then
                                local fmt = '%.' .. format('%d', precision) .. 'f
                                local result = fmt:format(tonumber(value) + 2e-14
                                if not exponent then
                                        singular = (tonumber(result) == 1)
                                end
                                return result
                        end
                        return default
                end
                singular = (value == 1)
                local scientific
                local significand, exponent = clean:match('^([%d.]+)[Ee]([+%-]?%d
                if significand then
                        show = with_exponent(parms, rounded(significand, signific
                        scientific = true
                else
                        show = with_separator(parms, rounded(value, clean))
                end
                show = propersign .. show
                if parms.opt_spell_in then
                        show = spell_number(parms, 'in', propersign .. rounded(va
                        scientific = false
                end
                if scientific then
                        parms.opt_scientific = true
                end
        end
        if isnegative and (value ~= 0) then
                value = -value
                altvalue = -(altvalue or value)
        end
        return true, {
                value = value,
                altvalue = altvalue or value,
                singular = singular,
                clean = clean,
                show = show .. (reference or ''),
                denominator = denominator,
        }
end

local function get_number(text)
        -- Return v, f where:
        --   v = nil (text is not a number)
        -- or
        --   v = value of text (text is a number)
        --   f = true if value is an integer
        -- Input can use en digits or digits in local language or separators,
        -- but no Unicode minus, and no fraction.
        if text then
                local number = tonumber(to_en(text))
                if number then
                        local _, fracpart = math.modf(number)
                        return number, (fracpart == 0)
```

```
                end
        end
end

local function gcd(a, b)
        -- Return the greatest common denominator for the given values,
        -- which are known to be positive integers.
        if a > b then
                a, b = b, a
        end
        if a <= 0 then
                return b
        end
        local r = b % a
        if r <= 0 then
                return a
        end
        if r == 1 then
                return 1
        end
        return gcd(r, a)
end

local function fraction_table(value, denominator)
        -- Return value as a string or a table:
        -- * If result is a string, there is no fraction, and the result
        --   is value formatted as a string of en digits.
        -- * If result is a table, it represents a fraction with named fields:
        --   wholestr, numstr, denstr (strings of en digits for integer, numerato
        -- The result is rounded to the nearest multiple of (1/denominator).
        -- If the multiple is zero, no fraction is included.
        -- No fraction is included if value is very large as the fraction would
        -- be unhelpful, particularly if scientific notation is required.
        -- Input value is a non-negative number.
        -- Input denominator is a positive integer for the desired fraction.
        if value <= 0 then
                return '0'
        end
        if denominator <= 0 or value > 1e8 then
                return format('%.2f', value)
        end
        local integer, decimals = math.modf(value)
        local numerator = floor((decimals * denominator) +
                0.5 + 2e-14)  -- add fudge for some common cases of bad rounding
        if numerator >= denominator then
                integer = integer + 1
                numerator = 0
        end
        local wholestr = tostring(integer)
        if numerator > 0 then
                local div = gcd(numerator, denominator)
                if div > 1 then
                        numerator = numerator / div
                        denominator = denominator / div
                end
                return {
                        wholestr = (integer > 0) and wholestr or '',
                        numstr = tostring(numerator),
                        denstr = tostring(denominator),
                        value = value,
                }
        end
        return wholestr
end
```

```
local function preunits(count, preunit1, preunit2)
	-- If count is 1:
	--     ignore preunit2
	--     return p1
	-- else:
	--     preunit1 is used for preunit2 if the latter is empty
	--     return p1, p2
	-- where:
	--     p1 is text to insert before the input unit
	--     p2 is text to insert before the output unit
	--     p1 or p2 may be nil to mean "no preunit"
	-- Using '+' gives output like "5+ feet" (no space before, but space afte
	local function withspace(text, wantboth)
		-- Return text with space before and, if wantboth, after.
		-- However, no space is added if there is a space or ' ' or
		-- at that position ('-' is for adjectival text).
		-- There is also no space if text starts with '&'
		-- (e.g. '&deg;' would display a degree symbol with no preceding
		local char = text:sub(1, 1)
		if char == '&' then
			return text  -- an html entity can be used to specify the
		end
		if not (char == ' ' or char == '-' or char == '+') then
			text = ' ' .. text
		end
		if wantboth then
			char = text:sub(-1, -1)
			if not (char == ' ' or char == '-' or text:sub(-6, -1) ==
				text = text .. ' '
			end
		end
		return text
	end
	local PLUS = '+ '
	preunit1 = preunit1 or ''
	local trim1 = strip(preunit1)
	if count == 1 then
		if trim1 == '' then
			return nil
		end
		if trim1 == '+' then
			return PLUS
		end
		return withspace(preunit1, true)
	end
	preunit1 = withspace(preunit1)
	preunit2 = preunit2 or ''
	local trim2 = strip(preunit2)
	if trim1 == '+' then
		if trim2 == '' or trim2 == '+' then
			return PLUS, PLUS
		end
		preunit1 = PLUS
	end
	if trim2 == '' then
		if trim1 == '' then
			return nil, nil
		end
		preunit2 = preunit1
	elseif trim2 == '+' then
		preunit2 = PLUS
	elseif trim2 == '&#32;' then  -- trick to make preunit2 empty
		preunit2 = nil
```

```
        else
                preunit2 = withspace(preunit2)
        end
        return preunit1, preunit2
end

local function range_text(range, want_name, parms, before, after, inout, options)
        -- Return before .. rtext .. after
        -- where rtext is the text that separates two values in a range.
        local rtext, adj_text, exception
        options = options or {}
        if type(range) == 'table' then
                -- Table must specify range text for ('off' and 'on') or ('input'
                -- and may specify range text for 'adj=on',
                -- and may specify exception = true.
                rtext = range[want_name and 'off' or 'on'] or
                                range[((inout == 'in') == (parms.opt_flip == true
                adj_text = range['adj']
                exception = range['exception']
        else
                rtext = range
        end
        if parms.opt_adjectival then
                if want_name or (exception and parms.abbr_org == 'on') then
                        rtext = adj_text or rtext:gsub(' ', '-'):gsub(' ', '
                end
        end
        if rtext == '–' and (options.spaced or after:sub(1, #MINUS) == MINUS) the
                rtext = ' – '
        end
        return before .. rtext .. after
end

local function get_composite(parms, iparm, in_unit_table)
        -- Look for a composite input unit. For example, {{convert|1|yd|2|ft|3|in
        -- would result in a call to this function with
        --   iparm = 3 (parms[iparm] = "2", just after the first unit)
        --   in_unit_table = (unit table for "yd"; contains value 1 for number of
        -- Return true, iparm, unit where
        --   iparm = index just after the composite units (7 in above example)
        --   unit = composite unit table holding all input units,
        -- or return true if no composite unit is present in parms,
        -- or return false, t where t is an error message table.
        local default, subinfo
        local composite_units, count = { in_unit_table }, 1
        local fixups = {}
        local total = in_unit_table.valinfo[1].value
        local subunit = in_unit_table
        while subunit.subdivs do  -- subdivs is nil or a table of allowed subdivi
                local subcode = strip(parms[iparm+1])
                local subdiv = subunit.subdivs[subcode] or subunit.subdivs[(all_u
                if not subdiv then
                        break
                end
                local success
                success, subunit = lookup(parms, subcode, 'no_combination')
                if not success then return false, subunit end  -- should never oc
                success, subinfo = extract_number(parms, parms[iparm])
                if not success then return false, subinfo end
                iparm = iparm + 2
                subunit.inout = 'in'
                subunit.valinfo = { subinfo }
                -- Recalculate total as a number of subdivisions.
                -- subdiv[1] = number of subdivisions per previous unit (integer
```

```
                total = total * subdiv[1] + subinfo.value
                if not default then  -- set by the first subdiv with a default de
                        default = subdiv.default
                end
                count = count + 1
                composite_units[count] = subunit
                if subdiv.unit or subdiv.name then
                        fixups[count] = { unit = subdiv.unit, name = subdiv.name,
                end
        end
        if count == 1 then
                return true  -- no error and no composite unit
        end
        for i, fixup in pairs(fixups) do
                local unit = fixup.unit
                local name = fixup.name
                if not unit or (count > 2 and name) then
                        composite_units[i].fixed_name = name
                else
                        local success, alternate = lookup(parms, unit, 'no_combi
                        if not success then return false, alternate end  -- shoul
                        alternate.inout = 'in'
                        alternate.valinfo = fixup.valinfo
                        composite_units[i] = alternate
                end
        end
        return true, iparm, {
                utype = in_unit_table.utype,
                scale = subunit.scale,  -- scale of last (least significant) unit
                valinfo = { { value = total, clean = subinfo.clean, denominator =
                composite = composite_units,
                default = default or in_unit_table.default
        }
end

local function translate_parms(parms, kv_pairs)
        -- Update fields in parms by translating each key:value in kv_pairs to te
        -- used by this module (may involve translating from local language to En
        -- Also, checks are performed which may display warnings, if enabled.
        -- Return true if successful or return false, t where t is an error messa
        currency_text = nil  -- local testing can hold module in memory; must cle
        if kv_pairs.adj and kv_pairs.sing then
                -- For enwiki (before translation), warn if attempt to use adj an
                -- as the latter is a deprecated alias for the former.
                if kv_pairs.adj ~= kv_pairs.sing and kv_pairs.sing ~= '' then
                        add_warning(parms, 1, 'cvt_unknown_option', 'sing=' .. kv
                end
                kv_pairs.sing = nil
        end
        kv_pairs.comma = kv_pairs.comma or config.comma  -- for plwiki who want c
        for loc_name, loc_value in pairs(kv_pairs) do
                local en_name = text_code.en_option_name[loc_name]
                if en_name then
                        local en_value = text_code.en_option_value[en_name]
                        if en_value == 'INTEGER' then  -- altitude_ft, altitude_m
                                en_value = nil
                                if loc_value == '' then
                                        add_warning(parms, 2, 'cvt_empty_option',
                                else
                                        local minimum
                                        local number, is_integer = get_number(loc
                                        if en_name == 'sigfig' then
                                                minimum = 1
                                        elseif en_name == 'frac' then
```

```
                                        minimum = 2
                                        if number and number < 0 then
                                                parms.opt_fraction_horizo
                                                number = -number
                                        end
                                else
                                        minimum = -1e6
                                end
                                if number and is_integer and number >= mi
                                        en_value = number
                                else
                                        local m
                                        if en_name == 'frac' then
                                                m = 'cvt_bad_frac'
                                        elseif en_name == 'sigfig' then
                                                m = 'cvt_bad_sigfig'
                                        else
                                                m = 'cvt_bad_altitude'
                                        end
                                        add_warning(parms, 1, m, loc_name
                                end
                        end
                elseif en_value == 'TEXT' then  -- $, input, qid, qual, s
                        en_value = loc_value ~= '' and loc_value or nil
                        if not en_value and (en_name == '$' or en_name ==
                                add_warning(parms, 2, 'cvt_empty_option',
                        elseif en_name == '$' then
                                -- Value should be a single character lik
                                currency_text = (loc_value == 'euro') and
                        elseif en_name == 'input' then
                                -- May have something like {{convert|inpu
                                -- with optional fields. In that case, wa
                                parms.input_text = loc_value  -- keep inp
                        end
                else
                        en_value = en_value[loc_value]
                        if en_value and en_value:sub(-1) == '?' then
                                en_value = en_value:sub(1, -2)
                                add_warning(parms, -1, 'cvt_deprecated',
                        end
                        if en_value == nil then
                                if loc_value == '' then
                                        add_warning(parms, 2, 'cvt_empty_
                                else
                                        add_warning(parms, 1, 'cvt_unknow
                                end
                        elseif en_value == '' then
                                en_value = nil  -- an ignored option like
                        elseif type(en_value) == 'string' and en_value:su
                                for _, v in ipairs(split(en_value, ',')) 
                                        local lhs, rhs = v:match('^(.-)=(
                                        if rhs then
                                                parms[lhs] = tonumber(rhs
                                        else
                                                parms[v] = true
                                        end
                                end
                                en_value = nil
                        end
                end
                parms[en_name] = en_value
        else
                add_warning(parms, 1, 'cvt_unknown_option', loc_name .. '
        end
```

```
	end
	local abbr_entered = parms.abbr
	local cfg_abbr = config.abbr
	if cfg_abbr then
		-- Don't warn if invalid because every convert would show that wa
		if cfg_abbr == 'on always' then
			parms.abbr = 'on'
		elseif cfg_abbr == 'off always' then
			parms.abbr = 'off'
		elseif parms.abbr == nil then
			if cfg_abbr == 'on default' then
				parms.abbr = 'on'
			elseif cfg_abbr == 'off default' then
				parms.abbr = 'off'
			end
		end
	end
	if parms.abbr then
		if parms.abbr == 'unit' then
			parms.abbr = 'on'
			parms.number_word = true
		end
		parms.abbr_org = parms.abbr  -- original abbr, before any flip
	elseif parms.opt_hand_hh then
		parms.abbr_org = 'on'
		parms.abbr = 'on'
	else
		parms.abbr = 'out'  -- default is to abbreviate output only (use
	end
	if parms.opt_order_out then
		-- Disable options that do not work in a useful way with order=ou
		parms.opt_flip = nil  -- override adj=flip
		parms.opt_spell_in = nil
		parms.opt_spell_out = nil
		parms.opt_spell_upper = nil
	end
	if parms.opt_spell_out and not abbr_entered then
		parms.abbr = 'off'  -- should show unit name when spelling the ou
	end
	if parms.opt_flip then
		local function swap_in_out(option)
			local value = parms[option]
			if value == 'in' then
				parms[option] = 'out'
			elseif value == 'out' then
				parms[option] = 'in'
			end
		end
		swap_in_out('abbr')
		swap_in_out('lk')
		if parms.opt_spell_in and not parms.opt_spell_out then
			-- For simplicity, and because it does not appear to be r
			-- user cannot set an option to spell the output only.
			parms.opt_spell_in = nil
			parms.opt_spell_out = true
		end
	end
	if parms.opt_spell_upper then
		parms.spell_upper = parms.opt_flip and 'out' or 'in'
	end
	if parms.opt_table or parms.opt_tablecen then
		if abbr_entered == nil and parms.lk == nil then
			parms.opt_values = true
		end
```

```
                parms.table_align = parms.opt_table and 'right' or 'center'
        end
        if parms.table_align or parms.opt_sortable_on then
                parms.need_table_or_sort = true
        end
        local disp_joins = text_code.disp_joins
        local default_joins = disp_joins['b']
        parms.join_between = default_joins[3] or '; '
        local disp = parms.disp
        if disp == nil then  -- special case for the most common setting
                parms.joins = default_joins
        elseif disp == 'x' then
                -- Later, parms.joins is set from the input parameters.
        else
                -- Old template does this.
                local abbr = parms.abbr
                if disp == 'slash' then
                        if abbr_entered == nil then
                                disp = 'slash-nbsp'
                        elseif abbr == 'in' or abbr == 'out' then
                                disp = 'slash-sp'
                        else
                                disp = 'slash-nosp'
                        end
                elseif disp == 'sqbr' then
                        if abbr == 'on' then
                                disp = 'sqbr-nbsp'
                        else
                                disp = 'sqbr-sp'
                        end
                end
                parms.joins = disp_joins[disp] or default_joins
                parms.join_between = parms.joins[3] or parms.join_between
                parms.wantname = parms.joins.wantname
        end
        if (en_default and not parms.opt_lang_local and (parms[1] or ''):find('%d
                from_en_table = nil
        end
        if en_default and from_en_table then
                -- For hiwiki: localized symbol/name is defined with the US symbo
                -- and is used if output uses localized numbers.
                parms.opt_sp_us = true
        end
        return true
end

local function get_values(parms)
        -- If successful, update parms and return true, v, i where
        --   v = table of input values
        --   i = index to next entry in parms after those processed here
        -- or return false, t where t is an error message table.
        local valinfo = collection()  -- numbered table of input values
        local range = collection()  -- numbered table of range items (having, for
        local had_nocomma  -- true if removed "nocomma" kludge from second parame
        local parm2 = strip(parms[2])
        if parm2 and parm2:sub(-7, -1) == 'nocomma' then
                parms[2] = strip(parm2:sub(1, -8))
                parms.opt_nocomma = true
                had_nocomma = true
        end
        local function extractor(i)
                -- If the parameter is not a value, try unpacking it as a range (
                -- However, "-1-2/3" is a negative fraction (-1⅔), so it must be
                -- Do not unpack a parameter if it is like "3-1/2" which is somet
```

```
                -- used instead of "3+1/2" (and which should not be interpreted a
                -- Unpacked items are inserted into the parms table.
                -- The tail recursion allows combinations like "1x2 to 3x4".
                local valstr = strip(parms[i])  -- trim so any '-' as a negative
                local success, result = extract_number(parms, valstr, i > 1)
                if not success and valstr and i < 20 then  -- check i to limit ab
                        local lhs, sep, rhs = valstr:match('^(%S+)%s+(%S+)%s+(%S
                        if lhs and not (sep == '-' and rhs:match('/')) then
                                if sep:find('%d') then
                                        return success, result  -- to reject {{cc
                                end
                                parms[i] = rhs
                                table.insert(parms, i, sep)
                                table.insert(parms, i, lhs)
                                return extractor(i)
                        end
                        if not valstr:match('%-.*/') then
                                for _, sep in ipairs(text_code.ranges.words) do
                                        local start, stop = valstr:find(sep, 2, t
                                        if start then
                                                parms[i] = valstr:sub(stop + 1)
                                                table.insert(parms, i, sep)
                                                table.insert(parms, i, valstr:sub
                                                return extractor(i)
                                        end
                                end
                        end
                end
                return success, result
        end
        local i = 1
        local is_change
        while true do
                local success, info = extractor(i)  -- need to set parms.opt_nocc
                if not success then return false, info end
                i = i + 1
                if is_change then
                        info.is_change = true  -- value is after "±" and so is a
                        is_change = nil
                end
                valinfo:add(info)
                local range_item = get_range(strip(parms[i]))
                if not range_item then
                        break
                end
                i = i + 1
                range:add(range_item)
                if type(range_item) == 'table' then
                        -- For range "x", if append unit to some values, append i
                        parms.in_range_x = parms.in_range_x or range_item.in_rang
                        parms.out_range_x = parms.out_range_x or range_item.out_r
                        parms.abbr_range_x = parms.abbr_range_x or range_item.abb
                        is_change = range_item.is_range_change
                end
        end
        if range.n > 0 then
                if range.n > 30 then  -- limit abuse, although 4 is a more likely
                        return false, { 'cvt_invalid_num' }  -- misleading messag
                end
                parms.range = range
        elseif had_nocomma then
                return false, { 'cvt_unknown', parm2 }
        end
        return true, valinfo, i
```

```
end

local function simple_get_values(parms)
        -- If input is like "{{convert|valid_value|valid_unit|...}}",
        -- return true, i, in_unit, in_unit_table
        -- i = index in parms of what follows valid_unit, if anything.
        -- The valid_value is not negative and does not use a fraction, and
        -- no options requiring further processing of the input are used.
        -- Otherwise, return nothing or return false, parm1 for caller to interpr
        -- Testing shows this function is successful for 96% of converts in artic
        -- and that on average it speeds up converts by 8%.
        local clean = to_en(strip(parms[1] or ''), parms)
        if parms.opt_ri or parms.opt_spell_in or #clean > 10 or not clean:match('
                return false, clean
        end
        local value = tonumber(clean)
        if not value then return end
        local info = {
                value = value,
                altvalue = value,
                singular = (value == 1),
                clean = clean,
                show = with_separator(parms, clean),
        }
        local in_unit = strip(parms[2])
        local success, in_unit_table = lookup(parms, in_unit, 'no_combination')
        if not success then return end
        in_unit_table.valinfo = { info }
        return true, 3, in_unit, in_unit_table
end

local function wikidata_call(parms, operation, ...)
        -- Return true, s where s is the result of a Wikidata operation,
        -- or return false, t where t is an error message table.
        local function worker(...)
                wikidata_code = wikidata_code or require(wikidata_module)
                wikidata_data = wikidata_data or mw.loadData(wikidata_data_module
                return wikidata_code[operation](wikidata_data, ...)
        end
        local success, status, result = pcall(worker, ...)
        if success then
                return status, result
        end
        if parms.opt_sortable_debug then
                -- Use debug=yes to crash if an error while accessing Wikidata.
                error('Error accessing Wikidata: ' .. status, 0)
        end
        return false, { 'cvt_wd_fail' }
end

local function get_parms(parms, args)
        -- If successful, update parms and return true, unit where
        --   parms is a table of all arguments passed to the template
        --        converted to named arguments, and
        --   unit is the input unit table;
        -- or return false, t where t is an error message table.
        -- For special processing (not a convert), can also return
        -- true, wikitext where wikitext is the final result.
        -- The returned input unit table may be for a fake unit using the specifi
        -- unit code as the symbol and name, and with bad_mcode = message code ta
        -- MediaWiki removes leading and trailing whitespace from the values of
        -- named arguments. However, the values of numbered arguments include any
        -- whitespace entered in the template, and whitespace is used by some
        -- parameters (example: the numbered parameters associated with "disp=x")
```

```
	local kv_pairs = {}  -- table of input key:value pairs where key is a nam
	for k, v in pairs(args) do
		if type(k) == 'number' or k == 'test' then  -- parameter "test" i
			parms[k] = v
		else
			kv_pairs[k] = v
		end
	end
	if parms.test == 'wikidata' then
		local ulookup = function (ucode)
			-- Use empty table for parms so it does not accumulate re
			return lookup({}, ucode, 'no_combination')
		end
		return wikidata_call(parms, '_listunits', ulookup)
	end
	local success, msg = translate_parms(parms, kv_pairs)
	if not success then return false, msg end
	if parms.input then
		success, msg = wikidata_call(parms, '_adjustparameters', parms, 1
		if not success then return false, msg end
	end
	local success, i, in_unit, in_unit_table = simple_get_values(parms)
	if not success then
		if type(i) == 'string' and i:match('^NNN+$') then
			-- Some infoboxes have examples like {{convert|NNN|m}} (3
			-- Output an empty string for these.
			return false, { 'cvt_no_output' }
		end
		local valinfo
		success, valinfo, i = get_values(parms)
		if not success then return false, valinfo end
		in_unit = strip(parms[i])
		i = i + 1
		success, in_unit_table = lookup(parms, in_unit, 'no_combination')
		if not success then
			in_unit = in_unit or ''
			if parms.opt_ignore_error then  -- display given unit cod
				in_unit_table = ''  -- suppress error message and
			end
			in_unit_table = setmetatable({
				symbol = in_unit, name2 = in_unit, utype = in_uni
				scale = 1, default = '', defkey = '', linkey = '
				bad_mcode = in_unit_table }, unit_mt)
		end
		in_unit_table.valinfo = valinfo
	end
	if parms.test == 'msg' then
		-- Am testing the messages produced when no output unit is specif
		-- the input unit has a missing or invalid default.
		-- Set two units for testing that.
		-- LATER: Remove this code.
		if in_unit == 'chain' then
			in_unit_table.default = nil  -- no default
		elseif in_unit == 'rd' then
			in_unit_table.default  = "ft!X!m"  -- an invalid expressi
		end
	end
	in_unit_table.inout = 'in'  -- this is an input unit
	if not parms.range then
		local success, inext, composite_unit = get_composite(parms, i, in
		if not success then return false, inext end
		if composite_unit then
			in_unit_table = composite_unit
			i = inext
```

```
		end
	end
	if in_unit_table.builtin == 'mach' then
		-- As with old template, a number following Mach as the input uni
		-- That is deprecated: should use altitude_ft=NUMBER or altitude_
		local success, info
		success = tonumber(parms[i])  -- this will often work and will gi
		if success then
			info = { value = success }
		else
			success, info = extract_number(parms, parms[i], false, tr
		end
		if success then
			i = i + 1
			in_unit_table.altitude = info.value
		end
	end
	local word = strip(parms[i])
	i = i + 1
	local precision, is_bad_precision
	local function set_precision(text)
		local number, is_integer = get_number(text)
		if number then
			if is_integer then
				precision = number
			else
				precision = text
				is_bad_precision = true
			end
			return true  -- text was used for precision, good or bad
		end
	end
	if word and not set_precision(word) then
		parms.out_unit = parms.out_unit or word
		if set_precision(strip(parms[i])) then
			i = i + 1
		end
	end
	if parms.opt_adj_mid then
		word = parms[i]
		i = i + 1
		if word then  -- mid-text words
			if word:sub(1, 1) == '-' then
				parms.mid = word
			else
				parms.mid = ' ' .. word
			end
		end
	end
	if parms.opt_one_preunit then
		parms[parms.opt_flip and 'preunit2' or 'preunit1'] = preunits(1,
		i = i + 1
	end
	if parms.disp == 'x' then
		-- Following is reasonably compatible with the old template.
		local first = parms[i] or ''
		local second = parms[i+1] or ''
		i = i + 2
		if strip(first) == '' then  -- user can enter '&#32;' rather thar
			first = ' [ ' .. first
			second = ' ]' .. second
		end
		parms.joins = { first, second }
	elseif parms.opt_two_preunits then
```

```
                local p1, p2 = preunits(2, parms[i], parms[i+1])
                i = i + 2
                if parms.preunit1 then
                        -- To simplify documentation, allow unlikely use of adj=p
                        -- (however, an output unit must be specified with adj=pr
                        parms.preunit1 = parms.preunit1 .. p1
                        parms.preunit2 = p2
                else
                        parms.preunit1, parms.preunit2 = p1, p2
                end
        end
        if precision == nil then
                if set_precision(strip(parms[i])) then
                        i = i + 1
                end
        end
        if is_bad_precision then
                add_warning(parms, 1, 'cvt_bad_prec', precision)
        else
                parms.precision = precision
        end
        for j = i, i + 3 do
                local parm = parms[j]  -- warn if find a non-empty extraneous par
                if parm and parm:match('%S') then
                        add_warning(parms, 1, 'cvt_unknown_option', parm)
                        break
                end
        end
        return true, in_unit_table
end

local function record_default_precision(parms, out_current, precision)
        -- If necessary, adjust parameters and return a possibly adjusted precisi
        -- When converting a range of values where a default precision is require
        -- that default is calculated for each value because the result sometimes
        -- depends on the precise input and output values. This function may caus
        -- the entire convert process to be repeated in order to ensure that the
        -- same default precision is used for each individual convert.
        -- If that were not done, a range like 1000 to 1000.4 may give poor resul
        -- because the first output could be heavily rounded, while the second is
        -- For range 1000.4 to 1000, this function can give the second convert th
        -- same default precision that was used for the first.
        if not parms.opt_round_each then
                local maxdef = out_current.max_default_precision
                if maxdef then
                        if maxdef < precision then
                                parms.do_convert_again = true
                                out_current.max_default_precision = precision
                        else
                                precision = out_current.max_default_precision
                        end
                else
                        out_current.max_default_precision = precision
                end
        end
        return precision
end

local function default_precision(parms, invalue, inclean, denominator, outvalue,
        -- Return a default value for precision (an integer like 2, 0, -2).
        -- If denominator is not nil, it is the value of the denominator in incle
        -- Code follows procedures used in old template.
        local fudge = 1e-14  -- {{Order of magnitude}} adds this, so we do too
        local prec, minprec, adjust
```

```
	local subunit_ignore_trailing_zero
	local subunit_more_precision  -- kludge for "in" used in input like "|2|f
	local composite = in_current.composite
	if composite then
		subunit_ignore_trailing_zero = true  -- input "|2|st|10|lb" has p
		if composite[#composite].exception == 'subunit_more_precision' th
			subunit_more_precision = true  -- do not use standard pre
		end
	end
	if denominator and denominator > 0 then
		prec = math.max(log10(denominator), 1)
	else
		-- Count digits after decimal mark, handling cases like '12.345e6
		local exponent
		local integer, dot, decimals, expstr = inclean:match('^(%d*)(%.?)
		local e = expstr:sub(1, 1)
		if e == 'e' or e == 'E' then
			exponent = tonumber(expstr:sub(2))
		end
		if dot == '' then
			prec = subunit_ignore_trailing_zero and 0 or -integer:mat
		else
			prec = #decimals
		end
		if exponent then
			-- So '1230' and '1.23e3' both give prec = -1, and '0.001
			prec = prec - exponent
		end
	end
	if in_current.istemperature and out_current.istemperature then
		-- Converting between common temperatures (°C, °F, °R, K); not ke
		-- Kelvin value can be almost zero, or small but negative due to
		-- Also, an input value like -300 C (below absolute zero) gives r
		-- Calculate minimum precision from absolute value.
		adjust = 0
		local kelvin = abs((invalue - in_current.offset) * in_current.sca
		if kelvin < 1e-8 then  -- assume nonzero due to input or calculat
			minprec = 2
		else
			minprec = 2 - floor(log10(kelvin) + fudge)  -- 3 sigfigs
		end
	else
		if invalue == 0 or outvalue <= 0 then
			-- We are never called with a negative outvalue, but it m
			-- This is special-cased to avoid calculation exceptions
			return record_default_precision(parms, out_current, 0)
		end
		if out_current.exception == 'integer_more_precision' and floor(in
			-- With certain output units that sometimes give poor res
			-- with default rounding, use more precision when the inp
			-- value is equal to an integer. An example of a poor res
			-- is when input 50 gives a smaller output than input 49
			-- Experiment shows this helps, but it does not eliminate
			-- surprises because it is not clear whether "50" should
			-- interpreted as "from 45 to 55" or "from 49.5 to 50.5"
			adjust = -log10(in_current.scale)
		elseif subunit_more_precision then
			-- Conversion like "{{convert|6|ft|1|in|cm}}" (where subu
			-- has a non-standard adjust value, to give more output p
			adjust = log10(out_current.scale) + 2
		else
			adjust = log10(abs(invalue / outvalue))
		end
		adjust = adjust + log10(2)
```

```
                -- Ensure that the output has at least two significant figures.
                minprec = 1 - floor(log10(outvalue) + fudge)
        end
        if extra then
                adjust = extra.adjust or adjust
                minprec = extra.minprec or minprec
        end
        return record_default_precision(parms, out_current, math.max(floor(prec +
end

local function convert(parms, invalue, info, in_current, out_current)
        -- Convert given input value from one unit to another.
        -- Return output_value (a number) if a simple convert, or
        -- return f, t where
        --   f = true, t = table of information with results, or
        --   f = false, t = error message table.
        local inscale = in_current.scale
        local outscale = out_current.scale
        if not in_current.iscomplex and not out_current.iscomplex then
                return invalue * (inscale / outscale)  -- minimize overhead for m
        end
        if in_current.invert or out_current.invert then
                -- Inverted units, such as inverse length, inverse time, or
                -- fuel efficiency. Built-in units do not have invert set.
                if (in_current.invert or 1) * (out_current.invert or 1) < 0 then
                        return 1 / (invalue * inscale * outscale)
                end
                return invalue * (inscale / outscale)
        elseif in_current.offset then
                -- Temperature (there are no built-ins for this type of unit).
                if info.is_change then
                        return invalue * (inscale / outscale)
                end
                return (invalue - in_current.offset) * (inscale / outscale) + out
        else
                -- Built-in unit.
                local in_builtin = in_current.builtin
                local out_builtin = out_current.builtin
                if in_builtin and out_builtin then
                        if in_builtin == out_builtin then
                                return invalue
                        end
                        -- There are no cases (yet) where need to convert from or
                        -- built-in unit to another, so this should never occur.
                        return false, { 'cvt_bug_convert' }
                end
                if in_builtin == 'mach' or out_builtin == 'mach' then
                        -- Should check that only one altitude is given but am pl
                        -- in_current.altitude (which can only occur when Mach is
                        -- and out_current.altitude cannot occur.
                        local alt = parms.altitude_ft or in_current.altitude
                        if not alt and parms.altitude_m then
                                alt = parms.altitude_m / 0.3048  -- 1 ft = 0.3048
                        end
                        local spd = speed_of_sound(alt)
                        if in_builtin == 'mach' then
                                inscale = spd
                                return invalue * (inscale / outscale)
                        end
                        outscale = spd
                        local adjust = 0.1 / inscale
                        return true, {
                                outvalue = invalue * (inscale / outscale),
                                adjust = log10(adjust) + log10(2),
```

```
                        }
                elseif in_builtin == 'hand' then
                        -- 1 hand = 4 inches; 1.2 hands = 6 inches.
                        -- Decimals of a hand are only defined for the first digi
                        -- the first fractional digit should be a number of inche
                        -- However, this code interprets the entire fractional pa
                        -- of inches / 10 (so 1.75 inches would be 0.175 hands).
                        -- A value like 12.3 hands is exactly 12*4 + 3 inches; ba
                        local integer, fracpart = math.modf(invalue)
                        local inch_value = 4 * integer + 10 * fracpart  -- equiva
                        local factor = inscale / outscale
                        if factor == 4 then
                                -- Am converting to inches: show exact result, ar
                                if parms.abbr_org == nil then
                                        out_current.usename = true
                                end
                                local show = format('%g', abs(inch_value))  -- sh
                                if not show:find('e', 1, true) then
                                        return true, {
                                                invalue = inch_value,
                                                outvalue = inch_value,
                                                clean = show,
                                                show = show,
                                        }
                                end
                        end
                        local outvalue = (integer + 2.5 * fracpart) * factor
                        local fracstr = info.clean:match('%.(.*)') or ''
                        local fmt
                        if fracstr == '' then
                                fmt = '%.0f'
                        else
                                fmt = '%.' .. format('%d', #fracstr - 1) .. 'f'
                        end
                        return true, {
                                invalue = inch_value,
                                clean = format(fmt, inch_value),
                                outvalue = outvalue,
                                minprec = 0,
                        }
                end
        end
        return false, { 'cvt_bug_convert' }  -- should never occur
end

local function user_style(parms, i)
        -- Return text for a user-specified style for a table cell, or '' if none
        -- given i = 1 (input style) or 2 (output style).
        local style = parms[(i == 1) and 'stylein' or 'styleout']
        if style then
                style = style:gsub('"', '')
                if style ~= '' then
                        if style:sub(-1) ~= ';' then
                                style = style .. ';'
                        end
                        return style
                end
        end
        return ''
end

local function make_table_or_sort(parms, invalue, info, in_current, scaled_top)
        -- Set options to handle output for a table or a sort key, or both.
        -- The text sort key is based on the value resulting from converting
```

```
	-- the input to a fake base unit with scale = 1, and other properties
	-- required for a conversion derived from the input unit.
	-- For other modules, return the sort key in a hidden span element, and
	-- the scaled value used to generate the sort key.
	-- If scaled_top is set, it is the scaled value of the numerator of a per
	-- to be combined with this unit (the denominator) to make the sort key.
	-- Scaling only works with units that convert with a factor (not temperat
	local sortkey, scaled_value
	if parms.opt_sortable_on then
		local base = {  -- a fake unit with enough fields for a valid cor
			scale = 1,
			invert = in_current.invert and 1,
			iscomplex = in_current.iscomplex,
			offset = in_current.offset and 0,
		}
		local outvalue, extra = convert(parms, invalue, info, in_current,
		if extra then
			outvalue = extra.outvalue
		end
		if in_current.istemperature then
			-- Have converted to kelvin; assume numbers close to zero
			-- rounding error and should be zero.
			if abs(outvalue) < 1e-12 then
				outvalue = 0
			end
		end
		if scaled_top and outvalue ~= 0 then
			outvalue = scaled_top / outvalue
		end
		scaled_value = outvalue
		if not valid_number(outvalue) then
			if outvalue < 0 then
				sortkey = '1000000000000000000'
			else
				sortkey = '9000000000000000000'
			end
		elseif outvalue == 0 then
			sortkey = '5000000000000000000'
		else
			local mag = floor(log10(abs(outvalue)) + 1e-14)
			local prefix
			if outvalue > 0 then
				prefix = 7000 + mag
			else
				prefix = 2999 - mag
				outvalue = outvalue + 10^(mag+1)
			end
			sortkey = format('%d', prefix) .. format('%015.0f', floor
		end
	end
	local sortspan
	if sortkey and not parms.table_align then
		sortspan = parms.opt_sortable_debug and
			'<span data-sort-value="' .. sortkey .. '♠"><span style='
			'<span data-sort-value="' .. sortkey .. '♠"></span>'
		parms.join_before = sortspan
	end
	if parms.table_align then
		local sort
		if sortkey then
			sort = ' data-sort-value="' .. sortkey .. '"'
			if parms.opt_sortable_debug then
				parms.join_before = '<span style="border:1px soli
			end
```

```
                else
                        sort = ''
                end
                local style = 'style="text-align:' .. parms.table_align .. ';'
                local joins = {}
                for i = 1, 2 do
                        joins[i] = (i == 1 and '' or '\n|') .. style .. user_styl
                end
                parms.table_joins = joins
        end
        return sortspan, scaled_value
end

local cvt_to_hand

local function cvtround(parms, info, in_current, out_current)
        -- Return true, t where t is a table with the conversion results; fields:
        --   show = rounded, formatted string with the result of converting value
        --      using the rounding specified in parms.
        --   singular = true if result (after rounding and ignoring any negative
        --      is "1", or like "1.00", or is a fraction with value < 1;
        --   (and more fields shown below, and a calculated 'absvalue' field).
        -- or return false, t where t is an error message table.
        -- Input info.clean uses en digits (it has been translated, if necessary)
        -- Output show uses en or non-en digits as appropriate, or can be spelle
        if out_current.builtin == 'hand' then
                return cvt_to_hand(parms, info, in_current, out_current)
        end
        local invalue = in_current.builtin == 'hand' and info.altvalue or info.va
        local outvalue, extra = convert(parms, invalue, info, in_current, out_cu
        if parms.need_table_or_sort then
                parms.need_table_or_sort = nil  -- process using first input valu
                make_table_or_sort(parms, invalue, info, in_current)
        end
        if extra then
                if not outvalue then return false, extra end
                invalue = extra.invalue or invalue
                outvalue = extra.outvalue
        end
        if not valid_number(outvalue) then
                return false, { 'cvt_invalid_num' }
        end
        local isnegative
        if outvalue < 0 then
                isnegative = true
                outvalue = -outvalue
        end
        local precision, show, exponent
        local denominator = out_current.frac
        if denominator then
                show = fraction_table(outvalue, denominator)
        else
                precision = parms.precision
                if not precision then
                        if parms.sigfig then
                                show, exponent = make_sigfig(outvalue, parms.sig
                        elseif parms.opt_round then
                                local n = parms.opt_round
                                if n == 0.5 then
                                        local integer, fracpart = math.modf(floo
                                        if fracpart == 0 then
                                                show = format('%.0f', integer)
                                        else
                                                show = format('%.1f', integer + f
```

```
                                        end
                                else
                                        show = format('%.0f', floor((outvalue / r
                                end
                        elseif in_current.builtin == 'mach' then
                                local sigfig = info.clean:gsub('^[0.]+', ''):gsub
                                show, exponent = make_sigfig(outvalue, sigfig)
                        else
                                local inclean = info.clean
                                if extra then
                                        inclean = extra.clean or inclean
                                        show = extra.show
                                end
                                if not show then
                                        precision = default_precision(parms, inva
                                end
                        end
                end
        end
        if precision then
                if precision >= 0 then
                        local fudge
                        if precision <= 8 then
                                -- Add a fudge to handle common cases of bad roun
                                -- to precisely represent some values. This makes
                                -- {{convert|-100.1|C|K}} and {{convert|5555000|u
                                -- Old template uses #expr round, which invokes P
                                -- LATER: Investigate how PHP round() works.
                                fudge = 2e-14
                        else
                                fudge = 0
                        end
                        local fmt = '%.' .. format('%d', precision) .. 'f'
                        local success
                        success, show = pcall(format, fmt, outvalue + fudge)
                        if not success then
                                return false, { 'cvt_big_prec', tostring(precisio
                        end
                else
                        precision = -precision  -- #digits to zero (in addition t
                        local shift = 10 ^ precision
                        show = format('%.0f', outvalue/shift)
                        if show ~= '0' then
                                exponent = #show + precision
                        end
                end
        end
        local t = format_number(parms, show, exponent, isnegative)
        if type(show) == 'string' then
                -- Set singular using match because on some systems 0.99999999999
                if exponent then
                        t.singular = (exponent == 1 and show:match('^10*$'))
                else
                        t.singular = (show == '1' or show:match('^1%.0*$'))
                end
        else
                t.fraction_table = show
                t.singular = (outvalue <= 1)  -- cannot have 'fraction == 1', but
        end
        t.raw_absvalue = outvalue  -- absolute value before rounding
        return true, setmetatable(t, {
                __index = function (self, key)
                        if key == 'absvalue' then
                                -- Calculate absolute value after rounding, if ne
```

```
                                local clean, exponent = rawget(self, 'clean'), ra
                                local value = tonumber(clean)  -- absolute value
                                if exponent then
                                        value = value * 10^exponent
                                end
                                rawset(self, key, value)
                                return value
                        end
                end })
end

function cvt_to_hand(parms, info, in_current, out_current)
        -- Convert input to hands, inches.
        -- Return true, t where t is a table with the conversion results;
        -- or return false, t where t is an error message table.
        if parms.abbr_org == nil then
                out_current.usename = true  -- default is to show name not symbol
        end
        local precision = parms.precision
        local frac = out_current.frac
        if not frac and precision and precision > 1 then
                frac = (precision == 2) and 2 or 4
        end
        local out_next = out_current.out_next
        if out_next then
                -- Use magic knowledge to determine whether the next unit is inch
                -- The following ensures that when the output combination "hand i
                -- value is rounded to match the hands value. Also, displaying sa
                -- is better as 61.5 implies the value is not 61.4.
                if out_next.exception == 'subunit_more_precision' then
                        out_next.frac = frac
                end
        end
        -- Convert to inches; calculate hands from that.
        local dummy_unit_table = { scale = out_current.scale / 4, frac = frac }
        local success, outinfo = cvtround(parms, info, in_current, dummy_unit_tab
        if not success then return false, outinfo end
        local tfrac = outinfo.fraction_table
        local inches = outinfo.raw_absvalue
        if tfrac then
                inches = floor(inches)  -- integer part only; fraction added late
        else
                inches = floor(inches + 0.5)  -- a hands measurement never shows
        end
        local hands, inches = divide(inches, 4)
        outinfo.absvalue = hands + inches/4  -- supposed to be the absolute round
        local inchstr = tostring(inches)  -- '0', '1', '2' or '3'
        if precision and precision <= 0 then  -- using negative or 0 for precisio
                hands = floor(outinfo.raw_absvalue/4 + 0.5)
                inchstr = ''
        elseif tfrac then
                -- Always show an integer before fraction (like "15.0½") because
                inchstr = numdot .. format_fraction(parms, 'out', false, inchstr,
        else
                inchstr = numdot .. from_en(inchstr)
        end
        outinfo.show = outinfo.sign .. with_separator(parms, format('%.0f', hands
        return true, outinfo
end

local function evaluate_condition(value, condition)
        -- Return true or false from applying a conditional expression to value,
        -- or throw an error if invalid.
        -- A very limited set of expressions is supported:
```

```
        --    v < 9
        --    v * 9 < 9
        -- where
        --    'v' is replaced with value
        --    9 is any number (as defined by Lua tonumber)
        --      only en digits are accepted
        --    '<' can also be '<=' or '>' or '>='
        -- In addition, the following form is supported:
        --    LHS and RHS
        -- where
        --    LHS, RHS = any of above expressions.
        local function compare(value, text)
                local arithop, factor, compop, limit = text:match('^%s*v%s*([*]?)
                if arithop == nil then
                        error('Invalid default expression', 0)
                elseif arithop == '*' then
                        factor = tonumber(factor)
                        if factor == nil then
                                error('Invalid default expression', 0)
                        end
                        value = value * factor
                end
                limit = tonumber(limit)
                if limit == nil then
                        error('Invalid default expression', 0)
                end
                if compop == '<' then
                        return value < limit
                elseif compop == '<=' then
                        return value <= limit
                elseif compop == '>' then
                        return value > limit
                elseif compop == '>=' then
                        return value >= limit
                end
                error('Invalid default expression', 0)  -- should not occur
        end
        local lhs, rhs = condition:match('^(.-%W)and(%W.*)')
        if lhs == nil then
                return compare(value, condition)
        end
        return compare(value, lhs) and compare(value, rhs)
end

local function get_default(value, unit_table)
        -- Return true, s where s = name of unit's default output unit,
        -- or return false, t where t is an error message table.
        -- Some units have a default that depends on the input value
        -- (the first value if a range of values is used).
        -- If '!' is in the default, the first bang-delimited field is an
        -- expression that uses 'v' to represent the input value.
        -- Example: 'v < 120 ! small ! big ! suffix' (suffix is optional)
        -- evaluates 'v < 120' as a boolean with result
        -- 'smallsuffix' if (value < 120), or 'bigsuffix' otherwise.
        -- Input must use en digits and '.' decimal mark.
        local default = data_code.default_exceptions[unit_table.defkey or unit_ta
        if not default then
                local per = unit_table.per
                if per then
                        local function a_default(v, u)
                                local success, ucode = get_default(v, u)
                                if not success then
                                        return '?'  -- an unlikely error has occu
                                end
```

```
                                -- Attempt to use only the first unit if a combi
                                -- This is not bulletproof but should work for m
                                -- Where it does not work, the convert will need
                                local t = all_units[ucode]
                                if t then
                                        local combo = t.combination
                                        if combo then
                                                -- For a multiple like ftin, the
                                                local i = t.multiple and table_le
                                                ucode = combo[i]
                                        end
                                else
                                        -- Try for an automatically generated co
                                        local item = ucode:match('^(.-)%+') or u
                                        if all_units[item] then
                                                return item
                                        end
                                end
                                return ucode
                        end
                        local unit1, unit2 = per[1], per[2]
                        local def1 = (unit1 and a_default(value, unit1) or unit_t
                        local def2 = a_default(1, unit2)  -- 1 because per unit c
                        return true, def1 .. '/' .. def2
                end
                return false, { 'cvt_no_default', unit_table.symbol }
        end
        if default:find('!', 1, true) == nil then
                return true, default
        end
        local t = split(default, '!')
        if #t == 3 or #t == 4 then
                local success, result = pcall(evaluate_condition, value, t[1])
                if success then
                        default = result and t[2] or t[3]
                        if #t == 4 then
                                default = default .. t[4]
                        end
                        return true, default
                end
        end
        return false, { 'cvt_bad_default', unit_table.symbol }
end

local linked_pages  -- to record linked pages so will not link to the same page m

local function unlink(unit_table)
        -- Forget that the given unit has previously been linked (if it has).
        -- That is needed when processing a range of inputs or outputs when an id
        -- for the first range value may have been evaluated, but only an id for
        -- the last value is displayed, and that id may need to be linked.
        linked_pages[unit_table.unitcode or unit_table] = nil
end

local function make_link(link, id, unit_table)
        -- Return wikilink "[[link|id]]", possibly abbreviated as in examples:
        --   [[Mile|mile]]  --> [[mile]]
        --   [[Mile|miles]] --> [[mile]]s
        -- However, just id is returned if:
        -- * no link given (so caller does not need to check if a link was define
        -- * link has previously been used during the current convert (to avoid c
        local link_key
        if unit_table then
                link_key = unit_table.unitcode or unit_table
```

```
	else
		link_key = link
	end
	if not link or link == '' or linked_pages[link_key] then
		return id
	end
	linked_pages[link_key] = true
	-- Following only works for language en, but it should be safe on other w
	-- and overhead of doing it generally does not seem worthwhile.
	local l = link:sub(1, 1):lower() .. link:sub(2)
	if link == id or l == id then
		return '[[' .. id .. ']]'
	elseif link .. 's' == id or l .. 's' == id then
		return '[[' .. id:sub(1, -2) .. ']]s'
	else
		return '[[' .. link .. '|' .. id .. ']]'
	end
end

local function variable_name(clean, unit_table)
	-- For slwiki, a unit name depends on the value.
	-- Parameter clean is the unsigned rounded value in en digits, as a strin
	-- Value             Source    Example for "m"
	-- integer 1:        name1     meter  (also is the name of the unit)
	-- integer 2:        var{1}    metra
	-- integer 3 and 4:  var{2}    metri
	-- integer else:     var{3}    metrov (0 and 5 or more)
	-- real/fraction:    var{4}    metra
	-- var{i} means the i'th field in unit_table.varname if it exists and has
	-- an i'th field, otherwise name2.
	-- Fields are separated with "!" and are not empty.
	-- A field for a unit using an SI prefix has the prefix name inserted,
	-- replacing '#' if found, or before the field otherwise.
	local vname
	if clean == '1' then
		vname = unit_table.name1
	elseif unit_table.varname then
		local i
		if clean == '2' then
			i = 1
		elseif clean == '3' or clean == '4' then
			i = 2
		elseif clean:find('.', 1, true) then
			i = 4
		else
			i = 3
		end
		if i > 1 and varname == 'pl' then
			i = i - 1
		end
		vname = split(unit_table.varname, '!')[i]
	end
	if vname then
		local si_name = rawget(unit_table, 'si_name') or ''
		local pos = vname:find('#', 1, true)
		if pos then
			vname = vname:sub(1, pos - 1) .. si_name .. vname:sub(pos
		else
			vname = si_name .. vname
		end
		return vname
	end
	return unit_table.name2
end
```

```
local function linked_id(parms, unit_table, key_id, want_link, clean)
        -- Return final unit id (symbol or name), optionally with a wikilink,
        -- and update unit_table.sep if required.
        -- key_id is one of: 'symbol', 'sym_us', 'name1', 'name1_us', 'name2', 'n
        local abbr_on = (key_id == 'symbol' or key_id == 'sym_us')
        if abbr_on and want_link then
                local symlink = rawget(unit_table, 'symlink')
                if symlink then
                        return symlink  -- for exceptions that have the linked sy
                end
        end
        local multiplier = rawget(unit_table, 'multiplier')
        local per = unit_table.per
        if per then
                local paren1, paren2 = '', ''  -- possible parentheses around bot
                local unit1 = per[1]  -- top unit_table, or nil
                local unit2 = per[2]  -- bottom unit_table
                if abbr_on then
                        if not unit1 then
                                unit_table.sep = ''  -- no separator in "$2/acre'
                        end
                        if not want_link then
                                local symbol = unit_table.symbol_raw
                                if symbol then
                                        return symbol  -- for exceptions that hav
                                end
                        end
                        if (unit2.symbol):find('·', 1, true) then
                                paren1, paren2 = '(', ')'
                        end
                end
                local key_id2  -- unit2 is always singular
                if key_id == 'name2' then
                        key_id2 = 'name1'
                elseif key_id == 'name2_us' then
                        key_id2 = 'name1_us'
                else
                        key_id2 = key_id
                end
                local result
                if abbr_on then
                        result = '/'
                elseif omitsep then
                        result = per_word
                elseif unit1 then
                        result = ' ' .. per_word .. ' '
                else
                        result = per_word .. ' '
                end
                if want_link and unit_table.link then
                        if abbr_on or not varname then
                                result = (unit1 and linked_id(parms, unit1, key_i
                        else
                                result = (unit1 and variable_name(clean, unit1) c
                        end
                        if omit_separator(result) then
                                unit_table.sep = ''
                        end
                        return make_link(unit_table.link, result, unit_table)
                end
                if unit1 then
                        result = linked_id(parms, unit1, key_id, want_link, clean
                        if unit1.sep then
```

```
                                unit_table.sep = unit1.sep
                        end
                elseif omitsep then
                        unit_table.sep = ''
                end
                return result .. paren1 .. linked_id(parms, unit2, key_id2, want_
        end
        if multiplier then
                -- A multiplier (like "100" in "100km") forces the unit to be plu
                multiplier = from_en(multiplier)
                if not omitsep then
                        multiplier = multiplier .. (abbr_on and ' ' or ' ')
                end
                if not abbr_on then
                        if key_id == 'name1' then
                                key_id = 'name2'
                        elseif key_id == 'name1_us' then
                                key_id = 'name2_us'
                        end
                end
        else
                multiplier = ''
        end
        local id = unit_table.fixed_name or ((varname and not abbr_on) and variab
        if omit_separator(id) then
                unit_table.sep = ''
        end
        if want_link then
                local link = data_code.link_exceptions[unit_table.linkey or unit_
                if link then
                        local before = ''
                        local i = unit_table.customary
                        if i == 1 and parms.opt_sp_us then
                                i = 2  -- show "U.S." not "US"
                        end
                        if i == 3 and abbr_on then
                                i = 4  -- abbreviate "imperial" to "imp"
                        end
                        local customary = text_code.customary_units[i]
                        if customary then
                                -- LATER: This works for language en only, but it
                                local pertext
                                if id:sub(1, 1) == '/' then
                                        -- Want unit "/USgal" to display as "/U.S
                                        pertext = '/'
                                        id = id:sub(2)
                                elseif id:sub(1, 4) == 'per ' then
                                        -- Similarly want "per U.S. gallon", not
                                        pertext = 'per '
                                        id = id:sub(5)
                                else
                                        pertext = ''
                                end
                                -- Omit any "US"/"U.S."/"imp"/"imperial" from sta
                                local removes = (i < 3) and { 'US ', 'US ',
                                for _, prefix in ipairs(removes) do
                                        local plen = #prefix
                                        if id:sub(1, plen) == prefix then
                                                id = id:sub(plen + 1)
                                                break
                                        end
                                end
                                before = pertext .. make_link(customary.link, cus
                        end
```

```
                        id = before .. make_link(link, id, unit_table)
                end
        end
        return multiplier .. id
end

local function make_id(parms, which, unit_table)
        -- Return id, f where
        --   id = unit name or symbol, possibly modified
        --   f = true if id is a name, or false if id is a symbol
        -- using the value for index 'which', and for 'in' or 'out' (unit_table.i
        -- Result is '' if no symbol/name is to be used.
        -- In addition, set unit_table.sep = ' ' or ' ' or ''
        -- (the separator that caller will normally insert before the id).
        if parms.opt_values then
                unit_table.sep = ''
                return ''
        end
        local inout = unit_table.inout
        local info = unit_table.valinfo[which]
        local abbr_org = parms.abbr_org
        local adjectival = parms.opt_adjectival
        local lk = parms.lk
        local want_link = (lk == 'on' or lk == inout)
        local usename = unit_table.usename
        local singular = info.singular
        local want_name
        if usename then
                want_name = true
        else
                if abbr_org == nil then
                        if parms.wantname then
                                want_name = true
                        end
                        if unit_table.usesymbol then
                                want_name = false
                        end
                end
                if want_name == nil then
                        local abbr = parms.abbr
                        if abbr == 'on' or abbr == inout or (abbr == 'mos' and ir
                                want_name = false
                        else
                                want_name = true
                        end
                end
        end
        local key
        if want_name then
                if lk == nil and unit_table.builtin == 'hand' then
                        want_link = true
                end
                if parms.opt_use_nbsp then
                        unit_table.sep = ' '
                else
                        unit_table.sep = ' '
                end
                if parms.opt_singular then
                        local value
                        if inout == 'in' then
                                value = info.value
                        else
                                value = info.absvalue
                        end
```

```
                        if value then  -- some unusual units do not always set va
                                value = abs(value)
                                singular = (0 < value and value < 1.0001)
                        end
                end
                if unit_table.engscale then
                        -- engscale: so "|1|e3kg" gives "1 thousand kilograms" (p
                        singular = false
                end
                key = (adjectival or singular) and 'name1' or 'name2'
                if parms.opt_sp_us then
                        key = key .. '_us'
                end
        else
                if unit_table.builtin == 'hand' then
                        if parms.opt_hand_hh then
                                unit_table.symbol = 'hh'  -- LATER: might want i1
                        end
                end
                unit_table.sep = ' '
                key = parms.opt_sp_us and 'sym_us' or 'symbol'
        end
        return linked_id(parms, unit_table, key, want_link, info.clean), want_nam
end

local function decorate_value(parms, unit_table, which, number_word)
        -- If needed, update unit_table so values will be shown with extra inform
        -- For consistency with the old template (but different from fmtpower),
        -- the style to display powers of 10 includes "display:none" to allow som
        -- browsers to copy, for example, "10³" as "10^3", rather than as "103".
        local info
        local engscale = unit_table.engscale
        local prefix = unit_table.vprefix
        if engscale or prefix then
                info = unit_table.valinfo[which]
                if info.decorated then
                        return  -- do not redecorate if repeating convert
                end
                info.decorated = true
                if engscale then
                        local inout = unit_table.inout
                        local abbr = parms.abbr
                        if (abbr == 'on' or abbr == inout) and not parms.number_v
                                info.show = info.show ..
                                        '<span style="margin-left:0.2em">×<span s
                                        from_en('10') ..
                                        '</span></span><s style="display:none">^<
                                        from_en(tostring(engscale.exponent)) ..
                        elseif number_word then
                                local number_id
                                local lk = parms.lk
                                if lk == 'on' or lk == inout then
                                        number_id = make_link(engscale.link, engs
                                else
                                        number_id = engscale[1]
                                end
                                -- WP:NUMERAL recommends " " in values like
                                info.show = info.show .. (parms.opt_adjectival ar
                        end
                end
                if prefix then
                        info.show = prefix .. info.show
                end
        end
```

```
end

local function process_input(parms, in_current)
        -- Processing required once per conversion.
        -- Return block of text to represent input (value/unit).
        if parms.opt_output_only or parms.opt_output_number_only or parms.opt_out
                parms.joins = { '', '' }
                return ''
        end
        local first_unit
        local composite = in_current.composite  -- nil or table of units
        if composite then
                first_unit = composite[1]
        else
                first_unit = in_current
        end
        local id1, want_name = make_id(parms, 1, first_unit)
        local sep = first_unit.sep  -- separator between value and unit, set by m
        local preunit = parms.preunit1
        if preunit then
                sep = ''  -- any separator is included in preunit
        else
                preunit = ''
        end
        if parms.opt_input_unit_only then
                parms.joins = { '', '' }
                if composite then
                        local parts = { id1 }
                        for i, unit in ipairs(composite) do
                                if i > 1 then
                                        table.insert(parts, (make_id(parms, 1, un
                                end
                        end
                        id1 = table.concat(parts, ' ')
                end
                if want_name and parms.opt_adjectival then
                        return preunit .. hyphenated(id1)
                end
                return  preunit .. id1
        end
        if parms.opt_also_symbol and not composite and not parms.opt_flip then
                local join1 = parms.joins[1]
                if join1 == ' (' or join1 == ' [' then
                        parms.joins = { ' [' .. first_unit[parms.opt_sp_us and 's
                end
        end
        if in_current.builtin == 'mach' and first_unit.sep ~= '' then  -- '' mean
                local prefix = id1 .. ' '
                local range = parms.range
                local valinfo = first_unit.valinfo
                local result = prefix .. valinfo[1].show
                if range then
                        -- For simplicity and because more not needed, handle one
                        local prefix2 = make_id(parms, 2, first_unit) .. ' '
                        result = range_text(range[1], want_name, parms, result, p
                end
                return preunit .. result
        end
        if composite then
                -- Simplify: assume there is no range, and no decoration.
                local mid = (not parms.opt_flip) and parms.mid or ''
                local sep1 = ' '
                local sep2 = ' '
                if parms.opt_adjectival and want_name then
```

```
                        sep1 = '-'
                        sep2 = '-'
                end
                if omitsep and sep == '' then
                        -- Testing the id of the most significant unit should be
                        sep1 = ''
                        sep2 = ''
                end
                local parts = { first_unit.valinfo[1].show .. sep1 .. id1 }
                for i, unit in ipairs(composite) do
                        if i > 1 then
                                table.insert(parts, unit.valinfo[1].show .. sep1
                        end
                end
                return table.concat(parts, sep2) .. mid
        end
        local add_unit = (parms.abbr == 'mos') or
                parms[parms.opt_flip and 'out_range_x' or 'in_range_x'] or
                (not want_name and parms.abbr_range_x)
        local range = parms.range
        if range and not add_unit then
                unlink(first_unit)
        end
        local id = range and make_id(parms, range.n + 1, first_unit) or id1
        local extra, was_hyphenated = hyphenated_maybe(parms, want_name, sep, id,
        if was_hyphenated then
                add_unit = false
        end
        local result
        local valinfo = first_unit.valinfo
        if range then
                for i = 0, range.n do
                        local number_word
                        if i == range.n then
                                add_unit = false
                                number_word = true
                        end
                        decorate_value(parms, first_unit, i+1, number_word)
                        local show = valinfo[i+1].show
                        if add_unit then
                                show = show .. first_unit.sep .. (i == 0 and id1
                        end
                        if i == 0 then
                                result = show
                        else
                                result = range_text(range[i], want_name, parms, r
                        end
                end
        else
                decorate_value(parms, first_unit, 1, true)
                result = valinfo[1].show
        end
        return result .. preunit .. extra
end

local function process_one_output(parms, out_current)
        -- Processing required for each output unit.
        -- Return block of text to represent output (value/unit).
        local inout = out_current.inout  -- normally 'out' but can be 'in' for o
        local id1, want_name = make_id(parms, 1, out_current)
        local sep = out_current.sep  -- set by make_id
        local preunit = parms.preunit2
        if preunit then
                sep = ''  -- any separator is included in preunit
```

```
	else
		preunit = ''
	end
	if parms.opt_output_unit_only then
		if want_name and parms.opt_adjectival then
			return preunit .. hyphenated(id1)
		end
		return preunit .. id1
	end
	if out_current.builtin == 'mach' and out_current.sep ~= '' then  -- '' me
		local prefix = id1 .. ' '
		local range = parms.range
		local valinfo = out_current.valinfo
		local result = prefix .. valinfo[1].show
		if range then
			-- For simplicity and because more not needed, handle one
			result = range_text(range[1], want_name, parms, result, p
		end
		return preunit .. result
	end
	local add_unit = (parms[parms.opt_flip and 'in_range_x' or 'out_range_x']
		(not want_name and parms.abbr_range_x)) and
		not parms.opt_output_number_only
	local range = parms.range
	if range and not add_unit then
		unlink(out_current)
	end
	local id = range and make_id(parms, range.n + 1, out_current) or id1
	local extra, was_hyphenated = hyphenated_maybe(parms, want_name, sep, id
	if was_hyphenated then
		add_unit = false
	end
	local result
	local valinfo = out_current.valinfo
	if range then
		for i = 0, range.n do
			local number_word
			if i == range.n then
				add_unit = false
				number_word = true
			end
			decorate_value(parms, out_current, i+1, number_word)
			local show = valinfo[i+1].show
			if add_unit then
				show = show .. out_current.sep .. (i == 0 and id1
			end
			if i == 0 then
				result = show
			else
				result = range_text(range[i], want_name, parms, r
			end
		end
	else
		decorate_value(parms, out_current, 1, true)
		result = valinfo[1].show
	end
	if parms.opt_output_number_only then
		return result
	end
	return result .. preunit .. extra
end

local function make_output_single(parms, in_unit_table, out_unit_table)
	-- Return true, item where item = wikitext of the conversion result
```

```
	-- for a single output (which is not a combination or a multiple);
	-- or return false, t where t is an error message table.
	if parms.opt_order_out and in_unit_table.unitcode == out_unit_table.unit
		out_unit_table.valinfo = in_unit_table.valinfo
	else
		out_unit_table.valinfo = collection()
		for _, v in ipairs(in_unit_table.valinfo) do
			local success, info = cvtround(parms, v, in_unit_table, 
			if not success then return false, info end
			out_unit_table.valinfo:add(info)
		end
	end
	return true, process_one_output(parms, out_unit_table)
end

local function make_output_multiple(parms, in_unit_table, out_unit_table)
	-- Return true, item where item = wikitext of the conversion result
	-- for an output which is a multiple (like 'ftin');
	-- or return false, t where t is an error message table.
	local inout = out_unit_table.inout  -- normally 'out' but can be 'in' fo
	local multiple = out_unit_table.multiple  -- table of scaling factors (wi
	local combos = out_unit_table.combination  -- table of unit tables (will
	local abbr = parms.abbr
	local abbr_org = parms.abbr_org
	local disp = parms.disp
	local want_name = (abbr_org == nil and (disp == 'or' or disp == 'slash'))
	                                       not (abbr == 'on' or abbr == inou
	local want_link = (parms.lk == 'on' or parms.lk == inout)
	local mid = parms.opt_flip and parms.mid or ''
	local sep1 = ' '
	local sep2 = ' '
	if parms.opt_adjectival and want_name then
		sep1 = '-'
		sep2 = '-'
	end
	local do_spell = parms.opt_spell_out
	parms.opt_spell_out = nil  -- so the call to cvtround does not spell the
	local function make_result(info, isfirst)
		local fmt, outvalue, sign
		local results = {}
		for i = 1, #combos do
			local tfrac, thisvalue, strforce
			local out_current = combos[i]
			out_current.inout = inout
			local scale = multiple[i]
			if i == 1 then  -- least significant unit ('in' from 'fti
				local decimals
				out_current.frac = out_unit_table.frac
				local success, outinfo = cvtround(parms, info, i
				if not success then return false, outinfo end
				if isfirst then
					out_unit_table.valinfo = { outinfo }  --
				end
				sign = outinfo.sign
				tfrac = outinfo.fraction_table
				if outinfo.is_scientific then
					strforce = outinfo.show
					decimals = ''
				elseif tfrac then
					decimals = ''
				else
					local show = outinfo.show  -- number as a
					local p1, p2 = show:find(numdot, 1, true)
					decimals = p1 and show:sub(p2 + 1) or ''
```

```
                        end
                        fmt = '%.' .. ulen(decimals) .. 'f'  -- to reproc
                        if decimals == '' then
                                if tfrac then
                                        outvalue = floor(outinfo.raw_absv
                                else
                                        outvalue = floor(outinfo.raw_absv
                                end
                        else
                                outvalue = outinfo.absvalue
                        end
                end
                if scale then
                        outvalue, thisvalue = divide(outvalue, scale)
                else
                        thisvalue = outvalue
                end
                local id
                if want_name then
                        if varname then
                                local clean
                                if strforce or tfrac then
                                        clean = '.1'  -- dummy value to t
                                else
                                        clean = format(fmt, thisvalue)
                                end
                                id = variable_name(clean, out_current)
                        else
                                local key = 'name2'
                                if parms.opt_adjectival then
                                        key = 'name1'
                                elseif tfrac then
                                        if thisvalue == 0 then
                                                key = 'name1'
                                        end
                                elseif parms.opt_singular then
                                        if 0 < thisvalue and thisvalue <
                                                key = 'name1'
                                        end
                                else
                                        if thisvalue == 1 then
                                                key = 'name1'
                                        end
                                end
                                id = out_current[key]
                        end
                else
                        id = out_current['symbol']
                end
                if i == 1 and omit_separator(id) then
                        -- Testing the id of the least significant unit s
                        sep1 = ''
                        sep2 = ''
                end
                if want_link then
                        local link = out_current.link
                        if link then
                                id = make_link(link, id, out_current)
                        end
                end
                local strval
                local spell_inout = (i == #combos or outvalue == 0) and i
                if strforce and outvalue == 0 then
                        sign = ''  -- any sign is in strforce
```

```
                                strval = strforce  -- show small values in scient
                        elseif tfrac then
                                local wholestr = (thisvalue > 0) and tostring(thi
                                strval = format_fraction(parms, spell_inout, fals
                        else
                                strval = (thisvalue == 0) and from_en('0') or wit
                                if do_spell then
                                        strval = spell_number(parms, spell_inout,
                                end
                        end
                        table.insert(results, strval .. sep1 .. id)
                        if outvalue == 0 then
                                break
                        end
                        fmt = '%.0f'  -- only least significant unit can have a r
                end
                local reversed, count = {}, #results
                for i = 1, count do
                        reversed[i] = results[count + 1 - i]
                end
                return true, sign .. table.concat(reversed, sep2)
        end
        local valinfo = in_unit_table.valinfo
        local success, result = make_result(valinfo[1], true)
        if not success then return false, result end
        local range = parms.range
        if range then
                for i = 1, range.n do
                        local success, result2 = make_result(valinfo[i+1])
                        if not success then return false, result2 end
                        result = range_text(range[i], want_name, parms, result, r
                end
        end
        return true, result .. mid
end

local function process(parms, in_unit_table, out_unit_table)
        -- Return true, s, outunit where s = final wikitext result,
        -- or return false, t where t is an error message table.
        linked_pages = {}
        local success, bad_output
        local bad_input_mcode = in_unit_table.bad_mcode  -- nil if input unit is
        local out_unit = parms.out_unit
        if out_unit == nil or out_unit == '' or type(out_unit) == 'function' then
                if bad_input_mcode or parms.opt_input_unit_only then
                        bad_output = ''
                else
                        local getdef = type(out_unit) == 'function' and out_unit
                        success, out_unit = getdef(in_unit_table.valinfo[1].value
                        parms.out_unit = out_unit
                        if not success then
                                bad_output = out_unit
                        end
                end
        end
        if not bad_output and not out_unit_table then
                success, out_unit_table = lookup(parms, out_unit, 'any_combinatio
                if success then
                        local mismatch = check_mismatch(in_unit_table, out_unit_t
                        if mismatch then
                                bad_output = mismatch
                        end
                else
                        bad_output = out_unit_table
```

```
		end
	end
	local lhs, rhs
	local flipped = parms.opt_flip and not bad_input_mcode
	if bad_output then
		rhs = (bad_output == '') and '' or message(parms, bad_output)
	elseif parms.opt_input_unit_only then
		rhs = ''
	else
		local combos  -- nil (for 'ft' or 'ftin'), or table of unit table
		if not out_unit_table.multiple then  -- nil/false ('ft' or 'm ft'
			combos = out_unit_table.combination
		end
		local frac = parms.frac  -- nil or denominator of fraction for ou
		if frac then
			-- Apply fraction to the unit (if only one), or to non-SI
			-- except that if a precision is also specified, the frac
			-- the hand unit; that allows the following result:
			-- {{convert|156|cm|in hand|1|frac=2}} → 156 centimetres
			-- However, the following is handled elsewhere as a speci
			-- {{convert|156|cm|hand in|1|frac=2}} → 156 centimetres
			if combos then
				local precision = parms.precision
				for _, unit in ipairs(combos) do
					if unit.builtin == 'hand' or (not precisi
						unit.frac = frac
					end
				end
			else
				out_unit_table.frac = frac
			end
		end
		local outputs = {}
		local imax = combos and #combos or 1  -- 1 (single unit) or numbe
		if imax == 1 then
			parms.opt_order_out = nil  -- only useful with an output
		end
		if not flipped and not parms.opt_order_out then
			-- Process left side first so any duplicate links (from l
			-- on right. Example: {{convert|28|e9pc|e9ly|abbr=off|lk=
			lhs = process_input(parms, in_unit_table)
		end
		for i = 1, imax do
			local success, item
			local out_current = combos and combos[i] or out_unit_tabl
			out_current.inout = 'out'
			if i == 1 then
				if imax > 1 and out_current.builtin == 'hand' the
					out_current.out_next = combos[2]  -- buil
				end
				if parms.opt_order_out then
					out_current.inout = 'in'
				end
			end
			if out_current.multiple then
				success, item = make_output_multiple(parms, in_ur
			else
				success, item = make_output_single(parms, in_unit
			end
			if not success then return false, item end
			outputs[i] = item
		end
		if parms.opt_order_out then
			lhs = outputs[1]
```

```
                        table.remove(outputs, 1)
                end
                local sep = parms.table_joins and parms.table_joins[2] or parms.j
                rhs = table.concat(outputs, sep)
        end
        if flipped or not lhs then
                local input = process_input(parms, in_unit_table)
                if flipped then
                        lhs = rhs
                        rhs = input
                else
                        lhs = input
                end
        end
        if parms.join_before then
                lhs = parms.join_before .. lhs
        end
        local wikitext
        if bad_input_mcode then
                if bad_input_mcode == '' then
                        wikitext = lhs
                else
                        wikitext = lhs .. message(parms, bad_input_mcode)
                end
        elseif parms.table_joins then
                wikitext = parms.table_joins[1] .. lhs .. parms.table_joins[2] .
        else
                wikitext = lhs .. parms.joins[1] .. rhs .. parms.joins[2]
        end
        if parms.warnings and not bad_input_mcode then
                wikitext = wikitext .. parms.warnings
        end
        return true, get_styles(parms) .. wikitext, out_unit_table
end

local function main_convert(frame)
        -- Do convert, and if needed, do it again with higher default precision.
        local parms = { frame = frame }  -- will hold template arguments, after t
        set_config(frame.args)
        local success, result = get_parms(parms, frame:getParent().args)
        if success then
                if type(result) ~= 'table' then
                        return tostring(result)
                end
                local in_unit_table = result
                local out_unit_table
                for _ = 1, 2 do  -- use counter so cannot get stuck repeating cor
                        success, result, out_unit_table = process(parms, in_unit_
                        if success and parms.do_convert_again then
                                parms.do_convert_again = false
                        else
                                break
                        end
                end
        end
        -- If input=x gives a problem, the result should be just the user input
        -- (if x is a property like P123 it has been replaced with '').
        -- An unknown input unit would display the input and an error message
        -- with success == true at this point.
        -- Also, can have success == false with a message that outputs an empty s
        if parms.input_text then
                if success and not parms.have_problem then
                        return result
                end
```

```
                local cat
                if parms.tracking then
                        -- Add a tracking category using the given text as the ca
                        -- There is currently only one type of tracking, but in p
                        -- items could be tracked, using different sort keys for
                        cat = wanted_category('tracking', parms.tracking)
                end
                return parms.input_text .. (cat or '')
        end
        return success and result or message(parms, result)
end

local function _unit(unitcode, options)
        -- Helper function for Module:Val to look up a unit.
        -- Parameter unitcode must be a string to identify the wanted unit.
        -- Parameter options must be nil or a table with optional fields:
        --   value = number (for sort key; default value is 1)
        --   scaled_top = nil for a normal unit, or a number for a unit which is
        --                the denominator of a per unit (for sort key)
        --   si = { 'symbol', 'link' }
        --                (a table with two strings) to make an SI unit
        --                that will be used for the look up
        --   link = true if result should be [[linked]]
        --   sort = 'on' or 'debug' if result should include a sort key in a
        --                span element ('debug' makes the key visible)
        --   name = true for the name of the unit instead of the symbol
        --   us = true for the US spelling of the unit, if any
        -- Return nil if unitcode is not a non-empty string.
        -- Otherwise return a table with fields:
        --   text = requested symbol or name of unit, optionally linked
        --   scaled_value = input value adjusted by unit scale; used for sort key
        --   sortspan = span element with sort key like that provided by {{ntsh}}
        --     calculated from the result of converting value
        --     to a base unit with scale 1.
        --   unknown = true if the unitcode was not known
        unitcode = strip(unitcode)
        if unitcode == nil or unitcode == '' then
                return nil
        end
        set_config({})
        linked_pages = {}
        options = options or {}
        local parms = {
                abbr = options.name and 'off' or 'on',
                lk = options.link and 'on' or nil,
                opt_sp_us = options.us and true or nil,
                opt_ignore_error = true,  -- do not add pages using this functior
                opt_sortable_on = options.sort == 'on' or options.sort == 'debug'
                opt_sortable_debug = options.sort == 'debug',
        }
        if options.si then
                -- Make a dummy table of units (just one unit) for lookup to use
                -- This makes lookup recognize any SI prefix in the unitcode.
                local symbol = options.si[1] or '?'
                parms.unittable = { [symbol] = {
                        _name1 = symbol,
                        _name2 = symbol,
                        _symbol = symbol,
                        utype = symbol,
                        scale = symbol == 'g' and 0.001 or 1,
                        prefixes = 1,
                        default = symbol,
                        link = options.si[2],
                }}
```

```
        end
        local success, unit_table = lookup(parms, unitcode, 'no_combination')
        if not success then
                unit_table = setmetatable({
                        symbol = unitcode, name2 = unitcode, utype = unitcode,
                        scale = 1, default = '', defkey = '', linkey = '' }, unit
        end
        local value = tonumber(options.value) or 1
        local clean = tostring(abs(value))
        local info = {
                value = value,
                altvalue = value,
                singular = (clean == '1'),
                clean = clean,
                show = clean,
        }
        unit_table.inout = 'in'
        unit_table.valinfo = { info }
        local sortspan, scaled_value
        if options.sort then
                sortspan, scaled_value = make_table_or_sort(parms, value, info, u
        end
        return {
                text = make_id(parms, 1, unit_table),
                sortspan = sortspan,
                scaled_value = scaled_value,
                unknown = not success and true or nil,
        }
end

return { convert = main_convert, _unit = _unit }
```

Modul:Convert/sandbox/Doku

Dies ist die Dokumentationsseite für Modul:Convert/sandbox

When making a change, copy the current modules to the sandbox pages, then edit the sandbox copies.

If wanted, use the purge link just above to update the following status report.

- Module:Convert • Module:Convert/sandbox • same content
- Module:Convert/data • Module:Convert/data/sandbox • same content
- Module:Convert/text • Module:Convert/text/sandbox • same content
- Module:Convert/extra • Module:Convert/extra/sandbox • same content
- Module:Convert/wikidata • Module:Convert/wikidata/sandbox • same content
- Module:Convert/wikidata/data • Module:Convert/wikidata/data/sandbox • same content

Use the following template to test the results (example `{{convert/sandbox|123|lb|kg}}`):

- Template:Convert/sandbox • invokes the sandbox modules and shows all warnings

Testscases:

- Module:Convert/sandbox/testcases • templates to be tested, with expected outputs
- Module talk:Convert/sandbox/testcases • view test results
- Template:Convert/testcases#Sandbox testcases • more tests

It is not necessary to save a module before viewing test results. For example, Module:Convert/sandbox could be edited. While still editing that page, paste

Vorlage:Nowrap

into the page title box under "Preview page with this template", then click "Show preview".

Modul:Convert/sandbox/testcases

Die Dokumentation für dieses Modul kann unter Modul:Convert/sandbox/testcases/Doku erstellt werden

```
-- Tests for sandboxed convert.
-- [[Module talk:Convert/sandbox/testcases]] contains:
-- {{#invoke:convert/sandbox/testcases|run_tests}}

local tests = [==[

-- Table cell items.
{{convert/sandbox|0.16|/l|2|disp=table}}                align="right"|0.16\n|ali
{{convert/sandbox|0.17|/l|2|disp=table}}                align="right"|0.17\n|ali
{{convert/sandbox|9999|/l|2|disp=table}}                align="right"|9,999\n|al
{{convert/sandbox|9999|/l|2|disp=tablecen}}             align="center"|9,999\n|a

-- Error/warning messages.

-- Using "test=msg" with the unit codes shown here patches the units data to temp
{{convert/sandbox|123|chain|test=msg}}                  123 chains (<sup class="
{{convert/sandbox|123|rd|test=msg}}                     123 rods (<sup class="no

-- Missing/invalid.
{{convert/sandbox}}                                     <sup class="noprint Inli
{{convert/sandbox|}}                                    <sup class="noprint Inli
{{convert/sandbox| | }}                                 <sup class="noprint Inli
{{convert/sandbox|x|m}}                                 <sup class="noprint Inli
{{convert/sandbox|12}}                                  12<sup class="noprint In
{{convert/sandbox|1.2e310|m|mm}}                        <sup class="noprint Inli
{{convert/sandbox|12|ftin|m}}                           12 ftin<sup class="nopri
{{convert/sandbox|12|xyz|m}}                            12 xyz<sup class="noprin
{{convert/sandbox|ft|m}}                                <sup class="noprint Inli
{{convert/sandbox|12|to|ft|m}}                          <sup class="noprint Inli
{{convert/sandbox|X12|ft|m}}                            <sup class="noprint Inli
{{convert/sandbox|12|to|X34|ft|m}}                      <sup class="noprint Inli
{{convert/sandbox|1234|ft|kg}}                          1,234 feet (<sup class="
{{convert/sandbox|1|L100km}}                                        1 L100km<sup
{{convert/sandbox|1|gallons}}                                       1 gallons<su
{{convert/sandbox|1|gallon}}                                        1 gallon<sup
{{convert/sandbox|1|kilogram}}                                      1 kilogram<s
{{convert/sandbox|1|light-years}}                                   1 light-year
{{convert/sandbox|1|light-year}}                                    1 light-year
{{convert/sandbox|1|meters}}                                        1 meters<sup
{{convert/sandbox|1|meter}}                                         1 meter<sup
{{convert/sandbox|1|metres}}                                        1 metres<sup
{{convert/sandbox|1|metre}}                                         1 metre<sup
{{convert/sandbox|1|mpg}}                                           1 mpg<sup cl
{{convert/sandbox|1|pt}}                                            1 pt<sup cla
{{convert/sandbox|1|qt}}                                            1 qt<sup cla
{{convert/sandbox|1|sq feet}}                                       1 sq feet<su
{{convert/sandbox|123|m|m|999}}                         <sup class="noprint Inli
{{convert/sandbox|1.234e-200|m|ft}}                     <sup class="noprint Inli
{{convert/sandbox|123|ft|m|1.5}}                        123 feet (37 m)<sup
{{convert/sandbox|123|m|ft|junk=}}                                  123 metres (
{{convert/sandbox|123|m|ft|junk=on}}                                123 metres (
{{convert/sandbox|123|m|ft|adj=junk}}                               123 metres (
{{convert/sandbox|123|m|ft|adj=}}                       123 metres (404 ft)
{{convert/sandbox|123|m|ft|adj=on}}                     123-metre (404 ft)
```

```
{{convert/sandbox|123|m|ft|sing=on}}                    123-metre (404 ft)
{{convert/sandbox|123|m|ft|adj=off|sing=off}}           123 metres (404 ft)
{{convert/sandbox|123|m|ft|adj=on|sing=on}}             123-metre (404 ft)
{{convert/sandbox|123|m|ft|adj=off|sing=on}}                    123 metres (
{{convert/sandbox|123|m|ft|adj=on|sing=off}}                    123-metre (4
{{convert/sandbox|123|mm|in|sigfig=3}}                  123 millimetres (4.84&nb
{{convert/sandbox|123|mm|in|sigfig=}}                   123 millimetres (4.8&nbs
{{convert/sandbox|123|mm|in|sigfig= }}                  123 millimetres (4.8&nbs
{{convert/sandbox|123|mm|in|sigfig=-1}}                 123 millimetres (4.8&nbs
{{convert/sandbox|123|mm|in|sigfig=0}}                  123 millimetres (4.8&nbs
{{convert/sandbox|123|ft|m|sigfig=1.5}}                 123 feet (37 m)<sup
{{convert/sandbox|123|mm|in|sigfig=bogus}}              123 millimetres (4.8&nbs
{{convert/sandbox|123|mm|in|sortable=off}}              123 millimetres (4.8&nbs
{{convert/sandbox|123|mm|in|sortable=}}                 123 millimetres (4.8&nbs
{{convert/sandbox|123|mm|in|sortable=bogus}}                    123 millimet
{{convert/sandbox|123|mm|in|debug=yes}}                 123 millimetres (4.8&nbs
{{convert/sandbox|123|mm|in|sortable=on}}               <span style="display:nor
{{convert/sandbox|123|mm|in|sortable=on|debug=yes}}     <span style="border:1px
{{convert/sandbox|123|mm|in|sortable=on|debug=y}}               <span style=
{{convert/sandbox|1|m/s2|m2}}                           1 metre per second squar
{{convert/sandbox|1|m2/ha|e}}                           1 square metre per hecta
{{convert/sandbox|1|gmol|kgCO2/L}}                      1 gram-mole (<sup class=
{{convert/sandbox|1|$/m2|$/kg}}                         $1 per square metre (<su
{{convert/sandbox|1|£/ha|g/L}}                          £1 per hectare (<sup cla
{{convert/sandbox|1|J|kJ/km}}                           1 joule (<sup class="nop
{{convert/sandbox|1|kJ/g|kJ/L}}                         1 kilojoule per gram (<s
{{convert/sandbox|1|g/km|L/h}}                          1 gram per kilometre (<s
{{convert/sandbox|1|N|L/km}}                            1 newton (<sup class="no
{{convert/sandbox|1|kPa/m|m/km}}                        1 kilopascal per metre (
{{convert/sandbox|1|m|kg/m}}                            1 metre (<sup class="nop
{{convert/sandbox|1|kg|t/ha}}                           1 kilogram (<sup class="
{{convert/sandbox|1|kg/kW|kg/h}}                        1 kilogram per kilowatt
{{convert/sandbox|1|gmol/s|/sqkm}}                      1 gram-mole per second (
{{convert/sandbox|1|/l|PD/sqkm}}                        1 per litre (<sup class=
{{convert/sandbox|1|W|kW/t}}                            1 watt (<sup class="nopr
{{convert/sandbox|1|Pa|Bq}}                             1 pascal (<sup class="no
{{convert/sandbox|1|m/s|C}}                             1 metre per second (<sup
{{convert/sandbox|1|C-change|tsfc}}                   1 °C (<sup class="nop
{{convert/sandbox|1|s|Nm}}                              1 second (<sup class="no
{{convert/sandbox|1|m3|m3/km2}}                         1 cubic metre (<sup clas

-- Examples used at [[Help:Convert messages]].
{{convert/sandbox|123|m|ft}}                            123 metres (404 ft)
{{convert/sandbox||m|ft}}                               <sup class="noprint Inli
{{convert/sandbox|10|x|20|m|ft}}                        10 by 20 metres (33 
{{convert/sandbox|10|x| |m|ft}}                         <sup class="noprint Inli
{{convert/sandbox|10|x|20|x| |m|ft}}                    <sup class="noprint Inli
{{convert/sandbox|1|km|ft}}                             1 kilometre (3,300 
{{convert/sandbox|km|ft}}                               <sup class="noprint Inli
{{convert/sandbox|1e290|m|ft}}                          1e290 metres (3.3<span s
{{convert/sandbox|1e310|m|ft}}                          <sup class="noprint Inli
{{convert/sandbox|21455|acre|ha|2}}                     21,455 acres (8,682.53&n
{{convert/sandbox|21455|acre|ha|-2}}                    21,455 acres (8,700 
{{convert/sandbox|21455|acre|ha|2.5}}                   21,455 acres (8,683 
{{convert/sandbox|123|m|ft|2}}                          123 metres (403.54 
{{convert/sandbox|123|m|ft|200}}                        <sup class="noprint Inli
{{convert/sandbox|123|m|ft|-2}}                         123 metres (400 ft)
{{convert/sandbox|123|m|ft|-200}}                       123 metres (0 ft)
{{convert/sandbox|1.234|m|ft}}                          1.234 metres (4.05 
{{convert/sandbox|1.234e-200|m|ft}}                     <sup class="noprint Inli
{{convert/sandbox|1.234e-200|m|ft|sigfig=3}}            1.234e-200 metres (4.05<
{{convert/sandbox|123|m|ft|sigfig=3}}                   123 metres (404 ft)
{{convert/sandbox|123|m|ft|sigfig=0}}                   123 metres (404 ft)
{{convert/sandbox|123|m|ft|sigfig=3.5}}                 123 metres (404 ft)
```

```
{{convert/sandbox|123|m|ft|sp=us}}                          123 meters (404 ft)
{{convert/sandbox|123|m|ft|sp=}}                            123 metres (404 ft)
{{convert/sandbox|123|m|ft|abbr=off}}                       123 metres (404 feet)
{{convert/sandbox|123|m|ft|abr=off}}                                 123 metres (
{{convert/sandbox|12|ft}}                                   12 feet (3.7 m)
{{convert/sandbox|12}}                                      12<sup class="noprint In
{{convert/sandbox|12||ft}}                                  12<sup class="noprint In
{{convert/sandbox|12|x|20|ft}}                              12 by 20 feet (3.7 
{{convert/sandbox|12|x|20}}                                 12 by 20<sup class="nopr
{{convert/sandbox|12|ft|mi}}                                12 feet (0.0023 mi)
{{convert/sandbox|12|Ft|mi}}                                12 Ft<sup class="noprint
{{convert/sandbox|12|ft|m i}}                               12 feet (<sup class="nop
{{convert/sandbox|123|psi|Pa}}                              123 pounds per square in
{{convert/sandbox|123|psi|ha}}                              123 pounds per square in
{{convert/sandbox|21|mpgus|L/km}}                           21 miles per US gallon (
{{convert/sandbox|21|mpg|L/km}}                                      21 mpg<sup c
{{convert/sandbox|21|USpt|L}}                               21 US pints (9.9 L)
{{convert/sandbox|21|pt|L}}                                          21 pt<sup cl
{{convert/sandbox|123|K|C F}}                               123 K (−150 °C
{{convert/sandbox|123|C F|K}}                               123 C F<sup class="nopri
{{convert/sandbox|12345|ft|mi km}}                          12,345 feet (2.3381 
{{convert/sandbox|12345|ft|yd+mi+km}}                       12,345 feet (4,115 
{{convert/sandbox|12345|ft|yd+mi km}}                       12,345 feet (<sup class=

-- All 2458 "bytype" testcases as at 2013-09-24

-- acceleration
{{convert/sandbox|1|ft/s2|lk=on}}                           1 [[foot per second squa
{{convert/sandbox|1|m/s2|ft/s2|lk=on}}                      1 [[metre per second squ
{{convert/sandbox|1|g0|lk=on}}                              1 [[standard gravity]] (
{{convert/sandbox|1|m/s2|g0|lk=on}}                         1 [[metre per second squ
{{convert/sandbox|1|km/h/s|lk=on}}                          1 [[Acceleration|kilomet
{{convert/sandbox|1|m/s2|km/h/s|lk=on}}                     1 [[metre per second squ
{{convert/sandbox|1|km/hs|lk=on}}                           1 [[Acceleration|kilomet
{{convert/sandbox|1|m/s2|km/hs|lk=on}}                      1 [[metre per second squ
{{convert/sandbox|1|m/s2|lk=on}}                            1 [[metre per second squ
{{convert/sandbox|1|mph/s|lk=on}}                           1 [[Acceleration|mile pe
{{convert/sandbox|1|m/s2|mph/s|lk=on}}                      1 [[metre per second squ
{{convert/sandbox|1|m/s2|standard gravity|lk=on}}           1 [[metre per second squ

-- area
{{convert/sandbox|1|acre|lk=on}}                            1 [[acre]] (0.40 [[
{{convert/sandbox|1|m2|acre|lk=on}}                         1 [[square metre]] (0.00
{{convert/sandbox|1|m2|acre ha|lk=on}}                      1 [[square metre]] (0.00
{{convert/sandbox|1|m2|acre m2|lk=on}}                      1 [[square metre]] (0.00
{{convert/sandbox|1|m2|acre sqm|lk=on}}                     1 [[square metre]] (0.00
{{convert/sandbox|1|m2|acre sqmi|lk=on}}                    1 [[square metre]] (0.00
{{convert/sandbox|1|acres|lk=on}}                           1 [[acre]] (0.40 [[
{{convert/sandbox|1|m2|acres|lk=on}}                        1 [[square metre]] (0.00
{{convert/sandbox|1|acre-sing|lk=on}}                       1 [[acre]] (0.40 [[
{{convert/sandbox|1|m2|acre-sing|lk=on}}                    1 [[square metre]] (0.00
{{convert/sandbox|1|are|lk=on}}                             1 [[Hectare#Are|are]] (1
{{convert/sandbox|1|m2|are|lk=on}}                          1 [[square metre]] (0.01
{{convert/sandbox|1|arpent|lk=on}}                          1 [[arpent]] (0.34 
{{convert/sandbox|1|m2|arpent|lk=on}}                       1 [[square metre]] (0.00
{{convert/sandbox|1|cm2|lk=on}}                             1 [[square centimetre]]
{{convert/sandbox|1|m2|cm2|lk=on}}                          1 [[square metre]] (10,0
{{convert/sandbox|1|m2|cm2 in2|lk=on}}                      1 [[square metre]] (10,0
{{convert/sandbox|1|m2|cm2 sqin|lk=on}}                     1 [[square metre]] (10,0
{{convert/sandbox|1|m2|Cypriot donum|lk=on}}                1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Cypriot dönüm|lk=on}}                1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Cypriot donum diaeresis|lk=on}}      1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Cypriot donum dots|lk=on}}           1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Cypriot dunam|lk=on}}                1 [[square metre]] (0.00
```

```
{{convert/sandbox|1|m2|Cypriot dunum|lk=on}}              1 [[square metre]] (0.00
{{convert/sandbox|1|daa|lk=on}}                           1 [[decare]] (0.0010&nbs
{{convert/sandbox|1|m2|daa|lk=on}}                        1 [[square metre]] (0.00
{{convert/sandbox|1|dam2|lk=on}}                          1 [[Square metre|square
{{convert/sandbox|1|m2|dam2|lk=on}}                       1 [[square metre]] (0.01
{{convert/sandbox|1|decare|lk=on}}                        1 [[decare]] (0.0010&nbs
{{convert/sandbox|1|m2|decare|lk=on}}                     1 [[square metre]] (0.00
{{convert/sandbox|1|dm2|lk=on}}                           1 [[square decimetre]] (
{{convert/sandbox|1|m2|dm2|lk=on}}                        1 [[square metre]] (100&
{{convert/sandbox|1|donum|lk=on}}                         1 [[Dunam|donum]] (0.001
{{convert/sandbox|1|m2|donum|lk=on}}                      1 [[square metre]] (0.00
{{convert/sandbox|1|dönüm|lk=on}}                         1 [[Dunam|dönüm]] (0.001
{{convert/sandbox|1|m2|dönüm|lk=on}}                      1 [[square metre]] (0.00
{{convert/sandbox|1|m2|donum diaeresis|lk=on}}            1 [[square metre]] (0.00
{{convert/sandbox|1|m2|donum dots|lk=on}}                 1 [[square metre]] (0.00
{{convert/sandbox|1|dunam|lk=on}}                         1 [[dunam]] (0.0010 
{{convert/sandbox|1|m2|dunam|lk=on}}                      1 [[square metre]] (0.00
{{convert/sandbox|1|dunum|lk=on}}                         1 [[Dunam|dunum]] (0.001
{{convert/sandbox|1|m2|dunum|lk=on}}                      1 [[square metre]] (0.00
{{convert/sandbox|1|foot2|lk=on}}                         1 [[square foot]] (0.093
{{convert/sandbox|1|m2|foot2|lk=on}}                      1 [[square metre]] (11&n
{{convert/sandbox|1|m2|foot2 m2|lk=on}}                   1 [[square metre]] (11&n
{{convert/sandbox|1|ft2|lk=on}}                           1 [[square foot]] (0.093
{{convert/sandbox|1|m2|ft2|lk=on}}                        1 [[square metre]] (11&n
{{convert/sandbox|1|m2|ft2 m2|lk=on}}                     1 [[square metre]] (11&n
{{convert/sandbox|1|ha|lk=on}}                            1 [[hectare]] (2.5 [[acr
{{convert/sandbox|1|m2|ha|lk=on}}                         1 [[square metre]] (0.00
{{convert/sandbox|1|m2|ha acre|lk=on}}                    1 [[square metre]] (0.00
{{convert/sandbox|1|m2|ha sqmi|lk=on}}                    1 [[square metre]] (0.00
{{convert/sandbox|1|hm2|lk=on}}                           1 [[Square metre|square
{{convert/sandbox|1|m2|hm2|lk=on}}                        1 [[square metre]] (0.00
{{convert/sandbox|1|in2|lk=on}}                           1 [[square inch]] (6.5&n
{{convert/sandbox|1|m2|in2|lk=on}}                        1 [[square metre]] (1,60
{{convert/sandbox|1|m2|in2 cm2|lk=on}}                    1 [[square metre]] (1,60
{{convert/sandbox|1|m2|in2 mm2|lk=on}}                    1 [[square metre]] (1,60
{{convert/sandbox|1|m2|Iraqi donum|lk=on}}                1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Iraqi dönüm|lk=on}}                1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Iraqi donum diaeresis|lk=on}}      1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Iraqi donum dots|lk=on}}           1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Iraqi dunam|lk=on}}                1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Iraqi dunum|lk=on}}                1 [[square metre]] (0.00
{{convert/sandbox|1|m2|Irish acre|lk=on}}                 1 [[square metre]] (0.00
{{convert/sandbox|1|km2|lk=on}}                           1 [[square kilometre]] (
{{convert/sandbox|1|m2|km2|lk=on}}                        1 [[square metre]] (1.0<
{{convert/sandbox|1|km²|lk=on}}                           1 [[square kilometre]] (
{{convert/sandbox|1|m2|km²|lk=on}}                        1 [[square metre]] (1.0<
{{convert/sandbox|1|m2|km2 acre sqmi|lk=on}}              1 [[square metre]] (1.0<
{{convert/sandbox|1|m2|km2 mi2|lk=on}}                    1 [[square metre]] (1.0<
{{convert/sandbox|1|m2|km2 sqmi|lk=on}}                   1 [[square metre]] (1.0<
{{convert/sandbox|1|m2|lk=on}}                            1 [[square metre]] (11&n
{{convert/sandbox|1|m²|lk=on}}                            1 [[square metre]] (11&n
{{convert/sandbox|1|m2|m2 ft2|lk=on}}                     1 [[square metre]] (1.0&
{{convert/sandbox|1|m2|m2 sqft|lk=on}}                    1 [[square metre]] (1.0&
{{convert/sandbox|1|m2|metric donum|lk=on}}               1 [[square metre]] (0.00
{{convert/sandbox|1|m2|metric dönüm|lk=on}}               1 [[square metre]] (0.00
{{convert/sandbox|1|m2|metric donum diaeresis|lk=on}}     1 [[square metre]] (0.00
{{convert/sandbox|1|m2|metric donum dots|lk=on}}          1 [[square metre]] (0.00
{{convert/sandbox|1|m2|metric dunam|lk=on}}               1 [[square metre]] (0.00
{{convert/sandbox|1|mi2|lk=on}}                           1 [[square mile]] (2.6&n
{{convert/sandbox|1|m2|mi2|lk=on}}                        1 [[square metre]] (3.9<
{{convert/sandbox|1|m2|mi2 ha|lk=on}}                     1 [[square metre]] (3.9<
{{convert/sandbox|1|m2|mi2 km2|lk=on}}                    1 [[square metre]] (3.9<
{{convert/sandbox|1|m2|million acre|lk=on}}               1 [[square metre]] (2.5<
{{convert/sandbox|1|m2|million acres|lk=on}}              1 [[square metre]] (2.5<
```

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{{convert/sandbox|1|m2|million hectares|lk=on}}          1 [[square metre]] (1.0<
{{convert/sandbox|1|mm2|lk=on}}                          1 [[square millimetre]]
{{convert/sandbox|1|m2|mm2|lk=on}}                       1 [[square metre]] (1,00
{{convert/sandbox|1|m2|mm2 in2|lk=on}}                   1 [[square metre]] (1,00
{{convert/sandbox|1|m2|mm2 sqin|lk=on}}                  1 [[square metre]] (1,00
{{convert/sandbox|1|nmi2|lk=on}}                         1 [[Nautical mile|square
{{convert/sandbox|1|m2|nmi2|lk=on}}                      1 [[square metre]] (2.9<

-- area2
{{convert/sandbox|1|m2|old donum|lk=on}}                 1 [[square metre]] (0.00
{{convert/sandbox|1|m2|old dönüm|lk=on}}                 1 [[square metre]] (0.00
{{convert/sandbox|1|m2|old donum diaeresis|lk=on}}       1 [[square metre]] (0.00
{{convert/sandbox|1|m2|old donum dots|lk=on}}            1 [[square metre]] (0.00
{{convert/sandbox|1|m2|old dunam|lk=on}}                 1 [[square metre]] (0.00
{{convert/sandbox|1|m2|old dunum|lk=on}}                 1 [[square metre]] (0.00
{{convert/sandbox|1|pond|lk=on}}                         1 [[:nl:pondemaat|ponden
{{convert/sandbox|1|m2|pond|lk=on}}                      1 [[square metre]] (0.00
{{convert/sandbox|1|pondemaat|lk=on}}                    1 [[:nl:pondemaat|ponden
{{convert/sandbox|1|m2|pondemaat|lk=on}}                 1 [[square metre]] (0.00
{{convert/sandbox|1|pyeong|lk=on}}                       1 [[pyeong]] (3.3 |
{{convert/sandbox|1|m2|pyeong|lk=on}}                    1 [[square metre]] (0.30
{{convert/sandbox|1|rood|lk=on}}                         1 [[Rood (unit)|rood]] (
{{convert/sandbox|1|m2|rood|lk=on}}                      1 [[square metre]] (0.00
{{convert/sandbox|1|m2|sq arp|lk=on}}                    1 [[square metre]] (0.00
{{convert/sandbox|1|sqfoot|lk=on}}                       1 [[square foot]] (0.093
{{convert/sandbox|1|m2|sqfoot|lk=on}}                    1 [[square metre]] (11&n
{{convert/sandbox|1|m2|sqfoot m2|lk=on}}                 1 [[square metre]] (11&n
{{convert/sandbox|1|sqft|lk=on}}                         1 [[square foot]] (0.093
{{convert/sandbox|1|m2|sqft|lk=on}}                      1 [[square metre]] (11&n
{{convert/sandbox|1|m2|sqft m2|lk=on}}                   1 [[square metre]] (11&n
{{convert/sandbox|1|sqin|lk=on}}                         1 [[square inch]] (6.5&n
{{convert/sandbox|1|m2|sqin|lk=on}}                      1 [[square metre]] (1,60
{{convert/sandbox|1|m2|sqin cm2|lk=on}}                  1 [[square metre]] (1,60
{{convert/sandbox|1|m2|sqin mm2|lk=on}}                  1 [[square metre]] (1,60
{{convert/sandbox|1|sqkm|lk=on}}                         1 [[square kilometre]] (
{{convert/sandbox|1|m2|sqkm|lk=on}}                      1 [[square metre]] (1.0<
{{convert/sandbox|1|sqm|lk=on}}                          1 [[square metre]] (11&n
{{convert/sandbox|1|sqmi|lk=on}}                         1 [[square mile]] (2.6&n
{{convert/sandbox|1|m2|sqmi|lk=on}}                      1 [[square metre]] (3.9<
{{convert/sandbox|1|m2|sqmi acre|lk=on}}                 1 [[square metre]] (3.9<
{{convert/sandbox|1|m2|sqmi ha|lk=on}}                   1 [[square metre]] (3.9<
{{convert/sandbox|1|m2|sqmi ha km2|lk=on}}               1 [[square metre]] (3.9<
{{convert/sandbox|1|m2|sqmi km2|lk=on}}                  1 [[square metre]] (3.9<
{{convert/sandbox|1|sqnmi|lk=on}}                        1 [[Nautical mile|square
{{convert/sandbox|1|m2|sqnmi|lk=on}}                     1 [[square metre]] (2.9<
{{convert/sandbox|1|m2|square verst|lk=on}}              1 [[square metre]] (8.8<
{{convert/sandbox|1|sqverst|lk=on}}                      1 [[Verst|square verst]]
{{convert/sandbox|1|m2|sqverst|lk=on}}                   1 [[square metre]] (8.8<
{{convert/sandbox|1|sqyd|lk=on}}                         1 [[square yard]] (0.84&
{{convert/sandbox|1|m2|sqyd|lk=on}}                      1 [[square metre]] (1.2&
{{convert/sandbox|1|tsubo|lk=on}}                        1 [[Japanese units of me
{{convert/sandbox|1|m2|tsubo|lk=on}}                     1 [[square metre]] (0.30
{{convert/sandbox|1|m2|tsubo sqft|lk=on}}                1 [[square metre]] (0.30
{{convert/sandbox|1|verst2|lk=on}}                       1 [[Verst|square verst]]
{{convert/sandbox|1|m2|verst2|lk=on}}                    1 [[square metre]] (8.8<
{{convert/sandbox|1|yd2|lk=on}}                          1 [[square yard]] (0.84&
{{convert/sandbox|1|m2|yd2|lk=on}}                       1 [[square metre]] (1.2&

-- density
{{convert/sandbox|1|g/cm3|lk=on}}                        1 [[gram]] per [[cubic c
{{convert/sandbox|1|kg/m3|g/cm3|lk=on}}                  1 [[Density|kilogram per
{{convert/sandbox|1|g/dm3|lk=on}}                        1 [[Density|gram per cub
{{convert/sandbox|1|kg/m3|g/dm3|lk=on}}                  1 [[Density|kilogram per
{{convert/sandbox|1|g/L|lk=on}}                          1 [[Density|gram per lit
```

```
{{convert/sandbox|1|kg/m3|g/L|lk=on}}                    1 [[Density|kilogram per
{{convert/sandbox|1|g/mL|lk=on}}                         1 [[Density|gram per mil
{{convert/sandbox|1|kg/m3|g/mL|lk=on}}                   1 [[Density|kilogram per
{{convert/sandbox|1|g/ml|lk=on}}                         1 [[Density|gram per mil
{{convert/sandbox|1|kg/m3|g/ml|lk=on}}                   1 [[Density|kilogram per
{{convert/sandbox|1|kg/dm3|lk=on}}                       1 [[Density|kilogram per
{{convert/sandbox|1|kg/m3|kg/dm3|lk=on}}                 1 [[Density|kilogram per
{{convert/sandbox|1|kg/L|lk=on}}                         1 [[Density|kilogram per
{{convert/sandbox|1|kg/m3|kg/L|lk=on}}                   1 [[Density|kilogram per
{{convert/sandbox|1|kg/l|lk=on}}                         1 [[Density|kilogram per
{{convert/sandbox|1|kg/m3|kg/l|lk=on}}                   1 [[Density|kilogram per
{{convert/sandbox|1|kg/m3|lk=on}}                        1 [[Density|kilogram per
{{convert/sandbox|1|lb/cuft|lk=on}}                      1 [[Density|pound per cu
{{convert/sandbox|1|kg/m3|lb/cuft|lk=on}}                1 [[Density|kilogram per
{{convert/sandbox|1|lb/cuin|lk=on}}                      1 [[Density|pound per cu
{{convert/sandbox|1|kg/m3|lb/cuin|lk=on}}                1 [[Density|kilogram per
{{convert/sandbox|1|lb/cuyd|lk=on}}                      1 [[Density|pound per cu
{{convert/sandbox|1|kg/m3|lb/cuyd|lk=on}}                1 [[Density|kilogram per
{{convert/sandbox|1|lb/ft3|lk=on}}                       1 [[Density|pound per cu
{{convert/sandbox|1|kg/m3|lb/ft3|lk=on}}                 1 [[Density|kilogram per
{{convert/sandbox|1|lb/impgal|lk=on}}                    1 [[Density|pound per im
{{convert/sandbox|1|kg/m3|lb/impgal|lk=on}}              1 [[Density|kilogram per
{{convert/sandbox|1|kg/m3|lb/impgal lb/USgal|lk=on}}     1 [[Density|kilogram per
{{convert/sandbox|1|lb/in3|lk=on}}                       1 [[Density|pound per cu
{{convert/sandbox|1|kg/m3|lb/in3|lk=on}}                 1 [[Density|kilogram per
{{convert/sandbox|1|lb/U.S.gal|lk=on}}                   1 [[Density|pound per U
{{convert/sandbox|1|kg/m3|lb/U.S.gal|lk=on}}             1 [[Density|kilogram per
{{convert/sandbox|1|lb/USbu|lk=on}}                      1 [[Bushel|pound per US
{{convert/sandbox|1|kg/m3|lb/USbu|lk=on}}                1 [[Density|kilogram per
{{convert/sandbox|1|lb/USgal|lk=on}}                     1 [[Density|pound per US
{{convert/sandbox|1|kg/m3|lb/USgal|lk=on}}               1 [[Density|kilogram per
{{convert/sandbox|1|lb/yd3|lk=on}}                       1 [[Density|pound per cu
{{convert/sandbox|1|kg/m3|lb/yd3|lk=on}}                 1 [[Density|kilogram per
{{convert/sandbox|1|mcg/dL|lk=on}}                       1 [[microgram]] per [[de
{{convert/sandbox|1|kg/m3|mcg/dL|lk=on}}                 1 [[Density|kilogram per
{{convert/sandbox|1|mg/L|lk=on}}                         1 [[Density|milligram pe
{{convert/sandbox|1|kg/m3|mg/L|lk=on}}                   1 [[Density|kilogram per
{{convert/sandbox|1|Mg/m3|lk=on}}                        1 [[Tonne|megagram]] per
{{convert/sandbox|1|kg/m3|Mg/m3|lk=on}}                  1 [[Density|kilogram per
{{convert/sandbox|1|oz/cuin|lk=on}}                      1 [[Density|ounce per cu
{{convert/sandbox|1|kg/m3|oz/cuin|lk=on}}                1 [[Density|kilogram per
{{convert/sandbox|1|oz/in3|lk=on}}                       1 [[Density|ounce per cu
{{convert/sandbox|1|kg/m3|oz/in3|lk=on}}                 1 [[Density|kilogram per
{{convert/sandbox|1|ug/dL|lk=on}}                        1 [[microgram]] per [[de
{{convert/sandbox|1|kg/m3|ug/dL|lk=on}}                  1 [[Density|kilogram per
{{convert/sandbox|1|µg/dL|lk=on}}                        1 [[microgram]] per [[de
{{convert/sandbox|1|kg/m3|µg/dL|lk=on}}                  1 [[Density|kilogram per

-- energy
{{convert/sandbox|1|µerg|lk=on}}                         1 [[Erg|microerg]] (0.00
{{convert/sandbox|1|kJ|µerg|lk=on}}                      1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|µeV|lk=on}}                          1 [[Electronvolt|microel
{{convert/sandbox|1|kJ|µeV|lk=on}}                       1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|µJ|lk=on}}                           1 [[Joule|microjoule]] (
{{convert/sandbox|1|kJ|µJ|lk=on}}                        1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|µLatm|lk=on}}                        1 [[Atmosphere (unit)|mi
{{convert/sandbox|1|kJ|µLatm|lk=on}}                     1 [[kilojoule]] (9,900,0
{{convert/sandbox|1|µlatm|lk=on}}                        1 [[Atmosphere (unit)|mi
{{convert/sandbox|1|kJ|µlatm|lk=on}}                     1 [[kilojoule]] (9,900,0
{{convert/sandbox|1|µtonTNT|lk=on}}                      1 [[TNT equivalent|micro
{{convert/sandbox|1|kJ|µtonTNT|lk=on}}                   1 [[kilojoule]] (0.24 [[
{{convert/sandbox|1|µtTNT|lk=on}}                        1 [[TNT equivalent|micro
{{convert/sandbox|1|kJ|µtTNT|lk=on}}                     1 [[kilojoule]] (0.24 [[
{{convert/sandbox|1|µW.h|lk=on}}                         1 [[Watt-hour|microwatt
```

{{convert/sandbox|1|kJ|µW.h|lk=on}}	1 [[kilojoule]] (280,000
{{convert/sandbox|1|µW·h|lk=on}}	1 [[Watt-hour|microwatt
{{convert/sandbox|1|kJ|µW·h|lk=on}}	1 [[kilojoule]] (280,000
{{convert/sandbox|1|µWh|lk=on}}	1 [[Watt-hour|microwatt
{{convert/sandbox|1|kJ|µWh|lk=on}}	1 [[kilojoule]] (280,000
{{convert/sandbox|1|aJ|lk=on}}	1 [[Joule|attojoule]] (0
{{convert/sandbox|1|kJ|aJ|lk=on}}	1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|B.O.T.U.|lk=on}}	1 [[Watt-hour|Board of T
{{convert/sandbox|1|kJ|B.O.T.U.|lk=on}}	1 [[kilojoule]] (0.0002&
{{convert/sandbox|1|bboe|lk=on}}	1 [[barrel of oil equiva
{{convert/sandbox|1|kJ|bboe|lk=on}}	1 [[kilojoule]] (1.6<spa
{{convert/sandbox|1|BOE|lk=on}}	1 [[barrel of oil equiva
{{convert/sandbox|1|kJ|BOE|lk=on}}	1 [[kilojoule]] (1.6<spa
{{convert/sandbox|1|Btu|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|Btu|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|btu|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|btu|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|BTU|lk=on}}	1 [[British thermal unit
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{{convert/sandbox|1|kJ|BTU-59F|lk=on}}	1 [[kilojoule]] (0.95&nb
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{{convert/sandbox|1|kJ|Btu-59F|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|Btu-60F|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|Btu-60F|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|BTU-60F|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|BTU-60F|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|BTU-63F|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|BTU-63F|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|Btu-63F|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|Btu-63F|lk=on}}	1 [[kilojoule]] (0.95&nb
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{{convert/sandbox|1|kJ|BTU-ISO|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|Btu-ISO|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|Btu-ISO|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|Btu-IT|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|Btu-IT|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|BTU-IT|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|BTU-IT|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|BTU-mean|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|BTU-mean|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|Btu-mean|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|Btu-mean|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|BTU-th|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|BTU-th|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|Btu-th|lk=on}}	1 [[British thermal unit
{{convert/sandbox|1|kJ|Btu-th|lk=on}}	1 [[kilojoule]] (0.95&nb
{{convert/sandbox|1|Cal|lk=on}}	1 [[calorie]] (4.2
{{convert/sandbox|1|kJ|Cal|lk=on}}	1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|cal|lk=on}}	1 [[calorie]] (4.2
{{convert/sandbox|1|kJ|cal|lk=on}}	1 [[kilojoule]] (240&nbs
{{convert/sandbox|1|cal-15|lk=on}}	1 [[Calorie|calorie (15°
{{convert/sandbox|1|kJ|cal-15|lk=on}}	1 [[kilojoule]] (240&nbs
{{convert/sandbox|1|Cal-15|lk=on}}	1 [[Calorie|Calorie (15°
{{convert/sandbox|1|kJ|Cal-15|lk=on}}	1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|Cal-IT|lk=on}}	1 [[Calorie|Calorie (Int
{{convert/sandbox|1|kJ|Cal-IT|lk=on}}	1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|cal-IT|lk=on}}	1 [[Calorie|calorie (Int
{{convert/sandbox|1|kJ|cal-IT|lk=on}}	1 [[kilojoule]] (240&nbs
{{convert/sandbox|1|Cal-th|lk=on}}	1 [[Calorie|Calorie (the

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{{convert/sandbox|1|kJ|Cal-th|lk=on}}                    1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|cal-th|lk=on}}                       1 [[Calorie|calorie (the
{{convert/sandbox|1|kJ|cal-th|lk=on}}                    1 [[kilojoule]] (240&nbs
{{convert/sandbox|1|ccatm|lk=on}}                        1 [[Atmosphere (unit)|cu
{{convert/sandbox|1|kJ|ccatm|lk=on}}                     1 [[kilojoule]] (9,900&n
{{convert/sandbox|1|CHU-IT|lk=on}}                       1 [[Conversion of units|
{{convert/sandbox|1|kJ|CHU-IT|lk=on}}                    1 [[kilojoule]] (0.53&nb
{{convert/sandbox|1|cJ|lk=on}}                           1 [[Joule|centijoule]] (
{{convert/sandbox|1|kJ|cJ|lk=on}}                        1 [[kilojoule]] (100,000
{{convert/sandbox|1|cm3atm|lk=on}}                       1 [[Atmosphere (unit)|cu
{{convert/sandbox|1|kJ|cm3atm|lk=on}}                    1 [[kilojoule]] (9,900&n
{{convert/sandbox|1|cufootatm|lk=on}}                    1 [[Atmosphere (unit)|cu
{{convert/sandbox|1|kJ|cufootatm|lk=on}}                 1 [[kilojoule]] (0.35&nb
{{convert/sandbox|1|cufootnaturalgas|lk=on}}             1 [[Conversion of units|
{{convert/sandbox|1|kJ|cufootnaturalgas|lk=on}}          1 [[kilojoule]] (0.00095
{{convert/sandbox|1|cuftatm|lk=on}}                      1 [[Atmosphere (unit)|cu
{{convert/sandbox|1|kJ|cuftatm|lk=on}}                   1 [[kilojoule]] (0.35&nb
{{convert/sandbox|1|cuftnaturalgas|lk=on}}               1 [[Conversion of units|
{{convert/sandbox|1|kJ|cuftnaturalgas|lk=on}}            1 [[kilojoule]] (0.00095
{{convert/sandbox|1|cuydatm|lk=on}}                      1 [[Atmosphere (unit)|cu
{{convert/sandbox|1|kJ|cuydatm|lk=on}}                   1 [[kilojoule]] (0.013&n
{{convert/sandbox|1|daJ|lk=on}}                          1 [[Joule|decajoule]] (2
{{convert/sandbox|1|kJ|daJ|lk=on}}                       1 [[kilojoule]] (100&nbs
{{convert/sandbox|1|dJ|lk=on}}                           1 [[Joule|decijoule]] (0
{{convert/sandbox|1|kJ|dJ|lk=on}}                        1 [[kilojoule]] (10,000&
{{convert/sandbox|1|e3BTU|lk=on}}                        1 thousand [[Britis
{{convert/sandbox|1|kJ|e3BTU|lk=on}}                     1 [[kilojoule]] (0.00095
{{convert/sandbox|1|e6BTU|lk=on}}                        1 million [[British
{{convert/sandbox|1|kJ|e6BTU|lk=on}}                     1 [[kilojoule]] (9.5<spa
{{convert/sandbox|1|Eh|lk=on}}                           1 [[Hartree]] (27 |
{{convert/sandbox|1|kJ|Eh|lk=on}}                        1 [[kilojoule]] (2.3<spa
{{convert/sandbox|1|EJ|lk=on}}                           1 [[Joule|exajoule]] (2
{{convert/sandbox|1|kJ|EJ|lk=on}}                        1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|erg|lk=on}}                          1 [[erg]] (0.10 [[J
{{convert/sandbox|1|kJ|erg|lk=on}}                       1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|eV|lk=on}}                           1 [[electronvolt]] (0.10
{{convert/sandbox|1|kJ|eV|lk=on}}                        1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|feV|lk=on}}                          1 [[Electronvolt|femtoel
{{convert/sandbox|1|kJ|feV|lk=on}}                       1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|fJ|lk=on}}                           1 [[Joule|femtojoule]] (
{{convert/sandbox|1|kJ|fJ|lk=on}}                        1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|foe|lk=on}}                          1 [[Foe (unit of energy)
{{convert/sandbox|1|kJ|foe|lk=on}}                       1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|ft.lbf|lk=on}}                       1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|ft.lbf|lk=on}}                    1 [[kilojoule]] (740&nbs
{{convert/sandbox|1|ft·lbf|lk=on}}                       1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|ft·lbf|lk=on}}                    1 [[kilojoule]] (740&nbs
{{convert/sandbox|1|ft·lb-f|lk=on}}                      1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|ft·lb-f|lk=on}}                   1 [[kilojoule]] (740&nbs
{{convert/sandbox|1|ftlb|lk=on}}                         1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|ftlb|lk=on}}                      1 [[kilojoule]] (740&nbs
{{convert/sandbox|1|ftlbf|lk=on}}                        1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|ftlbf|lk=on}}                     1 [[kilojoule]] (740&nbs
{{convert/sandbox|1|ftlb-f|lk=on}}                       1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|ftlb-f|lk=on}}                    1 [[kilojoule]] (740&nbs
{{convert/sandbox|1|ftpdl|lk=on}}                        1 [[foot-poundal]] (0.04
{{convert/sandbox|1|kJ|ftpdl|lk=on}}                     1 [[kilojoule]] (24,000&

-- energy2
{{convert/sandbox|1|g-cal-15|lk=on}}                     1 [[Calorie|calorie (15°
{{convert/sandbox|1|kJ|g-cal-15|lk=on}}                  1 [[kilojoule]] (240&nbs
{{convert/sandbox|1|g-cal-IT|lk=on}}                     1 [[Calorie|calorie (Int
{{convert/sandbox|1|kJ|g-cal-IT|lk=on}}                  1 [[kilojoule]] (240&nbs
{{convert/sandbox|1|g-cal-th|lk=on}}                     1 [[Calorie|calorie (the
```

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{{convert/sandbox|1|kJ|g-cal-th|lk=on}}                1 [[kilojoule]] (240&nbs
{{convert/sandbox|1|GeV|lk=on}}                        1 [[Electronvolt|gigaele
{{convert/sandbox|1|kJ|GeV|lk=on}}                     1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|GJ|lk=on}}                         1 [[Joule|gigajoule]] (2
{{convert/sandbox|1|kJ|GJ|lk=on}}                      1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|g-kcal-15|lk=on}}                  1 [[Calorie|kilocalorie
{{convert/sandbox|1|kJ|g-kcal-15|lk=on}}               1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|g-kcal-IT|lk=on}}                  1 [[Calorie|kilocalorie
{{convert/sandbox|1|kJ|g-kcal-IT|lk=on}}               1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|g-kcal-th|lk=on}}                  1 [[Calorie|kilocalorie
{{convert/sandbox|1|kJ|g-kcal-th|lk=on}}               1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|GLatm|lk=on}}                      1 [[Atmosphere (unit)|gi
{{convert/sandbox|1|kJ|GLatm|lk=on}}                   1 [[kilojoule]] (9.9<spa
{{convert/sandbox|1|Glatm|lk=on}}                      1 [[Atmosphere (unit)|gi
{{convert/sandbox|1|kJ|Glatm|lk=on}}                   1 [[kilojoule]] (9.9<spa
{{convert/sandbox|1|g-Mcal-15|lk=on}}                  1 [[Calorie|megacalorie
{{convert/sandbox|1|kJ|g-Mcal-15|lk=on}}               1 [[kilojoule]] (0.00024
{{convert/sandbox|1|g-mcal-15|lk=on}}                  1 [[Calorie|millicalorie
{{convert/sandbox|1|kJ|g-mcal-15|lk=on}}               1 [[kilojoule]] (240,000
{{convert/sandbox|1|g-Mcal-IT|lk=on}}                  1 [[Calorie|megacalorie
{{convert/sandbox|1|kJ|g-Mcal-IT|lk=on}}               1 [[kilojoule]] (0.00024
{{convert/sandbox|1|g-mcal-IT|lk=on}}                  1 [[Calorie|millicalorie
{{convert/sandbox|1|kJ|g-mcal-IT|lk=on}}               1 [[kilojoule]] (240,000
{{convert/sandbox|1|g-mcal-th|lk=on}}                  1 [[Calorie|millicalorie
{{convert/sandbox|1|kJ|g-mcal-th|lk=on}}               1 [[kilojoule]] (240,000
{{convert/sandbox|1|g-Mcal-th|lk=on}}                  1 [[Calorie|megacalorie
{{convert/sandbox|1|kJ|g-Mcal-th|lk=on}}               1 [[kilojoule]] (0.00024
{{convert/sandbox|1|gTNT|lk=on}}                       1 [[TNT equivalent|gram
{{convert/sandbox|1|kJ|gTNT|lk=on}}                    1 [[kilojoule]] (0.24 [[
{{convert/sandbox|1|Gtoe|lk=on}}                       1 [[Tonne of oil equival
{{convert/sandbox|1|kJ|Gtoe|lk=on}}                    1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|GtonTNT|lk=on}}                    1 [[TNT equivalent|gigat
{{convert/sandbox|1|kJ|GtonTNT|lk=on}}                 1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|GtTNT|lk=on}}                      1 [[TNT equivalent|gigat
{{convert/sandbox|1|kJ|GtTNT|lk=on}}                   1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|GW.h|lk=on}}                       1 [[Watt-hour|gigawatt-h
{{convert/sandbox|1|kJ|GW.h|lk=on}}                    1 [[kilojoule]] (2.8<spa
{{convert/sandbox|1|GW·h|lk=on}}                       1 [[Watt-hour|gigawatt-h
{{convert/sandbox|1|kJ|GW·h|lk=on}}                    1 [[kilojoule]] (2.8<spa
{{convert/sandbox|1|GWh|lk=on}}                        1 [[Watt-hour|gigawatt-h
{{convert/sandbox|1|kJ|GWh|lk=on}}                     1 [[kilojoule]] (2.8<spa
{{convert/sandbox|1|GW-h|lk=on}}                       1 [[Watt-hour|gigawatt-h
{{convert/sandbox|1|kJ|GW-h|lk=on}}                    1 [[kilojoule]] (2.8<spa
{{convert/sandbox|1|Hartree|lk=on}}                    1 [[Hartree]] (27 |
{{convert/sandbox|1|kJ|Hartree|lk=on}}                 1 [[kilojoule]] (2.3<spa
{{convert/sandbox|1|hJ|lk=on}}                         1 [[Joule|hectojoule]] (
{{convert/sandbox|1|kJ|hJ|lk=on}}                      1 [[kilojoule]] (10 
{{convert/sandbox|1|hp.h|lk=on}}                       1 [[Horsepower|horsepowe
{{convert/sandbox|1|kJ|hp.h|lk=on}}                    1 [[kilojoule]] (0.0003
{{convert/sandbox|1|hp·h|lk=on}}                       1 [[Horsepower|horsepowe
{{convert/sandbox|1|kJ|hp·h|lk=on}}                    1 [[kilojoule]] (0.0003
{{convert/sandbox|1|hph|lk=on}}                        1 [[Horsepower|horsepowe
{{convert/sandbox|1|kJ|hph|lk=on}}                     1 [[kilojoule]] (0.0003
{{convert/sandbox|1|impgalatm|lk=on}}                  1 [[Atmosphere (unit)|im
{{convert/sandbox|1|kJ|impgalatm|lk=on}}               1 [[kilojoule]] (2.2&nbs
{{convert/sandbox|1|in.lbf|lk=on}}                     1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|in.lbf|lk=on}}                  1 [[kilojoule]] (8,900&n
{{convert/sandbox|1|in.lb-f|lk=on}}                    1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|in.lb-f|lk=on}}                 1 [[kilojoule]] (8,900&n
{{convert/sandbox|1|in.ozf|lk=on}}                     1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|in.ozf|lk=on}}                  1 [[kilojoule]] (140,000
{{convert/sandbox|1|in.oz-f|lk=on}}                    1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|in.oz-f|lk=on}}                 1 [[kilojoule]] (140,000
{{convert/sandbox|1|in·lbf|lk=on}}                     1 [[Foot-pound (energy)|
```

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{{convert/sandbox|1|kJ|in·lbf|lk=on}}                    1 [[kilojoule]] (8,900&r
{{convert/sandbox|1|in·lb-f|lk=on}}                      1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|in·lb-f|lk=on}}                   1 [[kilojoule]] (8,900&r
{{convert/sandbox|1|in·ozf|lk=on}}                       1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|in·ozf|lk=on}}                    1 [[kilojoule]] (140,000
{{convert/sandbox|1|in·oz-f|lk=on}}                      1 [[Foot-pound (energy)|
{{convert/sandbox|1|kJ|in·oz-f|lk=on}}                   1 [[kilojoule]] (140,000
{{convert/sandbox|1|J|lk=on}}                            1 [[joule]] (0.24 |
{{convert/sandbox|1|kJ|J|lk=on}}                         1 [[kilojoule]] (1,000&r
{{convert/sandbox|1|kbboe|lk=on}}                        1 [[Barrel of oil equiva
{{convert/sandbox|1|kJ|kbboe|lk=on}}                     1 [[kilojoule]] (1.6<spa
{{convert/sandbox|1|kBOE|lk=on}}                         1 [[Barrel of oil equiva
{{convert/sandbox|1|kJ|kBOE|lk=on}}                      1 [[kilojoule]] (1.6<spa
{{convert/sandbox|1|kcal|lk=on}}                         1 [[Calorie|kilocalorie]
{{convert/sandbox|1|kJ|kcal|lk=on}}                      1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|kcal-15|lk=on}}                      1 [[Calorie|kilocalorie
{{convert/sandbox|1|kJ|kcal-15|lk=on}}                   1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|kcal-IT|lk=on}}                      1 [[Calorie|kilocalorie
{{convert/sandbox|1|kJ|kcal-IT|lk=on}}                   1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|kcal-th|lk=on}}                      1 [[Calorie|kilocalorie
{{convert/sandbox|1|kJ|kcal-th|lk=on}}                   1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|kerg|lk=on}}                         1 [[Erg|kiloerg]] (0.10&
{{convert/sandbox|1|kJ|kerg|lk=on}}                      1 [[kilojoule]] (10,000
{{convert/sandbox|1|keV|lk=on}}                          1 [[Electronvolt|kiloele
{{convert/sandbox|1|kJ|keV|lk=on}}                       1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|kg-cal-15|lk=on}}                    1 [[Calorie|Calorie (15°
{{convert/sandbox|1|kJ|kg-cal-15|lk=on}}                 1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|kg-cal-IT|lk=on}}                    1 [[Calorie|Calorie (Int
{{convert/sandbox|1|kJ|kg-cal-IT|lk=on}}                 1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|kg-cal-th|lk=on}}                    1 [[Calorie|Calorie (the
{{convert/sandbox|1|kJ|kg-cal-th|lk=on}}                 1 [[kilojoule]] (0.24&nb
{{convert/sandbox|1|kgTNT|lk=on}}                        1 [[TNT equivalent|kilog
{{convert/sandbox|1|kJ|kgTNT|lk=on}}                     1 [[kilojoule]] (0.0002
{{convert/sandbox|1|kJ|lk=on}}                           1 [[kilojoule]] (240&nbs
{{convert/sandbox|1|klatm|lk=on}}                        1 [[Atmosphere (unit)|ki
{{convert/sandbox|1|kJ|klatm|lk=on}}                     1 [[kilojoule]] (0.0099&
{{convert/sandbox|1|kLatm|lk=on}}                        1 [[Atmosphere (unit)|ki
{{convert/sandbox|1|kJ|kLatm|lk=on}}                     1 [[kilojoule]] (0.0099&
{{convert/sandbox|1|kt(TNT)|lk=on}}                      1 [[TNT equivalent|kilot
{{convert/sandbox|1|kJ|kt(TNT)|lk=on}}                   1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|ktoe|lk=on}}                         1 [[Tonne of oil equival
{{convert/sandbox|1|kJ|ktoe|lk=on}}                      1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|ktonTNT|lk=on}}                      1 [[TNT equivalent|kilot
{{convert/sandbox|1|kJ|ktonTNT|lk=on}}                   1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|ktTNT|lk=on}}                        1 [[TNT equivalent|kilot
{{convert/sandbox|1|kJ|ktTNT|lk=on}}                     1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|kW.h|lk=on}}                         1 [[Watt-hour|kilowatt-h
{{convert/sandbox|1|kJ|kW.h|lk=on}}                      1 [[kilojoule]] (0.0002&
{{convert/sandbox|1|kW·h|lk=on}}                         1 [[Watt-hour|kilowatt-h
{{convert/sandbox|1|kJ|kW·h|lk=on}}                      1 [[kilojoule]] (0.0002&
{{convert/sandbox|1|kWh|lk=on}}                          1 [[Watt-hour|kilowatt-h
{{convert/sandbox|1|kJ|kWh|lk=on}}                       1 [[kilojoule]] (0.0002&
{{convert/sandbox|1|kW-h|lk=on}}                         1 [[Watt-hour|kilowatt-h
{{convert/sandbox|1|kJ|kW-h|lk=on}}                      1 [[kilojoule]] (0.0002&
{{convert/sandbox|1|Latm|lk=on}}                         1 [[Atmosphere (unit)|li
{{convert/sandbox|1|kJ|Latm|lk=on}}                      1 [[kilojoule]] (9.9&nbs
{{convert/sandbox|1|latm|lk=on}}                         1 [[Atmosphere (unit)|li
{{convert/sandbox|1|kJ|latm|lk=on}}                      1 [[kilojoule]] (9.9&nbs
{{convert/sandbox|1|m3atm|lk=on}}                        1 [[Atmosphere (unit)|cu
{{convert/sandbox|1|kJ|m3atm|lk=on}}                     1 [[kilojoule]] (0.0099&
{{convert/sandbox|1|MBtu|lk=on}}                         1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu|lk=on}}                      1 [[kilojoule]] (0.0009&
{{convert/sandbox|1|MBtu-39F|lk=on}}                     1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu-39F|lk=on}}                  1 [[kilojoule]] (0.0009&
```

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{{convert/sandbox|1|MBTU-39F|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBTU-39F|lk=on}}                 1 [[kilojoule]] (0.00094
{{convert/sandbox|1|MBTU-59F|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBTU-59F|lk=on}}                 1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBtu-59F|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu-59F|lk=on}}                 1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBTU-60F|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBTU-60F|lk=on}}                 1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBtu-60F|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu-60F|lk=on}}                 1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBtu-63F|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu-63F|lk=on}}                 1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBTU-63F|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBTU-63F|lk=on}}                 1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBTU-ISO|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBTU-ISO|lk=on}}                 1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBtu-ISO|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu-ISO|lk=on}}                 1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBTU-IT|lk=on}}                     1 [[British thermal unit
{{convert/sandbox|1|kJ|MBTU-IT|lk=on}}                  1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBtu-IT|lk=on}}                     1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu-IT|lk=on}}                  1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBtu-mean|lk=on}}                   1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu-mean|lk=on}}                1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBTU-mean|lk=on}}                   1 [[British thermal unit
{{convert/sandbox|1|kJ|MBTU-mean|lk=on}}                1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBTU-th|lk=on}}                     1 [[British thermal unit
{{convert/sandbox|1|kJ|MBTU-th|lk=on}}                  1 [[kilojoule]] (0.00095
{{convert/sandbox|1|MBtu-th|lk=on}}                     1 [[British thermal unit
{{convert/sandbox|1|kJ|MBtu-th|lk=on}}                  1 [[kilojoule]] (0.00095

-- energy3
{{convert/sandbox|1|mcal|lk=on}}                        1 [[Calorie|millicalorie
{{convert/sandbox|1|kJ|mcal|lk=on}}                     1 [[kilojoule]] (240,000
{{convert/sandbox|1|Mcal|lk=on}}                        1 [[Calorie|megacalorie]
{{convert/sandbox|1|kJ|Mcal|lk=on}}                     1 [[kilojoule]] (0.00024
{{convert/sandbox|1|Mcal-15|lk=on}}                     1 [[Calorie|megacalorie
{{convert/sandbox|1|kJ|Mcal-15|lk=on}}                  1 [[kilojoule]] (0.00024
{{convert/sandbox|1|mcal-15|lk=on}}                     1 [[Calorie|millicalorie
{{convert/sandbox|1|kJ|mcal-15|lk=on}}                  1 [[kilojoule]] (240,000
{{convert/sandbox|1|mcal-IT|lk=on}}                     1 [[Calorie|millicalorie
{{convert/sandbox|1|kJ|mcal-IT|lk=on}}                  1 [[kilojoule]] (240,000
{{convert/sandbox|1|Mcal-IT|lk=on}}                     1 [[Calorie|megacalorie
{{convert/sandbox|1|kJ|Mcal-IT|lk=on}}                  1 [[kilojoule]] (0.00024
{{convert/sandbox|1|mcal-th|lk=on}}                     1 [[Calorie|millicalorie
{{convert/sandbox|1|kJ|mcal-th|lk=on}}                  1 [[kilojoule]] (240,000
{{convert/sandbox|1|Mcal-th|lk=on}}                     1 [[Calorie|megacalorie
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{{convert/sandbox|1|Merg|lk=on}}                        1 [[Erg|megaerg]] (0.10&
{{convert/sandbox|1|kJ|Merg|lk=on}}                     1 [[kilojoule]] (10,000&
{{convert/sandbox|1|merg|lk=on}}                        1 [[Erg|millierg]] (0.00
{{convert/sandbox|1|kJ|merg|lk=on}}                     1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|MeV|lk=on}}                         1 [[Electronvolt|megaele
{{convert/sandbox|1|kJ|MeV|lk=on}}                      1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|meV|lk=on}}                         1 [[Electronvolt|millie]
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{{convert/sandbox|1|MJ|lk=on}}                          1 [[megajoule]] (0.28&nb
{{convert/sandbox|1|kJ|MJ|lk=on}}                       1 [[kilojoule]] (0.0010&
{{convert/sandbox|1|mJ|lk=on}}                          1 [[Joule|millijoule]] (
{{convert/sandbox|1|kJ|mJ|lk=on}}                       1 [[kilojoule]] (1,000,0
{{convert/sandbox|1|Mlatm|lk=on}}                       1 [[Atmosphere (unit)|me
{{convert/sandbox|1|kJ|Mlatm|lk=on}}                    1 [[kilojoule]] (9.9<spa
{{convert/sandbox|1|mlatm|lk=on}}                       1 [[Atmosphere (unit)|mi
{{convert/sandbox|1|kJ|mlatm|lk=on}}                    1 [[kilojoule]] (9,900&n
```

```
 {{convert/sandbox|1|MLatm|lk=on}}                                1 [[Atmosphere (unit)|me
 {{convert/sandbox|1|kJ|MLatm|lk=on}}                             1 [[kilojoule]] (9.9<spa
 {{convert/sandbox|1|mLatm|lk=on}}                                1 [[Atmosphere (unit)|mi
 {{convert/sandbox|1|kJ|mLatm|lk=on}}                             1 [[kilojoule]] (9,900&n
 {{convert/sandbox|1|MMBtu|lk=on}}                                1 [[British thermal unit
 {{convert/sandbox|1|kJ|MMBtu|lk=on}}                             1 [[kilojoule]] (9.5<spa
 {{convert/sandbox|1|MMBTU-39F|lk=on}}                            1 [[British thermal unit
 {{convert/sandbox|1|kJ|MMBTU-39F|lk=on}}                         1 [[kilojoule]] (9.4<spa
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 {{convert/sandbox|1|MMBTU-60F|lk=on}}                            1 [[British thermal unit
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 {{convert/sandbox|1|kJ|MMBtu-63F|lk=on}}                         1 [[kilojoule]] (9.5<spa
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 {{convert/sandbox|1|kJ|MMBTU-ISO|lk=on}}                         1 [[kilojoule]] (9.5<spa
 {{convert/sandbox|1|MMBtu-ISO|lk=on}}                            1 [[British thermal unit
 {{convert/sandbox|1|kJ|MMBtu-ISO|lk=on}}                         1 [[kilojoule]] (9.5<spa
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 {{convert/sandbox|1|MMBtu-mean|lk=on}}                           1 [[British thermal unit
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 {{convert/sandbox|1|Mt(TNT)|lk=on}}                              1 [[TNT equivalent|megat
 {{convert/sandbox|1|kJ|Mt(TNT)|lk=on}}                           1 [[kilojoule]] (2.4<spa
 {{convert/sandbox|1|Mtoe|lk=on}}                                 1 [[Tonne of oil equival
 {{convert/sandbox|1|kJ|Mtoe|lk=on}}                              1 [[kilojoule]] (2.4<spa
 {{convert/sandbox|1|mtonTNT|lk=on}}                              1 [[TNT equivalent|milli
 {{convert/sandbox|1|kJ|mtonTNT|lk=on}}                           1 [[kilojoule]] (0.0002
 {{convert/sandbox|1|MtonTNT|lk=on}}                              1 [[TNT equivalent|megat
 {{convert/sandbox|1|kJ|MtonTNT|lk=on}}                           1 [[kilojoule]] (2.4<spa
 {{convert/sandbox|1|MtTNT|lk=on}}                                1 [[TNT equivalent|megat
 {{convert/sandbox|1|kJ|MtTNT|lk=on}}                             1 [[kilojoule]] (2.4<spa
 {{convert/sandbox|1|mtTNT|lk=on}}                                1 [[TNT equivalent|milli
 {{convert/sandbox|1|kJ|mtTNT|lk=on}}                             1 [[kilojoule]] (0.0002
 {{convert/sandbox|1|MW.h|lk=on}}                                 1 [[Watt-hour|megawatt-h
 {{convert/sandbox|1|kJ|MW.h|lk=on}}                              1 [[kilojoule]] (2.8<spa
 {{convert/sandbox|1|mW.h|lk=on}}                                 1 [[Watt-hour|milliwatt-
 {{convert/sandbox|1|kJ|mW.h|lk=on}}                              1 [[kilojoule]] (280&nbs
 {{convert/sandbox|1|MW·h|lk=on}}                                 1 [[Watt-hour|megawatt-h
 {{convert/sandbox|1|kJ|MW·h|lk=on}}                              1 [[kilojoule]] (2.8<spa
 {{convert/sandbox|1|mW·h|lk=on}}                                 1 [[Watt-hour|milliwatt-
 {{convert/sandbox|1|kJ|mW·h|lk=on}}                              1 [[kilojoule]] (280&nbs
 {{convert/sandbox|1|mWh|lk=on}}                                  1 [[Watt-hour|milliwatt-
 {{convert/sandbox|1|kJ|mWh|lk=on}}                               1 [[kilojoule]] (280&nbs
 {{convert/sandbox|1|MWh|lk=on}}                                  1 [[Watt-hour|megawatt-h
 {{convert/sandbox|1|kJ|MWh|lk=on}}                               1 [[kilojoule]] (2.8<spa
 {{convert/sandbox|1|MW-h|lk=on}}                                 1 [[Watt-hour|megawatt-h
 {{convert/sandbox|1|kJ|MW-h|lk=on}}                              1 [[kilojoule]] (2.8<spa
```

```
{{convert/sandbox|1|mW-h|lk=on}}                    1 [[Watt-hour|milliwatt-
{{convert/sandbox|1|kJ|mW-h|lk=on}}                 1 [[kilojoule]] (280&nbs
{{convert/sandbox|1|neV|lk=on}}                     1 [[Electronvolt|nanoele
{{convert/sandbox|1|kJ|neV|lk=on}}                  1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|nJ|lk=on}}                      1 [[Joule|nanojoule]] (2
{{convert/sandbox|1|kJ|nJ|lk=on}}                   1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|PeV|lk=on}}                     1 [[Electronvolt|petaele
{{convert/sandbox|1|kJ|PeV|lk=on}}                  1 [[kilojoule]] (6,200,0
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{{convert/sandbox|1|PJ|lk=on}}                      1 [[Joule|petajoule]] (2
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{{convert/sandbox|1|pJ|lk=on}}                      1 [[Joule|picojoule]] (0
{{convert/sandbox|1|kJ|pJ|lk=on}}                   1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|quad|lk=on}}                    1 [[Quad (energy)|quadri
{{convert/sandbox|1|kJ|quad|lk=on}}                 1 [[kilojoule]] (9.5<spa

-- energy4
{{convert/sandbox|1|Ry|lk=on}}                      1 [[Rydberg constant|ryd
{{convert/sandbox|1|kJ|Ry|lk=on}}                   1 [[kilojoule]] (4.6<spa
{{convert/sandbox|1|scc|lk=on}}                     1 [[Atmosphere (unit)|st
{{convert/sandbox|1|kJ|scc|lk=on}}                  1 [[kilojoule]] (9,900&n
{{convert/sandbox|1|scf|lk=on}}                     1 [[Atmosphere (unit)|st
{{convert/sandbox|1|kJ|scf|lk=on}}                  1 [[kilojoule]] (0.35&nb
{{convert/sandbox|1|scfoot|lk=on}}                  1 [[Atmosphere (unit)|st
{{convert/sandbox|1|kJ|scfoot|lk=on}}               1 [[kilojoule]] (0.35&nb
{{convert/sandbox|1|scy|lk=on}}                     1 [[Atmosphere (unit)|st
{{convert/sandbox|1|kJ|scy|lk=on}}                  1 [[kilojoule]] (0.013&n
{{convert/sandbox|1|sl|lk=on}}                      1 [[Atmosphere (unit)|st
{{convert/sandbox|1|kJ|sl|lk=on}}                   1 [[kilojoule]] (9.9&nbs
{{convert/sandbox|1|t(TNT)|lk=on}}                  1 [[TNT equivalent|tonne
{{convert/sandbox|1|kJ|t(TNT)|lk=on}}               1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|TeV|lk=on}}                     1 [[Electronvolt|teraele
{{convert/sandbox|1|kJ|TeV|lk=on}}                  1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|th|lk=on}}                      1 [[Conversion of units|
{{convert/sandbox|1|kJ|th|lk=on}}                   1 [[kilojoule]] (0.0002
{{convert/sandbox|1|thm-EC|lk=on}}                  1 [[Therm|therm (EC)]] (
{{convert/sandbox|1|kJ|thm-EC|lk=on}}               1 [[kilojoule]] (9.5<spa
{{convert/sandbox|1|thm-UK|lk=on}}                  1 [[Therm|therm (UK)]] (
{{convert/sandbox|1|kJ|thm-UK|lk=on}}               1 [[kilojoule]] (9.5<spa
{{convert/sandbox|1|thm-US|lk=on}}                  1 [[Therm|therm (US)]] (
{{convert/sandbox|1|kJ|thm-US|lk=on}}               1 [[kilojoule]] (9.5<spa
{{convert/sandbox|1|TJ|lk=on}}                      1 [[Joule|terajoule]] (2
{{convert/sandbox|1|kJ|TJ|lk=on}}                   1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|toe|lk=on}}                     1 [[tonne of oil equival
{{convert/sandbox|1|kJ|toe|lk=on}}                  1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|tonTNT|lk=on}}                  1 [[TNT equivalent|ton o
{{convert/sandbox|1|kJ|tonTNT|lk=on}}               1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|tTNT|lk=on}}                    1 [[TNT equivalent|tonne
{{convert/sandbox|1|kJ|tTNT|lk=on}}                 1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|TtonTNT|lk=on}}                 1 [[TNT equivalent|terat
{{convert/sandbox|1|kJ|TtonTNT|lk=on}}              1 [[kilojoule]] (2.4<spa
{{convert/sandbox|1|TtTNT|lk=on}}                   1 [[TNT equivalent|terat
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{{convert/sandbox|1|kJ|TW.h|lk=on}}                 1 [[kilojoule]] (2.8<spa
{{convert/sandbox|1|TW·h|lk=on}}                    1 [[Watt-hour|terawatt-h
{{convert/sandbox|1|kJ|TW·h|lk=on}}                 1 [[kilojoule]] (2.8<spa
{{convert/sandbox|1|TWh|lk=on}}                     1 [[Watt-hour|terawatt-h
{{convert/sandbox|1|kJ|TWh|lk=on}}                  1 [[kilojoule]] (2.8<spa
{{convert/sandbox|1|TW-h|lk=on}}                    1 [[Watt-hour|terawatt-h
{{convert/sandbox|1|kJ|TW-h|lk=on}}                 1 [[kilojoule]] (2.8<spa
{{convert/sandbox|1|U.S.galatm|lk=on}}              1 [[Atmosphere (unit)|U.
{{convert/sandbox|1|kJ|U.S.galatm|lk=on}}           1 [[kilojoule]] (2.6&nbs
```

```
{{convert/sandbox|1|uerg|lk=on}}                    1 [[Erg|microerg]] (0.00
{{convert/sandbox|1|kJ|uerg|lk=on}}                 1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|ueV|lk=on}}                     1 [[Electronvolt|microel
{{convert/sandbox|1|kJ|ueV|lk=on}}                  1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|uJ|lk=on}}                      1 [[Joule|microjoule]] (
{{convert/sandbox|1|kJ|uJ|lk=on}}                   1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|uLatm|lk=on}}                   1 [[Atmosphere (unit)|mi
{{convert/sandbox|1|kJ|uLatm|lk=on}}                1 [[kilojoule]] (9,900,0
{{convert/sandbox|1|ulatm|lk=on}}                   1 [[Atmosphere (unit)|mi
{{convert/sandbox|1|kJ|ulatm|lk=on}}                1 [[kilojoule]] (9,900,0
{{convert/sandbox|1|USgalatm|lk=on}}                1 [[Atmosphere (unit)|US
{{convert/sandbox|1|kJ|USgalatm|lk=on}}             1 [[kilojoule]] (2.6&nbs
{{convert/sandbox|1|utonTNT|lk=on}}                 1 [[TNT equivalent|micro
{{convert/sandbox|1|kJ|utonTNT|lk=on}}              1 [[kilojoule]] (0.24 [[
{{convert/sandbox|1|utTNT|lk=on}}                   1 [[TNT equivalent|micro
{{convert/sandbox|1|kJ|utTNT|lk=on}}                1 [[kilojoule]] (0.24 [[
{{convert/sandbox|1|uW.h|lk=on}}                    1 [[Watt-hour|microwatt-
{{convert/sandbox|1|kJ|uW.h|lk=on}}                 1 [[kilojoule]] (280,000
{{convert/sandbox|1|uW·h|lk=on}}                    1 [[Watt-hour|microwatt-
{{convert/sandbox|1|kJ|uW·h|lk=on}}                 1 [[kilojoule]] (280,000
{{convert/sandbox|1|uWh|lk=on}}                     1 [[Watt-hour|microwatt-
{{convert/sandbox|1|kJ|uWh|lk=on}}                  1 [[kilojoule]] (280,000
{{convert/sandbox|1|uW-h|lk=on}}                    1 [[Watt-hour|microwatt-
{{convert/sandbox|1|kJ|uW-h|lk=on}}                 1 [[kilojoule]] (280,000
{{convert/sandbox|1|W.h|lk=on}}                     1 [[watt-hour]] (3.6&nbs
{{convert/sandbox|1|kJ|W.h|lk=on}}                  1 [[kilojoule]] (0.28&nb
{{convert/sandbox|1|W·h|lk=on}}                     1 [[watt-hour]] (3.6&nbs
{{convert/sandbox|1|kJ|W·h|lk=on}}                  1 [[kilojoule]] (0.28&nb
{{convert/sandbox|1|Wh|lk=on}}                      1 [[watt-hour]] (3.6&nbs
{{convert/sandbox|1|kJ|Wh|lk=on}}                   1 [[kilojoule]] (0.28&nb
{{convert/sandbox|1|W-h|lk=on}}                     1 [[watt-hour]] (3.6&nbs
{{convert/sandbox|1|kJ|W-h|lk=on}}                  1 [[kilojoule]] (0.28&nb
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{{convert/sandbox|1|kJ|YJ|lk=on}}                   1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|yJ|lk=on}}                      1 [[Joule|yoctojoule]] (
{{convert/sandbox|1|kJ|yJ|lk=on}}                   1 [[kilojoule]] (1.0<spa
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{{convert/sandbox|1|kJ|ZJ|lk=on}}                   1 [[kilojoule]] (1.0<spa
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{{convert/sandbox|1|µerg|lk=on}}                    1 [[Erg|microerg]] (0.00
{{convert/sandbox|1|kJ|µerg|lk=on}}                 1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|µeV|lk=on}}                     1 [[Electronvolt|microel
{{convert/sandbox|1|kJ|µeV|lk=on}}                  1 [[kilojoule]] (6.2<spa
{{convert/sandbox|1|µJ|lk=on}}                      1 [[Joule|microjoule]] (
{{convert/sandbox|1|kJ|µJ|lk=on}}                   1 [[kilojoule]] (1.0<spa
{{convert/sandbox|1|µLatm|lk=on}}                   1 [[Atmosphere (unit)|mi
{{convert/sandbox|1|kJ|µLatm|lk=on}}                1 [[kilojoule]] (9,900,0
{{convert/sandbox|1|µlatm|lk=on}}                   1 [[Atmosphere (unit)|mi
{{convert/sandbox|1|kJ|µlatm|lk=on}}                1 [[kilojoule]] (9,900,0
{{convert/sandbox|1|µtonTNT|lk=on}}                 1 [[TNT equivalent|micro
{{convert/sandbox|1|kJ|µtonTNT|lk=on}}              1 [[kilojoule]] (0.24 [[
{{convert/sandbox|1|µtTNT|lk=on}}                   1 [[TNT equivalent|micro
{{convert/sandbox|1|kJ|µtTNT|lk=on}}                1 [[kilojoule]] (0.24 [[
{{convert/sandbox|1|µW.h|lk=on}}                    1 [[Watt-hour|microwatt-
{{convert/sandbox|1|kJ|µW.h|lk=on}}                 1 [[kilojoule]] (280,000
{{convert/sandbox|1|µW·h|lk=on}}                    1 [[Watt-hour|microwatt-
{{convert/sandbox|1|kJ|µW·h|lk=on}}                 1 [[kilojoule]] (280,000
{{convert/sandbox|1|µWh|lk=on}}                     1 [[Watt-hour|microwatt-
{{convert/sandbox|1|kJ|µWh|lk=on}}                  1 [[kilojoule]] (280,000
{{convert/sandbox|1|µW-h|lk=on}}                    1 [[Watt-hour|microwatt-
{{convert/sandbox|1|kJ|µW-h|lk=on}}                 1 [[kilojoule]] (280,000

-- energyperlength
```

```
{{convert/sandbox|1|BTU/mi|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ/km|BTU/mi|lk=on}}              1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kJ/km|lk=on}}                     1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kJ/km|kWh/100 km|lk=on}}          1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kWh/km|lk=on}}                    1 [[Kilowatt hour|kilowa
{{convert/sandbox|1|kJ/km|kWh/km|lk=on}}              1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kJ/km|kWh/km kWh/mi|lk=on}}       1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kJ/km|kWh/km MJ/km|lk=on}}        1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kWh/mi|lk=on}}                    1 [[Kilowatt hour|kilowa
{{convert/sandbox|1|kJ/km|kWh/mi|lk=on}}              1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kJ/km|MJ/100 km|lk=on}}           1 [[kilojoule]] per [[ki
{{convert/sandbox|1|MJ/km|lk=on}}                     1 [[megajoule]] per [[ki
{{convert/sandbox|1|kJ/km|MJ/km|lk=on}}               1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kJ/km|MJ/km kWh/km|lk=on}}        1 [[kilojoule]] per [[ki
{{convert/sandbox|1|kJ/km|MJ/km kWh/mi|lk=on}}        1 [[kilojoule]] per [[ki

-- energypermass
{{convert/sandbox|1|BTU/lb|lk=on}}                    1 [[British thermal unit
{{convert/sandbox|1|kJ/kg|BTU/lb|lk=on}}              1 [[kilojoule per kilogr
{{convert/sandbox|1|cal/g|lk=on}}                     1 [[calorie per gram]] (
{{convert/sandbox|1|kJ/kg|cal/g|lk=on}}               1 [[kilojoule per kilogr
{{convert/sandbox|1|Cal/g|lk=on}}                     1 [[calorie]] per [[gram
{{convert/sandbox|1|kJ/kg|Cal/g|lk=on}}               1 [[kilojoule per kilogr
{{convert/sandbox|1|GJ/kg|lk=on}}                     1 [[Joule|gigajoule per
{{convert/sandbox|1|kJ/kg|GJ/kg|lk=on}}               1 [[kilojoule per kilogr
{{convert/sandbox|1|J/g|lk=on}}                       1 [[Joule|joule per gram
{{convert/sandbox|1|kJ/kg|J/g|lk=on}}                 1 [[kilojoule per kilogr
{{convert/sandbox|1|kcal/g|lk=on}}                    1 [[kilocalorie per gram
{{convert/sandbox|1|kJ/kg|kcal/g|lk=on}}              1 [[kilojoule per kilogr
{{convert/sandbox|1|kJ/g|lk=on}}                      1 [[Joule|kilojoule per
{{convert/sandbox|1|kJ/kg|kJ/g|lk=on}}                1 [[kilojoule per kilogr
{{convert/sandbox|1|kJ/kg|lk=on}}                     1 [[kilojoule per kilogr
{{convert/sandbox|1|ktonTNT/MT|lk=on}}                1 [[TNT equivalent|kilot
{{convert/sandbox|1|kJ/kg|ktonTNT/MT|lk=on}}          1 [[kilojoule per kilogr
{{convert/sandbox|1|ktTNT/t|lk=on}}                   1 [[TNT equivalent|kilot
{{convert/sandbox|1|kJ/kg|ktTNT/t|lk=on}}             1 [[kilojoule per kilogr
{{convert/sandbox|1|MtonTNT/MT|lk=on}}                1 [[TNT equivalent|megat
{{convert/sandbox|1|kJ/kg|MtonTNT/MT|lk=on}}          1 [[kilojoule per kilogr
{{convert/sandbox|1|MtTNT/MT|lk=on}}                  1 [[TNT equivalent|megat
{{convert/sandbox|1|kJ/kg|MtTNT/MT|lk=on}}            1 [[kilojoule per kilogr
{{convert/sandbox|1|TJ/kg|lk=on}}                     1 [[Joule|terajoule per
{{convert/sandbox|1|kJ/kg|TJ/kg|lk=on}}               1 [[kilojoule per kilogr

-- energypervolume
{{convert/sandbox|1|BTU/cuft|lk=on}}                  1 [[British thermal unit
{{convert/sandbox|1|kJ/l|BTU/cuft|lk=on}}             1 [[kilojoule]] per [[li
{{convert/sandbox|1|Cal/USoz|lk=on}}                  1 [[calorie]] per [[US f
{{convert/sandbox|1|kJ/l|Cal/USoz|lk=on}}             1 [[kilojoule]] per [[li
{{convert/sandbox|1|kJ/L|lk=on}}                      1 [[kilojoule]] per [[li
{{convert/sandbox|1|kJ/l|kJ/L|lk=on}}                 1 [[kilojoule]] per [[li
{{convert/sandbox|1|kJ/l|lk=on}}                      1 [[kilojoule]] per [[li
{{convert/sandbox|1|kJ/ml|lk=on}}                     1 [[kilojoule]] per [[mi
{{convert/sandbox|1|kJ/l|kJ/ml|lk=on}}                1 [[kilojoule]] per [[li

-- exhaustemission
{{convert/sandbox|1|g/km|lk=on}}                      1 [[Exhaust gas|gram per
{{convert/sandbox|1|kg/km|g/km|lk=on}}                1 [[Exhaust gas|kilogram
{{convert/sandbox|1|g/mi|lk=on}}                      1 [[Exhaust gas|gram per
{{convert/sandbox|1|kg/km|g/mi|lk=on}}                1 [[Exhaust gas|kilogram
{{convert/sandbox|1|kg/km|lk=on}}                     1 [[Exhaust gas|kilogram
{{convert/sandbox|1|lb/mi|lk=on}}                     1 [[Exhaust gas|pound pe
{{convert/sandbox|1|kg/km|lb/mi|lk=on}}               1 [[Exhaust gas|kilogram
{{convert/sandbox|1|oz/mi|lk=on}}                     1 [[Exhaust gas|ounce pe
{{convert/sandbox|1|kg/km|oz/mi|lk=on}}               1 [[Exhaust gas|kilogram
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-- flow
{{convert/sandbox|1|cuft/a|lk=on}}                          1 [[Cubic foot per secon
{{convert/sandbox|1|m3/s|cuft/a|lk=on}}                     1 [[cubic metre per secc
{{convert/sandbox|1|cuft/d|lk=on}}                          1 [[Cubic foot per secon
{{convert/sandbox|1|m3/s|cuft/d|lk=on}}                     1 [[cubic metre per secc
{{convert/sandbox|1|cuft/h|lk=on}}                          1 [[Cubic foot per secon
{{convert/sandbox|1|m3/s|cuft/h|lk=on}}                     1 [[cubic metre per secc
{{convert/sandbox|1|cuft/min|lk=on}}                        1 [[Cubic foot#cubic foc
{{convert/sandbox|1|m3/s|cuft/min|lk=on}}                   1 [[cubic metre per secc
{{convert/sandbox|1|cuft/s|lk=on}}                          1 [[cubic foot per secon
{{convert/sandbox|1|m3/s|cuft/s|lk=on}}                     1 [[cubic metre per secc
{{convert/sandbox|1|cumi/a|lk=on}}                          1 [[Cubic foot per secon
{{convert/sandbox|1|m3/s|cumi/a|lk=on}}                     1 [[cubic metre per secc
{{convert/sandbox|1|cuyd/h|lk=on}}                          1 [[Cubic foot per minut
{{convert/sandbox|1|m3/s|cuyd/h|lk=on}}                     1 [[cubic metre per secc
{{convert/sandbox|1|cuyd/s|lk=on}}                          1 [[cubic yard per secon
{{convert/sandbox|1|m3/s|cuyd/s|lk=on}}                     1 [[cubic metre per secc
{{convert/sandbox|1|ft3/a|lk=on}}                           1 [[Cubic foot per secon
{{convert/sandbox|1|m3/s|ft3/a|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|ft3/d|lk=on}}                           1 [[Cubic foot per secon
{{convert/sandbox|1|m3/s|ft3/d|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|ft3/h|lk=on}}                           1 [[Cubic foot per secon
{{convert/sandbox|1|m3/s|ft3/h|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|ft3/s|lk=on}}                           1 [[cubic foot per secon
{{convert/sandbox|1|m3/s|ft3/s|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|Gcuft/a|lk=on}}                        1 [[1000000000 (num
{{convert/sandbox|1|m3/s|Gcuft/a|lk=on}}                    1 [[cubic metre per secc
{{convert/sandbox|1|Gcuft/d|lk=on}}                        1 [[1000000000 (num
{{convert/sandbox|1|m3/s|Gcuft/d|lk=on}}                    1 [[cubic metre per secc
{{convert/sandbox|1|Goilbbl/a|lk=on}}                       1 [[Barrel per day|billi
{{convert/sandbox|1|m3/s|Goilbbl/a|lk=on}}                  1 [[cubic metre per secc
{{convert/sandbox|1|impgal/h|lk=on}}                        1 [[Gallon|imperial gall
{{convert/sandbox|1|m3/s|impgal/h|lk=on}}                   1 [[cubic metre per secc
{{convert/sandbox|1|impgal/min|lk=on}}                      1 [[Gallon|imperial gall
{{convert/sandbox|1|m3/s|impgal/min|lk=on}}                 1 [[cubic metre per secc
{{convert/sandbox|1|m3/s|impgal/min USgal/min|lk=on}}          1 [[cubic metre per s
{{convert/sandbox|1|impgal/s|lk=on}}                        1 [[Imperial gallons per
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{{convert/sandbox|1|kcuft/a|lk=on}}                        1 thousand [[Cubic
{{convert/sandbox|1|m3/s|kcuft/a|lk=on}}                    1 [[cubic metre per secc
{{convert/sandbox|1|kcuft/d|lk=on}}                        1 thousand [[Cubic
{{convert/sandbox|1|m3/s|kcuft/d|lk=on}}                    1 [[cubic metre per secc
{{convert/sandbox|1|kcuft/s|lk=on}}                        1 thousand [[cubic
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{{convert/sandbox|1|m3/s|km3/a|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|koilbbl/a|lk=on}}                       1 [[Barrel per day|thous
{{convert/sandbox|1|m3/s|koilbbl/a|lk=on}}                  1 [[cubic metre per secc
{{convert/sandbox|1|koilbbl/d|lk=on}}                       1 [[Barrel per day|thous
{{convert/sandbox|1|m3/s|koilbbl/d|lk=on}}                  1 [[cubic metre per secc
{{convert/sandbox|1|L/min|lk=on}}                           1 [[Cubic metre per secc
{{convert/sandbox|1|m3/s|L/min|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|L/s|lk=on}}                             1 [[Cubic metre per secc
{{convert/sandbox|1|m3/s|L/s|lk=on}}                        1 [[cubic metre per secc
{{convert/sandbox|1|m3/s|L/s impgal/min|lk=on}}             1 [[cubic metre per secc
{{convert/sandbox|1|m3/a|lk=on}}                            1 [[Cubic metre per secc
{{convert/sandbox|1|m3/s|m3/a|lk=on}}                       1 [[cubic metre per secc
{{convert/sandbox|1|m3/d|lk=on}}                            1 [[Cubic metre per secc
{{convert/sandbox|1|m3/s|m3/d|lk=on}}                       1 [[cubic metre per secc
{{convert/sandbox|1|m3/h|lk=on}}                            1 [[Cubic metre per secc
{{convert/sandbox|1|m3/s|m3/h|lk=on}}                       1 [[cubic metre per secc
{{convert/sandbox|1|m3/min|lk=on}}                          1 [[Cubic metre per secc
{{convert/sandbox|1|m3/s|m3/min|lk=on}}                     1 [[cubic metre per secc
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{{convert/sandbox|1|m3/s|lk=on}}                                1 [[cubic metre per secc
{{convert/sandbox|1|m³/s|lk=on}}                                1 [[cubic metre per secc
{{convert/sandbox|1|m3/s|m3/s impgal/min|lk=on}}                1 [[cubic metre per secc
{{convert/sandbox|1|Mcuft/a|lk=on}}                             1 million [[Cubic f
{{convert/sandbox|1|m3/s|Mcuft/a|lk=on}}                        1 [[cubic metre per secc
{{convert/sandbox|1|Mcuft/d|lk=on}}                             1 million [[Cubic f
{{convert/sandbox|1|m3/s|Mcuft/d|lk=on}}                        1 [[cubic metre per secc
{{convert/sandbox|1|Mcuft/s|lk=on}}                             1 million [[cubic f
{{convert/sandbox|1|m3/s|Mcuft/s|lk=on}}                        1 [[cubic metre per secc
{{convert/sandbox|1|Moilbbl/a|lk=on}}                           1 [[Barrel per day|milli
{{convert/sandbox|1|m3/s|Moilbbl/a|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|Moilbbl/d|lk=on}}                           1 [[Barrel per day|milli
{{convert/sandbox|1|m3/s|Moilbbl/d|lk=on}}                      1 [[cubic metre per secc
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{{convert/sandbox|1|m3/s|oilbbl/a|lk=on}}                       1 [[cubic metre per secc
{{convert/sandbox|1|oilbbl/d|lk=on}}                            1 [[barrel per day]] (0.
{{convert/sandbox|1|m3/s|oilbbl/d|lk=on}}                       1 [[cubic metre per secc
{{convert/sandbox|1|Tcuft/a|lk=on}}                             1 [[1000000000000 (
{{convert/sandbox|1|m3/s|Tcuft/a|lk=on}}                        1 [[cubic metre per secc
{{convert/sandbox|1|Tcuft/d|lk=on}}                             1 [[1000000000000 (
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{{convert/sandbox|1|Toilbbl/a|lk=on}}                           1 [[Barrel per day|trill
{{convert/sandbox|1|m3/s|Toilbbl/a|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|U.S.gal/d|lk=on}}                           1 [[United States custom
{{convert/sandbox|1|m3/s|U.S.gal/d|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|U.S.gal/h|lk=on}}                           1 [[United States custom
{{convert/sandbox|1|m3/s|U.S.gal/h|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|U.S.gal/min|lk=on}}                         1 [[Gallon|U.S. gallon p
{{convert/sandbox|1|m3/s|U.S.gal/min|lk=on}}                    1 [[cubic metre per secc
{{convert/sandbox|1|u.s.gal/min|lk=on}}                         1 [[Gallon|U.S. gallon p
{{convert/sandbox|1|m3/s|u.s.gal/min|lk=on}}                    1 [[cubic metre per secc
{{convert/sandbox|1|USgal/d|lk=on}}                             1 [[US gallon per day]]
{{convert/sandbox|1|m3/s|USgal/d|lk=on}}                        1 [[cubic metre per secc
{{convert/sandbox|1|USgal/h|lk=on}}                             1 [[United States custom
{{convert/sandbox|1|m3/s|USgal/h|lk=on}}                        1 [[cubic metre per secc
{{convert/sandbox|1|USgal/min|lk=on}}                           1 [[Gallon|US gallon per
{{convert/sandbox|1|m3/s|USgal/min|lk=on}}                      1 [[cubic metre per secc
{{convert/sandbox|1|USgal/s|lk=on}}                             1 [[US gallons per secon
{{convert/sandbox|1|m3/s|USgal/s|lk=on}}                        1 [[cubic metre per secc

-- force
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{{convert/sandbox|1|N|µN grf|lk=on}}                            1 [[Newton (unit)|newton
{{convert/sandbox|1|N|µN gr-f|lk=on}}                           1 [[Newton (unit)|newton
{{convert/sandbox|1|dyn|lk=on}}                                 1 [[dyne]] (0.016 |
{{convert/sandbox|1|N|dyn|lk=on}}                               1 [[Newton (unit)|newton
{{convert/sandbox|1|dyne|lk=on}}                                1 [[dyne]] (0.016 |
{{convert/sandbox|1|N|dyne|lk=on}}                              1 [[Newton (unit)|newton
{{convert/sandbox|1|gf|lk=on}}                                  1 [[Kilogram-force|gram-
{{convert/sandbox|1|N|gf|lk=on}}                                1 [[Newton (unit)|newton
{{convert/sandbox|1|g-f|lk=on}}                                 1 [[Kilogram-force|gram-
{{convert/sandbox|1|N|g-f|lk=on}}                               1 [[Newton (unit)|newton
{{convert/sandbox|1|GN|lk=on}}                                  1 [[Newton (unit)|gigane
{{convert/sandbox|1|N|GN|lk=on}}                                1 [[Newton (unit)|newton
{{convert/sandbox|1|N|GN LTf|lk=on}}                            1 [[Newton (unit)|newton
{{convert/sandbox|1|N|GN LT-f|lk=on}}                           1 [[Newton (unit)|newton
{{convert/sandbox|1|N|GN LTf STf|lk=on}}                        1 [[Newton (unit)|newton
{{convert/sandbox|1|N|GN LT-f ST-f|lk=on}}                      1 [[Newton (unit)|newton
{{convert/sandbox|1|N|GN STf|lk=on}}                            1 [[Newton (unit)|newton
{{convert/sandbox|1|N|GN ST-f|lk=on}}                           1 [[Newton (unit)|newton
{{convert/sandbox|1|N|GN STf LTf|lk=on}}                        1 [[Newton (unit)|newton
{{convert/sandbox|1|N|GN ST-f LT-f|lk=on}}                      1 [[Newton (unit)|newton
{{convert/sandbox|1|grf|lk=on}}                                 1 [[Pound-force|grain-fo
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{{convert/sandbox|1|N|grf|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|gr-f|lk=on}}	1 [[Pound-force|grain-fo
{{convert/sandbox|1|N|gr-f|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|kdyn|lk=on}}	1 [[Dyne|kilodyne]] (0.0
{{convert/sandbox|1|N|kdyn|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|kgf|lk=on}}	1 [[kilogram-force]] (9.
{{convert/sandbox|1|N|kgf|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|kg-f|lk=on}}	1 [[kilogram-force]] (9.
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{{convert/sandbox|1|N|kN LTf STf|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|N|kN LT-f ST-f|lk=on}}	1 [[Newton (unit)|newtor
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{{convert/sandbox|1|N|kN ST-f LT-f|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|kp|lk=on}}	1 [[Kilogram-force|kilop
{{convert/sandbox|1|N|kp|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|lbf|lk=on}}	1 [[pound-force]] (4.4&n
{{convert/sandbox|1|N|lbf|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|lb-f|lk=on}}	1 [[pound-force]] (4.4&n
{{convert/sandbox|1|N|lb-f|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|LTf|lk=on}}	1 [[long ton-force]] (1(
{{convert/sandbox|1|N|LTf|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|LT-f|lk=on}}	1 [[long ton-force]] (1(
{{convert/sandbox|1|N|LT-f|lk=on}}	1 [[Newton (unit)|newtor
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{{convert/sandbox|1|N|mdyn|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|Mdyn|lk=on}}	1 [[Dyne|megadyne]] (2.2
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{{convert/sandbox|1|N|MN ST-f LT-f|lk=on}}	1 [[Newton (unit)|newtor
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{{convert/sandbox|1|N|Mp|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|mp|lk=on}}	1 [[Kilogram-force|milli
{{convert/sandbox|1|N|mp|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|N|lk=on}}	1 [[Newton (unit)|newtor
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{{convert/sandbox|1|N|N oz-f|lk=on}}	1 [[Newton (unit)|newtor
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{{convert/sandbox|1|N|newtons|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|nN|lk=on}}	1 [[Newton (unit)|nanone
{{convert/sandbox|1|N|nN|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|N|nN grf|lk=on}}	1 [[Newton (unit)|newtor
{{convert/sandbox|1|N|nN gr-f|lk=on}}	1 [[Newton (unit)|newtor

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{{convert/sandbox|1|ozf|lk=on}}                          1 [[Pound-force|ounce-fo
{{convert/sandbox|1|N|ozf|lk=on}}                        1 [[Newton (unit)|newton
{{convert/sandbox|1|oz-f|lk=on}}                         1 [[Pound-force|ounce-fo
{{convert/sandbox|1|N|oz-f|lk=on}}                       1 [[Newton (unit)|newton
{{convert/sandbox|1|p|lk=on}}                            1 [[Kilogram-force|pond]
{{convert/sandbox|1|N|p|lk=on}}                          1 [[Newton (unit)|newton
{{convert/sandbox|1|pdl|lk=on}}                          1 [[poundal]] (0.14 
{{convert/sandbox|1|N|pdl|lk=on}}                        1 [[Newton (unit)|newton
{{convert/sandbox|1|poundal|lk=on}}                      1 [[poundal]] (0.14 
{{convert/sandbox|1|N|poundal|lk=on}}                    1 [[Newton (unit)|newton
{{convert/sandbox|1|S/Tf|lk=on}}                         1 [[short ton-force]] (8
{{convert/sandbox|1|N|S/Tf|lk=on}}                       1 [[Newton (unit)|newton
{{convert/sandbox|1|S/T-f|lk=on}}                        1 [[short ton-force]] (8
{{convert/sandbox|1|N|S/T-f|lk=on}}                      1 [[Newton (unit)|newton
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{{convert/sandbox|1|N|STf|lk=on}}                        1 [[Newton (unit)|newton
{{convert/sandbox|1|ST-f|lk=on}}                         1 [[short ton-force]] (8
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{{convert/sandbox|1|N|tf|lk=on}}                         1 [[Newton (unit)|newton
{{convert/sandbox|1|t-f|lk=on}}                          1 [[Ton-force#Tonne-forc
{{convert/sandbox|1|N|t-f|lk=on}}                        1 [[Newton (unit)|newton
{{convert/sandbox|1|uN|lk=on}}                           1 [[Newton (unit)|micron
{{convert/sandbox|1|N|uN|lk=on}}                         1 [[Newton (unit)|newton
{{convert/sandbox|1|N|uN grf|lk=on}}                     1 [[Newton (unit)|newton
{{convert/sandbox|1|N|uN gr-f|lk=on}}                    1 [[Newton (unit)|newton
{{convert/sandbox|1|µN|lk=on}}                           1 [[Newton (unit)|micron
{{convert/sandbox|1|N|µN|lk=on}}                         1 [[Newton (unit)|newton
{{convert/sandbox|1|N|µN grf|lk=on}}                     1 [[Newton (unit)|newton
{{convert/sandbox|1|N|µN gr-f|lk=on}}                    1 [[Newton (unit)|newton

-- fuelconsumption
{{convert/sandbox|1|impgal/mi|lk=on}}                    1 [[Imperial unit|imperi
{{convert/sandbox|1|l/km|impgal/mi|lk=on}}               1 [[litre]] per [[kilome
{{convert/sandbox|1|l/km|impgal/mi U.S.gal/mi|lk=on}}    1 [[litre]] per [[kilome
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{{convert/sandbox|1|km/l|lk=on}}                         1 [[kilometre]] per [[li
{{convert/sandbox|1|l/km|km/l|lk=on}}                    1 [[litre]] per [[kilome
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{{convert/sandbox|1|l/km|km/l mpgimp|lk=on}}             1 [[litre]] per [[kilome
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{{convert/sandbox|1|l/km|km/L mpgus|lk=on}}              1 [[litre]] per [[kilome
{{convert/sandbox|1|l/km|km/L mpgUS|lk=on}}              1 [[litre]] per [[kilome
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{{convert/sandbox|1|l/km|l/100 km|lk=on}}                1 [[litre]] per [[kilome
{{convert/sandbox|1|l/km|L/100 km|lk=on}}                1 [[litre]] per [[kilome
{{convert/sandbox|1|l/km|l/100 km mpgimp|lk=on}}         1 [[litre]] per [[kilome
{{convert/sandbox|1|l/km|L/100 km mpgimp|lk=on}}         1 [[litre]] per [[kilome
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{{convert/sandbox|1|l/km|L/100km|lk=on}}                 1 [[litre]] per [[kilome
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{{convert/sandbox|1|l/km|mi/U.S.qt|lk=on}}                1 [[litre]] per [[kilome
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-- gradient
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{{convert/sandbox|1|m/km|ft/nmi|lk=on}}                   1 [[Grade (slope)|metre
{{convert/sandbox|1|in/ft|lk=on}}                         1 [[Grade (slope)|inch p
{{convert/sandbox|1|m/km|in/ft|lk=on}}                    1 [[Grade (slope)|metre
{{convert/sandbox|1|in/mi|lk=on}}                         1 [[Grade (slope)|inch p
{{convert/sandbox|1|m/km|in/mi|lk=on}}                    1 [[Grade (slope)|metre
{{convert/sandbox|1|m/km|lk=on}}                          1 [[Grade (slope)|metre
{{convert/sandbox|1|mm/km|lk=on}}                         1 [[Grade (slope)|millim
{{convert/sandbox|1|m/km|mm/km|lk=on}}                    1 [[Grade (slope)|metre
{{convert/sandbox|1|mm/m|lk=on}}                          1 [[Grade (slope)|millim
{{convert/sandbox|1|m/km|mm/m|lk=on}}                     1 [[Grade (slope)|metre

-- length
{{convert/sandbox|1|µm|lk=on}}                            1 [[micrometre]] (3.9<sp
{{convert/sandbox|1|m|µm|lk=on}}                          1 [[metre]] (1,000,000&n
{{convert/sandbox|1|Å|lk=on}}                             1 [[Angstrom|ångström]]
{{convert/sandbox|1|m|Å|lk=on}}                           1 [[metre]] (1.0<span st
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{{convert/sandbox|1|admi|lk=on}}                    1 [[Nautical mile|admira
{{convert/sandbox|1|m|admi|lk=on}}                  1 [[metre]] (0.00054&nbs
{{convert/sandbox|1|m|admiralty nmi|lk=on}}         1 [[metre]] (0.00054&nbs
{{convert/sandbox|1|angstrom|lk=on}}                1 [[Angstrom|ångström]]
{{convert/sandbox|1|m|angstrom|lk=on}}              1 [[metre]] (1.0<span st
{{convert/sandbox|1|AU|lk=on}}                      1 [[astronomical unit]]
{{convert/sandbox|1|m|AU|lk=on}}                    1 [[metre]] (6.7<span st
{{convert/sandbox|1|Brnmi|lk=on}}                   1 [[Nautical mile|Britis
{{convert/sandbox|1|m|Brnmi|lk=on}}                 1 [[metre]] (0.00054&nbs
{{convert/sandbox|1|bu|lk=on}}                      1 [[Japanese units of me
{{convert/sandbox|1|m|bu|lk=on}}                    1 [[metre]] (330 [[Japar
{{convert/sandbox|1|ch|lk=on}}                      1 [[Chain (unit)|chain]]
{{convert/sandbox|1|m|ch|lk=on}}                    1 [[metre]] (0.050 
{{convert/sandbox|1|chain|lk=on}}                   1 [[Chain (unit)|chain]]
{{convert/sandbox|1|m|chain|lk=on}}                 1 [[metre]] (0.050 [[Cha
{{convert/sandbox|1|cm|lk=on}}                      1 [[centimetre]] (0.39&n
{{convert/sandbox|1|m|cm|lk=on}}                    1 [[metre]] (100 [[
{{convert/sandbox|1|m|cm in|lk=on}}                 1 [[metre]] (100 [[
{{convert/sandbox|1|dam|lk=on}}                     1 [[decametre]] (33 
{{convert/sandbox|1|m|dam|lk=on}}                   1 [[metre]] (0.10 [
{{convert/sandbox|1|dm|lk=on}}                      1 [[decimetre]] (3.9&nbs
{{convert/sandbox|1|m|dm|lk=on}}                    1 [[metre]] (10 [[D
{{convert/sandbox|1|Em|lk=on}}                      1 [[exametre]] (6.2<span
{{convert/sandbox|1|m|Em|lk=on}}                    1 [[metre]] (1.0<span st
{{convert/sandbox|1|fathom|lk=on}}                  1 [[fathom]] (6.0 [
{{convert/sandbox|1|m|fathom|lk=on}}                1 [[metre]] (0.55 [[fath
{{convert/sandbox|1|m|fathom ft|lk=on}}             1 [[metre]] (0.55 [[fath
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{{convert/sandbox|1|m|foot m|lk=on}}                1 [[metre]] (3.3 [[
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{{convert/sandbox|1|m|ft km|lk=on}}                 1 [[metre]] (3.3 [[
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{{convert/sandbox|1|m|ft mi|lk=on}}                 1 [[metre]] (3.3 [[
{{convert/sandbox|1|furlong|lk=on}}                 1 [[furlong]] (660 
{{convert/sandbox|1|m|furlong|lk=on}}               1 [[metre]] (0.0050 [[fu
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{{convert/sandbox|1|m|Gly|lk=on}}                   1 [[metre]] (1.1<span st
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{{convert/sandbox|1|Gpc|lk=on}}                     1 [[Parsec#Megaparsecs a
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{{convert/sandbox|1|hand|lk=on}}                                1 [[Hand (un
{{convert/sandbox|1|m|hand|lk=on}}                  1 [[metre]] (9.3 [[Hand
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{{convert/sandbox|1|m|hands|lk=on}}                 1 [[metre]] (9.3 [[Hand
{{convert/sandbox|1|hm|lk=on}}                      1 [[hectometre]] (330&nb
{{convert/sandbox|1|m|hm|lk=on}}                    1 [[metre]] (0.010 
{{convert/sandbox|1|in|lk=on}}                      1 [[inch]] (25 [[Mi
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{{convert/sandbox|1|m|in mm|lk=on}}                 1 [[metre]] (39 [[i
{{convert/sandbox|1|inabbreviated|lk=on}}           1 [[Inch|in]] (25 [
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{{convert/sandbox|1|inch|lk=on}}                    1 [[inch]] (25 [[Mi
{{convert/sandbox|1|m|inch|lk=on}}                  1 [[metre]] (39 [[i
{{convert/sandbox|1|kly|lk=on}}                     1 [[Light-year#Distances
{{convert/sandbox|1|m|kly|lk=on}}                   1 [[metre]] (1.1<span st
{{convert/sandbox|1|km|lk=on}}                      1 [[kilometre]] (0.62&nb
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{{convert/sandbox|1|m|km mi ft|lk=on}}              1 [[metre]] (0.0010 
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{{convert/sandbox|1|m|km nmi|lk=on}}                    1 [[metre]] (0.0010 
{{convert/sandbox|1|kpc|lk=on}}                         1 [[Parsec#Parsecs and k
{{convert/sandbox|1|m|kpc|lk=on}}                       1 [[metre]] (3.2<span st
{{convert/sandbox|1|LD|lk=on}}                          1 [[Lunar distance (asti
{{convert/sandbox|1|m|LD|lk=on}}                        1 [[metre]] (2.6<span st
{{convert/sandbox|1|league|lk=on}}                      1 [[League (unit)|league
{{convert/sandbox|1|m|league|lk=on}}                    1 [[metre]] (0.00021&nbs
{{convert/sandbox|1|ly|lk=on}}                          1 [[light-year]] (63,000
{{convert/sandbox|1|m|ly|lk=on}}                        1 [[metre]] (1.1<span st
{{convert/sandbox|1|m|lk=on}}                           1 [[metre]] (3 [[Fo
{{convert/sandbox|1|m|m foot|lk=on}}                    1 [[metre]] (1.0 [[
{{convert/sandbox|1|m|m ft|lk=on}}                      1 [[metre]] (1.0 [[
{{convert/sandbox|1|m|m yd|lk=on}}                      1 [[metre]] (1.0 [[
{{convert/sandbox|1|mi|lk=on}}                          1 [[mile]] (1.6 [[K
{{convert/sandbox|1|m|mi|lk=on}}                        1 [[metre]] (0.00062&nbs
{{convert/sandbox|1|m|mi ft|lk=on}}                     1 [[metre]] (0.00062&nbs
{{convert/sandbox|1|m|mi km|lk=on}}                     1 [[metre]] (0.00062&nbs
{{convert/sandbox|1|m|mi nmi|lk=on}}                    1 [[metre]] (0.00062&nbs
{{convert/sandbox|1|micrometre|lk=on}}                  1 [[micrometre]] (3.9<sp
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{{convert/sandbox|1|mil|lk=on}}                         1 [[Thou (unit of length
{{convert/sandbox|1|m|mil|lk=on}}                       1 [[metre]] (39,000 [[Th
{{convert/sandbox|1|miles|lk=on}}                       1 [[mile]] (1.6 [[K
{{convert/sandbox|1|m|miles|lk=on}}                     1 [[metre]] (0.00062&nbs
{{convert/sandbox|1|Mly|lk=on}}                         1 [[Light-year#Distances
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{{convert/sandbox|1|mm|lk=on}}                          1 [[millimetre]] (0.039&
{{convert/sandbox|1|m|mm|lk=on}}                        1 [[metre]] (1,000 
{{convert/sandbox|1|Mm|lk=on}}                          1 [[megametre]] (620&nbs
{{convert/sandbox|1|m|Mm|lk=on}}                        1 [[metre]] (1.0<span st
{{convert/sandbox|1|m|mm in|lk=on}}                     1 [[metre]] (1,000 
{{convert/sandbox|1|Mpc|lk=on}}                         1 [[Parsec#Megaparsecs a
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{{convert/sandbox|1|perch|lk=on}}                       1 [[Rod (unit)|perch]] (
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{{convert/sandbox|1|pole|lk=on}}                        1 [[Rod (unit)|pole]] (1
{{convert/sandbox|1|m|pole|lk=on}}                      1 [[metre]] (0.20 [[Rod
{{convert/sandbox|1|pre1954U.S.nmi|lk=on}}              1 [[Nautical mile|(pre-1
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{{convert/sandbox|1|rd|lk=on}}                          1 [[Rod (unit)|rod]] (17
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{{convert/sandbox|1|rod|lk=on}}                          1 [[Rod (unit)|rod]] (1
{{convert/sandbox|1|m|rod|lk=on}}                        1 [[metre]] (0.20 [
{{convert/sandbox|1|m|royal cubit|lk=on}}                1 [[metre]] (1.9 [[
{{convert/sandbox|1|rtkm|lk=on}}                         1 [[Kilometre|route kilo
{{convert/sandbox|1|m|rtkm|lk=on}}                       1 [[metre]] (0.0010 
{{convert/sandbox|1|rtmi|lk=on}}                         1 [[Mile|route mile]] (1
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-- length2
{{convert/sandbox|1|shaku|lk=on}}                        1 [[Japanese units of me
{{convert/sandbox|1|m|shaku|lk=on}}                      1 [[metre]] (3.3 [[Japan
{{convert/sandbox|1|sm|lk=on}}                           1 [[Smoot (unit)|smoot]]
{{convert/sandbox|1|m|sm|lk=on}}                         1 [[metre]] (0.59 [
{{convert/sandbox|1|smi|lk=on}}                          1 [[statute mile]] (1.6&
{{convert/sandbox|1|m|smi|lk=on}}                        1 [[metre]] (0.00062&nbs
{{convert/sandbox|1|smoot|lk=on}}                        1 [[Smoot (unit)|smoot]]
{{convert/sandbox|1|m|smoot|lk=on}}                      1 [[metre]] (0.59 [
{{convert/sandbox|1|m|statmi km|lk=on}}                  1 [[metre]] (0.00062&nbs
{{convert/sandbox|1|sun|lk=on}}                          1 [[Japanese units of me
{{convert/sandbox|1|m|sun|lk=on}}                        1 [[metre]] (33 [[Japane
{{convert/sandbox|1|thou|lk=on}}                         1 [[Thou (unit of length
{{convert/sandbox|1|m|thou|lk=on}}                       1 [[metre]] (39,000 [[Th
{{convert/sandbox|1|Tm|lk=on}}                           1 [[terametre]] (620,000
{{convert/sandbox|1|m|Tm|lk=on}}                         1 [[metre]] (1.0<span st
{{convert/sandbox|1|uin|lk=on}}                          1 [[SI prefix#Non-SI uni
{{convert/sandbox|1|m|uin|lk=on}}                        1 [[metre]] (39,000,000&
{{convert/sandbox|1|um|lk=on}}                           1 [[micrometre]] (3.9<sp
{{convert/sandbox|1|m|um|lk=on}}                         1 [[metre]] (1,000,000&n
{{convert/sandbox|1|verst|lk=on}}                        1 [[verst]] (1.1 [[
{{convert/sandbox|1|m|verst|lk=on}}                      1 [[metre]] (0.00094 [[v
{{convert/sandbox|1|yard|lk=on}}                         1 [[yard]] (0.91 [[
{{convert/sandbox|1|m|yard|lk=on}}                       1 [[metre]] (1.1 [[
{{convert/sandbox|1|yards|lk=on}}                        1 [[yard]] (0.91 [[
{{convert/sandbox|1|m|yards|lk=on}}                      1 [[metre]] (1.1 [[
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{{convert/sandbox|1|m|yd|lk=on}}                         1 [[metre]] (1.1 [[
{{convert/sandbox|1|m|yd m|lk=on}}                       1 [[metre]] (1.1 [[
{{convert/sandbox|1|Ym|lk=on}}                           1 [[yottametre]] (6.2<sp
{{convert/sandbox|1|m|Ym|lk=on}}                         1 [[metre]] (1.0<span st
{{convert/sandbox|1|Zm|lk=on}}                           1 [[zettametre]] (6.2<sp
{{convert/sandbox|1|m|Zm|lk=on}}                         1 [[metre]] (1.0<span st
{{convert/sandbox|1|µin|lk=on}}                          1 [[SI prefix#Non-SI uni
{{convert/sandbox|1|m|µin|lk=on}}                        1 [[metre]] (39,000,000&
{{convert/sandbox|1|µm|lk=on}}                           1 [[micrometre]] (3.9<sp
{{convert/sandbox|1|m|µm|lk=on}}                         1 [[metre]] (1,000,000&n

-- lineardensity
{{convert/sandbox|1|kg/cm|lk=on}}                        1 [[Linear density|kilog
{{convert/sandbox|1|kg/m|kg/cm|lk=on}}                   1 [[Linear density|kilog
{{convert/sandbox|1|kg/m|lk=on}}                         1 [[Linear density|kilog
{{convert/sandbox|1|lb/ft|lk=on}}                        1 [[Linear density|pound
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{{convert/sandbox|1|kg/m|lb/yd|lk=on}}                   1 [[Linear density|kilog

-- mass
{{convert/sandbox|1|µg|lk=on}}                           1 [[microgram]] (1.5<spa
{{convert/sandbox|1|g|µg|lk=on}}                         1 [[gram]] (1,000,000&nb
{{convert/sandbox|1|g|billion tonne|lk=on}}              1 [[gram]] (1.0<span sty
{{convert/sandbox|1|carat|lk=on}}                        1 [[Carat (mass)|carat]]
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{{convert/sandbox|1|drachm|lk=on}}                       1 [[Dram (unit)|drachm]]
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{{convert/sandbox|1|g|dwt|lk=on}}                     1 [[gram]] (0.64 [[
{{convert/sandbox|1|DWton|lk=on}}                     1 [[Tonnage|deadweight t
{{convert/sandbox|1|g|DWton|lk=on}}                   1 [[gram]] (9.8<span sty
{{convert/sandbox|1|DWtonne|lk=on}}                   1 [[Tonnage|deadweight t
{{convert/sandbox|1|g|DWtonne|lk=on}}                 1 [[gram]] (1.0<span sty
{{convert/sandbox|1|g|lk=on}}                         1 [[gram]] (0.035 [
{{convert/sandbox|1|g|g gr|lk=on}}                    1 [[gram]] (1.0 [[G
{{convert/sandbox|1|g|g oz|lk=on}}                    1 [[gram]] (1.0 [[G
{{convert/sandbox|1|gr|lk=on}}                        1 [[Grain (unit)|grain]]
{{convert/sandbox|1|g|gr|lk=on}}                      1 [[gram]] (15 [[Gr
{{convert/sandbox|1|g|gr mg|lk=on}}                   1 [[gram]] (15 [[Gr
{{convert/sandbox|1|Gt|lk=on}}                        1 [[Tonne|gigatonne]] (9
{{convert/sandbox|1|g|Gt|lk=on}}                      1 [[gram]] (1.0<span sty
{{convert/sandbox|1|kg|lk=on}}                        1 [[kilogram]] (2.2 
{{convert/sandbox|1|g|kg|lk=on}}                      1 [[gram]] (0.0010 
{{convert/sandbox|1|g|kg lb|lk=on}}                   1 [[gram]] (0.0010 
{{convert/sandbox|1|g|kg lb st|lk=on}}                1 [[gram]] (0.0010 
{{convert/sandbox|1|g|kg Scwt|lk=on}}                 1 [[gram]] (0.0010 
{{convert/sandbox|1|g|kg st|lk=on}}                   1 [[gram]] (0.0010 
{{convert/sandbox|1|g|kg st lb|lk=on}}                1 [[gram]] (0.0010 
{{convert/sandbox|1|g|kg stlb|lk=on}}                 1 [[gram]] (0.0010 
{{convert/sandbox|1|kilotonne|lk=on}}                 1 [[Tonne|kilotonne]] (9
{{convert/sandbox|1|g|kilotonne|lk=on}}               1 [[gram]] (1.0<span sty
{{convert/sandbox|1|lb|lk=on}}                        1 [[Pound (mass)|pound]]
{{convert/sandbox|1|g|lb|lk=on}}                      1 [[gram]] (0.0022 
{{convert/sandbox|1|g|lb kg|lk=on}}                   1 [[gram]] (0.0022 
{{convert/sandbox|1|g|lb kg st|lk=on}}                1 [[gram]] (0.0022 
{{convert/sandbox|1|g|lb ozt|lk=on}}                  1 [[gram]] (0.0022 
{{convert/sandbox|1|g|lb st|lk=on}}                   1 [[gram]] (0.0022 
{{convert/sandbox|1|g|lb st kg|lk=on}}                1 [[gram]] (0.0022 
{{convert/sandbox|1|g|lb stlb|lk=on}}                 1 [[gram]] (0.0022 
{{convert/sandbox|1|g|lboz|lk=on}}                    1 [[gram]] (0.035 [
{{convert/sandbox|1|lbs|lk=on}}                       1 [[Pound (mass)|pound]]
{{convert/sandbox|1|g|lbs|lk=on}}                     1 [[gram]] (0.0022 
{{convert/sandbox|1|lbt|lk=on}}                       1 [[Troy weight|troy pou
{{convert/sandbox|1|g|lbt|lk=on}}                     1 [[gram]] (0.0027 [[Tro
{{convert/sandbox|1|Lcwt|lk=on}}                      1 [[Hundredweight|long h
{{convert/sandbox|1|g|Lcwt|lk=on}}                    1 [[gram]] (2.0<span sty
{{convert/sandbox|1|lcwt|lk=on}}                      1 [[Hundredweight|long h
{{convert/sandbox|1|g|lcwt|lk=on}}                    1 [[gram]] (2.0<span sty
{{convert/sandbox|1|g|long cwt|lk=on}}                1 [[gram]] (2.0<span sty
{{convert/sandbox|1|g|long qtr|lk=on}}                1 [[gram]] (7.9<span sty
{{convert/sandbox|1|g|long ton|lk=on}}                1 [[gram]] (9.8<span sty
{{convert/sandbox|1|LT|lk=on}}                        1 [[long ton]] (1.0 
{{convert/sandbox|1|g|LT|lk=on}}                      1 [[gram]] (9.8<span sty
{{convert/sandbox|1|lt|lk=on}}                        1 [[long ton]] (1.0 
{{convert/sandbox|1|g|lt|lk=on}}                      1 [[gram]] (9.8<span sty
{{convert/sandbox|1|g|LT ST|lk=on}}                   1 [[gram]] (9.8<span sty
{{convert/sandbox|1|g|LT ST t|lk=on}}                 1 [[gram]] (9.8<span sty
{{convert/sandbox|1|g|LT t|lk=on}}                    1 [[gram]] (9.8<span sty
{{convert/sandbox|1|g|LT t ST|lk=on}}                 1 [[gram]] (9.8<span sty
{{convert/sandbox|1|g|metric ton|lk=on}}              1 [[gram]] (1.0<span sty
{{convert/sandbox|1|Mg|lk=on}}                        1 [[Tonne|megagram]] (0
{{convert/sandbox|1|g|Mg|lk=on}}                      1 [[gram]] (1.0<span sty
{{convert/sandbox|1|mg|lk=on}}                        1 [[milligram]] (0.015&n
{{convert/sandbox|1|g|mg|lk=on}}                      1 [[gram]] (1,000 [
{{convert/sandbox|1|g|mg gr|lk=on}}                   1 [[gram]] (1,000 [
{{convert/sandbox|1|g|million tonne|lk=on}}           1 [[gram]] (1.0<span sty
{{convert/sandbox|1|MT|lk=on}}                        1 [[Tonne|metric ton]] (
{{convert/sandbox|1|g|MT|lk=on}}                      1 [[gram]] (1.0<span sty
{{convert/sandbox|1|Mt|lk=on}}                        1 [[Tonne|megatonne]] (9
{{convert/sandbox|1|g|Mt|lk=on}}                      1 [[gram]] (1.0<span sty
```

```
 {{convert/sandbox|1|MTON|lk=on}}                          1 [[measurement ton]] (1
 {{convert/sandbox|1|ng|lk=on}}                            1 [[Gram|nanogram]] (1.5
 {{convert/sandbox|1|g|ng|lk=on}}                          1 [[gram]] (1.0<span sty
 {{convert/sandbox|1|oz|lk=on}}                            1 [[ounce]] (28 [[G
 {{convert/sandbox|1|g|oz|lk=on}}                          1 [[gram]] (0.035 [
 {{convert/sandbox|1|g|oz g|lk=on}}                        1 [[gram]] (0.035 [
 {{convert/sandbox|1|g|oz ozt|lk=on}}                      1 [[gram]] (0.035 [
 {{convert/sandbox|1|ozt|lk=on}}                           1 [[troy ounce]] (1.1&nb
 {{convert/sandbox|1|g|ozt|lk=on}}                         1 [[gram]] (0.032 [
 {{convert/sandbox|1|g|ozt g|lk=on}}                       1 [[gram]] (0.032 [
 {{convert/sandbox|1|g|ozt oz|lk=on}}                      1 [[gram]] (0.032 [
 {{convert/sandbox|1|pdr|lk=on}}                           1 [[Pound (mass)|pounde
 {{convert/sandbox|1|g|pdr|lk=on}}                         1 [[gram]] (0.0022 
 {{convert/sandbox|1|scwt|lk=on}}                          1 [[short hundredweight]
 {{convert/sandbox|1|g|scwt|lk=on}}                        1 [[gram]] (2.2<span sty
 {{convert/sandbox|1|Scwt|lk=on}}                          1 [[short hundredweight]
 {{convert/sandbox|1|g|Scwt|lk=on}}                        1 [[gram]] (2.2<span sty
 {{convert/sandbox|1|g|short cwt|lk=on}}                   1 [[gram]] (2.2<span sty
 {{convert/sandbox|1|g|short qtr|lk=on}}                   1 [[gram]] (8.8<span sty
 {{convert/sandbox|1|g|short ton|lk=on}}                   1 [[gram]] (1.1<span sty
 {{convert/sandbox|1|shtn|lk=on}}                          1 [[short ton]] (0.91&nb
 {{convert/sandbox|1|g|shtn|lk=on}}                        1 [[gram]] (1.1<span sty
 {{convert/sandbox|1|shton|lk=on}}                         1 [[ton]] (0.91 [[t
 {{convert/sandbox|1|g|shton|lk=on}}                       1 [[gram]] (1.1<span sty
 {{convert/sandbox|1|g|solar mass|lk=on}}                  1 [[gram]] (5.0<span sty
 {{convert/sandbox|1|st|lk=on}}                            1 [[Stone (unit)|stone]]
 {{convert/sandbox|1|g|st|lk=on}}                          1 [[gram]] (0.00016 
 {{convert/sandbox|1|ST|lk=on}}                            1 [[short ton]] (0.91&nb
 {{convert/sandbox|1|g|ST|lk=on}}                          1 [[gram]] (1.1<span sty
 {{convert/sandbox|1|g|st and lb|lk=on}}                   1 [[gram]] (0.0022 
 {{convert/sandbox|1|g|st kg|lk=on}}                       1 [[gram]] (0.00016 
 {{convert/sandbox|1|g|st kg lb|lk=on}}                    1 [[gram]] (0.00016 
 {{convert/sandbox|1|g|st lb|lk=on}}                       1 [[gram]] (0.00016 
 {{convert/sandbox|1|g|st lb kg|lk=on}}                    1 [[gram]] (0.00016 
 {{convert/sandbox|1|g|ST LT|lk=on}}                       1 [[gram]] (1.1<span sty
 {{convert/sandbox|1|g|ST LT t|lk=on}}                     1 [[gram]] (1.1<span sty
 {{convert/sandbox|1|g|ST t|lk=on}}                        1 [[gram]] (1.1<span sty
 {{convert/sandbox|1|g|ST t LT|lk=on}}                     1 [[gram]] (1.1<span sty
 {{convert/sandbox|1|g|stlb|lk=on}}                        1 [[gram]] (0.0022 
 {{convert/sandbox|1|stone|lk=on}}                         1 [[Stone (unit)|stone]]
 {{convert/sandbox|1|g|stone|lk=on}}                       1 [[gram]] (0.00016 
 {{convert/sandbox|1|t|lk=on}}                             1 [[tonne]] (0.98 [[long
 {{convert/sandbox|1|g|t|lk=on}}                           1 [[gram]] (1.0<span sty
 {{convert/sandbox|1|g|t LT|lk=on}}                        1 [[gram]] (1.0<span sty
 {{convert/sandbox|1|g|t LT ST|lk=on}}                     1 [[gram]] (1.0<span sty
 {{convert/sandbox|1|g|t Scwt|lk=on}}                      1 [[gram]] (1.0<span sty
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 {{convert/sandbox|1|g|t ST LT|lk=on}}                     1 [[gram]] (1.0<span sty
 {{convert/sandbox|1|g|thousand tonne|lk=on}}              1 [[gram]] (1.0<span sty
 {{convert/sandbox|1|g|ton|lk=on}}                         1 [[gram]] (9.8<span sty
 {{convert/sandbox|1|tonne|lk=on}}                         1 [[tonne]] (1.1 [[ton]]
 {{convert/sandbox|1|g|tonne|lk=on}}                       1 [[gram]] (1.0<span sty
 {{convert/sandbox|1|tonnes|lk=on}}                        1 [[tonne]] (0.98 [[long
 {{convert/sandbox|1|g|tonnes|lk=on}}                      1 [[gram]] (1.0<span sty
 {{convert/sandbox|1|g|troy pound|lk=on}}                  1 [[gram]] (0.0027 [[Tro
 {{convert/sandbox|1|ug|lk=on}}                            1 [[microgram]] (1.5<spa
 {{convert/sandbox|1|g|ug|lk=on}}                          1 [[gram]] (1,000,000&nb
 {{convert/sandbox|1|viss|lk=on}}                          1 [[Burmese units of mea
 {{convert/sandbox|1|g|viss|lk=on}}                        1 [[gram]] (0.00061 
 {{convert/sandbox|1|µg|lk=on}}                            1 [[microgram]] (1.5<spa
 {{convert/sandbox|1|g|µg|lk=on}}                          1 [[gram]] (1,000,000&nb

 -- mole
 {{convert/sandbox|1|gmol|lk=on}}                          1 [[Mole (unit)|gram-mol
```

```
{{convert/sandbox|1|g-mol|lk=on}}                    1 [[Mole (unit)|gram-mol
{{convert/sandbox|1|kmol|lk=on}}                     1 [[Mole (unit)|kilomole
{{convert/sandbox|1|lbmol|lk=on}}                    1 [[Mole (unit)#Other ur
{{convert/sandbox|1|lb-mol|lk=on}}                   1 [[Mole (unit)#Other ur
{{convert/sandbox|1|mol|lk=on}}                      1 [[Mole (unit)|mole]] (
{{convert/sandbox|1|gmol/d|lk=on}}                   1 [[Mole (unit)|gram-mol
{{convert/sandbox|1|g-mol/d|lk=on}}                  1 [[Mole (unit)|gram-mol
{{convert/sandbox|1|gmol/h|lk=on}}                   1 [[Mole (unit)|gram-mol
{{convert/sandbox|1|g-mol/h|lk=on}}                  1 [[Mole (unit)|gram-mol
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{{convert/sandbox|1|g-mol/min|lk=on}}                1 [[Mole (unit)|gram-mol
{{convert/sandbox|1|gmol/s|lk=on}}                   1 [[Mole (unit)|gram-mol
{{convert/sandbox|1|g-mol/s|lk=on}}                  1 [[Mole (unit)|gram-mol
{{convert/sandbox|1|kmol/d|lk=on}}                   1 [[Mole (unit)|kilomole
{{convert/sandbox|1|kmol/h|lk=on}}                   1 [[Mole (unit)|kilomole
{{convert/sandbox|1|kmol/min|lk=on}}                 1 [[Kilomole (unit)|kilo
{{convert/sandbox|1|kmol/s|lk=on}}                   1 [[Mole (unit)|kilomole
{{convert/sandbox|1|lbmol/d|lk=on}}                  1 [[Mole (unit)#Other ur
{{convert/sandbox|1|lb-mol/d|lk=on}}                 1 [[Mole (unit)#Other ur
{{convert/sandbox|1|lbmol/h|lk=on}}                  1 [[Mole (unit)#Other ur
{{convert/sandbox|1|lb-mol/h|lk=on}}                 1 [[Mole (unit)#Other ur
{{convert/sandbox|1|lbmol/min|lk=on}}                1 [[Mole (unit)#Other ur
{{convert/sandbox|1|lb-mol/min|lk=on}}               1 [[Mole (unit)#Other ur
{{convert/sandbox|1|lbmol/s|lk=on}}                  1 [[Mole (unit)#Other ur
{{convert/sandbox|1|lb-mol/s|lk=on}}                 1 [[Mole (unit)#Other ur
{{convert/sandbox|1|mol/d|lk=on}}                    1 [[Mole (unit)|mole per
{{convert/sandbox|1|mol/h|lk=on}}                    1 [[Mole (unit)|mole per
{{convert/sandbox|1|mol/min|lk=on}}                  1 [[Mole (unit)|mole per
{{convert/sandbox|1|mol/s|lk=on}}                    1 [[Mole (unit)|mole per
{{convert/sandbox|1|umol/s|lk=on}}                   1 [[Mole (unit)|micromol
{{convert/sandbox|1|µmol/s|lk=on}}                   1 [[Mole (unit)|micromol

-- per
{{convert/sandbox|1|/acre|lk=on}}                    1 [[Acre|per acre]] (2.5
{{convert/sandbox|1|/ha|lk=on}}                      1 [[Hectare|per hectare]
{{convert/sandbox|1|/km2|lk=on}}                     1 [[Square kilometre|per
{{convert/sandbox|1|/sqkm|lk=on}}                    1 [[Square kilometre|per
{{convert/sandbox|1|/sqmi|lk=on}}                    1 [[Square mile|per squa
{{convert/sandbox|1|/l|lk=on}}                       1 [[Litre|per litre]] (3
{{convert/sandbox|1|/usgal|lk=on}}                   1 per [[United States cu
{{convert/sandbox|1|/USgal|lk=on}}                   1 per [[United States cu
{{convert/sandbox|1|£/acre|lk=on}}                   £1 per [[acre]] (£2.5/[[
{{convert/sandbox|1|£/ha|lk=on}}                     £1 per [[hectare]] (£0.4
{{convert/sandbox|1|$/acre|lk=on}}                   $1 per [[acre]] ($2.5/[[
{{convert/sandbox|1|$/ha|lk=on}}                     $1 per [[hectare]] ($0.4
{{convert/sandbox|1|$/m2|lk=on}}                     $1 per [[square metre]]
{{convert/sandbox|1|$/sqft|lk=on}}                   $1 per [[square foot]] (
{{convert/sandbox|1|$/kg|lk=on}}                     $1 per [[kilogram]] ($0.
{{convert/sandbox|1|$/lb|lk=on}}                     $1 per [[Pound (mass)|po

-- populationdensity
{{convert/sandbox|1|pd/acre|lk=on}}                  1 [[Acre|inhabitants per
{{convert/sandbox|1|PD/km2|pd/acre|lk=on}}           1 [[Square kilometre|inh
{{convert/sandbox|1|PD/acre|lk=on}}                  1 [[Acre|inhabitants per
{{convert/sandbox|1|PD/km2|PD/acre|lk=on}}           1 [[Square kilometre|inh
{{convert/sandbox|1|pd/ha|lk=on}}                    1 [[Hectare|inhabitants
{{convert/sandbox|1|PD/km2|pd/ha|lk=on}}             1 [[Square kilometre|inh
{{convert/sandbox|1|PD/ha|lk=on}}                    1 [[Hectare|inhabitants
{{convert/sandbox|1|PD/km2|PD/ha|lk=on}}             1 [[Square kilometre|inh
{{convert/sandbox|1|PD/km2|lk=on}}                   1 [[Square kilometre|inh
{{convert/sandbox|1|pd/km2|lk=on}}                   1 [[Square kilometre|inh
{{convert/sandbox|1|PD/km²|lk=on}}                   1 [[Square kilometre|inh
{{convert/sandbox|1|pd/sqkm|lk=on}}                  1 [[Square kilometre|inh
{{convert/sandbox|1|PD/sqkm|lk=on}}                  1 [[Square kilometre|inh
```

```
{{convert/sandbox|1|PD/sqmi|lk=on}}                    1 [[Square mile|inhabita
{{convert/sandbox|1|PD/km2|PD/sqmi|lk=on}}             1 [[Square kilometre|inh
{{convert/sandbox|1|pd/sqmi|lk=on}}                    1 [[Square mile|inhabita
{{convert/sandbox|1|PD/km2|pd/sqmi|lk=on}}             1 [[Square kilometre|inh

-- power
{{convert/sandbox|1|µW|lk=on}}                         1 [[microwatt]] (1.3<spa
{{convert/sandbox|1|W|µW|lk=on}}                       1 [[watt]] (1,000,000&nb
{{convert/sandbox|1|aW|lk=on}}                         1 [[attowatt]] (1.3<span
{{convert/sandbox|1|W|aW|lk=on}}                       1 [[watt]] (1.0<span sty
{{convert/sandbox|1|BHP|lk=on}}                        1 [[Horsepower#Brake hor
{{convert/sandbox|1|W|BHP|lk=on}}                      1 [[watt]] (0.0013 
{{convert/sandbox|1|bhp|lk=on}}                        1 [[Horsepower#Brake hor
{{convert/sandbox|1|W|bhp|lk=on}}                      1 [[watt]] (0.0013 
{{convert/sandbox|1|BTU/h|lk=on}}                      1 [[British thermal unit
{{convert/sandbox|1|W|BTU/h|lk=on}}                    1 [[watt]] (3.4 [[B
{{convert/sandbox|1|Btu/h|lk=on}}                      1 [[British thermal unit
{{convert/sandbox|1|W|Btu/h|lk=on}}                    1 [[watt]] (3.4 [[B
{{convert/sandbox|1|btu/h|lk=on}}                      1 [[British thermal unit
{{convert/sandbox|1|W|btu/h|lk=on}}                    1 [[watt]] (3.4 [[B
{{convert/sandbox|1|Cal/d|lk=on}}                      1 [[Calorie|large calori
{{convert/sandbox|1|W|Cal/d|lk=on}}                    1 [[watt]] (21 [[Ca
{{convert/sandbox|1|cal/h|lk=on}}                      1 [[Calorie|calorie per
{{convert/sandbox|1|W|cal/h|lk=on}}                    1 [[watt]] (860 [[C
{{convert/sandbox|1|Cal/h|lk=on}}                      1 [[Calorie|calorie per
{{convert/sandbox|1|W|Cal/h|lk=on}}                    1 [[watt]] (0.86 [[
{{convert/sandbox|1|cW|lk=on}}                         1 [[Watt|centiwatt]] (1
{{convert/sandbox|1|W|cW|lk=on}}                       1 [[watt]] (100 [[W
{{convert/sandbox|1|daW|lk=on}}                        1 [[Watt|decawatt]] (0.0
{{convert/sandbox|1|W|daW|lk=on}}                      1 [[watt]] (0.10 [[
{{convert/sandbox|1|dW|lk=on}}                         1 [[Watt|deciwatt]] (0.0
{{convert/sandbox|1|W|dW|lk=on}}                       1 [[watt]] (10 [[Wa
{{convert/sandbox|1|EW|lk=on}}                         1 [[exawatt]] (1.3<span
{{convert/sandbox|1|W|EW|lk=on}}                       1 [[watt]] (1.0<span sty
{{convert/sandbox|1|fW|lk=on}}                         1 [[femtowatt]] (1.3<spa
{{convert/sandbox|1|W|fW|lk=on}}                       1 [[watt]] (1.0<span sty
{{convert/sandbox|1|GW|lk=on}}                         1 [[gigawatt]] (1,300,00
{{convert/sandbox|1|W|GW|lk=on}}                       1 [[watt]] (1.0<span sty
{{convert/sandbox|1|hk|lk=on}}                         1 [[metric horsepower]]
{{convert/sandbox|1|W|hk|lk=on}}                       1 [[watt]] (0.0014 
{{convert/sandbox|1|Hp|lk=on}}                         1 [[horsepower]] (0.75&n
{{convert/sandbox|1|W|Hp|lk=on}}                       1 [[watt]] (0.0013 
{{convert/sandbox|1|hp|lk=on}}                         1 [[horsepower]] (0.75&n
{{convert/sandbox|1|W|hp|lk=on}}                       1 [[watt]] (0.0013 
{{convert/sandbox|1|HP|lk=on}}                         1 [[horsepower]] (0.75&n
{{convert/sandbox|1|W|HP|lk=on}}                       1 [[watt]] (0.0013 
{{convert/sandbox|1|hp-electric|lk=on}}                1 [[electric horsepower]
{{convert/sandbox|1|W|hp-electric|lk=on}}              1 [[watt]] (0.0013 
{{convert/sandbox|1|hp-electrical|lk=on}}              1 [[electrical horsepowe
{{convert/sandbox|1|W|hp-electrical|lk=on}}            1 [[watt]] (0.0013 
{{convert/sandbox|1|hp-mechanical|lk=on}}              1 [[horsepower]] (0.75&n
{{convert/sandbox|1|W|hp-mechanical|lk=on}}            1 [[watt]] (0.0013 
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{{convert/sandbox|1|W|hp-metric|lk=on}}                1 [[watt]] (0.0014 
{{convert/sandbox|1|hW|lk=on}}                         1 [[Watt|hectowatt]] (0.
{{convert/sandbox|1|W|hW|lk=on}}                       1 [[watt]] (0.010 [
{{convert/sandbox|1|IHP|lk=on}}                        1 [[Horsepower#Indicated
{{convert/sandbox|1|W|IHP|lk=on}}                      1 [[watt]] (0.0013 
{{convert/sandbox|1|ihp|lk=on}}                        1 [[Horsepower#Indicated
{{convert/sandbox|1|W|ihp|lk=on}}                      1 [[watt]] (0.0013 
{{convert/sandbox|1|kcal/h|lk=on}}                     1 [[Calorie|kilocalorie
{{convert/sandbox|1|W|kcal/h|lk=on}}                   1 [[watt]] (0.86 [[
{{convert/sandbox|1|kJ/d|lk=on}}                       1 [[Kilojoule|kilojoule
{{convert/sandbox|1|W|kJ/d|lk=on}}                     1 [[watt]] (86 [[Ki
```

```
{{convert/sandbox|1|kJ/h|lk=on}}                                1 [[Kilojoule|kilojoule
{{convert/sandbox|1|W|kJ/h|lk=on}}                              1 [[watt]] (3.6 [[K
{{convert/sandbox|1|kW|lk=on}}                                  1 [[kilowatt]] (1.3 
{{convert/sandbox|1|W|kW|lk=on}}                                1 [[watt]] (0.0010 
{{convert/sandbox|1|W|kW bhp|lk=on}}                            1 [[watt]] (0.0010 
{{convert/sandbox|1|W|kW hp|lk=on}}                             1 [[watt]] (0.0010 
{{convert/sandbox|1|W|kW PS|lk=on}}                             1 [[watt]] (0.0010 
{{convert/sandbox|1|mW|lk=on}}                                  1 [[milliwatt]] (1.3<spa
{{convert/sandbox|1|W|mW|lk=on}}                                1 [[watt]] (1,000 |
{{convert/sandbox|1|MW|lk=on}}                                  1 [[megawatt]] (1,300&nb
{{convert/sandbox|1|W|MW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|nW|lk=on}}                                  1 [[nanowatt]] (1.3<span
{{convert/sandbox|1|W|nW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|PS|lk=on}}                                  1 [[metric horsepower]]
{{convert/sandbox|1|W|PS|lk=on}}                                1 [[watt]] (0.0014 
{{convert/sandbox|1|W|PS bhp|lk=on}}                            1 [[watt]] (0.0014 
{{convert/sandbox|1|W|PS hp|lk=on}}                             1 [[watt]] (0.0014 
{{convert/sandbox|1|pW|lk=on}}                                  1 [[picowatt]] (1.3<span
{{convert/sandbox|1|W|pW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|PW|lk=on}}                                  1 [[petawatt]] (1.3<span
{{convert/sandbox|1|W|PW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|shp|lk=on}}                                 1 [[Horsepower#Shaft hor
{{convert/sandbox|1|W|shp|lk=on}}                               1 [[watt]] (0.0013 
{{convert/sandbox|1|SHP|lk=on}}                                 1 [[Horsepower#Shaft hor
{{convert/sandbox|1|W|SHP|lk=on}}                               1 [[watt]] (0.0013 
{{convert/sandbox|1|TW|lk=on}}                                  1 [[terawatt]] (1.3<span
{{convert/sandbox|1|W|TW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|uW|lk=on}}                                  1 [[microwatt]] (1.3<spa
{{convert/sandbox|1|W|uW|lk=on}}                                1 [[watt]] (1,000,000&nb
{{convert/sandbox|1|W|lk=on}}                                   1 [[watt]] (0.0013 
{{convert/sandbox|1|whp|lk=on}}                                 1 [[horsepower]] (0.75&n
{{convert/sandbox|1|W|whp|lk=on}}                               1 [[watt]] (0.0013 
{{convert/sandbox|1|YW|lk=on}}                                  1 [[yottawatt]] (1.3<spa
{{convert/sandbox|1|W|YW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|yW|lk=on}}                                  1 [[yoctowatt]] (1.3<spa
{{convert/sandbox|1|W|yW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|ZW|lk=on}}                                  1 [[zettawatt]] (1.3<spa
{{convert/sandbox|1|W|ZW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|zW|lk=on}}                                  1 [[zeptowatt]] (1.3<spa
{{convert/sandbox|1|W|zW|lk=on}}                                1 [[watt]] (1.0<span sty
{{convert/sandbox|1|µW|lk=on}}                                  1 [[microwatt]] (1.3<spa
{{convert/sandbox|1|W|µW|lk=on}}                                1 [[watt]] (1,000,000&nb

-- pressure
{{convert/sandbox|1|atm|lk=on}}                                 1 [[Atmosphere (unit)|st
{{convert/sandbox|1|Pa|atm|lk=on}}                              1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Ba|lk=on}}                                  1 [[barye]] (0.10 |
{{convert/sandbox|1|Pa|Ba|lk=on}}                               1 [[Pascal (unit)|pascal
{{convert/sandbox|1|bar|lk=on}}                                 1 [[Bar (unit)|bar]] (10
{{convert/sandbox|1|Pa|bar|lk=on}}                              1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|bar kPa|lk=on}}                          1 [[Pascal (unit)|pascal
{{convert/sandbox|1|dbar|lk=on}}                                1 [[Bar (unit)|decibar]]
{{convert/sandbox|1|Pa|dbar|lk=on}}                             1 [[Pascal (unit)|pascal
{{convert/sandbox|1|GPa|lk=on}}                                 1 [[Pascal (unit)|gigapa
{{convert/sandbox|1|Pa|GPa|lk=on}}                              1 [[Pascal (unit)|pascal
{{convert/sandbox|1|hPa|lk=on}}                                 1 [[Pascal (unit)|hectop
{{convert/sandbox|1|Pa|hPa|lk=on}}                              1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|hPa inHg|lk=on}}                         1 [[Pascal (unit)|pascal
{{convert/sandbox|1|inHg|lk=on}}                                1 [[inch of mercury]] (3
{{convert/sandbox|1|Pa|inHg|lk=on}}                             1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|inHg psi|lk=on}}                         1 [[Pascal (unit)|pascal
{{convert/sandbox|1|kBa|lk=on}}                                 1 [[Barye|kilobarye]] (1
{{convert/sandbox|1|Pa|kBa|lk=on}}                              1 [[Pascal (unit)|pascal
{{convert/sandbox|1|kgf/cm2|lk=on}}                             1 [[Kilogram-force|kilog
```

```
{{convert/sandbox|1|Pa|kgf/cm2|lk=on}}                  1 [[Pascal (unit)|pascal
{{convert/sandbox|1|kg-f/cm2|lk=on}}                    1 [[Kilogram-force|kilog
{{convert/sandbox|1|Pa|kg-f/cm2|lk=on}}                 1 [[Pascal (unit)|pascal
{{convert/sandbox|1|kgfpsqcm|lk=on}}                    1 [[Kilogram-force|kilog
{{convert/sandbox|1|Pa|kgfpsqcm|lk=on}}                 1 [[Pascal (unit)|pascal
{{convert/sandbox|1|kN/m2|lk=on}}                       1 [[Pascal (unit)|kilopa
{{convert/sandbox|1|Pa|kN/m2|lk=on}}                    1 [[Pascal (unit)|pascal
{{convert/sandbox|1|kPa|lk=on}}                         1 [[Pascal (unit)|kilopa
{{convert/sandbox|1|Pa|kPa|lk=on}}                      1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|kPa inHg|lk=on}}                 1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|kPa kg/cm2|lk=on}}               1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|kPa kgf/cm2|lk=on}}              1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|kPa kg-f/cm2|lk=on}}             1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|kPa lb/in2|lk=on}}               1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|kPa mmHg|lk=on}}                 1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|kPa psi|lk=on}}                  1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|kPa Torr|lk=on}}                 1 [[Pascal (unit)|pascal
{{convert/sandbox|1|ksi|lk=on}}                         1 [[Pounds per square in
{{convert/sandbox|1|Pa|ksi|lk=on}}                      1 [[Pascal (unit)|pascal
{{convert/sandbox|1|lbf/in2|lk=on}}                     1 [[Pounds-force per squ
{{convert/sandbox|1|Pa|lbf/in2|lk=on}}                  1 [[Pascal (unit)|pascal
{{convert/sandbox|1|mb|lk=on}}                          1 [[Bar (unit)|millibar]
{{convert/sandbox|1|Pa|mb|lk=on}}                       1 [[Pascal (unit)|pascal
{{convert/sandbox|1|mbar|lk=on}}                        1 [[Bar (unit)|millibar]
{{convert/sandbox|1|Pa|mbar|lk=on}}                     1 [[Pascal (unit)|pascal
{{convert/sandbox|1|mmHg|lk=on}}                        1 [[Millimeter of mercur
{{convert/sandbox|1|Pa|mmHg|lk=on}}                     1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|mmHg psi|lk=on}}                 1 [[Pascal (unit)|pascal
{{convert/sandbox|1|MPa|lk=on}}                         1 [[Pascal (unit)|megapa
{{convert/sandbox|1|Pa|MPa|lk=on}}                      1 [[Pascal (unit)|pascal
{{convert/sandbox|1|mPa|lk=on}}                         1 [[Pascal (unit)|millip
{{convert/sandbox|1|Pa|mPa|lk=on}}                      1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|MPa kgf/cm2|lk=on}}              1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|MPa kg-f/cm2|lk=on}}             1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|MPa ksi|lk=on}}                  1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|MPa psi|lk=on}}                  1 [[Pascal (unit)|pascal
{{convert/sandbox|1|N/cm2|lk=on}}                       1 [[Newton (unit)|newton
{{convert/sandbox|1|Pa|N/cm2|lk=on}}                    1 [[Pascal (unit)|pascal
{{convert/sandbox|1|N/m2|lk=on}}                        1 [[Newton (unit)|newton
{{convert/sandbox|1|Pa|N/m2|lk=on}}                     1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|lk=on}}                          1 [[Pascal (unit)|pascal
{{convert/sandbox|1|psf|lk=on}}                         1 [[Pounds per square in
{{convert/sandbox|1|Pa|psf|lk=on}}                      1 [[Pascal (unit)|pascal
{{convert/sandbox|1|psi|lk=on}}                         1 [[Pounds per square in
{{convert/sandbox|1|Pa|psi|lk=on}}                      1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Torr|lk=on}}                        1 [[torr]] (0.13 [[
{{convert/sandbox|1|Pa|Torr|lk=on}}                     1 [[Pascal (unit)|pascal
{{convert/sandbox|1|torr|lk=on}}                        1 [[torr]] (0.13 [[
{{convert/sandbox|1|Pa|torr|lk=on}}                     1 [[Pascal (unit)|pascal
{{convert/sandbox|1|Pa|Torr psi|lk=on}}                 1 [[Pascal (unit)|pascal

-- radioactivity
{{convert/sandbox|1|µCi|lk=on}}                         1 [[Curie|microcurie]] (
{{convert/sandbox|1|Ci|µCi|lk=on}}                      1 [[curie]] (1,000,000&n
{{convert/sandbox|1|Bq|lk=on}}                          1 [[becquerel]] (27 
{{convert/sandbox|1|Ci|Bq|lk=on}}                       1 [[curie]] (3.7<span st
{{convert/sandbox|1|Ci|lk=on}}                          1 [[curie]] (37 [[E
{{convert/sandbox|1|EBq|lk=on}}                         1 [[Becquerel|exabecquer
{{convert/sandbox|1|Ci|EBq|lk=on}}                      1 [[curie]] (3.7<span st
{{convert/sandbox|1|fCi|lk=on}}                         1 [[Curie|femtocurie]] (
{{convert/sandbox|1|Ci|fCi|lk=on}}                      1 [[curie]] (1.0<span st
{{convert/sandbox|1|GBq|lk=on}}                         1 [[Becquerel|gigabecque
{{convert/sandbox|1|Ci|GBq|lk=on}}                      1 [[curie]] (37 [[E
{{convert/sandbox|1|kBq|lk=on}}                         1 [[Becquerel|kilobecque
```

```
{{convert/sandbox|1|Ci|kBq|lk=on}}                          1 [[curie]] (37,000,000&
{{convert/sandbox|1|kCi|lk=on}}                             1 [[Curie|kilocurie]] (3
{{convert/sandbox|1|Ci|kCi|lk=on}}                          1 [[curie]] (0.0010 
{{convert/sandbox|1|MBq|lk=on}}                             1 [[Becquerel|megabecque
{{convert/sandbox|1|Ci|MBq|lk=on}}                          1 [[curie]] (37,000 
{{convert/sandbox|1|mBq|lk=on}}                             1 [[Becquerel|millibecqu
{{convert/sandbox|1|Ci|mBq|lk=on}}                          1 [[curie]] (3.7<span st
{{convert/sandbox|1|MCi|lk=on}}                             1 [[Curie|megacurie]] (3
{{convert/sandbox|1|Ci|MCi|lk=on}}                          1 [[curie]] (1.0<span st
{{convert/sandbox|1|mCi|lk=on}}                             1 [[Curie|millicurie]] (
{{convert/sandbox|1|Ci|mCi|lk=on}}                          1 [[curie]] (1,000 
{{convert/sandbox|1|nCi|lk=on}}                             1 [[Curie|nanocurie]] (3
{{convert/sandbox|1|Ci|nCi|lk=on}}                          1 [[curie]] (1.0<span st
{{convert/sandbox|1|PBq|lk=on}}                             1 [[Becquerel|petabecque
{{convert/sandbox|1|Ci|PBq|lk=on}}                          1 [[curie]] (3.7<span st
{{convert/sandbox|1|pCi|lk=on}}                             1 [[Curie|picocurie]] (0
{{convert/sandbox|1|Ci|pCi|lk=on}}                          1 [[curie]] (1.0<span st
{{convert/sandbox|1|TBq|lk=on}}                             1 [[Becquerel|terabecque
{{convert/sandbox|1|Ci|TBq|lk=on}}                          1 [[curie]] (0.037 
{{convert/sandbox|1|uCi|lk=on}}                             1 [[Curie|microcurie]] (
{{convert/sandbox|1|Ci|uCi|lk=on}}                          1 [[curie]] (1,000,000&n

-- speed
{{convert/sandbox|1|cm/s|lk=on}}                            1 [[Metre per second|cen
{{convert/sandbox|1|m/s|cm/s|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|cm/y|lk=on}}                            1 [[Orders of magnitude
{{convert/sandbox|1|m/s|cm/y|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|cm/year|lk=on}}                         1 [[Orders of magnitude
{{convert/sandbox|1|m/s|cm/year|lk=on}}                     1 [[metre per second]] (
{{convert/sandbox|1|cm/yr|lk=on}}                           1 [[Orders of magnitude
{{convert/sandbox|1|m/s|cm/yr|lk=on}}                       1 [[metre per second]] (
{{convert/sandbox|1|foot/s|lk=on}}                          1 [[Feet per second|foot
{{convert/sandbox|1|m/s|foot/s|lk=on}}                      1 [[metre per second]] (
{{convert/sandbox|1|m/s|foot/s m/s|lk=on}}                  1 [[metre per second]] (
{{convert/sandbox|1|ft/min|lk=on}}                          1 [[Feet per second|foot
{{convert/sandbox|1|m/s|ft/min|lk=on}}                      1 [[metre per second]] (
{{convert/sandbox|1|ft/s|lk=on}}                            1 [[Feet per second|foot
{{convert/sandbox|1|m/s|ft/s|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|m/s|ft/s m/s|lk=on}}                    1 [[metre per second]] (
{{convert/sandbox|1|m/s|furlong per fortnight|lk=on}}       1 [[metre per second]] (
{{convert/sandbox|1|in/s|lk=on}}                            1 [[Inch|inch per second
{{convert/sandbox|1|m/s|in/s|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|in/y|lk=on}}                            1 [[Orders of magnitude
{{convert/sandbox|1|m/s|in/y|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|in/year|lk=on}}                         1 [[Orders of magnitude
{{convert/sandbox|1|m/s|in/year|lk=on}}                     1 [[metre per second]] (
{{convert/sandbox|1|in/yr|lk=on}}                           1 [[Orders of magnitude
{{convert/sandbox|1|m/s|in/yr|lk=on}}                       1 [[metre per second]] (
{{convert/sandbox|1|km/h|lk=on}}                            1 [[Kilometres per hour|
{{convert/sandbox|1|m/s|km/h|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|m/s|km/h kn|lk=on}}                     1 [[metre per second]] (
{{convert/sandbox|1|m/s|km/h mph|lk=on}}                    1 [[metre per second]] (
{{convert/sandbox|1|km/s|lk=on}}                            1 [[Metre per second|kil
{{convert/sandbox|1|m/s|km/s|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|kn|lk=on}}                              1 [[Knot (unit)|knot]] (
{{convert/sandbox|1|m/s|kn|lk=on}}                          1 [[metre per second]] (
{{convert/sandbox|1|m/s|kn km/h|lk=on}}                     1 [[metre per second]] (
{{convert/sandbox|1|m/s|kn m/s|lk=on}}                      1 [[metre per second]] (
{{convert/sandbox|1|m/s|kn mph|lk=on}}                      1 [[metre per second]] (
{{convert/sandbox|1|knot|lk=on}}                            1 [[Knot (unit)|knot]] (
{{convert/sandbox|1|m/s|knot|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|knots|lk=on}}                           1 [[Knot (unit)|knot]] (
{{convert/sandbox|1|m/s|knots|lk=on}}                       1 [[metre per second]] (
{{convert/sandbox|1|kph|lk=on}}                             1 [[Kilometres per hour|
```

```
{{convert/sandbox|1|m/s|kph|lk=on}}                    1 [[metre per second]] (
{{convert/sandbox|1|m/min|lk=on}}                      1 [[Metre per second|met
{{convert/sandbox|1|m/s|m/min|lk=on}}                  1 [[metre per second]] (
{{convert/sandbox|1|m/s|lk=on}}                        1 [[metre per second]] (
{{convert/sandbox|1|m/s|m/s foot/s|lk=on}}             1 [[metre per second]] (
{{convert/sandbox|1|m/s|m/s ft/s|lk=on}}               1 [[metre per second]] (
{{convert/sandbox|1|m/s|m/s kn km/h|lk=on}}            1 [[metre per second]] (
{{convert/sandbox|1|m/s|m/s mph|lk=on}}                1 [[metre per second]] (
{{convert/sandbox|1|Mach|lk=on}}                       [[Mach number|Mach]]&nbs
{{convert/sandbox|1|m/s|Mach|lk=on}}                   1 [[metre per second]] (
{{convert/sandbox|1|mi/h|lk=on}}                       1 [[Miles per hour|mile
{{convert/sandbox|1|m/s|mi/h|lk=on}}                   1 [[metre per second]] (
{{convert/sandbox|1|mi/s|lk=on}}                       1 [[Mile|mile per secon
{{convert/sandbox|1|m/s|mi/s|lk=on}}                   1 [[metre per second]] (
{{convert/sandbox|1|mph|lk=on}}                        1 [[Miles per hour|mile
{{convert/sandbox|1|m/s|mph|lk=on}}                    1 [[metre per second]] (
{{convert/sandbox|1|m/s|mph km/h|lk=on}}               1 [[metre per second]] (
{{convert/sandbox|1|m/s|mph kn|lk=on}}                 1 [[metre per second]] (

-- temperature
{{convert/sandbox|1|°C|lk=on}}                         1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°C °F|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°C °F °R|lk=on}}                 1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°C °F K|lk=on}}                  1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°C °R|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°C °R °F|lk=on}}                 1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°C °R K|lk=on}}                  1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°C K|lk=on}}                     1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°C K °F|lk=on}}                  1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°C K °R|lk=on}}                  1 [[Celsius|°C]] (1
{{convert/sandbox|1|°F|lk=on}}                         1 [[Fahrenheit|°F]]
{{convert/sandbox|1|C|°F|lk=on}}                       1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°F °C|lk=on}}                    1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°F °C °R|lk=on}}                 1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°F °C K|lk=on}}                  1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°F °R|lk=on}}                    1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°F °R °C|lk=on}}                 1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°F °R K|lk=on}}                  1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°F K|lk=on}}                     1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|°F K °C|lk=on}}                  1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°F K °R|lk=on}}                  1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|°F R|lk=on}}                     1 [[Celsius|°C]] (3
{{convert/sandbox|1|°R|lk=on}}                         1 [[Rankine scale|°
{{convert/sandbox|1|C|°R|lk=on}}                       1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R °C|lk=on}}                    1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R °C °F|lk=on}}                 1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R °C K|lk=on}}                  1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R °F|lk=on}}                    1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R °F °C|lk=on}}                 1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R °F K|lk=on}}                  1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R K|lk=on}}                     1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R K °C|lk=on}}                  1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|°R K °F|lk=on}}                  1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|lk=on}}                          1 [[Celsius|°C]] (3
{{convert/sandbox|1|C|C F|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|C F K|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|C F R|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|C K|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|C K F|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|C K R|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|C R|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|C R F|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|C R K|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|Celsius|lk=on}}                    1 [[Celsius|°C]] (3
```

```
{{convert/sandbox|1|C|Celsius|lk=on}}                    1 [[Celsius|°C]] (1
{{convert/sandbox|1|F|lk=on}}                            1 [[Fahrenheit|°F]]
{{convert/sandbox|1|C|F|lk=on}}                          1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F C|lk=on}}                        1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F C K|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F C R|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F K|lk=on}}                        1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F K C|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F K R|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F R|lk=on}}                        1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F R C|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|C|F R K|lk=on}}                      1 [[Celsius|°C]] (1
{{convert/sandbox|1|K|lk=on}}                            1 [[kelvin|K]] (−27
{{convert/sandbox|1|C|K|lk=on}}                          1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °C|lk=on}}                       1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °C °F|lk=on}}                    1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °C °R|lk=on}}                    1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °F|lk=on}}                       1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °F °C|lk=on}}                    1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °F °R|lk=on}}                    1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °R|lk=on}}                       1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °R °C|lk=on}}                    1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K °R °F|lk=on}}                    1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K C|lk=on}}                        1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K C F|lk=on}}                      1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K C R|lk=on}}                      1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K F|lk=on}}                        1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K F C|lk=on}}                      1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K F R|lk=on}}                      1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K R|lk=on}}                        1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K R C|lk=on}}                      1 [[Celsius|°C]] (2
{{convert/sandbox|1|C|K R F|lk=on}}                      1 [[Celsius|°C]] (2
{{convert/sandbox|1|MK|lk=on}}                           1 [[Kelvin|megakelvin]]
{{convert/sandbox|1|C|MK|lk=on}}                         1 [[Celsius|°C]] (0
{{convert/sandbox|1|R|lk=on}}                            1 [[Rankine scale|°
{{convert/sandbox|1|C|R|lk=on}}                          1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R C|lk=on}}                        1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R C F|lk=on}}                      1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R C K|lk=on}}                      1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R F|lk=on}}                        1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R F C|lk=on}}                      1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R F K|lk=on}}                      1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R K|lk=on}}                        1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R K C|lk=on}}                      1 [[Celsius|°C]] (4
{{convert/sandbox|1|C|R K F|lk=on}}                      1 [[Celsius|°C]] (4

-- temperature-change
{{convert/sandbox|1|C-change|lk=on}}                     1 [[Celsius|°C]] (1
{{convert/sandbox|1|F-change|lk=on}}                     1 [[Fahrenheit|°F]]
{{convert/sandbox|1|C-change|F-change|lk=on}}            1 [[Celsius|°C]] (1
{{convert/sandbox|1|K-change|lk=on}}                     1 [[Kelvin|K]] (1.8
{{convert/sandbox|1|C-change|K-change|lk=on}}            1 [[Celsius|°C]] (1

-- time
{{convert/sandbox|1|µs|lk=on}}                           1 [[microsecond]] (0.001
{{convert/sandbox|1|s|µs|lk=on}}                         1 [[second]] (1,000,000&
{{convert/sandbox|1|byr|lk=on}}                          1 [[Annum|billion years]
{{convert/sandbox|1|s|byr|lk=on}}                        1 [[second]] (3.2<span s
{{convert/sandbox|1|century|lk=on}}                      1 [[century]] (3.2 
{{convert/sandbox|1|s|century|lk=on}}                    1 [[second]] (3.2<span s
{{convert/sandbox|1|d|lk=on}}                            1 [[day]] (86 [[Kil
{{convert/sandbox|1|s|d|lk=on}}                          1 [[second]] (1.2<span s
{{convert/sandbox|1|day|lk=on}}                          1 [[day]] (86 [[Kil
{{convert/sandbox|1|s|day|lk=on}}                        1 [[second]] (1.2<span s
```

```
{{convert/sandbox|1|days|lk=on}}                                1 [[day]] (86 [[Ki
{{convert/sandbox|1|s|days|lk=on}}                              1 [[second]] (1.2<span s
{{convert/sandbox|1|decade|lk=on}}                              1 [[decade]] (320 [
{{convert/sandbox|1|s|decade|lk=on}}                            1 [[second]] (3.2<span s
{{convert/sandbox|1|dog year|lk=on}}                            1 [[dog year]] (7.0 
{{convert/sandbox|1|s|dog year|lk=on}}                          1 [[second]] (4.5<span s
{{convert/sandbox|1|dog yr|lk=on}}                              1 [[dog year]] (7.0 
{{convert/sandbox|1|s|dog yr|lk=on}}                            1 [[second]] (4.5<span s
{{convert/sandbox|1|Es|lk=on}}                                  1 [[exasecond]] (32 
{{convert/sandbox|1|s|Es|lk=on}}                                1 [[second]] (1.0<span s
{{convert/sandbox|1|fortnight|lk=on}}                           1 [[fortnight]] (2.0 [[w
{{convert/sandbox|1|s|fortnight|lk=on}}                         1 [[second]] (8.3<span s
{{convert/sandbox|1|Gs|lk=on}}                                  1 [[gigasecond]] (3.2&nb
{{convert/sandbox|1|s|Gs|lk=on}}                                1 [[second]] (1.0<span s
{{convert/sandbox|1|Gyr|lk=on}}                                 1 [[Annum|thousand milli
{{convert/sandbox|1|s|Gyr|lk=on}}                               1 [[second]] (3.2<span s
{{convert/sandbox|1|h|lk=on}}                                   1 [[hour]] (3.6 [[K
{{convert/sandbox|1|s|h|lk=on}}                                 1 [[second]] (0.00028&nb
{{convert/sandbox|1|hour|lk=on}}                                1 [[hour]] (3.6 [[K
{{convert/sandbox|1|s|hour|lk=on}}                              1 [[second]] (0.00028&nb
{{convert/sandbox|1|hours|lk=on}}                               1 [[hour]] (3.6 [[K
{{convert/sandbox|1|s|hours|lk=on}}                             1 [[second]] (0.00028&nb
{{convert/sandbox|1|kmyr|lk=on}}                                1 [[Annum|thousand milli
{{convert/sandbox|1|s|kmyr|lk=on}}                              1 [[second]] (3.2<span s
{{convert/sandbox|1|kMyr|lk=on}}                                1 [[Annum|thousand milli
{{convert/sandbox|1|s|kMyr|lk=on}}                              1 [[second]] (3.2<span s
{{convert/sandbox|1|ks|lk=on}}                                  1 [[kilosecond]] (0.28&n
{{convert/sandbox|1|s|ks|lk=on}}                                1 [[second]] (0.0010&nbs
{{convert/sandbox|1|kyr|lk=on}}                                 1 [[millennium]] (32&nbs
{{convert/sandbox|1|s|kyr|lk=on}}                               1 [[second]] (3.2<span s
{{convert/sandbox|1|long billion year|lk=on}}                   1 [[Annum|billion years]
{{convert/sandbox|1|s|long billion year|lk=on}}                 1 [[second]] (3.2<span s
{{convert/sandbox|1|long byr|lk=on}}                            1 [[Annum|billion years]
{{convert/sandbox|1|s|long byr|lk=on}}                          1 [[second]] (3.2<span s
{{convert/sandbox|1|millennium|lk=on}}                          1 [[millennium]] (32&nbs
{{convert/sandbox|1|s|millennium|lk=on}}                        1 [[second]] (3.2<span s
{{convert/sandbox|1|milliard year|lk=on}}                       1 [[Annum|milliard years
{{convert/sandbox|1|s|milliard year|lk=on}}                     1 [[second]] (3.2<span s
{{convert/sandbox|1|million year|lk=on}}                        1 [[Annum|million years]
{{convert/sandbox|1|s|million year|lk=on}}                      1 [[second]] (3.2<span s
{{convert/sandbox|1|min|lk=on}}                                 1 [[minute]] (60 [[
{{convert/sandbox|1|s|min|lk=on}}                               1 [[second]] (0.017 
{{convert/sandbox|1|minute|lk=on}}                              1 [[minute]] (60 [[
{{convert/sandbox|1|s|minute|lk=on}}                            1 [[second]] (0.017 
{{convert/sandbox|1|minutes|lk=on}}                             1 [[minute]] (60 [[
{{convert/sandbox|1|s|minutes|lk=on}}                           1 [[second]] (0.017 
{{convert/sandbox|1|month|lk=on}}                               1 [[month]] (2.6 [[
{{convert/sandbox|1|s|month|lk=on}}                             1 [[second]] (3.8<span s
{{convert/sandbox|1|months|lk=on}}                              1 [[month]] (0.083 
{{convert/sandbox|1|s|months|lk=on}}                            1 [[second]] (3.8<span s
{{convert/sandbox|1|ms|lk=on}}                                  1 [[millisecond]] (0.00
{{convert/sandbox|1|s|ms|lk=on}}                                1 [[second]] (1,000 
{{convert/sandbox|1|Ms|lk=on}}                                  1 [[megasecond]] (1.7 [[
{{convert/sandbox|1|s|Ms|lk=on}}                                1 [[second]] (1.0<span s
{{convert/sandbox|1|mth|lk=on}}                                 1 [[month]] (2.6 [[
{{convert/sandbox|1|s|mth|lk=on}}                               1 [[second]] (3.8<span s
{{convert/sandbox|1|Myr|lk=on}}                                 1 [[Annum|million years]
{{convert/sandbox|1|s|Myr|lk=on}}                               1 [[second]] (3.2<span s
{{convert/sandbox|1|myr|lk=on}}                                 1 [[Annum|million years]
{{convert/sandbox|1|s|myr|lk=on}}                               1 [[second]] (3.2<span s
{{convert/sandbox|1|ns|lk=on}}                                  1 [[nanosecond]] (0.001
{{convert/sandbox|1|s|ns|lk=on}}                                1 [[second]] (1.0<span s
{{convert/sandbox|1|Ps|lk=on}}                                  1 [[petasecond]] (32&nbs
{{convert/sandbox|1|s|Ps|lk=on}}                                1 [[second]] (1.0<span s
```

```
{{convert/sandbox|1|s|lk=on}}                          1 [[second]] (0.017 
{{convert/sandbox|1|second|lk=on}}                     1 [[second]] (0.017 
{{convert/sandbox|1|seconds|lk=on}}                    1 [[second]] (0.017 
{{convert/sandbox|1|short billion year|lk=on}}         1 [[Annum|billion years]
{{convert/sandbox|1|s|short billion year|lk=on}}       1 [[second]] (3.2<span s
{{convert/sandbox|1|short trillion year|lk=on}}        1 [[Annum|trillion years
{{convert/sandbox|1|s|short trillion year|lk=on}}      1 [[second]] (3.2<span s
{{convert/sandbox|1|thousand million year|lk=on}}      1 [[Annum|thousand milli
{{convert/sandbox|1|s|thousand million year|lk=on}}    1 [[second]] (3.2<span s
{{convert/sandbox|1|tmyr|lk=on}}                       1 [[Annum|thousand milli
{{convert/sandbox|1|s|tmyr|lk=on}}                     1 [[second]] (3.2<span s
{{convert/sandbox|1|tryr|lk=on}}                       1 [[Annum|trillion years
{{convert/sandbox|1|s|tryr|lk=on}}                     1 [[second]] (3.2<span s
{{convert/sandbox|1|Ts|lk=on}}                         1 [[terasecond]] (32&nbs
{{convert/sandbox|1|s|Ts|lk=on}}                       1 [[second]] (1.0<span s
{{convert/sandbox|1|tyr|lk=on}}                        1 [[millennium]] (32&nbs
{{convert/sandbox|1|s|tyr|lk=on}}                      1 [[second]] (3.2<span s
{{convert/sandbox|1|us|lk=on}}                         1 [[microsecond]] (0.001
{{convert/sandbox|1|s|us|lk=on}}                       1 [[second]] (1,000,000&
{{convert/sandbox|1|week|lk=on}}                       1 [[week]] (0.60 [[
{{convert/sandbox|1|s|week|lk=on}}                     1 [[second]] (1.7<span s
{{convert/sandbox|1|weeks|lk=on}}                      1 [[week]] (0.60 [[
{{convert/sandbox|1|s|weeks|lk=on}}                    1 [[second]] (1.7<span s
{{convert/sandbox|1|wk|lk=on}}                         1 [[week]] (0.60 [[
{{convert/sandbox|1|s|wk|lk=on}}                       1 [[second]] (1.7<span s
{{convert/sandbox|1|year|lk=on}}                       1 [[Annum|year]] (32&nbs
{{convert/sandbox|1|s|year|lk=on}}                     1 [[second]] (3.2<span s
{{convert/sandbox|1|years|lk=on}}                      1 [[Annum|year]] (32&nbs
{{convert/sandbox|1|s|years|lk=on}}                    1 [[second]] (3.2<span s
{{convert/sandbox|1|yr|lk=on}}                         1 [[Annum|year]] (32&nbs
{{convert/sandbox|1|s|yr|lk=on}}                       1 [[second]] (3.2<span s
{{convert/sandbox|1|µs|lk=on}}                         1 [[microsecond]] (0.001
{{convert/sandbox|1|s|µs|lk=on}}                       1 [[second]] (1,000,000&

-- torque
{{convert/sandbox|1|in.lbf|lk=on}}                     1 [[Foot-pound (energy)|
{{convert/sandbox|1|Nm|in.lbf|lk=on}}                  1 [[newton metre]] (8.9&
{{convert/sandbox|1|in.lb-f|lk=on}}                    1 [[Foot-pound (energy)|
{{convert/sandbox|1|Nm|in.lb-f|lk=on}}                 1 [[newton metre]] (8.9&
{{convert/sandbox|1|in.ozf|lk=on}}                     1 [[Foot-pound (energy)|
{{convert/sandbox|1|Nm|in.ozf|lk=on}}                  1 [[newton metre]] (140&
{{convert/sandbox|1|in.oz-f|lk=on}}                    1 [[Foot-pound (energy)|
{{convert/sandbox|1|Nm|in.oz-f|lk=on}}                 1 [[newton metre]] (140&
{{convert/sandbox|1|in·lbf|lk=on}}                     1 [[Foot-pound (energy)|
{{convert/sandbox|1|Nm|in·lbf|lk=on}}                  1 [[newton metre]] (8.9&
{{convert/sandbox|1|in·lb-f|lk=on}}                    1 [[Foot-pound (energy)|
{{convert/sandbox|1|Nm|in·lb-f|lk=on}}                 1 [[newton metre]] (8.9&
{{convert/sandbox|1|in·ozf|lk=on}}                     1 [[Foot-pound (energy)|
{{convert/sandbox|1|Nm|in·ozf|lk=on}}                  1 [[newton metre]] (140&
{{convert/sandbox|1|in·oz-f|lk=on}}                    1 [[Foot-pound (energy)|
{{convert/sandbox|1|Nm|in·oz-f|lk=on}}                 1 [[newton metre]] (140&
{{convert/sandbox|1|kg.m|lk=on}}                       1 [[kilogram metre]] (9
{{convert/sandbox|1|Nm|kg.m|lk=on}}                    1 [[newton metre]] (0.10
{{convert/sandbox|1|kgf.m|lk=on}}                      1 [[Kilogram metre|kilog
{{convert/sandbox|1|Nm|kgf.m|lk=on}}                   1 [[newton metre]] (0.10
{{convert/sandbox|1|kgm|lk=on}}                        1 [[kilogram metre]] (9
{{convert/sandbox|1|Nm|kgm|lk=on}}                     1 [[newton metre]] (0.10
{{convert/sandbox|1|Nm|kgm lbft|lk=on}}                1 [[newton metre]] (0.10
{{convert/sandbox|1|kN/m|lk=on}}                       1 [[Newton (unit)|kilone
{{convert/sandbox|1|Nm|kN/m|lk=on}}                    1 [[newton metre]] (0.00
{{convert/sandbox|1|lb.ft|lk=on}}                      1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lb.ft|lk=on}}                   1 [[newton metre]] (0.74
{{convert/sandbox|1|lb.in|lk=on}}                      1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lb.in|lk=on}}                   1 [[newton metre]] (8.9&
```

```
{{convert/sandbox|1|lb·ft|lk=on}}                    1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lb·ft|lk=on}}                 1 [[newton metre]] (0.74
{{convert/sandbox|1|lbf.ft|lk=on}}                   1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lbf.ft|lk=on}}                1 [[newton metre]] (0.74
{{convert/sandbox|1|lb-f.ft|lk=on}}                  1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lb-f.ft|lk=on}}               1 [[newton metre]] (0.74
{{convert/sandbox|1|lbf/in|lk=on}}                   1 [[pound-force]] per [[
{{convert/sandbox|1|Nm|lbf/in|lk=on}}                1 [[newton metre]] (0.00
{{convert/sandbox|1|lbf·ft|lk=on}}                   1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lbf·ft|lk=on}}                1 [[newton metre]] (0.74
{{convert/sandbox|1|lb-f·ft|lk=on}}                  1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lb-f·ft|lk=on}}               1 [[newton metre]] (0.74
{{convert/sandbox|1|lbfft|lk=on}}                    1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lbfft|lk=on}}                 1 [[newton metre]] (0.74
{{convert/sandbox|1|lb-fft|lk=on}}                   1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lb-fft|lk=on}}                1 [[newton metre]] (0.74
{{convert/sandbox|1|lbft|lk=on}}                     1 [[Pound-foot (torque)|
{{convert/sandbox|1|Nm|lbft|lk=on}}                  1 [[newton metre]] (0.74
{{convert/sandbox|1|Nm|lbft kgm|lk=on}}              1 [[newton metre]] (0.74
{{convert/sandbox|1|m.kgf|lk=on}}                    1 [[Kilogram metre|metre
{{convert/sandbox|1|Nm|m.kgf|lk=on}}                 1 [[newton metre]] (0.10
{{convert/sandbox|1|m.kg-f|lk=on}}                   1 [[Kilogram metre|metre
{{convert/sandbox|1|Nm|m.kg-f|lk=on}}                1 [[newton metre]] (0.10
{{convert/sandbox|1|mkgf|lk=on}}                     1 [[Kilogram metre|metre
{{convert/sandbox|1|Nm|mkgf|lk=on}}                  1 [[newton metre]] (0.10
{{convert/sandbox|1|mkg-f|lk=on}}                    1 [[Kilogram metre|metre
{{convert/sandbox|1|Nm|mkg-f|lk=on}}                 1 [[newton metre]] (0.10
{{convert/sandbox|1|mN.m|lk=on}}                     1 [[Newton metre|milline
{{convert/sandbox|1|Nm|mN.m|lk=on}}                  1 [[newton metre]] (1,00
{{convert/sandbox|1|N.m|lk=on}}                      1 [[newton metre]] (0.74
{{convert/sandbox|1|N·m|lk=on}}                      1 [[newton metre]] (0.74
{{convert/sandbox|1|Nm|lk=on}}                       1 [[newton metre]] (0.74
{{convert/sandbox|1|Nm|Nm kgm|lk=on}}                1 [[newton metre]] (1.08
{{convert/sandbox|1|Nm|Nm lbfft|lk=on}}              1 [[newton metre]] (1.08
{{convert/sandbox|1|Nm|Nm lb-fft|lk=on}}             1 [[newton metre]] (1.08
{{convert/sandbox|1|Nm|Nm lbft|lk=on}}               1 [[newton metre]] (1.08

-- volume
{{convert/sandbox|1|µL|lk=on}}                       1 [[microlitre]] (6.1<sp
{{convert/sandbox|1|m3|µL|lk=on}}                    1 [[cubic metre]] (1.0<s
{{convert/sandbox|1|µl|lk=on}}                       1 [[microlitre]] (6.1<sp
{{convert/sandbox|1|m3|µl|lk=on}}                    1 [[cubic metre]] (1.0<s
{{convert/sandbox|1|m3|acre feet|lk=on}}             1 [[cubic metre]] (0.000
{{convert/sandbox|1|m3|acre foot|lk=on}}             1 [[cubic metre]] (0.000
{{convert/sandbox|1|m3|acre ft|lk=on}}               1 [[cubic metre]] (0.000
{{convert/sandbox|1|acre.foot|lk=on}}                1 [[acre foot]] (1,200&n
{{convert/sandbox|1|m3|acre.foot|lk=on}}             1 [[cubic metre]] (0.000
{{convert/sandbox|1|acre.ft|lk=on}}                  1 [[acre foot]] (1,200&n
{{convert/sandbox|1|m3|acre.ft|lk=on}}               1 [[cubic metre]] (0.000
{{convert/sandbox|1|acre·foot|lk=on}}                1 [[acre foot]] (1,200&n
{{convert/sandbox|1|m3|acre·foot|lk=on}}             1 [[cubic metre]] (0.000
{{convert/sandbox|1|acre·ft|lk=on}}                  1 [[acre foot]] (1,200&n
{{convert/sandbox|1|m3|acre·ft|lk=on}}               1 [[cubic metre]] (0.000
{{convert/sandbox|1|acre-feet|lk=on}}                1 [[acre foot]] (1,200&n
{{convert/sandbox|1|m3|acre-feet|lk=on}}             1 [[cubic metre]] (0.000
{{convert/sandbox|1|bdft|lk=on}}                     1 [[board foot]] (0.0024
{{convert/sandbox|1|m3|bdft|lk=on}}                  1 [[cubic metre]] (420&n
{{convert/sandbox|1|m3|board feet|lk=on}}            1 [[cubic metre]] (420 |
{{convert/sandbox|1|m3|board foot|lk=on}}            1 [[cubic metre]] (420 |
{{convert/sandbox|1|cc|lk=on}}                       1 [[cubic centimetre]] (
{{convert/sandbox|1|m3|cc|lk=on}}                    1 [[cubic metre]] (1,000
{{convert/sandbox|1|m3|cc L|lk=on}}                  1 [[cubic metre]] (1,000
{{convert/sandbox|1|cid|lk=on}}                      1 [[Cubic inch#Engine di
{{convert/sandbox|1|m3|cid|lk=on}}                   1 [[cubic metre]] (61,00
```

```
 {{convert/sandbox|1|CID|lk=on}}                          1 [[Cubic inch#Engine di
 {{convert/sandbox|1|m3|CID|lk=on}}                       1 [[cubic metre]] (61,00
 {{convert/sandbox|1|cL|lk=on}}                           1 [[centilitre]] (0.35&n
 {{convert/sandbox|1|m3|cL|lk=on}}                        1 [[cubic metre]] (100,0
 {{convert/sandbox|1|cl|lk=on}}                           1 [[centilitre]] (0.35&n
 {{convert/sandbox|1|m3|cl|lk=on}}                        1 [[cubic metre]] (100,0
 {{convert/sandbox|1|cm3|lk=on}}                          1 [[cubic centimetre]] (
 {{convert/sandbox|1|m3|cm3|lk=on}}                       1 [[cubic metre]] (1,000
 {{convert/sandbox|1|m3|cm3 L|lk=on}}                     1 [[cubic metre]] (1,000
 {{convert/sandbox|1|cord|lk=on}}                         1 [[Cord (volume)|cord]]
 {{convert/sandbox|1|m3|cord|lk=on}}                      1 [[cubic metre]] (0.28&
 {{convert/sandbox|1|cufoot|lk=on}}                       1 [[cubic foot]] (0.028&
 {{convert/sandbox|1|m3|cufoot|lk=on}}                    1 [[cubic metre]] (35&nb
 {{convert/sandbox|1|cuft|lk=on}}                         1 [[cubic foot]] (0.028&
 {{convert/sandbox|1|m3|cuft|lk=on}}                      1 [[cubic metre]] (35&nb
 {{convert/sandbox|1|m3|cuft m3|lk=on}}                   1 [[cubic metre]] (35&nb
 {{convert/sandbox|1|cuin|lk=on}}                         1 [[cubic inch]] (16&nbs
 {{convert/sandbox|1|m3|cuin|lk=on}}                      1 [[cubic metre]] (61,00
 {{convert/sandbox|1|m3|cuin USoz USpt|lk=on}}            1 [[cubic metre]] (61,00
 {{convert/sandbox|1|cumi|lk=on}}                         1 [[cubic mile]] (4.2&nb
 {{convert/sandbox|1|m3|cumi|lk=on}}                      1 [[cubic metre]] (2.4<s
 {{convert/sandbox|1|cuyd|lk=on}}                         1 [[cubic yard]] (0.76&n
 {{convert/sandbox|1|m3|cuyd|lk=on}}                      1 [[cubic metre]] (1.3&n
 {{convert/sandbox|1|m3|cuyd m3|lk=on}}                   1 [[cubic metre]] (1.3&n
 {{convert/sandbox|1|daL|lk=on}}                          1 [[decalitre]] (2.2&nbs
 {{convert/sandbox|1|m3|daL|lk=on}}                       1 [[cubic metre]] (100&n
 {{convert/sandbox|1|dal|lk=on}}                          1 [[decalitre]] (2.2&nbs
 {{convert/sandbox|1|m3|dal|lk=on}}                       1 [[cubic metre]] (100&n
 {{convert/sandbox|1|dam3|lk=on}}                         1 [[cubic decametre]] (1
 {{convert/sandbox|1|m3|dam3|lk=on}}                      1 [[cubic metre]] (0.001
 {{convert/sandbox|1|dL|lk=on}}                           1 [[decilitre]] (3.5&nbs
 {{convert/sandbox|1|m3|dL|lk=on}}                        1 [[cubic metre]] (10,00
 {{convert/sandbox|1|dl|lk=on}}                           1 [[decilitre]] (3.5&nbs
 {{convert/sandbox|1|m3|dl|lk=on}}                        1 [[cubic metre]] (10,00
 {{convert/sandbox|1|dm3|lk=on}}                          1 [[cubic decimetre]] (1
 {{convert/sandbox|1|m3|dm3|lk=on}}                       1 [[cubic metre]] (1,000
 {{convert/sandbox|1|m3|floz|lk=on}}                      1 [[cubic metre]] (35,00
 {{convert/sandbox|1|foot3|lk=on}}                        1 [[cubic foot]] (0.028&
 {{convert/sandbox|1|m3|foot3|lk=on}}                     1 [[cubic metre]] (35&nb
 {{convert/sandbox|1|ft3|lk=on}}                          1 [[cubic foot]] (0.028&
 {{convert/sandbox|1|m3|ft3|lk=on}}                       1 [[cubic metre]] (35&nb
 {{convert/sandbox|1|gal|lk=on}}                          1 [[US gallon]] (3.8&nbs
 {{convert/sandbox|1|m3|gal|lk=on}}                       1 [[cubic metre]] (260&n
 {{convert/sandbox|1|Gcuft|lk=on}}                       1 [[1000000000 (num
 {{convert/sandbox|1|m3|Gcuft|lk=on}}                     1 [[cubic metre]] (3.5<s
 {{convert/sandbox|1|GL|lk=on}}                           1 [[gigalitre]] (35,000
 {{convert/sandbox|1|m3|GL|lk=on}}                        1 [[cubic metre]] (1.0<s
 {{convert/sandbox|1|Gl|lk=on}}                           1 [[gigalitre]] (35,000
 {{convert/sandbox|1|m3|Gl|lk=on}}                        1 [[cubic metre]] (1.0<s
 {{convert/sandbox|1|Goilbbl|lk=on}}                      1 [[Barrel (volume)#Oil
 {{convert/sandbox|1|m3|Goilbbl|lk=on}}                   1 [[cubic metre]] (6.3<s
 {{convert/sandbox|1|grt|lk=on}}                          1 [[Gross register tonna
 {{convert/sandbox|1|m3|grt|lk=on}}                       1 [[cubic metre]] (0.35&
 {{convert/sandbox|1|hL|lk=on}}                           1 [[hectolitre]] (22&nbs
 {{convert/sandbox|1|m3|hL|lk=on}}                        1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|hl|lk=on}}                           1 [[hectolitre]] (22&nbs
 {{convert/sandbox|1|m3|hl|lk=on}}                        1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hL impgal|lk=on}}                 1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hl impgal|lk=on}}                 1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hL impgal U.S.gal|lk=on}}         1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hl impgal U.S.gal|lk=on}}         1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hL impgal USgal|lk=on}}           1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hl impgal USgal|lk=on}}           1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hL U.S.gal|lk=on}}                1 [[cubic metre]] (10&nb
```

```
 {{convert/sandbox|1|m3|hl U.S.gal|lk=on}}                1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hL U.S.gal impgal|lk=on}}         1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hl U.S.gal impgal|lk=on}}         1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hL USgal|lk=on}}                  1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hl USgal|lk=on}}                  1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hL USgal impgal|lk=on}}           1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|m3|hl USgal impgal|lk=on}}           1 [[cubic metre]] (10&nb
 {{convert/sandbox|1|hm3|lk=on}}                          1 [[Cubic metre|cubic he
 {{convert/sandbox|1|m3|hm3|lk=on}}                       1 [[cubic metre]] (1.0<s
 {{convert/sandbox|1|impbbl|lk=on}}                       1 [[Barrel (unit)|imperi
 {{convert/sandbox|1|m3|impbbl|lk=on}}                    1 [[cubic metre]] (6.1&r
 {{convert/sandbox|1|impbsh|lk=on}}                       1 [[imperial bushel]] (3
 {{convert/sandbox|1|m3|impbsh|lk=on}}                    1 [[cubic metre]] (27&nb
 {{convert/sandbox|1|impbu|lk=on}}                        1 [[imperial bushel]] (0
 {{convert/sandbox|1|m3|impbu|lk=on}}                     1 [[cubic metre]] (27&nb
 {{convert/sandbox|1|impfloz|lk=on}}                      1 [[imperial fluid ounce
 {{convert/sandbox|1|m3|impfloz|lk=on}}                   1 [[cubic metre]] (35,00
 {{convert/sandbox|1|m3|impfloz U.S.floz|lk=on}}          1 [[cubic metre]] (35,00
 {{convert/sandbox|1|Impgal|lk=on}}                       1 [[imperial gallon]] (4
 {{convert/sandbox|1|m3|Impgal|lk=on}}                    1 [[cubic metre]] (220&r
 {{convert/sandbox|1|impgal|lk=on}}                       1 [[imperial gallon]] (4
 {{convert/sandbox|1|m3|impgal|lk=on}}                    1 [[cubic metre]] (220&r
 {{convert/sandbox|1|m3|impgal cuyd|lk=on}}               1 [[cubic metre]] (220&r

 -- volume5
 {{convert/sandbox|1|USdrypt|lk=on}}                      1 [[Pint|US dry pint]] (
 {{convert/sandbox|1|m3|USdrypt|lk=on}}                   1 [[cubic metre]] (1,800
 {{convert/sandbox|1|USdryqt|lk=on}}                      1 [[Quart|US dry quart]]
 {{convert/sandbox|1|m3|USdryqt|lk=on}}                   1 [[cubic metre]] (910&r
 {{convert/sandbox|1|USfloz|lk=on}}                       1 [[US fluid ounce]] (30
 {{convert/sandbox|1|m3|USfloz|lk=on}}                    1 [[cubic metre]] (34,00
 {{convert/sandbox|1|m3|USfloz impfloz|lk=on}}            1 [[cubic metre]] (34,00
 {{convert/sandbox|1|USGAL|lk=on}}                        1 [[US gallon]] (3.8&nbs
 {{convert/sandbox|1|m3|USGAL|lk=on}}                     1 [[cubic metre]] (260&r
 {{convert/sandbox|1|USgal|lk=on}}                        1 [[US gallon]] (3.8&nbs
 {{convert/sandbox|1|m3|USgal|lk=on}}                     1 [[cubic metre]] (260&r
 {{convert/sandbox|1|usgal|lk=on}}                        1 [[US gallon]] (3.8&nbs
 {{convert/sandbox|1|m3|usgal|lk=on}}                     1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|usgal impgal|lk=on}}              1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal impgal|lk=on}}              1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal impgal L|lk=on}}            1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal impgal l|lk=on}}            1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal L|lk=on}}                   1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal l|lk=on}}                   1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal L impgal|lk=on}}            1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal l impgal|lk=on}}            1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal m3|lk=on}}                  1 [[cubic metre]] (260&r
 {{convert/sandbox|1|m3|USgal USdrygal|lk=on}}            1 [[cubic metre]] (260&r
 {{convert/sandbox|1|USgi|lk=on}}                         1 [[Gill (unit)|gill]] (
 {{convert/sandbox|1|m3|USgi|lk=on}}                      1 [[cubic metre]] (8,500
 {{convert/sandbox|1|usgi|lk=on}}                         1 [[Gill (unit)|gill]] (
 {{convert/sandbox|1|m3|usgi|lk=on}}                      1 [[cubic metre]] (8,500
 {{convert/sandbox|1|USkenning|lk=on}}                    1 [[Kenning (unit)|US ke
 {{convert/sandbox|1|m3|USkenning|lk=on}}                 1 [[cubic metre]] (57&nb
 {{convert/sandbox|1|USmin|lk=on}}                        1 [[Minim (unit)|US mini
 {{convert/sandbox|1|m3|USmin|lk=on}}                     1 [[cubic metre]] (16,00
 {{convert/sandbox|1|USoz|lk=on}}                         1 [[US fluid ounce]] (30
 {{convert/sandbox|1|m3|USoz|lk=on}}                      1 [[cubic metre]] (34,00
 {{convert/sandbox|1|m3|USoz impoz|lk=on}}                1 [[cubic metre]] (34,00
 {{convert/sandbox|1|m3|USoz mL|lk=on}}                   1 [[cubic metre]] (34,00
 {{convert/sandbox|1|m3|USoz ml|lk=on}}                   1 [[cubic metre]] (34,00
 {{convert/sandbox|1|USpk|lk=on}}                         1 [[Peck|US peck]] (8.8&
 {{convert/sandbox|1|m3|USpk|lk=on}}                      1 [[cubic metre]] (110&r
 {{convert/sandbox|1|USpt|lk=on}}                         1 [[Pint|US pint]] (0.47
```

```
{{convert/sandbox|1|m3|USpt|lk=on}}                    1 [[cubic metre]] (2,100
{{convert/sandbox|1|USqt|lk=on}}                       1 [[United States custom
{{convert/sandbox|1|m3|USqt|lk=on}}                    1 [[cubic metre]] (1,100
{{convert/sandbox|1|USquart|lk=on}}                    1 [[Quart|US quart]] (95
{{convert/sandbox|1|m3|USquart|lk=on}}                 1 [[cubic metre]] (1,100
{{convert/sandbox|1|winecase|lk=on}}                   1 [[Case (goods)|case]]
{{convert/sandbox|1|m3|winecase|lk=on}}                1 [[cubic metre]] (110 |
{{convert/sandbox|1|yd3|lk=on}}                        1 [[cubic yard]] (0.76&n
{{convert/sandbox|1|m3|yd3|lk=on}}                     1 [[cubic metre]] (1.3&n
{{convert/sandbox|1|µL|lk=on}}                         1 [[microlitre]] (6.1<sp
{{convert/sandbox|1|m3|µL|lk=on}}                      1 [[cubic metre]] (1.0<s
{{convert/sandbox|1|µl|lk=on}}                         1 [[microlitre]] (6.1<sp
{{convert/sandbox|1|m3|µl|lk=on}}                      1 [[cubic metre]] (1.0<s

-- misc
{{convert/sandbox|1|A.h|lk=on}}                        1 [[ampere-hour]] (3,600
{{convert/sandbox|1|A·h|lk=on}}                        1 [[ampere-hour]] (3,600
{{convert/sandbox|1|coulomb|lk=on}}                    1 [[coulomb]] (6.2<span
{{convert/sandbox|1|e|lk=on}}                          1 [[elementary charge]]
{{convert/sandbox|1|cuft/sqmi|lk=on}}                  1 [[cubic foot]] per [[s
{{convert/sandbox|1|dtex|lk=on}}                       1 [[Units of textile mea
{{convert/sandbox|1|si tsfc|lk=on}}                    1 [[Thrust specific fuel
{{convert/sandbox|1|gCO2/km|lk=on}}                    1 [[Exhaust gas|gram of
{{convert/sandbox|1|gCO2/mi|lk=on}}                    1 [[Exhaust gas|gram of
{{convert/sandbox|1|hp/LT|lk=on}}                      1 [[Power-to-weight rati
{{convert/sandbox|1|hp/ST|lk=on}}                      1 [[Power-to-weight rati
{{convert/sandbox|1|impgalh2o|lk=on}}                  1 [[Imperial gallon|impe
{{convert/sandbox|1|keVT|lk=on}}                       1 [[Electronvolt|kiloele
{{convert/sandbox|1|kg/kW|lk=on}}                      1 [[Kilowatt|kilogram pe
{{convert/sandbox|1|kgCO2/km|lk=on}}                   1 [[Exhaust gas|kilogram
{{convert/sandbox|1|kgCO2/L|lk=on}}                    1 [[Exhaust gas|kilogram
{{convert/sandbox|1|kgpsqcm|lk=on}}                    1 [[Kilogram-force|kilog
{{convert/sandbox|1|kPa/m|lk=on}}                      1 [[Pascal (unit)|kilopa
{{convert/sandbox|1|kW/t|lk=on}}                       1 [[Power-to-weight rati
{{convert/sandbox|1|tsfc|lk=on}}                       1 [[Thrust specific fuel
{{convert/sandbox|1|lb/hp|lk=on}}                      1 [[Horsepower|pound per
{{convert/sandbox|1|lbCO2/mi|lk=on}}                   1 [[Exhaust gas|pound of
{{convert/sandbox|1|lbCO2/USgal|lk=on}}                1 [[Exhaust gas|pound pe
{{convert/sandbox|1|lbm/cuin|lk=on}}                   1 [[Density|pound mass p
{{convert/sandbox|1|lbm/in3|lk=on}}                    1 [[Density|pound mass p
{{convert/sandbox|1|LT/acre|lk=on}}                    1 [[long ton]] per [[acr
{{convert/sandbox|1|m2/ha|lk=on}}                      1 [[Basal area|square me
{{convert/sandbox|1|m3/ha|lk=on}}                      1 [[Hectare|cubic metre
{{convert/sandbox|1|m3/km2|lk=on}}                     1 [[cubic metre]] per [[
{{convert/sandbox|1|ozCO2/mi|lk=on}}                   1 [[Exhaust gas|ounce of
{{convert/sandbox|1|PS/t|lk=on}}                       1 [[Power-to-weight rati
{{convert/sandbox|1|psi/ft|lk=on}}                     1 [[Pounds per square in
{{convert/sandbox|1|sqft/acre|lk=on}}                  1 [[square foot per acre
{{convert/sandbox|1|ST/acre|lk=on}}                    1 [[short ton]] per [[ac
{{convert/sandbox|1|t/ha|lk=on}}                       1 [[tonne]] per [[hectar
{{convert/sandbox|1|U.S.gal/acre|lk=on}}               1 [[U.S. gallon]] per [[
{{convert/sandbox|1|USbu/acre|lk=on}}                  1 [[Bushel|US bushel per
{{convert/sandbox|1|USgal/acre|lk=on}}                 1 [[US gallon]] per [[ac
{{convert/sandbox|1|usgalh2o|lk=on}}                   1 [[United States custom

-- Options.
{{convert/sandbox|10|mi|km|4}}                         10 miles (16.0934 k
{{convert/sandbox|10|mi|km|sigfig=4}}                  10 miles (16.09 km)
{{convert/sandbox|100|in|cm|abbr=off}}                 100 inches (250 centimet
{{convert/sandbox|100|in|cm|abbr=on}}                  100 in (250 cm
{{convert/sandbox|100|in|cm|abbr=in}}                  100 in (250 centime
{{convert/sandbox|100|in|cm|abbr=out}}                 100 inches (250 cm)
{{convert/sandbox|100|in|cm|abbr=values}}              100 (250)
{{convert/sandbox|100|in|cm|disp=flip}}                250 centimetres (100&nbs
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{{convert/sandbox|100|in|cm|abbr=off|disp=flip}}          250 centimetres (100 inc
{{convert/sandbox|100|in|cm|abbr=on|disp=flip}}           250 cm (100 in
{{convert/sandbox|100|in|cm|abbr=in|disp=flip}}           250 cm (100 inches)
{{convert/sandbox|100|in|cm|abbr=out|disp=flip}}          250 centimetres (100&nbs
{{convert/sandbox|100|in|cm|abbr=values|disp=flip}}       250 (100)
{{convert/sandbox|1|cuyd|disp=u2}}                        m<sup>3</sup>
{{convert/sandbox|1|cuyd|disp=unit}}                      cubic yard
{{convert/sandbox|2|cuyd|disp=unit}}                      cubic yards
{{convert/sandbox|2|cuyd|adj=off|disp=unit}}              cubic yards
{{convert/sandbox|2|cuyd|adj=on|disp=unit}}               cubic-yard
{{convert/sandbox|2|cuyd|m3|adj=mid|extra text}}          2-cubic-yard extra text
{{convert/sandbox|2|cuyd|adj=on}}                         2-cubic-yard (1.5 m
{{convert/sandbox|190|ft|m|adj=mid|bridge}}               190-foot bridge (58 
{{convert/sandbox|190|ft|m|adj=mid|-long}}                190-foot-long (58 m
{{convert/sandbox|2|cuyd|m3|adj=mid|xyz}}                 2-cubic-yard xyz (1.5&nb
{{convert/sandbox|2|cuyd|m3|adj=mid|-xyz}}                2-cubic-yard-xyz (1.5&nb
{{convert/sandbox|5|to|10|kg|lb|2}}                       5 to 10 kilograms (11.02
{{convert/sandbox|-12|kg|lb|disp=5}}                      −12 kilograms (−25 
{{convert/sandbox|123.45|m|dam}}                          123.45 metres (12.345&nb
{{convert/sandbox|123.45|m|dam|sp=us}}                    123.45 meters (12.345&nb
{{convert/sandbox|12.345|dam|m|sp=us}}                    12.345 dekameters (123.4
{{convert/sandbox|123.45|m|dam|sp=us|disp=flip}}          12.345 dekameters (123.4
{{convert/sandbox|12|ft|in|abbr=off|adj=on}}              12-foot (140-inch)
{{convert/sandbox|12|ft|m|abbr=off|adj=on}}               12-foot (3.7-metre)
{{convert/sandbox|1|ft|in|disp=unit}}                     foot
{{convert/sandbox|1|foot|in|disp=unit}}                   foot
{{convert/sandbox|6|ft|in|disp=unit}}                     feet
{{convert/sandbox|6|foot|in|disp=unit}}                   foot
{{convert/sandbox|6|foot|in|disp=unit|abbr=on}}           ft
{{convert/sandbox|6|ft|in|disp=number}}                   72
{{convert/sandbox|6|ft|in|disp=output number only}}       72
{{convert/sandbox|6|ft|in|disp=out}}                      72 in
{{convert/sandbox|6|ft|in|disp=output only}}              72 in
{{convert/sandbox|6|ft|in|disp=output only|adj=flip}}     72 inches
{{convert/sandbox|6|ft|in|disp=output only|abbr=off}}     72 inches
{{convert/sandbox|6|ft|in|disp=output only|abbr=off|adj=on}}          72-inch
{{convert/sandbox|6|ft|in|disp=output only|abbr=off|adj=mid|-long}}  72-inch
{{convert/sandbox|3.21|ft|cm|lk=off}}                     3.21 feet (98 cm)
{{convert/sandbox|3.21|ft|cm|lk=on}}                      3.21 [[Foot (unit)|feet]
{{convert/sandbox|3.21|ft|cm|lk=in}}                      3.21 [[Foot (unit)|feet]
{{convert/sandbox|3.21|ft|cm|lk=out}}                     3.21 feet (98 [[Cen
{{convert/sandbox|3.21|ft|cm|disp=flip}}                  98 centimetres (3.21&nbs
{{convert/sandbox|3.21|ft|cm|lk=off|disp=flip}}           98 centimetres (3.21&nbs
{{convert/sandbox|3.21|ft|cm|lk=on|disp=flip}}            98 [[centimetre]]s (3.21
{{convert/sandbox|3.21|ft|cm|lk=in|disp=flip}}            98 [[centimetre]]s (3.21
{{convert/sandbox|3.21|ft|cm|lk=out|disp=flip}}           98 centimetres (3.21&nbs
{{convert/sandbox|3.21|ft|cm|lk=off|abbr=on}}             3.21 ft (98 cm
{{convert/sandbox|3.21|ft|cm|lk=on|abbr=on}}              3.21 [[Foot (unit)|
{{convert/sandbox|3.21|ft|cm|lk=in|abbr=on}}              3.21 [[Foot (unit)|
{{convert/sandbox|3.21|ft|cm|lk=out|abbr=on}}             3.21 ft (98 [[
{{convert/sandbox|3.21|ft|cm|lk=off|abbr=off}}            3.21 feet (98 centimetre
{{convert/sandbox|3.21|ft|cm|lk=on|abbr=off}}             3.21 [[Foot (unit)|feet]
{{convert/sandbox|3.21|ft|cm|lk=in|abbr=off}}             3.21 [[Foot (unit)|feet]
{{convert/sandbox|3.21|ft|cm|lk=out|abbr=off}}            3.21 feet (98 [[centimet
{{convert/sandbox|3.21|ft|cm|lk=off|abbr=in}}             3.21 ft (98 centime
{{convert/sandbox|3.21|ft|cm|lk=on|abbr=in}}              3.21 [[Foot (unit)|
{{convert/sandbox|3.21|ft|cm|lk=in|abbr=in}}              3.21 [[Foot (unit)|
{{convert/sandbox|3.21|ft|cm|lk=out|abbr=in}}             3.21 ft (98 [[centi
{{convert/sandbox|3.21|ft|cm|lk=off|abbr=out}}            3.21 feet (98 cm)
{{convert/sandbox|3.21|ft|cm|lk=on|abbr=out}}             3.21 [[Foot (unit)|feet]
{{convert/sandbox|3.21|ft|cm|lk=in|abbr=out}}             3.21 [[Foot (unit)|feet]
{{convert/sandbox|3.21|ft|cm|lk=out|abbr=out}}            3.21 feet (98 [[Cen
{{convert/sandbox|3.21|ft|cm|lk=out|abbr=out|adj=flip}}   98 centimetres (3.21&nbs
{{convert/sandbox|3.21|ft|cm|lk=out|abbr=out|disp=flip}} 98 centimetres (3.21&nbs
```

```
{{convert/sandbox|3.21|ft|cm|lk=out|abbr=out|adj=on}}    3.21-foot (98 [[Cer
{{convert/sandbox|3.21|ft|cm|lk=out|abbr=out|adj=mid|bridge}}       3.21-foot bri
{{convert/sandbox|3.21|ft|cm|disp=x| (begin | end)}}     3.21 feet (begin 98 
{{convert/sandbox|3.21|ft|cm|disp=x| or}}                3.21 feet or98 cm
{{convert/sandbox|3.21|ft|cm|disp=x}}                    3.21 feet [ 98 
{{convert/sandbox|3.21|ft|cm|disp=comma}}                3.21 feet, 98 cm
{{convert/sandbox|3.21|ft|cm|disp=sqbr}}                 3.21 feet [98 cm]
{{convert/sandbox|3.21|ft|cm|disp=or}}                   3.21 feet or 98 centimet
{{convert/sandbox|3.21|ft|cm|disp=slash}}                3.21 feet / 98 cent
{{convert/sandbox|3.21|ft|cm|disp=s}}                    3.21 feet / 98 cent
{{convert/sandbox|3.21|ft|cm|disp=/}}                    3.21 feet / 98 cent
{{convert/sandbox|3.21|ft|cm|disp=2}}                    98 cm
{{convert/sandbox|3.21|ft|cm|disp=b}}                    3.21 feet (98 cm)
{{convert/sandbox|3.21|ft|cm|disp=br}}                   3.21 feet<br/>98 centime
{{convert/sandbox|9|kPa|abbr=~}}                         9 kilopascals (kPa, 1.3&
{{convert/sandbox|1.25|km|ftin|abbr=~}}                  1.25 kilometres (km, 4,1
{{convert/sandbox|33|e9m3|e9cuft|adj=on|abbr=off}}       33-billion-cubic-metre (
{{convert/sandbox|400|LT|adj=on|abbr=off}}               400-long-ton (410-tonne)
{{convert/sandbox|1.5|mi|km|adj=1}}                      1.5 miles (2.4 km)
{{convert/sandbox|1|mi|km|adj=1}}                        1 mile (1.6 km)
{{convert/sandbox|0.5|mi|km|adj=1}}                      0.5 mile (0.80 km)
{{convert/sandbox|0|mi|km|adj=1}}                        0 miles (0 km)
{{convert/sandbox|75|ft|m|abbr=off|adj=j}}               75 feet (23 me
{{convert/sandbox|4543.5|m|ft|disp=flip|adj=j}}          14,906 feet (4,543
{{convert/sandbox|75|ft|m|disp=flip5|adj=j}}             25 metres (75 
{{convert/sandbox|3.21|ft|cm|abbr=in|disp=flip}}         98 cm (3.21 feet)
{{convert/sandbox|3.21|ft|cm|abbr=out|disp=flip}}        98 centimetres (3.21&nbs
{{convert/sandbox|3.21|ft|cm|lk=in|disp=flip}}           98 [[centimetre]]s (3.21
{{convert/sandbox|3.21|ft|cm|lk=out|disp=flip}}          98 centimetres (3.21&nbs
{{convert/sandbox|1|m|ft|adj=pre|FIRST}}                 1 FIRST metre (3.3 
{{convert/sandbox|1|m|ft|adj=pre|FIRST|disp=flip}}       3.3 FIRST feet (1 m
{{convert/sandbox|1|m|ft|disp=preunit|FIRST |SECOND}}    1 FIRST metre (3.3 SECON
{{convert/sandbox|1|m|ft|disp=preunit|FIRST |SECOND |abbr=off}}       1 FIRST met
{{convert/sandbox|1|m|ft|disp=preunit|+}}                1+metre (3.3+ft)
{{convert/sandbox|4|m|ft|disp=preunit|+ |SECOND}}        4+ metres (13 SECONDft)
{{convert/sandbox|4|m|ft|disp=preunit|linear}}           4 linearmetres (13 linea
{{convert/sandbox|1780|kg|lb|-1|abbr=on}}                1,780 kg (3,920&nbs
{{convert/sandbox|1234|tonocomma|5678|kg|oz}}            1234 to 5678 kilograms (
{{convert/sandbox|1234|-nocomma|5678|kg|oz}}             1234–5678 kilograms (435
{{convert/sandbox|233435993|in|m|sp=us|disp=or}}         233,435,993 inches or 5,
{{convert/sandbox|0.12|km|yd|sing=1}}                    0.12 kilometre (130 
{{convert/sandbox|12|km|yd|sing=1}}                      12 kilometres (13,000&nb
{{convert/sandbox|12|km|yd|sing=flip}}                   13,000 yards (12 km
{{convert/sandbox|12|km|yd|sing=j}}                      12 kilometres (13,0
{{convert/sandbox|12|km|yd|FIRST|sing=mid}}              12-kilometre FIRST (13,0
{{convert/sandbox|12|km|yd|FIRST|sing=pre}}              12 FIRST kilometres (13,
{{convert/sandbox|12|km|yd|sing=off}}                    12 kilometres (13,000&nb
{{convert/sandbox|12|km|yd|sing=on}}                     12-kilometre (13,000&nbs
{{convert/sandbox|123.4456|km|yd|sing=ri1}}              123.4 kilometres (135,00
{{convert/sandbox|123.4456|km|yd|sing=ri2}}              123.45 kilometres (135,0
{{convert/sandbox|123.4456|km|yd|sing=ri3}}              123.446 kilometres (135,
{{convert/sandbox|0.98|AU|e9km|lk=on}}                   0.98 [[astronomical unit
{{convert/sandbox|1.23|e12km|lk=on}}                     1.23 [[10000000000
{{convert/sandbox|1.23|e12km|abbr=off|lk=on}}            1.23 [[10000000000
{{convert/sandbox|1.23|e3m3}}                            1.23 thousand cubic
{{convert/sandbox|1.23|e3m3|abbr=on}}                    1.23<span style="margin-
{{convert/sandbox|1.23|e3m3|adj=on}}                     1.23-thousand-cubic-metr
{{convert/sandbox|1.23|e3m3|lk=in}}                      1.23 thousand [[cub
{{convert/sandbox|1.23|e6m3|lk=in}}                      1.23 million [[cubi
{{convert/sandbox|1.23|e9m3|lk=in}}                      1.23 [[1000000000 (
{{convert/sandbox|1.23|e12m3|lk=in}}                     1.23 [[10000000000
{{convert/sandbox|1.23|e15m3|lk=in}}                     1.23 [[10000000000
{{convert/sandbox|1.23|e15m3|lk=on}}                     1.23 [[10000000000
{{convert/sandbox|1.23|e15m3|abbr=on|lk=on}}             1.23<span style="margin-
```

```
{{convert/sandbox|4500|acre ft|e9USgal e6m3}}            4,500 acre feet (1.5<spa
{{convert/sandbox|4500|acre ft|e9USgal e6m3|abbr=off}}   4,500 acre feet (1.5&nbs

-- Ranges.
{{convert/sandbox|-3|-|+3|m|ft}}                         −3–+3 metres (−9.8–9.8&r
{{convert/sandbox|-3|-|3|m|ft}}                          −3–3 metres (−9.8–9.8&nb
{{convert/sandbox|-8|-|-3|F|C}}                          −8 − −3 °F (−2
{{convert/sandbox|-8|-|-3|m|ft}}                                  −8 − −3
{{convert/sandbox|4|-|9|L|USgal|abbr=off|sp=us|lk=out}}  4–9 liters (1.1–2.4 [[US
{{convert/sandbox|4|-|9|L|USgal|abbr=off}}               4–9 litres (1.1–2.4 US g
{{convert/sandbox|5|-|10|kg|lb|2}}                       5–10 kilograms (11.02–22
{{convert/sandbox|5|-|12|kg|abbr=in}}                    5–12 kg (11–26 pour
{{convert/sandbox|5|-|12|kg|abbr=off}}                   5–12 kilograms (11–26 po
{{convert/sandbox|5|-|12|kg|abbr=out}}                   5–12 kilograms (11–26&nb
{{convert/sandbox|5|-|12|kg}}                            5–12 kilograms (11–26&nb
{{convert/sandbox|41|-|50|F|K}}                          41–50 °F (278–283&r
{{convert/sandbox|4500|-|4900|acre ft|e9USgal e6m3|abbr=off|lk=on}} 4,500–4,900 |
{{convert/sandbox|4500|-|4900|acre ft|e9USgal e6m3|abbr=off}}       4,500–4,900 a
{{convert/sandbox|4500|-|4900|acre ft|e9USgal e6m3|lk=on}}          4,500–4,900 |
{{convert/sandbox|4500|-|4900|acre ft|e9USgal e6m3}}     4,500–4,900 acre feet (1
{{convert/sandbox|3|–|4|in|mm}}                                    3–4 inches (
{{convert/sandbox|12.5|+/-|2.3|kg|lb|abbr=off}}                    12.5 ±&
{{convert/sandbox|12.5|+/-|2.3|kg|lb}}                             12.5 ±&
{{convert/sandbox|12.5|±|2.3|kg}}                                  12.5 ±&
{{convert/sandbox|3|&|4|in|mm}}                                    3 and 4 inch
{{convert/sandbox|3|and(-)|4|in|mm}}                               3 and 4 inch
{{convert/sandbox|3|±|4|in|mm}}                                    3 ±&nbs
{{convert/sandbox|45|+/-|8|mm}}                                    45 ±&nb
{{convert/sandbox|5|&|12|kg}}                            5 and 12 kilograms (11 a
{{convert/sandbox|5|and|12|kg|lb|abbr=off|adj=on}}       5-and-12-kilogram (11-ar
{{convert/sandbox|5|and|12|kg|lb|abbr=off}}              5 and 12 kilograms (11 a
{{convert/sandbox|5|and|12|kg}}                          5 and 12 kilograms (11 a
{{convert/sandbox|8|or|10|ft|m|abbr=off|adj=on}}         8-or-10-foot (2.4-or-3.0
{{convert/sandbox|8|or|10|ft|m|abbr=off}}                8 or 10 feet (2.4 or 3.0
{{convert/sandbox|8|or|10|ft|m|adj=on}}                  8-or-10-foot (2.4 or 3.0
{{convert/sandbox|8|or|10|ft|m}}                         8 or 10 feet (2.4 or 3.0
{{convert/sandbox|375|to about|500|g|lb|sp=us}}          375 to about 500 grams (
{{convert/sandbox|-3|to(-)|-3|m|ft}}                     −3 to −3 metres (−9
{{convert/sandbox|5|to(-)|12|kg}}                        5 to 12 kilograms (
{{convert/sandbox|5|to-|12|kg|abbr=on}}                  5–12 kg (11–26 
{{convert/sandbox|5|to-|12|kg}}                          5 to 12 kilograms (
{{convert/sandbox|41|to|50|F|C}}                         41 to 50 °F (5 to 1
{{convert/sandbox|5|to|12|kg|abbr=on}}                   5 to 12 kg (11 to 2
{{convert/sandbox|5|to|12|kg|lb|abbr=off}}               5 to 12 kilograms (11 to
{{convert/sandbox|5|to|12|kg}}                           5 to 12 kilograms (11 to
{{convert/sandbox|5|to|7|L|USgal|abbr=mos}}              5 litres to 7 litres (1.
{{convert/sandbox|60|by|120|m|ft|abbr=in}}               60 by 120 m (200 by
{{convert/sandbox|60|by|120|m|ft|abbr=off}}              60 by 120 metres (200 by
{{convert/sandbox|60|by|120|m|ft|abbr=on}}               60 by 120 m (200 by
{{convert/sandbox|60|by|120|m|ft|abbr=out}}              60 by 120 metres (200 by
{{convert/sandbox|60|by|120|m|ft}}                       60 by 120 metres (200 by
{{convert/sandbox|3|×|4|in|mm}}                                    3 by 4 inche
{{convert/sandbox|1|x|1|m|ft|sp=us}}                     1 by 1 meters (3.3 
{{convert/sandbox|60|x|120|m|ft|abbr=in}}                60 m × 120&nbs
{{convert/sandbox|60|x|120|m|ft|abbr=off}}               60 by 120 metres (200 by
{{convert/sandbox|60|x|120|m|ft|abbr=on}}                60 m × 120&nbs
{{convert/sandbox|60|x|120|m|ft|abbr=out}}               60 by 120 metres (200&nb
{{convert/sandbox|60|x|120|m|ft}}                        60 by 120 metres (200&nb
{{convert/sandbox|8|xx|10|ft|m|abbr=off}}                8 × 10 feet (2
{{convert/sandbox|8|xx|10|ft|m|abbr=on}}                 8 × 10 ft
{{convert/sandbox|8|xx|10|ft|m|adj=on}}                  8-×-10-foot (2.4 ×&
{{convert/sandbox|8|xx|10|ft|m}}                         8 × 10 feet (2

-- Engineering notation.
```

```
{{convert/sandbox|1.23|e12U.S.gal}}                    1.23 trillion U.S.
{{convert/sandbox|1.23|e12cuft}}                       1.23 trillion cubi
{{convert/sandbox|1.23|e12m3/a}}                       1.23 trillion cubi
{{convert/sandbox|1.23|e3BTU}}                         1.23 thousand Briti
{{convert/sandbox|1.23|e3acre}}                        1.23 thousand acre
{{convert/sandbox|1.23|e3m2}}                          1.23 thousand squa
{{convert/sandbox|1.23|e3m3/a}}                        1.23 thousand cubi
{{convert/sandbox|1.23|e6BTU}}                         1.23 million Briti
{{convert/sandbox|1.23|e6L}}                           1.23 million litre
{{convert/sandbox|1.23|e6km}}                          1.23 million kilom
{{convert/sandbox|1.23|e6m3/h}}                        1.23 million cubic
{{convert/sandbox|1.23|e6mi}}                          1.23 million miles
{{convert/sandbox|1.23|e9USgal/a}}                     1.23 billion US ga
{{convert/sandbox|1.23|e9impgal}}                      1.23 billion imper
{{convert/sandbox|123.4|e3m2}}                         123.4 thousand squ
{{convert/sandbox|1.23|e6L}}                           1.23 million litre
{{convert/sandbox|1.23|e6L|e3usgal|abbr=off|lk=on}}    1.23 million [[lit
{{convert/sandbox|1.23|e9impgal}}                      1.23 billion imper
{{convert/sandbox|1.23|e9impgal|e3usgal|abbr=off|lk=on}} 1.23 [[1000000000
{{convert/sandbox|1.23|e12cuft}}                       1.23 trillion cubi

-- SI prefixes.
{{convert/sandbox|1234.56789|Ym|in|lk=on}}             1,234.56789 [[yottametr
{{convert/sandbox|1234.56789|Zm|in|lk=on}}             1,234.56789 [[zettametr
{{convert/sandbox|1234.56789|Em|in|lk=on}}             1,234.56789 [[exametre]]
{{convert/sandbox|1234.56789|Pm|in|lk=on}}             1,234.56789 [[petametre]
{{convert/sandbox|1234.56789|Tm|in|lk=on}}             1,234.56789 [[terametre]
{{convert/sandbox|1234.56789|Gm|in|lk=on}}             1,234.56789 [[gigametre]
{{convert/sandbox|1234.56789|Mm|in|lk=on}}             1,234.56789 [[megametre]
{{convert/sandbox|1234.56789|km|in|lk=on}}             1,234.56789 [[kilometre]
{{convert/sandbox|1234.56789|hm|in|lk=on}}             1,234.56789 [[hectometr
{{convert/sandbox|1234.56789|dam|in|lk=on}}            1,234.56789 [[decametre]
{{convert/sandbox|1234.56789|dm|in|lk=on}}             1,234.56789 [[decimetre]
{{convert/sandbox|1234.56789|cm|in|lk=on}}             1,234.56789 [[centimetr
{{convert/sandbox|1234.56789|mm|in|lk=on}}             1,234.56789 [[millimetr
{{convert/sandbox|1234.56789|µm|in|lk=on}}             1,234.56789 [[micrometr
{{convert/sandbox|1234.56789|µm|in|lk=on}}             1,234.56789 [[micrometr
{{convert/sandbox|1234.56789|um|in|lk=on}}             1,234.56789 [[micrometr
{{convert/sandbox|1234.56789|nm|in|lk=on}}             1,234.56789 [[nanometre]
{{convert/sandbox|1234.56789|pm|in|lk=on}}             1,234.56789 [[picometre]
{{convert/sandbox|1234.56789|fm|in|lk=on}}             1,234.56789 [[femtometr
{{convert/sandbox|1234.56789|am|in|lk=on}}             1,234.56789 [[Metre|att
{{convert/sandbox|1234.56789|zm|in|lk=on}}             1,234.56789 [[Metre|zep
{{convert/sandbox|1234.56789|ym|in|lk=on}}             1,234.56789 [[Metre|yoc
{{convert/sandbox|1234.56789|Ym|in|lk=on|abbr=on}}     1,234.56789 [[Yott
{{convert/sandbox|1234.56789|Zm|in|lk=on|abbr=on}}     1,234.56789 [[Zett
{{convert/sandbox|1234.56789|Em|in|lk=on|abbr=on}}     1,234.56789 [[Exam
{{convert/sandbox|1234.56789|Pm|in|lk=on|abbr=on}}     1,234.56789 [[Peta
{{convert/sandbox|1234.56789|Tm|in|lk=on|abbr=on}}     1,234.56789 [[Tera
{{convert/sandbox|1234.56789|Gm|in|lk=on|abbr=on}}     1,234.56789 [[Giga
{{convert/sandbox|1234.56789|Mm|in|lk=on|abbr=on}}     1,234.56789 [[Mega
{{convert/sandbox|1234.56789|km|in|lk=on|abbr=on}}     1,234.56789 [[Kilo
{{convert/sandbox|1234.56789|hm|in|lk=on|abbr=on}}     1,234.56789 [[Hect
{{convert/sandbox|1234.56789|dam|in|lk=on|abbr=on}}    1,234.56789 [[Deca
{{convert/sandbox|1234.56789|dm|in|lk=on|abbr=on}}     1,234.56789 [[Deci
{{convert/sandbox|1234.56789|cm|in|lk=on|abbr=on}}     1,234.56789 [[Cent
{{convert/sandbox|1234.56789|mm|in|lk=on|abbr=on}}     1,234.56789 [[Mill
{{convert/sandbox|1234.56789|µm|in|lk=on|abbr=on}}     1,234.56789 [[Micr
{{convert/sandbox|1234.56789|µm|in|lk=on|abbr=on}}     1,234.56789 [[Micr
{{convert/sandbox|1234.56789|um|in|lk=on|abbr=on}}     1,234.56789 [[Micr
{{convert/sandbox|1234.56789|nm|in|lk=on|abbr=on}}     1,234.56789 [[Nano
{{convert/sandbox|1234.56789|pm|in|lk=on|abbr=on}}     1,234.56789 [[Pico
{{convert/sandbox|1234.56789|fm|in|lk=on|abbr=on}}     1,234.56789 [[Femt
{{convert/sandbox|1234.56789|am|in|lk=on|abbr=on}}     1,234.56789 [[Metr
```

```
{{convert/sandbox|1234.56789|zm|in|lk=on|abbr=on}}       1,234.56789 [[Metre
{{convert/sandbox|1234.56789|ym|in|lk=on|abbr=on}}       1,234.56789 [[Metre

-- Spell.
{{convert/sandbox|1+2/3|in|mm|spell=in}}                 one and two-thirds inche
{{convert/sandbox|2/3|mi|km|spell=In}}                   Two-thirds mile (1.1&nbs
{{convert/sandbox|1000000|mi|km|spell=in}}               one million miles (1,600
{{convert/sandbox|1/4|m|m|spell=in}}                     one-quarter metre (0.25&
{{convert/sandbox|1+1/2|ft|spell=In}}                    One and a half feet (0.4

-- New units.
{{convert/sandbox|111|$/oilbbl}}                         $111 per barrel ($700/m<
{{convert/sandbox|75,000|bushels|L|adj=on}}              75,000-US-bushel (2,600)
{{convert/sandbox|39427|acre-ft}}                        39,427 acre feet (48,632
{{convert/sandbox|26|kt}}                                26 kilotonnes (26,000 lo
{{convert/sandbox|100|m|yds}}                            100 metres (110 yd)
{{convert/sandbox|123|km/s2}}                            123 kilometres per secon
{{convert/sandbox|123|km/s2|5|sp=us|abbr=on|lk=on}}      123 [[Acceleration|

]==]

local p = require('Module:Convert/tester')
p.tests = tests
return p
```

Modul:Convert/tester

This module runs unit tests to compare template output with expected text. In addition, the module can output the results of expanding templates.

While intended for testing Module:Convert, the tester should be useful with other templates that require many tests using a simple format for the test input.

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Testcases example

- Module:Convert/sandbox/testcases • templates to be tested, with expected outputs
- Module talk:Convert/sandbox/testcases • view test results

It is not necessary to save the testcases page before viewing test results. For example, Module:Convert/sandbox/testcases could be edited to change the tests. While still editing that page, paste Vorlage:Nowrap (without quotes) into the page title box under "Preview page with this template", then click "Show preview".

The testcases talk page (for example, Module talk:Convert/sandbox/testcases) contains:

```
{{#invoke:convert/sandbox/testcases|run_tests}}
```

The testcases module page (for example, Module:Convert/sandbox/testcases) may contain:

```
local tests = [==[

A template to be tested must be at the start of a line.
Lines which do not start with a template are ignored.
{{convert/sandbox|1|acre|lk=on}}            1 [[acre]] (0.40 [[hectare|ha]])
{{convert/sandbox|1|m2|acres|lk=on}}        1 [[square metre]] (0.00025 [[acre]]s
{{convert/sandbox|0.16|/l|2|disp=table}}    align="right"|0.16\n|align="right"|0.

]==]

local p = require('Module:Convert/tester')
p.tests = tests
return p
```

If wanted, the tests can be run using a template different from the one specified in the tests. For example, the following would run the tests from Module:Convert/sandbox/testcases, but would change the name of each template found on that page to "convert/sandbox2".

```
{{#invoke:convert/sandbox/testcases|run_tests|template=convert/sandbox2}}
```

Format

Tests are extracted from a multiline string. Any line that does not start with a template is ignored. Each processed line starts with a template, and is followed by whitespace, then the wikitext which should result from expanding the template.

The expected output must be entered in a single line. If the template outputs multiple lines, those lines must be joined with "\n" (two characters—backslash n).

The templates do not have to be the same, for example, the following tests would work:

```
local tests = [==[

{{convert|12|m}}                                12 metres (39 ft)
{{convert/sandbox|12|m}}                        12 metres (39 ft)
{{age|1989|7|23|2003|7|14}}                     13
{{age in days|2007|5|24|2008|4|23}}             335

]==]
```

In the results, the status column shows "Pass" if the output from the template exactly matches the expected text. If there is no expected text, the template output is shown in the Actual column with a blank status. If the given expected text differs from the template output, the template output is shown in the Actual column with status "Fail", and the number of fails is shown at the top of the page. Searching the page for "Fail" will find each problem. Any "Fail" result is followed by a row showing the nowiki actual and expected wikitext.

Specifying tests

If using a testcases module (as in the above example), the test text is assigned to `p.tests` before executing `run_tests`.

Alternatively, the test text can be read from any page, or from any section on any page. For example, the following wikitext could be entered in a sandbox:

```
== Mixed tests ==
<pre>
{{convert|12|m}}                                12 metres (39 ft)
{{convert/sandbox|0.16|/l|2|disp=table}}    align="right"|0.16\n|align="right"|0
{{age in days|2007|5|24|2008|4|23}}             335
--- The following line is incorrect to demonstrate a "fail".
{{convert|12|m|lk=on}}                          12 [[meter|metres]] (39 [[Foot|ft]])
The following line demonstrates the result when no expected text is provided.
{{convert/sandbox|1|-|5|in|mm|lk=on}}
</pre>
```

Given the above, the tests can be run as shown in the following section.

Instead of specifying the tests with a multiline string, it is possible to assign a table to `p.tests` as shown in the following testcases module.

```
local tests = {
    -- Each test item is of form { template, expected }.
    { '{{convert|12|m}}', '12 metres (39 ft)' },
    { '{{convert/sandbox|0.16|/l|2|disp=table}}', 'align="right"|0.16\n|align="ri
    { '{{age in days|2007|5|24|2008|4|23}}', '335' },
    { '{{convert|12|m|lk=on}}', '12 [[meter|metres]] (39 [[Foot|ft]])' },
    { '{{convert/sandbox|1|-|5|in|mm|lk=on}}' },
}

local p = require('Module:Convert/tester')
p.tests = tests
return p
```

This example provides the same results as the multiline string at "Mixed tests" above.

Running tests from any page

Entering either of the following lines of wikitext in a sandbox or talk page would run the tests found at the specified location. The first line would show all tests on page "Template talk: Example", while the second would show only those tests on that page that are in the "Mixed tests" section.

```
{{#invoke:convert/tester|run_tests|page=Template talk:Example}}
{{#invoke:convert/tester|run_tests|page=Template talk:Example|section=Mixed tests
```

As a demonstration, the following line is used to produce the table shown below, including the comment that starts with three dashes.

```
{{#invoke:convert/tester|run_tests|page=Module:Convert/tester/doc|section=Specify
```

Error

Could not read wikitext from "Module:Convert/tester/doc".

Making expected results

Function `make_tests` can be used to create tests in the format expected by `run_tests`. For example, previewing either of the following in a sandbox would show the results from expanding each template found on the specified page.

```
{{#invoke:convert/tester|make_tests|page=Template talk:Example}}
{{#invoke:convert/tester|make_tests|page=Template talk:Example|show=all}}
```

When using `make_tests`, any expected results in the input are ignored. Instead, the module shows each template and its actual output as plain text which can be copied to make a testcases page. The templates to be processed can be specified by setting `p.tests` or by specifying a page with an optional section.

If `|show=all` is included, any non-template lines are included in the result. The output could then be copied and used to replace the page with the tests in order to update the expected text for each template, but without changing non-template lines.

As a demonstration, the following line is used to produce the text shown below.

```
{{#invoke:convert/tester|make_tests|page=Module:Convert/tester/doc|section=Speci
```

Error

Could not read wikitext from "Module:Convert/tester/doc".

Using show=all

The `|show=all` option can be used with `make_tests` and with `run_tests`.

An example using `make_tests` is shown in the previous section.

Using `|show=all` with `run_tests` allows comment lines to be displayed in the output table—not *all* lines are shown, only those that start with three dashes. For example, the testcases may include the following.

```
Added 12 January 2014.
--- The following tests check the widget option.
{{example|1|2|widget=on}}          ...(expected output)...
```

The table produced by `run_tests` would show "The following tests check the widget option." as a comment line, but only if `|show=all` is used. Comments have a distinctive background color, but also show "Cmnt" in the status column so they can be found by searching.

Comparing a module with its sandbox

When viewing a module, the documentation page is displayed; if the module has a sandbox, the documentation includes "Editors can experiment in this module's sandbox" with a link to diff the module and its sandbox.

The tester module provides a `compare` function which can check a series of modules, and compare each with its sandbox. A table is displayed showing whether the content is different, with a diff link.

For example, the following wikitext could be used.

```
{{#invoke:convert/tester|compare|Example|Example/data}}
```

The names "Example" and "Example/data" do not include a colon (`:`), so "Module:" is assumed. The command compares **Module:Example** with **Module:Example/sandbox**, and **Module:Example/data** with **Module:Example/data/sandbox**.

It is also possible for a module to define pairs of page titles in `p.pairs` (a table), and to use the tester module to generate a table for each pair of titles.

As a convenience, certain keywords are defined. If a keyword is recognized, the list of pairs comes from the module rather than the parameters. For example, the following uses the "convert" keyword to get the list of pairs of pages related to Module:Convert.

```
{{#invoke:convert/tester|compare|convert}}
```

The following text is a sample showing output that may result from the above.

- Module:Convert • Module:Convert/sandbox • different (diff)
- Module:Convert/data • Module:Convert/data/sandbox • same content
- Module:Convert/text • Module:Convert/text/sandbox • different (diff)
- Module:Convert/extra • Module:Convert/extra/sandbox • different (diff)

By default, each output line is prefixed with '*' to give a bulleted list. An alternative prefix can be specified with the `prefix` parameter. For example, the following gives an indented bulleted list.

```
{{#invoke:convert/tester|compare|convert|prefix=:*}}
```

```
-- Test the output from a template by comparing it with fixed text.
-- The expected text must be in a single line, but can include
-- "\n" (two characters) to indicate that a newline is expected.
-- Tests are run (or created) by setting p.tests (string or table), or
-- by setting page=PAGE_TITLE (and optionally section=SECTION_TITLE),
-- then executing run_tests (or make_tests).

local Collection = {}
Collection.__index = Collection
do
        function Collection:add(item)
                if item ~= nil then
                        self.n = self.n + 1
                        self[self.n] = item
                end
        end
        function Collection:join(sep)
                return table.concat(self, sep)
        end
        function Collection.new()
                return setmetatable({n = 0}, Collection)
        end
end

local function empty(text)
        -- Return true if text is nil or empty (assuming a string).
        return text == nil or text == ''
end
```

```
local function strip(text)
	-- Return text with no leading/trailing whitespace.
	return text:match("^%s*(.-)%s*$")
end

local function normalize(text)
	-- Return text with any strip markers normalized by replacing the
	-- unique number with a fixed value so comparisons work.
	return text:gsub('(\127[^\127]*UNIQ[^\127]*%-)(%x\+)(-QINU[^\127]*\127)',
end

local function status_box(stats, expected, actual, iscomment)
	local label, bgcolor, align, isfail
	if iscomment then
		actual = ''
		align = 'center'
		bgcolor = 'silver'
		label = 'Cmnt'
	elseif expected == '' then
		stats.ignored = stats.ignored + 1
		return '', actual
	elseif normalize(expected) == normalize(actual) then
		stats.pass = stats.pass + 1
		actual = ''
		align = 'center'
		bgcolor = 'green'
		label = 'Pass'
	else
		stats.fail = stats.fail + 1
		align = 'center'
		bgcolor = 'red'
		label = 'Fail'
		isfail = true
	end
	local sbox = 'style="text-align:' .. align .. ';color:white;background:'
	return sbox, actual, isfail
end

local function status_text(stats)
	local bgcolor, ignored_text, msg, ttext
	if stats.template then
		ttext = "'''Using [[Template:" .. stats.template .. "]]:''' "
	else
		ttext = ''
	end
	if stats.fail == 0 then
		if stats.pass == 0 then
			bgcolor = 'salmon'
			msg = 'No tests performed'
		else
			bgcolor = 'green'
			msg = string.format('All %d tests passed', stats.pass)
		end
	else
		bgcolor = 'darkred'
		msg = string.format('%d test%s failed', stats.fail, stats.fail ==
	end
	if stats.ignored == 0 then
		ignored_text = ''
	else
		bgcolor = 'salmon'
		ignored_text = string.format(', %d test%s ignored because expecte
	end
```

```
        return ttext .. '<span style="font-size:120%;color:white;background-color
                msg .. ignored_text .. '.</span>'
end

local function run_template(frame, template, args, collapse_multiline)
        -- Template "{{ example |  2  =  def  |  abc  |  name  =  ghi jkl  }}"
        -- gives xargs { "  abc  ", "def", name = "ghi jkl" }.
        if template:sub(1, 2) == '{{' and template:sub(-2, -1) == '}}' then
                template = template:sub(3, -3) .. '|'  -- append sentinel to get
        else
                return '(invalid template)'
        end
        local xargs = {}
        local index = 1
        local templatename
        local function put_arg(k, v)
                -- Kludge: Module:Val uses Module:Arguments which trims arguments
                -- omits blank arguments. Simulate that here.
                -- LATER Need a parameter to control this.
                if templatename:sub(1, 3) == 'val' then
                        v = strip(v)
                        if v == '' then
                                return
                        end
                end
                xargs[k] = v
        end
        template = template:gsub('(%[%[[^%[%]]-)|(.-%]%])', '%1\0%2')  -- replace
        for field in template:gmatch('(.-)|') do
                field = field:gsub('%z', '|')  -- restore pipe in piped link
                if templatename == nil then
                        templatename = args.template or strip(field)
                        if templatename == '' then
                                return '(invalid template)'
                        end
                else
                        local k, eq, v = field:match("^(.-)(=)(.*)$")
                        if eq then
                                k, v = strip(k), strip(v)  -- k and/or v can be e
                                local i = tonumber(k)
                                if i and i > 0 and string.match(k, '^%d+$') then
                                        put_arg(i, v)
                                else
                                        put_arg(k, v)
                                end
                        else
                                while xargs[index] ~= nil do
                                        -- Skip any explicit numbered parameters
                                        index = index + 1
                                end
                                put_arg(index, field)
                        end
                end
        end
        if args.test and not xargs.test then
                -- For convert, allow test=preview or test=nopreview to be inject
                -- the convert under test, if it does not already use that parame
                -- That allows, for example, a preview of make_tests to show nopr
                xargs.test = args.test
        end
        local function expand(t)
                return frame:expandTemplate(t)
        end
        local ok, result = pcall(expand, { title = templatename, args = xargs })
```

```
	if not ok then
		result = 'Error: ' .. result
	end
	if collapse_multiline then
		result = result:gsub('\n', '\\n')
	end
	return result
end

local function _make_tests(frame, all_tests, args)
	local maxlen = 38
	for _, item in ipairs(all_tests) do
		local template = item[1]
		if template then
			local templen = mw.ustring.len(template)
			item.templen = templen
			if maxlen < templen and templen <= 70 then
				maxlen = templen
			end
		end
	end
	local result = Collection.new()
	for _, item in ipairs(all_tests) do
		local template = item[1]
		if template then
			local actual = run_template(frame, template, args, true)
			local pad = string.rep(' ', maxlen - item.templen) .. '
			result:add(template .. pad .. actual)
		else
			local text = item.text
			if text then
				result:add(text)
			end
		end
	end
	-- Pre tags returned by a module are html tags, not like wikitext <pre>.
	return '<pre>\n' .. mw.text.nowiki(result:join('\n')) .. '\n</pre>'
end

local function _run_tests(frame, all_tests, args)
	local function safe_cell(text, multiline)
		-- For testing {{convert}}, want wikitext like '[[kilogram|kg]]'
		-- so the link works and so the displayed text is short (just "kg
		text = text:gsub('(%[%[[^%[%]]-)|(.-%]%])', '%1\0%2')  -- replace
		text = text:gsub('{', '&#123;'):gsub('|', '&#124;')    -- escape
		text = text:gsub('%z', '|')                            -- restore
		if multiline then
			text = text:gsub('\\n', '<br />')
		end
		return text
	end
	local function nowiki_cell(text, multiline)
		text = mw.text.nowiki(text)
		if multiline then
			text = text:gsub('\\n', '<br />')
		end
		return text
	end
	local stats = { pass = 0, fail = 0, ignored = 0, template = args.template
	local result = Collection.new()
	result:add('{| class="wikitable sortable"')
	result:add('! Template !! Expected !! Actual, if different !! Status')
	for _, item in ipairs(all_tests) do
		local template, expected = item[1], item[2] or ''
```

```
                if template then
                        local actual = run_template(frame, template, args, true)
                        local sbox, actual, isfail = status_box(stats, expected,
                        result:add('|-')
                        result:add('| ' .. safe_cell(template))
                        result:add('| ' .. safe_cell(expected, true))
                        result:add('| ' .. safe_cell(actual, true))
                        result:add('| ' .. sbox)
                        if isfail then
                                result:add('|-')
                                result:add('| align="center"| (above, nowiki)')
                                result:add('| ' .. nowiki_cell(normalize(expecte
                                result:add('| ' .. nowiki_cell(normalize(actual)
                                result:add('|')
                        end
                else
                        local text = item.text
                        if text and text:sub(1, 3) == '---' then
                                result:add('|-')
                                result:add('| colspan="3" style="color:white;back
                                result:add('| ' .. status_box(stats, '', '', true
                        end
                end
        end
        result:add('|}')
        return status_text(stats) .. '\n\n' .. result:join('\n')
end

local function get_page_content(page_title, ignore_error)
        local t = mw.title.new(page_title)
        if t then
                local content = t:getContent()
                if content then
                        if content:sub(-1) ~= '\n' then
                                content = content .. '\n'
                        end
                        return content
                end
        end
        if not ignore_error then
                error('Could not read wikitext from "[[' .. page_title .. ']]".',
        end
end

local function _compare(frame, page_pairs)
        local prefix = frame.args.prefix or '*'
        local function diff_link(title1, title2)
                return '<span class="plainlinks">[' ..
                        tostring(mw.uri.fullUrl('Special:ComparePages',
                                { page1 = title1, page2 = title2 })) ..
                        ' diff]</span>'
        end
        local function link(title)
                return '[[' .. title .. ']]'
        end
        local function message(text, isgood)
                local color = isgood and 'green' or 'darkred'
                return '<span style="color:' .. color .. ';">' .. text .. '</span
        end
        local result = Collection.new()
        for _, item in ipairs(page_pairs) do
                local label
                local title1 = item[1]
                local title2 = item[2]
```

```
                if title1 == title2 then
                        label = message('same title', false)
                else
                        local content1 = get_page_content(title1, true)
                        local content2 = get_page_content(title2, true)
                        if not content1 or not content2 then
                                label = message('does not exist', false)
                        elseif content1 == content2 then
                                label = message('same content', true)
                        else
                                label = message('different', false) .. ' (' .. di
                        end
                end
                result:add(prefix .. link(title1) .. ' • ' .. link(title2) .. ' •
        end
        return result:join('\n')
end

local function sections(text)
        return {
                first = 1,  -- just after the newline at the end of the last heac
                this_section = 1,
                next_heading = function(self)
                        local first = self.first
                        while first <= #text do
                                local last, heading
                                first, last, heading = text:find('==+[\t ]*([^\n]
                                if first then
                                        if first == 1 or text:sub(first - 1, firs
                                                self.this_section = first
                                                self.first = last + 1
                                                return heading
                                        end
                                        first = last + 1
                                else
                                        break
                                end
                        end
                        self.first = #text + 1
                        return nil
                end,
                current_section = function(self)
                        local first = self.this_section
                        local last = text:find('\n==[^\n]-==[\t\r ]*\n', first)
                        if not last then
                                last = -1
                        end
                        return text:sub(first, last)
                end,
        }
end

local function get_tests(frame, tests)
        local args = frame.args
        local page_title, section_title = args.page, args.section
        local show_all = (args.show == 'all')
        if not empty(page_title) then
                if not empty(tests) then
                        error('Invoke must not set "page=' .. page_title .. '" i
                end
                if page_title:sub(1, 2) == '[[' and page_title:sub(-2) == ']]' th
                        page_title = strip(page_title:sub(3, -3))
                end
                tests = get_page_content(page_title)
```

```
                if not empty(section_title) then
                        local s = sections(tests)
                        while true do
                                local heading = s:next_heading()
                                if heading then
                                        if heading == section_title then
                                                tests = s:current_section()
                                                break
                                        end
                                else
                                        error('Section "' .. section_title .. '"
                                end
                        end
                end
        end
        if type(tests) ~= 'string' then
                if type(tests) == 'table' then
                        return tests
                end
                error('No tests were specified; see [[Module:Convert/tester/doc]]
        end
        if tests:sub(-1) ~= '\n' then
                tests = tests .. '\n'
        end
        local template_count = 0
        local all_tests = Collection.new()
        for line in (tests):gmatch('([^\n]-)[\t\r ]*\n') do
                local template, expected = line:match('^({{.-}})%s*(.-)%s*$')
                if template then
                        template_count = template_count + 1
                        all_tests:add({ template, expected })
                elseif show_all then
                        all_tests:add({ text = line })
                end
        end
        if template_count == 0 then
                error('No templates found; see [[Module:Convert/tester/doc]].', 0
        end
        return all_tests
end

local function main(frame, p, worker)
        local ok, result = pcall(get_tests, frame, p.tests)
        if ok then
                ok, result = pcall(worker, frame, result, frame.args)
                if ok then
                        return result
                end
        end
        return '<strong class="error">Error</strong>\n\n' .. result
end

local modules = {
        -- For convenience, a key defined here can be used to refer to the
        -- corresponding list of modules.
        countries = {  -- Commons
                'Countries',
                'Countries/Africa',
                'Countries/Americas',
                'Countries/Arab world',
                'Countries/Asia',
                'Countries/Caribbean',
                'Countries/Central America',
                'Countries/Europe',
```

```
                'Countries/North America',
                'Countries/North America (subcontinent)',
                'Countries/Oceania',
                'Countries/South America',
                'Countries/United Kingdom',
        },
        convert = {
                'Convert',
                'Convert/data',
                'Convert/text',
                'Convert/extra',
                'Convert/wikidata',
                'Convert/wikidata/data',
        },
        cs1 = {
                'Citation/CS1',
                'Citation/CS1/Configuration',
        },
        cs1all = {
                'Citation/CS1',
                'Citation/CS1/Configuration',
                'Citation/CS1/Whitelist',
                'Citation/CS1/Date validation',
        },
        team = {
                'Team appearances list',
                'Team appearances list/data',
                'Team appearances list/show',
        },
        val = {
                'Val',
                'Val/units',
        },
}

local p = {}

function p.compare(frame)
        local page_pairs = p.pairs
        if not page_pairs then
                local args = frame.args
                if not args[2] then
                        local builtins = modules[args[1] or 'convert']
                        if builtins then
                                args = builtins
                        end
                end
                page_pairs = {}
                for i, title in ipairs(args) do
                        if not title:find(':', 1, true) then
                                title = 'Module:' .. title
                        end
                        page_pairs[i] = { title, title .. '/sandbox' }
                end
        end
        local ok, result = pcall(_compare, frame, page_pairs)
        if ok then
                return result
        end
        return '<strong class="error">Error</strong>\n\n' .. result
end

p.check_sandbox = p.compare
```

```
function p.make_tests(frame)
	return main(frame, p, _make_tests)
end

function p.run_tests(frame)
	return main(frame, p, _run_tests)
end

return p
```

Modul:Convert/tester/Doku

Dies ist die Dokumentationsseite für Modul:Convert/tester

This module runs unit tests to compare template output with expected text. In addition, the module can output the results of expanding templates.

While intended for testing Module:Convert, the tester should be useful with other templates that require many tests using a simple format for the test input.

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Testcases example

- Module:Convert/sandbox/testcases • templates to be tested, with expected outputs
- Module talk:Convert/sandbox/testcases • view test results

It is not necessary to save the testcases page before viewing test results. For example, Module:Convert/sandbox/testcases could be edited to change the tests. While still editing that page, paste Vorlage:Nowrap (without quotes) into the page title box under "Preview page with this template", then click "Show preview".

The testcases talk page (for example, Module talk:Convert/sandbox/testcases) contains:

```
{{#invoke:convert/sandbox/testcases|run_tests}}
```

The testcases module page (for example, Module:Convert/sandbox/testcases) may contain:

```
local tests = [==[

A template to be tested must be at the start of a line.
Lines which do not start with a template are ignored.
{{convert/sandbox|1|acre|lk=on}}            1 [[acre]] (0.40 [[hectare|ha]])
{{convert/sandbox|1|m2|acres|lk=on}}        1 [[square metre]] (0.00025 [[acre]]s
{{convert/sandbox|0.16|/l|2|disp=table}}    align="right"|0.16\n|align="right"|0.

]==]

local p = require('Module:Convert/tester')
p.tests = tests
return p
```

If wanted, the tests can be run using a template different from the one specified in the tests. For example, the following would run the tests from Module:Convert/sandbox/testcases, but would change the name of each template found on that page to "convert/sandbox2".

```
{{#invoke:convert/sandbox/testcases|run_tests|template=convert/sandbox2}}
```

Format

Tests are extracted from a multiline string. Any line that does not start with a template is ignored. Each processed line starts with a template, and is followed by whitespace, then the wikitext which should result from expanding the template.

The expected output must be entered in a single line. If the template outputs multiple lines, those lines must be joined with "\n" (two characters—backslash n).

The templates do not have to be the same, for example, the following tests would work:

```
local tests = [==[

{{convert|12|m}}                                12 metres (39 ft)
{{convert/sandbox|12|m}}                        12 metres (39 ft)
{{age|1989|7|23|2003|7|14}}                     13
{{age in days|2007|5|24|2008|4|23}}             335

]==]
```

In the results, the status column shows "Pass" if the output from the template exactly matches the expected text. If there is no expected text, the template output is shown in the Actual column with a blank status. If the given expected text differs from the template output, the template output is shown in the Actual column with status "Fail", and the number of fails is shown at the top of the page. Searching the page for "Fail" will find each problem. Any "Fail" result is followed by a row showing the nowiki actual and expected wikitext.

Specifying tests

If using a testcases module (as in the above example), the test text is assigned to `p.tests` before executing `run_tests`.

Alternatively, the test text can be read from any page, or from any section on any page. For example, the following wikitext could be entered in a sandbox:

```
== Mixed tests ==
<pre>
{{convert|12|m}}                                12 metres (39 ft)
{{convert/sandbox|0.16|/l|2|disp=table}}    align="right"|0.16\n|align="right"|0
```

```
{{age in days|2007|5|24|2008|4|23}}         335
--- The following line is incorrect to demonstrate a "fail".
{{convert|12|m|lk=on}}                      12 [[meter|metres]] (39 [[Foot|ft]])
The following line demonstrates the result when no expected text is provided.
{{convert/sandbox|1|-|5|in|mm|lk=on}}
</pre>
```

Given the above, the tests can be run as shown in the following section.

Instead of specifying the tests with a multiline string, it is possible to assign a table to `p.tests` as shown in the following testcases module.

```
local tests = {
    -- Each test item is of form { template, expected }.
    { '{{convert|12|m}}', '12 metres (39 ft)' },
    { '{{convert/sandbox|0.16|/l|2|disp=table}}', 'align="right"|0.16\n|align="ri
    { '{{age in days|2007|5|24|2008|4|23}}', '335' },
    { '{{convert|12|m|lk=on}}', '12 [[meter|metres]] (39 [[Foot|ft]])' },
    { '{{convert/sandbox|1|-|5|in|mm|lk=on}}' },
}

local p = require('Module:Convert/tester')
p.tests = tests
return p
```

This example provides the same results as the multiline string at "Mixed tests" above.

Running tests from any page

Entering either of the following lines of wikitext in a sandbox or talk page would run the tests found at the specified location. The first line would show all tests on page "Template talk: Example", while the second would show only those tests on that page that are in the "Mixed tests" section.

```
{{#invoke:convert/tester|run_tests|page=Template talk:Example}}
{{#invoke:convert/tester|run_tests|page=Template talk:Example|section=Mixed tests
```

As a demonstration, the following line is used to produce the table shown below, including the comment that starts with three dashes.

```
{{#invoke:convert/tester|run_tests|page=Module:Convert/tester/doc|section=Specify
```

Error

Could not read wikitext from "Module:Convert/tester/doc".

Making expected results

Function `make_tests` can be used to create tests in the format expected by `run_tests`. For example, previewing either of the following in a sandbox would show the results from expanding each template found on the specified page.

```
{{#invoke:convert/tester|make_tests|page=Template talk:Example}}
{{#invoke:convert/tester|make_tests|page=Template talk:Example|show=all}}
```

When using `make_tests`, any expected results in the input are ignored. Instead, the module shows each template and its actual output as plain text which can be copied to make a testcases page. The templates to be processed can be specified by setting `p.tests` or by specifying a page with an optional section.

If `|show=all` is included, any non-template lines are included in the result. The output could then be copied and used to replace the page with the tests in order to update the expected text for each template, but without changing non-template lines.

As a demonstration, the following line is used to produce the text shown below.

```
{{#invoke:convert/tester|make_tests|page=Module:Convert/tester/doc|section=Specif
```

Error

Could not read wikitext from "Module:Convert/tester/doc".

Using show=all

The `|show=all` option can be used with `make_tests` and with `run_tests`.

An example using `make_tests` is shown in the previous section.

Using `|show=all` with `run_tests` allows comment lines to be displayed in the output table—not *all* lines are shown, only those that start with three dashes. For example, the testcases may include the following.

```
Added 12 January 2014.
--- The following tests check the widget option.
{{example|1|2|widget=on}}          ...(expected output)...
```

The table produced by `run_tests` would show "The following tests check the widget option." as a comment line, but only if `|show=all` is used. Comments have a distinctive background color, but also show "Cmnt" in the status column so they can be found by searching.

Comparing a module with its sandbox

When viewing a module, the documentation page is displayed; if the module has a sandbox, the documentation includes "Editors can experiment in this module's sandbox" with a link to diff the module and its sandbox.

The tester module provides a `compare` function which can check a series of modules, and compare each with its sandbox. A table is displayed showing whether the content is different, with a diff link.

For example, the following wikitext could be used.

```
{{#invoke:convert/tester|compare|Example|Example/data}}
```

The names "Example" and "Example/data" do not include a colon (`:`), so "Module:" is assumed. The command compares **Module:Example** with **Module:Example/sandbox**, and **Module:Example/data** with **Module:Example/data/sandbox**.

It is also possible for a module to define pairs of page titles in `p.pairs` (a table), and to use the tester module to generate a table for each pair of titles.

As a convenience, certain keywords are defined. If a keyword is recognized, the list of pairs comes from the module rather than the parameters. For example, the following uses the "convert" keyword to get the list of pairs of pages related to Module:Convert.

```
{{#invoke:convert/tester|compare|convert}}
```

The following text is a sample showing output that may result from the above.

- Module:Convert • Module:Convert/sandbox • different (diff)
- Module:Convert/data • Module:Convert/data/sandbox • same content
- Module:Convert/text • Module:Convert/text/sandbox • different (diff)
- Module:Convert/extra • Module:Convert/extra/sandbox • different (diff)

By default, each output line is prefixed with '`*`' to give a bulleted list. An alternative prefix can be specified with the `prefix` parameter. For example, the following gives an indented bulleted list.

```
{{#invoke:convert/tester|compare|convert|prefix=:*}}
```

Modul:Convert/text

This page defines text used by Module:Convert. All documentation (from Module:Convert/doc) is at that module. The text includes messages and categories output by the module, and parameters used as input.

This is a separate module to simplify translation for use on another wiki. For example, see `translation_table` and the other tables in bn:Module:Convert/text. Documentation is at Template:Convert/Transwiki guide.

Any changes should first be tested at Module:Convert/text/sandbox—see Template:Convert/testcases#Sandbox testcases.

```
-- Text used by Module:Convert for enwiki.
-- This is a separate module to simplify translation for use on another wiki.
-- See [[:en:Template:Convert/Transwiki guide]] if copying to another wiki.

-- Some units accept an SI prefix before the unit code, such as "kg" for kilogram
local SIprefixes = {
        -- The prefix field is what the prefix should be, if different from the p
        ['Y'] = { exponent = 24, name = 'yotta',                  },
        ['Z'] = { exponent = 21, name = 'zetta',                  },
        ['E'] = { exponent = 18, name = 'exa'  ,                  },
        ['P'] = { exponent = 15, name = 'peta' ,                  },
        ['T'] = { exponent = 12, name = 'tera' ,                  },
        ['G'] = { exponent =  9, name = 'giga' ,                  },
        ['M'] = { exponent =  6, name = 'mega' ,                  },
        ['k'] = { exponent =  3, name = 'kilo' ,                  },
        ['h'] = { exponent =  2, name = 'hecto',                  },
        ['da']= { exponent =  1, name = 'deca' , name_us = 'deka' },
        ['d'] = { exponent = -1, name = 'deci' ,                  },
        ['c'] = { exponent = -2, name = 'centi',                  },
        ['m'] = { exponent = -3, name = 'milli',                  },
        ['µ'] = { exponent = -6, name = 'micro',                  },  -- key = 'G
        ['μ'] = { exponent = -6, name = 'micro', prefix = 'µ'     },  -- key = 'M
        ['u'] = { exponent = -6, name = 'micro', prefix = 'µ'     },  -- not an S
        ['n'] = { exponent = -9, name = 'nano' ,                  },
        ['p'] = { exponent =-12, name = 'pico' ,                  },
        ['f'] = { exponent =-15, name = 'femto',                  },
        ['a'] = { exponent =-18, name = 'atto' ,                  },
        ['z'] = { exponent =-21, name = 'zepto',                  },
        ['y'] = { exponent =-24, name = 'yocto',                  },
}

-- Some units can be qualified with one of the following prefixes, when linked.
local customary_units = {
        { "US", link = "United States customary units" },
        { "U.S.", link = "United States customary units" },
        { "imperial", link = "Imperial units" },
        { "imp", link = "Imperial units" },
}

-- Names when using engineering notation (a prefix of "eN" where N is a number; e
-- key = { "name", link = "article title", exponent = numeric_key_value }
-- If lk=on and link is defined, the name of the number will appear as a link.
local eng_scales = {
        ["3"]  = { "thousand", exponent = 3 },
```

```
        ["6"]  = { "million", exponent = 6 },
        ["9"]  = { "billion", link = "1000000000 (number)", exponent = 9 },
        ["12"] = { "trillion", link = "1000000000000 (number)", exponent = 12 },
        ["15"] = { "quadrillion", link = "1000000000000000 (number)", exponent =
}

local all_categories = {
        unit = "[[Category:Convert errors]]",
        option = "[[Category:Convert errors]]",
        warning = '[[Category:Convert invalid options]]',
        tracking = '[[Category:Convert tracking]]',
}

-- For some error messages, the following puts the wanted style around
-- each unit code marked like '...%{ft%}...'.
local unitcode_regex = '%%([{}])'
local unitcode_replace = { ['{'] = '"', ['}'] = '"' }  -- no longer need the more

-- All messages that may be displayed if a problem occurs.
local all_messages = {
        -- Message format string: $1=title, $2=text, $3=category, $4=anchor.
        -- Each displayed message starts with "Convert:" so can easily locate by
        cvt_format = '<sup class="noprint Inline-Template" style="white-space:nov
        cvt_format2 = '<sup class="noprint Inline-Template" style="white-space:no
        cvt_format_preview = '<strong class="error">Error in convert: $1 [[Help:C
        -- Each of following messages is a table:
        -- { [1] = 'title',         -- mouseover title text
        --   [2] = 'text',          -- link text displayed in article
        --   [3] = 'category key',  -- key to lookup category in all_categories
        --   [4] = 'anchor',        -- anchor for link to relevant section on hel
        --   regex = gsub_regex,
        --   replace = gsub_table,
        -- }                    Mouseover title text                          Li
        cvt_bad_input      = { 'input "$1" must be a number and unit'       , 'in
        cvt_bad_num        = { 'Value "$1" must be a number'               , 'in
        cvt_big_prec       = { 'Precision "$1" is too large'               , 'pr
        cvt_invalid_num    = { 'Number has overflowed'                     , 'nu
        cvt_no_num         = { 'Needs the number to be converted'          , 'ne
        cvt_no_num2        = { 'Needs another number for a range'          , 'ne
        cvt_bad_altitude   = { '"$1" needs an integer'                     , 'in
        cvt_bad_frac       = { '"$1" needs an integer above 1'             , 'in
        cvt_bad_prec       = { 'Precision "$1" must be an integer'         , 'in
        cvt_bad_sigfig     = { '"$1" needs a positive integer'             , 'in
        cvt_empty_option   = { 'Ignored empty option "$1"'                 , 'em
        cvt_deprecated     = { 'Option "$1" is deprecated'                 , '*'
        cvt_no_spell       = { 'Spelling is not available'                 , 'bu
        cvt_unknown_option = { 'Ignored invalid option "$1"'               , 'in
        cvt_wd_fail        = { 'Unable to access Wikidata'                 , 'wi
        cvt_bad_default    = { 'Unit "$1" has an invalid default'          , 'bu
        cvt_bad_unit       = { 'Unit "$1" is invalid here'                 , 'un
        cvt_no_default     = { 'Unit "$1" has no default output unit'      , 'bu
        cvt_no_unit        = { 'Needs name of unit'                        , 'ne
        cvt_unknown        = { 'Unit name "$1" is not known'               , 'un
        cvt_should_be      = { '$1'                                        , 'an
        cvt_mismatch       = { 'Cannot convert "$1" to "$2"'               , 'un
        cvt_bug_convert    = { 'Bug: Cannot convert between specified units', 'bu
        cvt_lookup         = { 'Unit "$1" is incorrectly defined'          , 'bu
}

-- Text to join input value/unit with output value/unit.
local disp_joins = {
        -- [1]=before output, [2]=after output, [3]=between outputs in a combinat
        -- [wantname] gives default abbr=off
        ["or"]         = { " or "    , "" , " or ", wantname = true },
```

```
        ["sqbr-sp"]    = { " ["      , "]" },
        ["sqbr-nbsp"]  = { " [" , "]" },
        ["comma"]      = { ", "      , "" , ", " },
        ["slash-sp"]   = { " / "     , "" , wantname = true },
        ["slash-nbsp"] = { " / ", "" , wantname = true },
        ["slash-nosp"] = { "/"       , "" , wantname = true },
        ["b"]          = { " ("      , ")" },
        ["(or)"]       = { " ("      , ")", " or " },
        ["br"]         = { "<br />"  , "" , wantname = true },
        ["br()"]       = { "<br />(" , ")", wantname = true },
}

-- Text to separate values in a range.
local range_types = {
        -- Specifying a table requires either:
        -- * "off" and "on" values (for "abbr=off" and "abbr=on"), or
        -- * "input" and "output" values (for LHS and RHS);
        -- other fields are optional.
        -- When "adj=on|abbr=off" applies, spaces in range text are replaced with
        -- With "exception = true", that also occurs with "adj=on|abbr=on".
        -- If "adj" is defined here, that text (unchanged) is used with "adj=on"
        ["+"]      = " + ",
        [","]      = ", ",
        [", and"]  = ", and ",
        [", or"]   = ", or ",
        ["by"]     = " by ",
        ["-"]      = "–",
        ["to about"] = " to about ",
        ["and"]    = { off = " and ", on = " and ", exception = true },
        ["and(-)"] = { input = " and ", output = "–" },
        ["or"]     = { off = " or " , on = " or " , exception = true },
        ["to"]     = { off = " to " , on = " to " , exception = true },
        ["to(-)"]  = { input = " to ", output = "–" },
        ["+/-"]    = { off = " ± ", on = " ± ", adj = " 
        ["by(x)"]  = { input = " by ", output = " × ", out_range_x = true },
        ["x"]      = { off = " by ", on = " × ", abbr_range_x = true },
        ["xx"]     = " × ",
        ["*"]      = "x",
        ["/"]      = " / ",  -- for a table of high/low temperature
}

local range_aliases = {
        -- ["alternative name for a range"] = "standard range name"
        ["–"]        = "-",
        ["&ndash;"]  = "-",
        ["x"]        = "x",
        ["&times;"]  = "x",
        ["±"]        = "+/-",
        ["&plusmn;"] = "+/-",
}

-- Convert accepts range text delimited with whitespace, for example, {{convert|1
-- In addition, the following "words" are accepted without spaces, for example, {
-- Words must be in correct order for searching, for example, 'x' after 'xx'.
local range_words = { '-', '–', 'xx', 'x', '*' }

local ranges = {
        types = range_types,
        aliases = range_aliases,
        words = range_words,
}

-- Valid option names.
local en_option_name = {
```

```
        -- ["local text for option name"] = "en name used in this module"
        ["$"] = "$",
        ["abbr"] = "abbr",
        ["adj"] = "adj",
        ["altitude_ft"] = "altitude_ft",
        ["altitude_m"] = "altitude_m",
        ["comma"] = "comma",
        ["debug"] = "debug",
        ["disp"] = "disp",
        ["frac"] = "frac",
        ["input"] = "input",
        ["lang"] = "lang",
        ["lk"] = "lk",
        ["order"] = "order",
        ["qid"] = "qid",
        ["qual"] = "qual",
        ["qualifier"] = "qual",
        ["round"] = "round",
        ["sigfig"] = "sigfig",
        ["sing"] = "adj",                   -- "sing" is an old alias for "adj"
        ["sortable"] = "sortable",
        ["sp"] = "sp",
        ["spell"] = "spell",
        ["stylein"] = "stylein",
        ["styleout"] = "styleout",
        ["tracking"] = "tracking",
}

-- Valid option values.
-- Convention: parms.opt_xxx refers to an option that is set here
-- (not intended to be set by the template which invokes this module).
-- Example: At enwiki, "abbr" includes:
--     ["values"] = "opt_values"
-- As a result, if the template uses abbr=values, Module:Convert sets:
--     parms["opt_values"] = true
--     parms["abbr"] = nil
-- Therefore parms.abbr will be nil, or will have one of the listed values
-- that do not start with "opt_".
-- An option value of form "xxx?" is the same as "xxx" but shows the input as dep
local en_option_value = {
        ["$"] = 'TEXT',                     -- TEXT should be a currency symbol t
        ["abbr"] = {
                -- ["local text for option value"] = "en value used in this modul
                ["def"] = "",                   -- ignored (some wrapper template
                ["h"] = "on",                   -- abbr=on + use "h" for hand uni
                ["hh"] = "opt_hand_hh",         -- abbr=on + use "hh" for hand un
                ["in"] = "in",                  -- use symbol for LHS unit
                ["none"] = "off",               -- old name for "off"
                ["off"] = "off",                -- use name for all units
                ["on"] = "on",                  -- use symbol for all units
                ["out"] = "out",                -- use symbol for RHS unit (defau
                ["unit"] = "unit",              -- abbr=on but abbreviate units c
                ["values"] = "opt_values",      -- show only input and output num
                ["~"] = "opt_also_symbol",      -- show input unit symbol as well
        },
        ["adj"] = {
                ["mid"] = "opt_adjectival, opt_adj_mid",  -- adj=on with user-spe
                ["off"] = "",                   -- ignored (off is the default)
                ["on"] = "opt_adjectival",      -- unit name is singular and hyph
                ["pre"] = "opt_one_preunit",    -- user-specified text before inp
                ["ri0"] = "opt_ri=0",           -- round input with precision = 0
                ["ri1"] = "opt_ri=1",           -- round input with precision = 1
                ["ri2"] = "opt_ri=2",           -- round input with precision = 2
                ["ri3"] = "opt_ri=3",           -- round input with precision = 3
```

```
        },
        ["altitude_ft"] = 'INTEGER',
        ["altitude_m"] = 'INTEGER',
        ["comma"] = {
                ["5"] = "opt_comma5",           -- only use numsep grouping if 5
                ["gaps"] = "opt_gaps",          -- use gaps, not numsep, to separ
                ["gaps3"] = "opt_gaps, opt_gaps3",  -- group only in threes rathe
                ["off"] = "opt_nocomma",        -- no numsep in input or output
        },
        ["debug"] = {
                ["yes"] = "opt_sortable_debug", -- make the normally hidden sort
        },
        ["disp"] = {
                ["5"] = "opt_round=5?",         -- round output value to nearest
                ["b"] = "b",                    -- join: '(...)'
                ["(or)"] = "(or)",              -- join: '(...)' with 'or' betwee
                ["br"] = "br",                  -- join: '<br />'
                ["br()"] = "br()",              -- join: '<br />(...)'
                ["comma"] = "comma",            -- join: ','
                ["flip"] = "opt_flip",          -- reverse order of input/output
                ["number"] = "opt_output_number_only",  -- display output value
                ["or"] = "or",                  -- join: 'or'
                ["out"] = "opt_output_only",
                ["output number only"] = "opt_output_number_only",
                ["output only"] = "opt_output_only",
                ["preunit"] = "opt_two_preunits",    -- user-specified text befor
                ["sqbr"] = "sqbr",              -- join: '[...]'
                ["table"] = "opt_table",        -- output is suitable for a table
                ["tablecen"] = "opt_tablecen",  -- output is suitable for a table
                ["unit"] = "opt_input_unit_only", -- display input symbol/name (
                ["unit or text"] = "opt_input_unit_only, opt_ignore_error", -- di
                ["unit2"] = "opt_output_unit_only",
                ["x"] = "x",                    -- join: <first>...<second> (user
        },
        ["frac"] = 'INTEGER',
        ["input"] = 'TEXT',                 -- TEXT should be value><space><unit
        ["lang"] = {                        -- language for output digits (both e
                ["en"] = "opt_lang_en",         -- use en digits for numbers, reg
                ["local"] = "opt_lang_local",   -- use local digits for numbers
        },
        ["lk"] = {
                ["in"] = "in",                  -- link LHS unit name or symbol
                ["off"] = "off",                -- do not link: same as default e
                ["on"] = "on",                  -- link all unit names or symbols
                ["out"] = "out",                -- link RHS unit name or symbol
        },
        ["order"] = {
                ["flip"] = "opt_flip",          -- reverse order of input/output
                ["out"] = "opt_order_out",      -- do not show input; instead, us
        },
        ["qid"] = 'TEXT',                   -- TEXT should be a Wikidata Q item i
        ["qual"] = 'TEXT',                  -- TEXT should be a Wikidata Q item i
        ["round"] = {
                ["0.5"] = "opt_round=0.5",      -- round output value to nearest
                ["5"] = "opt_round=5",          -- round output value to nearest
                ["10"] = "opt_round=10",        -- round output value to nearest
                ["25"] = "opt_round=25",        -- round output value to nearest
                ["50"] = "opt_round=50",        -- round output value to nearest
                ["each"] = "opt_round_each",    -- using default precision in a
        },
        ["sigfig"] = 'INTEGER',
        ["sortable"] = {
                ["off"] = "",                   -- ignored (off is the default)
                ["on"] = "opt_sortable_on",     -- output sort key for use in a s
```

```
                ["debug"] = "opt_sortable_on, opt_sortable_debug",  -- |sortable=
        },
        ["sp"] = {
                ["us"] = "opt_sp_us",           -- use U.S. spelling (like "meter
        },
        ["spell"] = {                       -- only English spelling is supported
                ["in"] = "opt_spell_in",        -- spell input value in words
                ["In"] = "opt_spell_in, opt_spell_upper",               -- spell
                ["on"] = "opt_spell_in, opt_spell_out",                 -- spell
                ["On"] = "opt_spell_in, opt_spell_out, opt_spell_upper", -- same;
        },
        ["stylein"] = 'TEXT',
        ["styleout"] = 'TEXT',
        ["tracking"] = 'TEXT',
}

local titles = {
        ["frac"] = "Fraction/styles.css",
        ["sfrac"] = "Sfrac/styles.css",
}

return {
        SIprefixes = SIprefixes,
        all_categories = all_categories,
        all_messages = all_messages,
        currency = { ['$'] = true, ['£'] = true, ['€'] = true, ['₱'] = true, ['']
        customary_units = customary_units,
        disp_joins = disp_joins,
        en_option_name = en_option_name,
        en_option_value = en_option_value,
        eng_scales = eng_scales,
        ranges = ranges,
        titles = titles,
}
```

Modul:Convert/text/Doku

Dies ist die Dokumentationsseite für Modul:Convert/text

This page defines text used by Module:Convert. All documentation (from Module:Convert/doc) is at that module. The text includes messages and categories output by the module, and parameters used as input.

This is a separate module to simplify translation for use on another wiki. For example, see `translation_table` and the other tables in bn:Module:Convert/text. Documentation is at Template:Convert/Transwiki guide.

Any changes should first be tested at Module:Convert/text/sandbox—see Template:Convert/testcases#Sandbox testcases.

Modul:Convert/text/sandbox

This page defines text used by Module:Convert. All documentation (from Module:Convert/doc) is at that module. The text includes messages and categories output by the module, and parameters used as input.

This is a separate module to simplify translation for use on another wiki. For example, see `translation_table` and the other tables in bn:Module:Convert/text. Documentation is at Template:Convert/Transwiki guide.

Any changes should first be tested at Module:Convert/text/sandbox—see Template:Convert/testcases#Sandbox testcases.

```
-- Text used by Module:Convert for enwiki.
-- This is a separate module to simplify translation for use on another wiki.
-- See [[:en:Template:Convert/Transwiki guide]] if copying to another wiki.

-- Some units accept an SI prefix before the unit code, such as "kg" for kilogram
local SIprefixes = {
        -- The prefix field is what the prefix should be, if different from the p
        ['Y'] = { exponent = 24, name = 'yotta',                  },
        ['Z'] = { exponent = 21, name = 'zetta',                  },
        ['E'] = { exponent = 18, name = 'exa'  ,                  },
        ['P'] = { exponent = 15, name = 'peta' ,                  },
        ['T'] = { exponent = 12, name = 'tera' ,                  },
        ['G'] = { exponent =  9, name = 'giga' ,                  },
        ['M'] = { exponent =  6, name = 'mega' ,                  },
        ['k'] = { exponent =  3, name = 'kilo' ,                  },
        ['h'] = { exponent =  2, name = 'hecto',                  },
        ['da']= { exponent =  1, name = 'deca' , name_us = 'deka' },
        ['d'] = { exponent = -1, name = 'deci' ,                  },
        ['c'] = { exponent = -2, name = 'centi',                  },
        ['m'] = { exponent = -3, name = 'milli',                  },
        ['µ'] = { exponent = -6, name = 'micro',                  },  -- key = 'G
        ['μ'] = { exponent = -6, name = 'micro', prefix = 'µ'     },  -- key = 'M
        ['u'] = { exponent = -6, name = 'micro', prefix = 'µ'     },  -- not an S
        ['n'] = { exponent = -9, name = 'nano' ,                  },
        ['p'] = { exponent =-12, name = 'pico' ,                  },
        ['f'] = { exponent =-15, name = 'femto',                  },
        ['a'] = { exponent =-18, name = 'atto' ,                  },
        ['z'] = { exponent =-21, name = 'zepto',                  },
        ['y'] = { exponent =-24, name = 'yocto',                  },
}

-- Some units can be qualified with one of the following prefixes, when linked.
local customary_units = {
        { "US", link = "United States customary units" },
        { "U.S.", link = "United States customary units" },
        { "imperial", link = "Imperial units" },
        { "imp", link = "Imperial units" },
}

-- Names when using engineering notation (a prefix of "eN" where N is a number; e
-- key = { "name", link = "article title", exponent = numeric_key_value }
-- If lk=on and link is defined, the name of the number will appear as a link.
local eng_scales = {
        ["3"]  = { "thousand", exponent = 3 },
```

```
        ["6"]  = { "million", exponent = 6 },
        ["9"]  = { "billion", link = "1000000000 (number)", exponent = 9 },
        ["12"] = { "trillion", link = "1000000000000 (number)", exponent = 12 },
        ["15"] = { "quadrillion", link = "1000000000000000 (number)", exponent =
}

local all_categories = {
        unit = "[[Category:Convert errors]]",
        option = "[[Category:Convert errors]]",
        warning = '[[Category:Convert invalid options]]',
        tracking = '[[Category:Convert tracking]]',
}

-- For some error messages, the following puts the wanted style around
-- each unit code marked like '...%{ft%}...'.
local unitcode_regex = '%%([{}])'
local unitcode_replace = { ['{'] = '"', ['}'] = '"' }  -- no longer need the more

-- All messages that may be displayed if a problem occurs.
local all_messages = {
        -- Message format string: $1=title, $2=text, $3=category, $4=anchor.
        -- Each displayed message starts with "Convert:" so can easily locate by
        cvt_format = '<sup class="noprint Inline-Template" style="white-space:nov
        cvt_format2 = '<sup class="noprint Inline-Template" style="white-space:no
        cvt_format_preview = '<strong class="error">Error in convert: $1 [[Help:C
        -- Each of following messages is a table:
        -- { [1] = 'title',         -- mouseover title text
        --   [2] = 'text',          -- link text displayed in article
        --   [3] = 'category key',  -- key to lookup category in all_categories
        --   [4] = 'anchor',        -- anchor for link to relevant section on hel
        --   regex = gsub_regex,
        --   replace = gsub_table,
        -- }                    Mouseover title text                          Li
        cvt_bad_input      = { 'input "$1" must be a number and unit'       , 'in
        cvt_bad_num        = { 'Value "$1" must be a number'               , 'in
        cvt_big_prec       = { 'Precision "$1" is too large'               , 'pr
        cvt_invalid_num    = { 'Number has overflowed'                     , 'nu
        cvt_no_num         = { 'Needs the number to be converted'          , 'ne
        cvt_no_num2        = { 'Needs another number for a range'          , 'ne
        cvt_bad_altitude   = { '"$1" needs an integer'                     , 'in
        cvt_bad_frac       = { '"$1" needs an integer above 1'             , 'in
        cvt_bad_prec       = { 'Precision "$1" must be an integer'         , 'in
        cvt_bad_sigfig     = { '"$1" needs a positive integer'             , 'in
        cvt_empty_option   = { 'Ignored empty option "$1"'                 , 'em
        cvt_deprecated     = { 'Option "$1" is deprecated'                 , '*'
        cvt_no_spell       = { 'Spelling is not available'                 , 'bu
        cvt_unknown_option = { 'Ignored invalid option "$1"'               , 'in
        cvt_wd_fail        = { 'Unable to access Wikidata'                 , 'wi
        cvt_bad_default    = { 'Unit "$1" has an invalid default'          , 'bu
        cvt_bad_unit       = { 'Unit "$1" is invalid here'                 , 'un
        cvt_no_default     = { 'Unit "$1" has no default output unit'      , 'bu
        cvt_no_unit        = { 'Needs name of unit'                        , 'ne
        cvt_unknown        = { 'Unit name "$1" is not known'               , 'un
        cvt_should_be      = { '$1'                                        , 'an
        cvt_mismatch       = { 'Cannot convert "$1" to "$2"'               , 'un
        cvt_bug_convert    = { 'Bug: Cannot convert between specified units', 'bu
        cvt_lookup         = { 'Unit "$1" is incorrectly defined'          , 'bu
}

-- Text to join input value/unit with output value/unit.
local disp_joins = {
        -- [1]=before output, [2]=after output, [3]=between outputs in a combinat
        -- [wantname] gives default abbr=off
        ["or"]         = { " or "    , "" , " or ", wantname = true },
```

```
        ["sqbr-sp"]    = { " ["      , "]" },
        ["sqbr-nbsp"]  = { " [" , "]" },
        ["comma"]      = { ", "      , "" , ", " },
        ["slash-sp"]   = { " / "     , "" , wantname = true },
        ["slash-nbsp"] = { " / ", "" , wantname = true },
        ["slash-nosp"] = { "/"       , "" , wantname = true },
        ["b"]          = { " ("      , ")" },
        ["(or)"]       = { " ("      , ")", " or " },
        ["br"]         = { "<br />"  , "" , wantname = true },
        ["br()"]       = { "<br />(" , ")", wantname = true },
}

-- Text to separate values in a range.
local range_types = {
        -- Specifying a table requires either:
        -- * "off" and "on" values (for "abbr=off" and "abbr=on"), or
        -- * "input" and "output" values (for LHS and RHS);
        -- other fields are optional.
        -- When "adj=on|abbr=off" applies, spaces in range text are replaced with
        -- With "exception = true", that also occurs with "adj=on|abbr=on".
        -- If "adj" is defined here, that text (unchanged) is used with "adj=on"
        ["+"]      = " + ",
        [","]      = ", ",
        [", and"]  = ", and ",
        [", or"]   = ", or ",
        ["by"]     = " by ",
        ["-"]      = "–",
        ["to about"] = " to about ",
        ["and"]    = { off = " and ", on = " and ", exception = true },
        ["and(-)"] = { input = " and ", output = "–" },
        ["or"]     = { off = " or " , on = " or " , exception = true },
        ["to"]     = { off = " to " , on = " to " , exception = true },
        ["to(-)"]  = { input = " to ", output = "–" },
        ["+/-"]    = { off = " ± ", on = " ± ", adj = " 
        ["by(x)"]  = { input = " by ", output = " × ", out_range_x = true },
        ["x"]      = { off = " by ", on = " × ", abbr_range_x = true },
        ["xx"]     = " × ",
        ["*"]      = "x",
        ["/"]      = " / ",  -- for a table of high/low temperature
}

local range_aliases = {
        -- ["alternative name for a range"] = "standard range name"
        ["–"]        = "-",
        ["&ndash;"]  = "-",
        ["x"]        = "x",
        ["&times;"]  = "x",
        ["±"]        = "+/-",
        ["&plusmn;"] = "+/-",
}

-- Convert accepts range text delimited with whitespace, for example, {{convert|1
-- In addition, the following "words" are accepted without spaces, for example, {
-- Words must be in correct order for searching, for example, 'x' after 'xx'.
local range_words = { '-', '–', 'xx', 'x', '*' }

local ranges = {
        types = range_types,
        aliases = range_aliases,
        words = range_words,
}

-- Valid option names.
local en_option_name = {
```

```
        -- ["local text for option name"] = "en name used in this module"
        ["$"] = "$",
        ["abbr"] = "abbr",
        ["adj"] = "adj",
        ["altitude_ft"] = "altitude_ft",
        ["altitude_m"] = "altitude_m",
        ["comma"] = "comma",
        ["debug"] = "debug",
        ["disp"] = "disp",
        ["frac"] = "frac",
        ["input"] = "input",
        ["lang"] = "lang",
        ["lk"] = "lk",
        ["order"] = "order",
        ["qid"] = "qid",
        ["qual"] = "qual",
        ["qualifier"] = "qual",
        ["round"] = "round",
        ["sigfig"] = "sigfig",
        ["sing"] = "adj",                   -- "sing" is an old alias for "adj"
        ["sortable"] = "sortable",
        ["sp"] = "sp",
        ["spell"] = "spell",
        ["stylein"] = "stylein",
        ["styleout"] = "styleout",
        ["tracking"] = "tracking",
}

-- Valid option values.
-- Convention: parms.opt_xxx refers to an option that is set here
-- (not intended to be set by the template which invokes this module).
-- Example: At enwiki, "abbr" includes:
--     ["values"] = "opt_values"
-- As a result, if the template uses abbr=values, Module:Convert sets:
--     parms["opt_values"] = true
--     parms["abbr"] = nil
-- Therefore parms.abbr will be nil, or will have one of the listed values
-- that do not start with "opt_".
-- An option value of form "xxx?" is the same as "xxx" but shows the input as dep
local en_option_value = {
        ["$"] = 'TEXT',                     -- TEXT should be a currency symbol t
        ["abbr"] = {
                -- ["local text for option value"] = "en value used in this modul
                ["def"] = "",                   -- ignored (some wrapper template
                ["h"] = "on",                   -- abbr=on + use "h" for hand uni
                ["hh"] = "opt_hand_hh",         -- abbr=on + use "hh" for hand un
                ["in"] = "in",                  -- use symbol for LHS unit
                ["none"] = "off",               -- old name for "off"
                ["off"] = "off",                -- use name for all units
                ["on"] = "on",                  -- use symbol for all units
                ["out"] = "out",                -- use symbol for RHS unit (defau
                ["unit"] = "unit",              -- abbr=on but abbreviate units c
                ["values"] = "opt_values",      -- show only input and output num
                ["~"] = "opt_also_symbol",      -- show input unit symbol as well
        },
        ["adj"] = {
                ["mid"] = "opt_adjectival, opt_adj_mid",  -- adj=on with user-spe
                ["off"] = "",                   -- ignored (off is the default)
                ["on"] = "opt_adjectival",      -- unit name is singular and hyph
                ["pre"] = "opt_one_preunit",    -- user-specified text before inp
                ["ri0"] = "opt_ri=0",           -- round input with precision = 0
                ["ri1"] = "opt_ri=1",           -- round input with precision = 1
                ["ri2"] = "opt_ri=2",           -- round input with precision = 2
                ["ri3"] = "opt_ri=3",           -- round input with precision = 3
```

```
        },
        ["altitude_ft"] = 'INTEGER',
        ["altitude_m"] = 'INTEGER',
        ["comma"] = {
                ["5"] = "opt_comma5",           -- only use numsep grouping if 5
                ["gaps"] = "opt_gaps",          -- use gaps, not numsep, to separ
                ["gaps3"] = "opt_gaps, opt_gaps3",  -- group only in threes rathe
                ["off"] = "opt_nocomma",        -- no numsep in input or output r
        },
        ["debug"] = {
                ["yes"] = "opt_sortable_debug", -- make the normally hidden sort
        },
        ["disp"] = {
                ["5"] = "opt_round=5?",         -- round output value to nearest
                ["b"] = "b",                    -- join: '(...)'
                ["(or)"] = "(or)",              -- join: '(...)' with 'or' betwee
                ["br"] = "br",                  -- join: '<br />'
                ["br()"] = "br()",              -- join: '<br />(...)'
                ["comma"] = "comma",            -- join: ','
                ["flip"] = "opt_flip",          -- reverse order of input/output
                ["number"] = "opt_output_number_only",  -- display output value (
                ["or"] = "or",                  -- join: 'or'
                ["out"] = "opt_output_only",
                ["output number only"] = "opt_output_number_only",
                ["output only"] = "opt_output_only",
                ["preunit"] = "opt_two_preunits",    -- user-specified text befor
                ["sqbr"] = "sqbr",              -- join: '[...]'
                ["table"] = "opt_table",        -- output is suitable for a table
                ["tablecen"] = "opt_tablecen",  -- output is suitable for a table
                ["unit"] = "opt_input_unit_only", -- display input symbol/name (r
                ["unit or text"] = "opt_input_unit_only, opt_ignore_error", -- di
                ["unit2"] = "opt_output_unit_only",
                ["x"] = "x",                    -- join: <first>...<second> (user
        },
        ["frac"] = 'INTEGER',
        ["input"] = 'TEXT',                 -- TEXT should be value><space><unit
        ["lang"] = {                        -- language for output digits (both e
                ["en"] = "opt_lang_en",         -- use en digits for numbers, reg
                ["local"] = "opt_lang_local",   -- use local digits for numbers (
        },
        ["lk"] = {
                ["in"] = "in",                  -- link LHS unit name or symbol
                ["off"] = "off",                -- do not link: same as default e
                ["on"] = "on",                  -- link all unit names or symbols
                ["out"] = "out",                -- link RHS unit name or symbol
        },
        ["order"] = {
                ["flip"] = "opt_flip",          -- reverse order of input/output
                ["out"] = "opt_order_out",      -- do not show input; instead, us
        },
        ["qid"] = 'TEXT',                   -- TEXT should be a Wikidata Q item i
        ["qual"] = 'TEXT',                  -- TEXT should be a Wikidata Q item i
        ["round"] = {
                ["0.5"] = "opt_round=0.5",      -- round output value to nearest
                ["5"] = "opt_round=5",          -- round output value to nearest
                ["10"] = "opt_round=10",        -- round output value to nearest
                ["25"] = "opt_round=25",        -- round output value to nearest
                ["50"] = "opt_round=50",        -- round output value to nearest
                ["each"] = "opt_round_each",    -- using default precision in a r
        },
        ["sigfig"] = 'INTEGER',
        ["sortable"] = {
                ["off"] = "",                   -- ignored (off is the default)
                ["on"] = "opt_sortable_on",     -- output sort key for use in a s
```

```
                ["debug"] = "opt_sortable_on, opt_sortable_debug",  -- |sortable=
        },
        ["sp"] = {
                ["us"] = "opt_sp_us",           -- use U.S. spelling (like "meter
        },
        ["spell"] = {                       -- only English spelling is supported
                ["in"] = "opt_spell_in",        -- spell input value in words
                ["In"] = "opt_spell_in, opt_spell_upper",               -- spell
                ["on"] = "opt_spell_in, opt_spell_out",                 -- spell
                ["On"] = "opt_spell_in, opt_spell_out, opt_spell_upper", -- same,
        },
        ["stylein"] = 'TEXT',
        ["styleout"] = 'TEXT',
        ["tracking"] = 'TEXT',
}

local titles = {
        ["frac"] = "Fraction/styles.css",
        ["sfrac"] = "Sfrac/styles.css",
}

return {
        SIprefixes = SIprefixes,
        all_categories = all_categories,
        all_messages = all_messages,
        currency = { ['$'] = true, ['£'] = true, ['€'] = true, ['₱'] = true, ['']
        customary_units = customary_units,
        disp_joins = disp_joins,
        en_option_name = en_option_name,
        en_option_value = en_option_value,
        eng_scales = eng_scales,
        ranges = ranges,
        titles = titles,
}
```

Modul:Convert/text/sandbox/Doku

Dies ist die Dokumentationsseite für Modul:Convert/text/sandbox

This page defines text used by Module:Convert. All documentation (from Module:Convert/doc) is at that module. The text includes messages and categories output by the module, and parameters used as input.

This is a separate module to simplify translation for use on another wiki. For example, see `translation_table` and the other tables in bn:Module:Convert/text. Documentation is at Template:Convert/Transwiki guide.

Any changes should first be tested at Module:Convert/text/sandbox—see Template:Convert/testcases#Sandbox testcases.

Modul:Convert/wikidata

Die Dokumentation für dieses Modul kann unter Modul:Convert/wikidata/Doku erstellt werden

```
-- Functions to access Wikidata for Module:Convert.

local Collection = {}
Collection.__index = Collection
do
	function Collection:add(item)
		if item ~= nil then
			self.n = self.n + 1
			self[self.n] = item
		end
	end
	function Collection:join(sep)
		return table.concat(self, sep)
	end
	function Collection:remove(pos)
		if self.n > 0 and (pos == nil or (0 < pos and pos <= self.n)) the
			self.n = self.n - 1
			return table.remove(self, pos)
		end
	end
	function Collection:sort(comp)
		table.sort(self, comp)
	end
	function Collection.new()
		return setmetatable({n = 0}, Collection)
	end
end

local function strip_to_nil(text)
	-- If text is a non-empty string, return its trimmed content,
	-- otherwise return nothing (empty string or not a string).
	if type(text) == 'string' then
		return text:match('(%S.-)%s*$')
	end
end

local function frequency_unit(value, unit_table)
	-- For use when converting m to Hz.
	-- Return true, s where s = name of unit's default output unit,
	-- or return false, t where t is an error message table.
	-- However, for simplicity a valid result is always returned.
	local unit
	if unit_table._symbol == 'm' then
		-- c = speed of light in a vacuum = 299792458 m/s
		-- frequency = c / wavelength
		local w = value * (unit_table.scale or 1)
		local f = 299792458 / w  -- if w == 0, f = math.huge which works
		if f >= 1e12 then
			unit = 'THz'
		elseif f >= 1e9 then
			unit = 'GHz'
		elseif f >= 1e6 then
			unit = 'MHz'
		elseif f >= 1e3 then
			unit = 'kHz'
		else
```

```
                        unit = 'Hz'
                end
        end
        return true, unit or 'Hz'
end

local function wavelength_unit(value, unit_table)
        -- Like frequency_unit but for use when converting Hz to m.
        local unit
        if unit_table._symbol == 'Hz' then
                -- Using 0.9993 rather than 1 avoids rounding which would give re
                -- like converting 300 MHz to 100 cm instead of 1 m.
                local w = 1 / (value * (unit_table.scale or 1))  -- Hz scale is i
                if w >= 0.9993e6 then
                        unit = 'Mm'
                elseif w >= 0.9993e3 then
                        unit = 'km'
                elseif w >= 0.9993 then
                        unit = 'm'
                elseif w >= 0.9993e-2 then
                        unit = 'cm'
                elseif w >= 0.9993e-3 then
                        unit = 'mm'
                else
                        unit = 'um'
                end
        end
        return true, unit or 'm'
end

local specials = {
        frequency = { frequency_unit },
        wavelength = { wavelength_unit },
        ------------------------------------------------------------------------
        -- Following is a removed experiment to show two values as a range
        -- using '-' as the separator.
        -- frequencyrange = { frequency_unit, '-' },
        -- wavelengthrange = { wavelength_unit, '-' },
}

local function make_unit(units, parms, uid)
        -- Return a unit code for convert or nil if unit unknown.
        -- If necessary, add a dummy unit to parms so convert will use it
        -- for the input without attempting a conversion since nothing
        -- useful is available (for example, with unit volt).
        local unit = units[uid]
        if type(unit) ~= 'table' then
                return nil
        end
        local ucode = unit.ucode
        if ucode and not unit.si then
                return ucode                -- a unit known to convert
        end
        parms.opt_ignore_error = true
        ucode = ucode or unit._ucode    -- must be a non-empty string
        local ukey, utable
        if unit.si then
                local base = units[unit.si]
                ukey = base.symbol          -- must be a non-empty string
                local n1 = base.name1
                local n2 = base.name2
                if not n1 then
                        n1 = ukey
                        n2 = n2 or n1           -- do not append 's'
```

```
                end
                utable = {
                        _symbol = ukey,
                        _name1 = n1,
                        _name2 = n2,
                        link = unit.link or base.link,
                        utype = n1,
                        prefixes = 1,
                }
        else
                ukey = ucode
                utable = {
                        symbol = ucode,         -- must be a non-empty string
                        name1 = unit.name1,     -- if nil, uses symbol
                        name2 = unit.name2,     -- if nil, uses name1..'s'
                        link = unit.link,       -- if nil, uses name1
                        utype = unit.name1 or ucode,
                }
        end
        utable.scale = 1
        utable.default = ''
        utable.defkey = ''
        utable.linkey = ''
        utable.bad_mcode = ''
        parms.unittable = { [ukey] = utable }
        return ucode
end

local function matches_qualifier(statement, qual)
        -- Return:
        --   false, nil : if statement does not match specification
        --   true, nil  : if matches, and statement has no qualifier
        --   true, sq   : if matches, where sq is the statement's qualifier
        -- A match means that no qualifier was specified (qual == nil), or that
        -- the statement has a qualifier matching the specification.
        -- If a match occurs, the caller needs the statement's qualifier (if any)
        -- so statements that duplicate the qualifier are not used, after the fi
        -- Then, if convert is showing all values for a property such as the diam
        -- of a telescope's mirror (diameters of primary and secondary mirrors),
        -- will not show alternative values that could in principle be present fo
        -- same item (telescope) and property (diameter) and qualifier (primary/s
        local target = (statement.qualifiers or {}).P518  -- P518 is "applies to
        if type(target) == 'table' then
                for _, q in ipairs(target) do
                        if type(q) == 'table' then
                                local value = (q.datavalue or {}).value
                                if value then
                                        if qual == nil or qual == value.id then
                                                return true, value.id
                                        end
                                end
                        end
                end
        end
        if qual == nil then
                return true, nil  -- only occurs if statement has no qualifier
        end
        return false, nil  -- statement's qualifier is not relevant because state
end

local function get_statements(parms, pid)
        -- Get specified item and return a list of tables with each statement for
        -- Each table is of form {statqual=sq, stmt=statement} where sq = stateme
        -- Statements are in Wikidata's order except that those with preferred ra
```

```
        -- are first, then normal rank. Any other rank is ignored.
        local stored = {}  -- qualifiers of statements that are first for the qua
        local qid = strip_to_nil(parms.qid)  -- nil for current page's item, or a
        local qual = strip_to_nil(parms.qual)  -- nil or id of wanted P518 (appli
        local result = Collection.new()
        local entity = mw.wikibase.getEntity(qid)
        if type(entity) == 'table' then
                local statements = (entity.claims or {})[pid]
                if type(statements) == 'table' then
                        for _, rank in ipairs({ 'preferred', 'normal' }) do
                                for _, statement in ipairs(statements) do
                                        if type(statement) == 'table' and rank ==
                                                local is_match, statqual = matche
                                                if is_match then
                                                        result:add({ statqual = s
                                                end
                                        end
                                end
                        end
                end
        end
        return result
end

local function input_from_property(tdata, parms, pid)
        -- Given that pid is a Wikidata property identifier like 'P123',
        -- return a collection of {amount, ucode} pairs (two strings)
        -- for each matching item/property, or return nothing.
        ------------------------------------------------------------------------
        -- There appear to be few restrictions on how Wikidata is organized so it
        -- very likely that any decision a module makes about how to handle data
        -- will be wrong for some cases at some time. This meets current requirem
        -- For each qualifier (or if no qualifier), if there are any preferred
        -- statements, use them and ignore any normal statements.
        -- For each qualifier, for the preferred statements if any, or for
        -- the normal statements (but not both):
        -- * Accept each statement if it has no qualifier (this will not occur
        --   if qual=x is specified because other code already ensures that in th
        --   case, only statements with a qualifier matching x are considered).
        -- * Ignore any statements after the first if it has a qualifier.
        -- The rationale is that for the diameter at [[South Pole Telescope]], wa
        -- convert to show the diameters for both the primary and secondary mirro
        -- if the convert does not specify which diameter is wanted.
        -- However, if convert is given the wanted qualifier, only one value
        -- (_the_ diameter) is wanted. For simplicity/consistency, that is also d
        -- even if no qual=x is specified. Unclear what should happen.
        -- For the wavelength at [[Nançay Radio Telescope]], want to show all thr
        -- values, and the values have no qualifiers.
        ------------------------------------------------------------------------
        local result = Collection.new()
        local done = {}
        local skip_normal
        for _, t in ipairs(get_statements(parms, pid)) do
                local statement = t.stmt
                if statement.mainsnak and statement.mainsnak.datatype == 'quantit
                        local value = (statement.mainsnak.datavalue or {}).value
                        if value then
                                local amount = value.amount
                                if amount then
                                        amount = tostring(amount)  -- in case amo
                                        if amount:sub(1, 1) == '+' then
                                                amount = amount:sub(2)
                                        end
                                        local unit = value.unit
```

```
                                        if type(unit) == 'string' then
                                                unit = unit:match('Q%d+$')  -- ur
                                                local ucode = make_unit(tdata.wik
                                                if ucode then
                                                        local skip
                                                        if t.statqual then
                                                                if done[t.statqua
                                                                        skip = tr
                                                                else
                                                                        done[t.st
                                                                end
                                                        else
                                                                if statement.rank
                                                                        skip_norm
                                                                elseif skip_norma
                                                                        skip = tr
                                                                end
                                                        end
                                                        if not skip then
                                                                result:add({ amou
                                                        end
                                                end
                                        end
                                end
                        end
                end
        end
        return result
end

local function input_from_text(tdata, parms, text, insert2)
        -- Given string should be of form "<value><space><unit>" or
        -- "<value1><space>ft<space><value2><space>in" for a special case (feet a
        -- Return true if values/units were extracted and inserted, or return not
        text = text:gsub(' ', ' '):gsub('%s+', ' ')
        local pos = text:find(' ', 1, true)
        if pos then
                -- Leave checking of value to convert which can handle fractions.
                local value = text:sub(1, pos - 1)
                local uid = text:sub(pos + 1)
                if uid:sub(1, 3) == 'ft ' and uid:sub(-3) == ' in' then
                        -- Special case for enwiki to allow {{convert|input=5 ft
                        insert2(uid:sub(4, -4), 'in')
                        insert2(value, 'ft')
                else
                        insert2(value, make_unit(tdata.wikidata_units, parms, uid
                end
                return true
        end
end

local function adjustparameters(tdata, parms, index)
        -- For Module:Convert, adjust parms (a table of {{convert}} parameters).
        -- Return true if successful or return false, t where t is an error messa
        -- This is intended mainly for use in infoboxes where the input might be
        --    <value><space><unit>    or
        --    <wikidata-property-id>
        -- If successful, insert values and units in parms, before given index.
        local text = parms.input  -- should be a trimmed, non-empty string
        local pid = text:match('^P%d+$')
        local sep = ','
        local special = specials[parms[index]]
        if special then
                parms.out_unit = special[1]
```

```
                sep = special[2] or sep
                table.remove(parms, index)
        end
        local function quit()
                return false, pid and { 'cvt_no_output' } or { 'cvt_bad_input', t
        end
        local function insert2(first, second)
                table.insert(parms, index, second)
                table.insert(parms, index, first)
        end
        if pid then
                parms.input_text = ''  -- output an empty string if an error occu
                local result = input_from_property(tdata, parms, pid)
                if result.n == 0 then
                        return quit()
                end
                local ucode
                for i, t in ipairs(result) do
                        -- Convert requires each input unit to be identical.
                        if i == 1 then
                                ucode = t[2]
                        elseif ucode ~= t[2] then
                                return quit()
                        end
                end
                local item = ucode
                if item == parms[index] then
                        -- Remove specified output unit if it is the same as the
                        -- For example, {{convert|input=P2044|km}} with property
                        table.remove(parms, index)
                end
                for i = result.n, 1, -1 do
                        insert2(result[i][1], item)
                        item = sep
                end
                return true
        else
                if input_from_text(tdata, parms, text, insert2) then
                        return true
                end
        end
        return quit()
end

-------------------------------------------------------------------------------
--- List units and check syntax of definitions --------------------------------
-------------------------------------------------------------------------------
local specifications = {
        -- seq = sequence in which fields are displayed
        base = {
                title = 'SI base units',
                fields = {
                        symbol = { seq = 2, mandatory = true },
                        name1  = { seq = 3, mandatory = true },
                        name2  = { seq = 4 },
                        link   = { seq = 5 },
                },
                noteseq = 6,
                header = '{| class="wikitable"\n!si !!symbol !!name1 !!name2 !!li
                item = '|-\n|%s ||%s ||%s ||%s ||%s ||%s',
                footer = '|}',
        },
        alias = {
                title = 'Aliases for convert',
```

```
                fields = {
                        ucode  = { seq = 2, mandatory = true },
                        si     = { seq = 3 },
                },
                noteseq = 4,
                header = '{| class="wikitable"\n!alias !!ucode !!base !!note',
                item = '|-\n|%s ||%s ||%s ||%s',
                footer = '|}',
        },
        known = {
                title = 'Units known to convert',
                fields = {
                        ucode  = { seq = 2, mandatory = true },
                        label  = { seq = 3, mandatory = true },
                },
                noteseq = 4,
                header = '{| class="wikitable"\n!qid !!ucode !!label !!note',
                item = '|-\n|%s ||%s ||%s ||%s',
                footer = '|}',
        },
        unknown = {
                title = 'Units not known to convert',
                fields = {
                        _ucode = { seq = 2, mandatory = true },
                        si     = { seq = 3 },
                        name1  = { seq = 4 },
                        name2  = { seq = 5 },
                        link   = { seq = 6 },
                        label  = { seq = 7, mandatory = true },
                },
                noteseq = 8,
                header = '{| class="wikitable"\n!qid !!_ucode !!base !!name1 !!na
                item = '|-\n|%s ||%s ||%s ||%s ||%s ||%s ||%s',
                footer = '|}',
        },
}

local function listunits(tdata, ulookup)
        -- For Module:Convert, make wikitext to list the built-in Wikidata units
        -- Return true, wikitext if successful or return false, t where t is an
        -- error message table. Currently, an error return never occurs.
        -- The syntax of each unit definition is checked and a note is added if
        -- a problem is detected.
        local function safe_cells(t)
                -- This is not currently needed, but in case definitions ever use
                -- like '[[kilogram|kg]]', escape the text so it works in a table
                local result = {}
                for i, v in ipairs(t) do
                        if v:find('|', 1, true) then
                                v = v:gsub('(%[%[[^%[%]]-)|(.-%]%])', '%1\0%2')
                                v = v:gsub('|', '&#124;')
                                v = v:gsub('%z', '|')
                        end
                        result[i] = v:gsub('{', '&#123;')                    -- e
                end
                return unpack(result)
        end
        local wdunits = tdata.wikidata_units
        local speckeys = { 'base', 'alias', 'unknown', 'known' }
        for _, sid in ipairs(speckeys) do
                specifications[sid].units = Collection.new()
        end
        local keys = Collection.new()
        for k, v in pairs(wdunits) do
```

```
                keys:add(k)
        end
        table.sort(keys)
        local note_count = 0
        for _, key in ipairs(keys) do
                local unit = wdunits[key]
                local ktext, sid
                if key:match('^Q%d+$') then
                        ktext = '[[d:' .. key .. '|' .. key .. ']]'
                        if unit.ucode then
                                sid = 'known'
                        else
                                sid = 'unknown'
                        end
                elseif unit.ucode then
                        ktext = key
                        sid = 'alias'
                else
                        ktext = key
                        sid = 'base'
                end
                local result = { ktext }
                local spec = specifications[sid]
                local fields = spec.fields
                local note = Collection.new()
                for k, v in pairs(unit) do
                        if fields[k] then
                                local seq = fields[k].seq
                                if result[seq] then
                                        note:add('duplicate ' .. k)  -- cannot ha
                                else
                                        result[seq] = v
                                end
                        else
                                note:add('invalid ' .. k)
                        end
                end
                for k, v in pairs(fields) do
                        local value = result[v.seq]
                        if value then
                                if k == 'si' and not wdunits[value] then
                                        note:add('need si ' .. value)
                                end
                                if k == 'label' then
                                        local wdl = mw.wikibase.getLabel(key)
                                        if wdl ~= value then
                                                note:add('label changed to ' .. t
                                        end
                                end
                        else
                                result[v.seq] = ''
                                if v.mandatory then
                                        note:add('missing ' .. k)
                                end
                        end
                end
                local text
                if note.n > 0 then
                        note_count = note_count + 1
                        text = '*' .. note:join('<br />')
                end
                result[spec.noteseq] = text or ''
                spec.units:add(result)
        end
```

```
        local results = Collection.new()
        if note_count > 0 then
                local text = note_count .. (note_count == 1 and ' note' or ' note
                results:add("'''Search for * to see " .. text .. "'''\n")
        end
        for _, sid in ipairs(speckeys) do
                local spec = specifications[sid]
                results:add("''''" .. spec.title .. "''''")
                results:add(spec.header)
                local fmt = spec.item
                for _, unit in ipairs(spec.units) do
                        results:add(string.format(fmt, safe_cells(unit)))
                end
                results:add(spec.footer)
        end
        return true, results:join('\n')
end

return { _adjustparameters = adjustparameters, _listunits = listunits }
```

Modul:Convert/wikidata/data

Die Dokumentation für dieses Modul kann unter Modul:Convert/wikidata/data/Doku erstellt werden

```
--[[ Cache of Wikidata information with units for Module:Convert.
The codes should rarely change, and using a cache means that changing a
unit at Wikidata will not cause lots of converts in articles to break.

For a unit known to convert, the unit here must have:
        label = Wikidata label for unit (used only when listing units)
        ucode = unit code for input to convert
        (there are no optional fields because convert handles everything)

For a unit not known to convert, the unit here must have:
        label = Wikidata label for unit (used only when listing units)
        (no ucode field)
        _ucode = unit code for input to convert, and the
                 symbol used to display the unit when abbr=on
        (convert will use the specified fields to display the unit,
        and will not attempt to do a conversion)

For a unit not known to convert, the unit here may have:
        name1 = singular name used to display the unit when abbr=off
        name2 = plural name used to display the unit when abbr=off
        link = name of article that unit will be linked to when lk=on
        si = key for the SI base unit, if any

The base unit for each SI unit here must have:
        symbol = symbol used to display the base unit when abbr=on
        name1 = singular name of base unit used to display the unit when abbr=off
        (if name1 is not given, symbol will be used, but an SI unit should have a

The base unit for each SI unit here may have:
        name2 = plural name of base unit used to display the unit when abbr=off
        link = name of article that unit will be linked to when lk=on
               (applies for all SI units using this base, where the
                   SI unit does not define its own link field)

If name1 is not specified, the symbol is used for the name.
If name2 is not specified, a plural name is formed by appending 's' to name1.
If link is not specified, name1 is used for the link.

SI units are assumed to be simple items like V (volt) where 'mV' would
cause convert to insert:
        'm' before the base symbol 'V' to make 'mV', if abbr=on
        'milli' before the base name 'volt' to make 'millivolt', if abbr=off
A unit like "square meter" would not work because it needs an SI prefix
inserted before "meter" rather than at the beginning of the name.

Items that should not be used with convert as no precise unit is implied:
Q11247037  ton          generic (cannot use)
Q178413    gallon       generic
Q130964    calorie      dubious (ambiguous, should not use)
Q216658    bushel       dubious
Q420266    fluid ounce  dubious
]]

local wikidata_units = {
```

```
	-- Following are SI base units.
	A = {
		symbol = 'A',
		name1 = 'ampere',
	},
	F = {
		symbol = 'F',
		name1 = 'faraday',
	},
	H = {
		symbol = 'H',
		name1 = 'henry',
	},
	V = {
		symbol = 'V',
		name1 = 'volt',
	},
	-- Following are aliases to convert unit codes, used with "input=<value><
	kilograms = {
		ucode = 'kg',
	},
	-- Following are SI units not known to convert, used with "input=<value><
	kV = {
		ucode = 'kV',
		si = 'V',
	},
	mV = {
		ucode = 'mV',
		si = 'V',
	},
	-- Following are Wikidata units.
	Q131255 = {
		label = 'farad',
		_ucode = 'F',
		si = 'F',
	},
	Q163354 = {
		label = 'henry',
		_ucode = 'H',
		si = 'H',
	},
	Q1916026 = {
		label = 'microvolt',
		_ucode = 'uV',
		si = 'V',
	},
	Q193933 = {
		label = 'dioptre',
		name1 = 'dioptre',
		_ucode = 'dpt',
	},
	Q212120 = {
		label = 'ampere hour',
		name1 = 'ampere hour',
		_ucode = 'A·h',
	},
	Q2448803 = {
		label = 'millivolt',
		_ucode = 'mV',
		si = 'V',
	},
	Q2451296 = {
		label = 'microfarad',
		_ucode = 'uF',
```

```
		si = 'F',
	},
	Q2490574 = {
		label = 'milliampere',
		_ucode = 'mA',
		si = 'A',
	},
	Q25250 = {
		label = 'volt',
		_ucode = 'V',
		si = 'V',
	},
	Q25272 = {
		label = 'ampere',
		_ucode = 'A',
		si = 'A',
	},
	Q2553708 = {
		label = 'megavolt',
		_ucode = 'MV',
		si = 'V',
	},
	Q2554092 = {
		label = 'kilovolt',
		_ucode = 'kV',
		si = 'V',
	},
	Q2636421 = {
		label = 'nanohenry',
		_ucode = 'nH',
		si = 'H',
	},
	Q2679083 = {
		label = 'microhenry',
		_ucode = 'uH',
		si = 'H',
	},
	Q2682463 = {
		label = 'nanofarad',
		_ucode = 'nF',
		si = 'F',
	},
	Q2756030 = {
		label = 'picofarad',
		_ucode = 'pF',
		si = 'F',
	},
	Q2793566 = {
		label = 'gigavolt',
		_ucode = 'GV',
		si = 'V',
	},
	Q2924137 = {
		label = 'millihenry',
		_ucode = 'mH',
		si = 'H',
	},
	Q3117809 = {
		label = 'microampere',
		_ucode = 'uA',
		si = 'A',
	},
	Q33680 = {
		label = 'radian',
```

```
                name1 = 'radian',
                _ucode = 'rad',
        },
        Q4456994 = {
                label = 'millifarad',
                _ucode = 'mF',
                si = 'F',
        },
        Q47083 = {
                label = 'ohm',
                name1 = 'ohm',
                _ucode = 'Ω',
        },
        Q483261 = {
                label = 'dalton',
                name1 = 'dalton',
                _ucode = 'u',
        },
        Q550341 = {
                label = 'volt-ampere',
                name1 = 'volt-ampere',
                _ucode = 'VA',
        },
        Q100995 = {
                label = 'pound',
                ucode = 'lb',
        },
        Q1022113 = {
                label = 'cubic centimetre',
                ucode = 'cc',
        },
        Q102573 = {
                label = 'becquerel',
                ucode = 'Bq',
        },
        Q103246 = {
                label = 'sievert',
                ucode = 'Sv',
        },
        Q1050958 = {
                label = 'inch of mercury',
                ucode = 'inHg',
        },
        Q1051665 = {
                label = 'metre per second squared',
                ucode = 'm/s2',
        },
        Q1052397 = {
                label = 'rad',
                ucode = 'rad',
        },
        Q1054140 = {
                label = 'megametre',
                ucode = 'Mm',
        },
        Q1057069 = {
                label = 'hectogram',
                ucode = 'hg',
        },
        Q1063786 = {
                label = 'square inch',
                ucode = 'sqin',
        },
        Q1092296 = {
```

```
                label = 'annum',
                ucode = 'year',
        },
        Q11570 = {
                label = 'kilogram',
                ucode = 'kg',
        },
        Q11573 = {
                label = 'metre',
                ucode = 'm',
        },
        Q11574 = {
                label = 'second',
                ucode = 's',
        },
        Q11579 = {
                label = 'kelvin',
                ucode = 'K',
        },
        Q11582 = {
                label = 'litre',
                ucode = 'litre',
        },
        Q1165588 = {
                label = 'rod',
                ucode = 'rod',
        },
        Q1165799 = {
                label = 'thou',
                ucode = 'thou',
        },
        Q11776930 = {
                label = 'megagram',
                ucode = 'Mg',
        },
        Q11929860 = {
                label = 'kiloparsec',
                ucode = 'kpc',
        },
        Q1194225 = {
                label = 'pound-force',
                ucode = 'lbf',
        },
        Q12129 = {
                label = 'parsec',
                ucode = 'pc',
        },
        Q12438 = {
                label = 'newton',
                ucode = 'N',
        },
        Q1255620 = {
                label = 'dram',
                ucode = 'drachm',
        },
        Q12874593 = {
                label = 'watt-hour',
                ucode = 'W.h',
        },
        Q128822 = {
                label = 'knot',
                ucode = 'kn',
        },
        Q1374438 = {
```

```
                label = 'kilosecond',
                ucode = 'ks',
        },
        Q1377051 = {
                label = 'gigasecond',
                ucode = 'Gs',
        },
        Q14754979 = {
                label = 'zettagram',
                ucode = 'Zg',
        },
        Q14786969 = {
                label = 'megajoule',
                ucode = 'MJ',
        },
        Q14787261 = {
                label = 'megawatt hour',
                ucode = 'MW.h',
        },
        Q1550511 = {
                label = 'square yard',
                ucode = 'sqyd',
        },
        Q160857 = {
                label = 'metric horsepower',
                ucode = 'hp',
        },
        Q1628990 = {
                label = 'horsepower-hour',
                ucode = 'hph',
        },
        Q163343 = {
                label = 'tesla',
                ucode = 'T',
        },
        Q1645498 = {
                label = 'microgram',
                ucode = 'ug',
        },
        Q17087835 = {
                label = 'cuerda',
                ucode = 'cda',
        },
        Q174728 = {
                label = 'centimetre',
                ucode = 'cm',
        },
        Q174789 = {
                label = 'millimetre',
                ucode = 'mm',
        },
        Q175821 = {
                label = 'micrometre',
                ucode = 'um',
        },
        Q1770733 = {
                label = 'teragram',
                ucode = 'Tg',
        },
        Q1772386 = {
                label = 'decigram',
                ucode = 'dg',
        },
        Q177493 = {
```

```
                label = 'gauss',
                ucode = 'G',
        },
        Q1777507 = {
                label = 'femtosecond',
                ucode = 'fs',
        },
        Q177974 = {
                label = 'standard atmosphere',
                ucode = 'atm',
        },
        Q178674 = {
                label = 'nanometre',
                ucode = 'nm',
        },
        Q180154 = {
                label = 'kilometre per hour',
                ucode = 'km/h',
        },
        Q180892 = {
                label = 'solar mass',
                ucode = 'solar mass',
        },
        Q1811 = {
                label = 'astronomical unit',
                ucode = 'au',
        },
        Q1815100 = {
                label = 'centilitre',
                ucode = 'cl',
        },
        Q182098 = {
                label = 'kilowatt hour',
                ucode = 'kW.h',
        },
        Q1823150 = {
                label = 'microwatt',
                ucode = 'uW',
        },
        Q182429 = {
                label = 'metre per second',
                ucode = 'm/s',
        },
        Q1826195 = {
                label = 'decilitre',
                ucode = 'dl',
        },
        Q185078 = {
                label = 'are',
                ucode = 'a',
        },
        Q185153 = {
                label = 'erg',
                ucode = 'erg',
        },
        Q185648 = {
                label = 'torr',
                ucode = 'Torr',
        },
        Q190095 = {
                label = 'gray',
                ucode = 'Gy',
        },
        Q191118 = {
```

```
                label = 'tonne',
                ucode = 'tonne',
        },
        Q1913097 = {
                label = 'femtogram',
                ucode = 'fg',
        },
        Q192274 = {
                label = 'picometre',
                ucode = 'pm',
        },
        Q1972579 = {
                label = 'poundal',
                ucode = 'pdl',
        },
        Q200323 = {
                label = 'decimetre',
                ucode = 'dm',
        },
        Q201933 = {
                label = 'dyne',
                ucode = 'dyn',
        },
        Q2029519 = {
                label = 'hectolitre',
                ucode = 'hl',
        },
        Q2051195 = {
                label = 'gigawatt hour',
                ucode = 'GW.h',
        },
        Q207488 = {
                label = 'Rankine scale',
                ucode = 'R',
        },
        Q208788 = {
                label = 'femtometre',
                ucode = 'fm',
        },
        Q2101 = {
                label = 'elementary charge',
                ucode = 'e',
        },
        Q21014455 = {
                label = 'metre per minute',
                ucode = 'm/min',
        },
        Q21062777 = {
                label = 'megapascal',
                ucode = 'MPa',
        },
        Q21064807 = {
                label = 'kilopascal',
                ucode = 'kPa',
        },
        Q211256 = {
                label = 'mile per hour',
                ucode = 'mph',
        },
        Q21178489 = {
                label = 'barrels per day',
                ucode = 'oilbbl/d',
        },
        Q2143992 = {
```

```
                label = 'kilohertz',
                ucode = 'kHz',
        },
        Q21467992 = {
                label = 'cubic foot per second',
                ucode = 'cuft/s',
        },
        Q215571 = {
                label = 'newton metre',
                ucode = 'Nm',
        },
        Q216795 = {
                label = 'dunam',
                ucode = 'dunam',
        },
        Q216880 = {
                label = 'kilogram-force',
                ucode = 'kgf',
        },
        Q18413919 = {
                label = 'centimetre per second',
                ucode = 'cm/s',
        },
        Q218593 = {
                label = 'inch',
                ucode = 'in',
        },
        Q2282891 = {
                label = 'microlitre',
                ucode = 'ul',
        },
        Q2282906 = {
                label = 'nanogram',
                ucode = 'ng',
        },
        Q229354 = {
                label = 'curie',
                ucode = 'Ci',
        },
        Q232291 = {
                label = 'square mile',
                ucode = 'sqmi',
        },
        Q2332346 = {
                label = 'millilitre',
                ucode = 'ml',
        },
        Q23387 = {
                label = 'week',
                ucode = 'week',
        },
        Q23823681 = {
                label = 'terawatt',
                ucode = 'TW',
        },
        Q23925410 = {
                label = 'gallon (UK)',
                ucode = 'impgal',
        },
        Q23925413 = {
                label = 'gallon (US)',
                ucode = 'USgal',
        },
        Q2438073 = {
```

```
                label = 'attogram',
                ucode = 'ag',
        },
        Q2474258 = {
                label = 'millisievert',
                ucode = 'mSv',
        },
        Q2483628 = {
                label = 'attosecond',
                ucode = 'as',
        },
        Q2489298 = {
                label = 'square centimetre',
                ucode = 'cm2',
        },
        Q2518569 = {
                label = 'nanosievert',
                ucode = 'nSv',
        },
        Q25235 = {
                label = 'hour',
                ucode = 'h',
        },
        Q25236 = {
                label = 'watt',
                ucode = 'W',
        },
        Q25267 = {
                label = 'degree Celsius',
                ucode = 'C',
        },
        Q25269 = {
                label = 'joule',
                ucode = 'J',
        },
        Q253276 = {
                label = 'mile',
                ucode = 'mi',
        },
        Q25343 = {
                label = 'square metre',
                ucode = 'm2',
        },
        Q25406 = {
                label = 'coulomb',
                ucode = 'coulomb',
        },
        Q25517 = {
                label = 'cubic metre',
                ucode = 'm3',
        },
        Q260126 = {
                label = 'Roentgen equivalent man',
                ucode = 'rem',
        },
        Q2612219 = {
                label = 'petagram',
                ucode = 'Pg',
        },
        Q2619500 = {
                label = 'foe',
                ucode = 'foe',
        },
        Q2637946 = {
```

```
                label = 'decalitre',
                ucode = 'dal',
        },
        Q2655272 = {
                label = 'exagram',
                ucode = 'Eg',
        },
        Q2691798 = {
                label = 'centigram',
                ucode = 'cg',
        },
        Q2739114 = {
                label = 'microsievert',
                ucode = 'uSv',
        },
        Q2799294 = {
                label = 'gigagram',
                ucode = 'Gg',
        },
        Q3013059 = {
                label = 'kiloannum',
                ucode = 'millennium',
        },
        Q305896 = {
                label = 'dots per inch',
                ucode = 'dpi',
        },
        Q3207456 = {
                label = 'milliwatt',
                ucode = 'mW',
        },
        Q3221356 = {
                label = 'yoctometre',
                ucode = 'ym',
        },
        Q3239557 = {
                label = 'picogram',
                ucode = 'pg',
        },
        Q3241121 = {
                label = 'milligram',
                ucode = 'mg',
        },
        Q3267417 = {
                label = 'terametre',
                ucode = 'Tm',
        },
        Q3270676 = {
                label = 'zeptometre',
                ucode = 'zm',
        },
        Q3276763 = {
                label = 'gigahertz',
                ucode = 'GHz',
        },
        Q3277907 = {
                label = 'exametre',
                ucode = 'Em',
        },
        Q3277915 = {
                label = 'zettametre',
                ucode = 'Zm',
        },
        Q3277919 = {
```

```
                label = 'petametre',
                ucode = 'Pm',
        },
        Q3312063 = {
                label = 'femtolitre',
                ucode = 'fl',
        },
        Q3320608 = {
                label = 'kilowatt',
                ucode = 'kW',
        },
        Q3332822 = {
                label = 'megaton of TNT',
                ucode = 'Mt(TNT)',
        },
        Q35852 = {
                label = 'hectare',
                ucode = 'ha',
        },
        Q3675550 = {
                label = 'cubic millimetre',
                ucode = 'mm3',
        },
        Q3710 = {
                label = 'foot',
                ucode = 'ft',
        },
        Q3773454 = {
                label = 'megaparsec',
                ucode = 'Mpc',
        },
        Q3902688 = {
                label = 'picolitre',
                ucode = 'pl',
        },
        Q3902709 = {
                label = 'picosecond',
                ucode = 'ps',
        },
        Q39369 = {
                label = 'hertz',
                ucode = 'Hz',
        },
        Q3972226 = {
                label = 'kilolitre',
                ucode = 'kl',
        },
        Q4068266 = {
                label = "apothecaries' drachm",
                ucode = 'drachm',
        },
        Q41803 = {
                label = 'gram',
                ucode = 'g',
        },
        Q4220561 = {
                label = 'kilometre per second',
                ucode = 'km/s',
        },
        Q42289 = {
                label = 'degree Fahrenheit',
                ucode = 'F',
        },
        Q4243638 = {
```

```
                label = 'cubic kilometre',
                ucode = 'km3',
        },
        Q44395 = {
                label = 'pascal',
                ucode = 'Pa',
        },
        Q48013 = {
                label = 'ounce',
                ucode = 'oz',
        },
        Q482798 = {
                label = 'yard',
                ucode = 'yd',
        },
        Q4989854 = {
                label = 'kilojoule',
                ucode = 'kJ',
        },
        Q4992853 = {
                label = 'kiloton of TNT',
                ucode = 'kt(TNT)',
        },
        Q5139563 = {
                label = 'hectopascal',
                ucode = 'hPa',
        },
        Q5151 = {
                label = 'month',
                ucode = 'month',
        },
        Q531 = {
                label = 'light-year',
                ucode = 'ly',
        },
        Q5465723 = {
                label = 'foot-poundal',
                ucode = 'ftpdl',
        },
        Q573 = {
                label = 'day',
                ucode = 'd',
        },
        Q577 = {
                label = 'year',
                ucode = 'year',
        },
        Q5879479 = {
                label = 'gigawatt',
                ucode = 'GW',
        },
        Q6003257 = {
                label = 'attometre',
                ucode = 'am',
        },
        Q613726 = {
                label = 'yottagram',
                ucode = 'Yg',
        },
        Q6170164 = {
                label = 'yoctogram',
                ucode = 'yg',
        },
        Q667419 = {
```

```
                label = 'long ton',
                ucode = 'LT',
        },
        Q673166 = {
                label = 'gravity of Earth',
                ucode = 'g0',
        },
        Q693944 = {
                label = 'grain',
                ucode = 'gr',
        },
        Q6982035 = {
                label = 'megawatt',
                ucode = 'MW',
        },
        Q712226 = {
                label = 'square kilometre',
                ucode = 'km2',
        },
        Q723733 = {
                label = 'millisecond',
                ucode = 'ms',
        },
        Q732454 = {
                label = 'megaannum',
                ucode = 'Myr',
        },
        Q732707 = {
                label = 'megahertz',
                ucode = 'MHz',
        },
        Q752079 = {
                label = 'gross register ton',
                ucode = 'grt',
        },
        Q752197 = {
                label = 'kilojoule per mole',
                ucode = 'kJ/mol',
        },
        Q7727 = {
                label = 'minute',
                ucode = 'min',
        },
        Q794261 = {
                label = 'cubic metre per second',
                ucode = 'm3/s',
        },
        Q809678 = {
                label = 'barye',
                ucode = 'Ba',
        },
        Q81292 = {
                label = 'acre',
                ucode = 'acre',
        },
        Q81454 = {
                label = 'ångström',
                ucode = 'angstrom',
        },
        Q828224 = {
                label = 'kilometre',
                ucode = 'km',
        },
        Q83327 = {
```

```
                label = 'electronvolt',
                ucode = 'eV',
        },
        Q838801 = {
                label = 'nanosecond',
                ucode = 'ns',
        },
        Q842015 = {
                label = 'microsecond',
                ucode = 'us',
        },
        Q844211 = {
                label = 'kilogram per cubic metre',
                ucode = 'kg/m3',
        },
        Q844338 = {
                label = 'hectometre',
                ucode = 'hm',
        },
        Q844976 = {
                label = 'oersted',
                ucode = 'Oe',
        },
        Q848856 = {
                label = 'decametre',
                ucode = 'dam',
        },
        Q854546 = {
                label = 'gigametre',
                ucode = 'Gm',
        },
        Q857027 = {
                label = 'square foot',
                ucode = 'sqft',
        },
        Q9048643 = {
                label = 'nanolitre',
                ucode = 'nl',
        },
        Q93318 = {
                label = 'nautical mile',
                ucode = 'nmi',
        },
}

return { wikidata_units = wikidata_units }
```

Modul:Convert/wikidata/data/sandbox

Die Dokumentation für dieses Modul kann unter Modul:Convert/wikidata/data/sandbox/Doku erstellt werden

```
--[[ Cache of Wikidata information with units for Module:Convert.
The codes should rarely change, and using a cache means that changing a
unit at Wikidata will not cause lots of converts in articles to break.

For a unit known to convert, the unit here must have:
        label = Wikidata label for unit (used only when listing units)
        ucode = unit code for input to convert
        (there are no optional fields because convert handles everything)

For a unit not known to convert, the unit here must have:
        label = Wikidata label for unit (used only when listing units)
        (no ucode field)
        _ucode = unit code for input to convert, and the
                 symbol used to display the unit when abbr=on
        (convert will use the specified fields to display the unit,
        and will not attempt to do a conversion)

For a unit not known to convert, the unit here may have:
        name1 = singular name used to display the unit when abbr=off
        name2 = plural name used to display the unit when abbr=off
        link = name of article that unit will be linked to when lk=on
        si = key for the SI base unit, if any

The base unit for each SI unit here must have:
        symbol = symbol used to display the base unit when abbr=on
        name1 = singular name of base unit used to display the unit when abbr=off
        (if name1 is not given, symbol will be used, but an SI unit should have a

The base unit for each SI unit here may have:
        name2 = plural name of base unit used to display the unit when abbr=off
        link = name of article that unit will be linked to when lk=on
               (applies for all SI units using this base, where the
                   SI unit does not define its own link field)

If name1 is not specified, the symbol is used for the name.
If name2 is not specified, a plural name is formed by appending 's' to name1.
If link is not specified, name1 is used for the link.

SI units are assumed to be simple items like V (volt) where 'mV' would
cause convert to insert:
        'm' before the base symbol 'V' to make 'mV', if abbr=on
        'milli' before the base name 'volt' to make 'millivolt', if abbr=off
A unit like "square meter" would not work because it needs an SI prefix
inserted before "meter" rather than at the beginning of the name.

Items that should not be used with convert as no precise unit is implied:
Q11247037  ton          generic (cannot use)
Q178413    gallon       generic
Q130964    calorie      dubious (ambiguous, should not use)
Q216658    bushel       dubious
Q420266    fluid ounce  dubious
]]

local wikidata_units = {
```

```
	-- Following are SI base units.
	A = {
		symbol = 'A',
		name1 = 'ampere',
	},
	F = {
		symbol = 'F',
		name1 = 'faraday',
	},
	H = {
		symbol = 'H',
		name1 = 'henry',
	},
	V = {
		symbol = 'V',
		name1 = 'volt',
	},
	-- Following are aliases to convert unit codes, used with "input=<value><
	kilograms = {
		ucode = 'kg',
	},
	-- Following are SI units not known to convert, used with "input=<value><
	kV = {
		ucode = 'kV',
		si = 'V',
	},
	mV = {
		ucode = 'mV',
		si = 'V',
	},
	-- Following are Wikidata units.
	Q131255 = {
		label = 'farad',
		_ucode = 'F',
		si = 'F',
	},
	Q163354 = {
		label = 'henry',
		_ucode = 'H',
		si = 'H',
	},
	Q1916026 = {
		label = 'microvolt',
		_ucode = 'uV',
		si = 'V',
	},
	Q193933 = {
		label = 'dioptre',
		name1 = 'dioptre',
		_ucode = 'dpt',
	},
	Q212120 = {
		label = 'ampere hour',
		name1 = 'ampere hour',
		_ucode = 'A·h',
	},
	Q2448803 = {
		label = 'millivolt',
		_ucode = 'mV',
		si = 'V',
	},
	Q2451296 = {
		label = 'microfarad',
		_ucode = 'uF',
```

```
		si = 'F',
	},
	Q2490574 = {
		label = 'milliampere',
		_ucode = 'mA',
		si = 'A',
	},
	Q25250 = {
		label = 'volt',
		_ucode = 'V',
		si = 'V',
	},
	Q25272 = {
		label = 'ampere',
		_ucode = 'A',
		si = 'A',
	},
	Q2553708 = {
		label = 'megavolt',
		_ucode = 'MV',
		si = 'V',
	},
	Q2554092 = {
		label = 'kilovolt',
		_ucode = 'kV',
		si = 'V',
	},
	Q2636421 = {
		label = 'nanohenry',
		_ucode = 'nH',
		si = 'H',
	},
	Q2679083 = {
		label = 'microhenry',
		_ucode = 'uH',
		si = 'H',
	},
	Q2682463 = {
		label = 'nanofarad',
		_ucode = 'nF',
		si = 'F',
	},
	Q2756030 = {
		label = 'picofarad',
		_ucode = 'pF',
		si = 'F',
	},
	Q2793566 = {
		label = 'gigavolt',
		_ucode = 'GV',
		si = 'V',
	},
	Q2924137 = {
		label = 'millihenry',
		_ucode = 'mH',
		si = 'H',
	},
	Q3117809 = {
		label = 'microampere',
		_ucode = 'uA',
		si = 'A',
	},
	Q33680 = {
		label = 'radian',
```

```
                name1 = 'radian',
                _ucode = 'rad',
        },
        Q4456994 = {
                label = 'millifarad',
                _ucode = 'mF',
                si = 'F',
        },
        Q47083 = {
                label = 'ohm',
                name1 = 'ohm',
                _ucode = 'Ω',
        },
        Q483261 = {
                label = 'dalton',
                name1 = 'dalton',
                _ucode = 'u',
        },
        Q550341 = {
                label = 'volt-ampere',
                name1 = 'volt-ampere',
                _ucode = 'VA',
        },
        Q100995 = {
                label = 'pound',
                ucode = 'lb',
        },
        Q1022113 = {
                label = 'cubic centimetre',
                ucode = 'cc',
        },
        Q102573 = {
                label = 'becquerel',
                ucode = 'Bq',
        },
        Q103246 = {
                label = 'sievert',
                ucode = 'Sv',
        },
        Q1050958 = {
                label = 'inch of mercury',
                ucode = 'inHg',
        },
        Q1051665 = {
                label = 'metre per second squared',
                ucode = 'm/s2',
        },
        Q1052397 = {
                label = 'rad',
                ucode = 'rad',
        },
        Q1054140 = {
                label = 'megametre',
                ucode = 'Mm',
        },
        Q1057069 = {
                label = 'hectogram',
                ucode = 'hg',
        },
        Q1063786 = {
                label = 'square inch',
                ucode = 'sqin',
        },
        Q1092296 = {
```

```
                label = 'annum',
                ucode = 'year',
        },
        Q11570 = {
                label = 'kilogram',
                ucode = 'kg',
        },
        Q11573 = {
                label = 'metre',
                ucode = 'm',
        },
        Q11574 = {
                label = 'second',
                ucode = 's',
        },
        Q11579 = {
                label = 'kelvin',
                ucode = 'K',
        },
        Q11582 = {
                label = 'litre',
                ucode = 'litre',
        },
        Q1165588 = {
                label = 'rod',
                ucode = 'rod',
        },
        Q1165799 = {
                label = 'thou',
                ucode = 'thou',
        },
        Q11776930 = {
                label = 'megagram',
                ucode = 'Mg',
        },
        Q11929860 = {
                label = 'kiloparsec',
                ucode = 'kpc',
        },
        Q1194225 = {
                label = 'pound-force',
                ucode = 'lbf',
        },
        Q12129 = {
                label = 'parsec',
                ucode = 'pc',
        },
        Q12438 = {
                label = 'newton',
                ucode = 'N',
        },
        Q1255620 = {
                label = 'dram',
                ucode = 'drachm',
        },
        Q12874593 = {
                label = 'watt-hour',
                ucode = 'W.h',
        },
        Q128822 = {
                label = 'knot',
                ucode = 'kn',
        },
        Q1374438 = {
```

```
                label = 'kilosecond',
                ucode = 'ks',
        },
        Q1377051 = {
                label = 'gigasecond',
                ucode = 'Gs',
        },
        Q14754979 = {
                label = 'zettagram',
                ucode = 'Zg',
        },
        Q14786969 = {
                label = 'megajoule',
                ucode = 'MJ',
        },
        Q14787261 = {
                label = 'megawatt hour',
                ucode = 'MW.h',
        },
        Q1550511 = {
                label = 'square yard',
                ucode = 'sqyd',
        },
        Q160857 = {
                label = 'metric horsepower',
                ucode = 'hp',
        },
        Q1628990 = {
                label = 'horsepower-hour',
                ucode = 'hph',
        },
        Q163343 = {
                label = 'tesla',
                ucode = 'T',
        },
        Q1645498 = {
                label = 'microgram',
                ucode = 'ug',
        },
        Q17087835 = {
                label = 'cuerda',
                ucode = 'cda',
        },
        Q174728 = {
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                ucode = 'cm',
        },
        Q174789 = {
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                ucode = 'mm',
        },
        Q175821 = {
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                ucode = 'um',
        },
        Q1770733 = {
                label = 'teragram',
                ucode = 'Tg',
        },
        Q1772386 = {
                label = 'decigram',
                ucode = 'dg',
        },
        Q177493 = {
```

```
                label = 'gauss',
                ucode = 'G',
        },
        Q1777507 = {
                label = 'femtosecond',
                ucode = 'fs',
        },
        Q177974 = {
                label = 'standard atmosphere',
                ucode = 'atm',
        },
        Q178674 = {
                label = 'nanometre',
                ucode = 'nm',
        },
        Q180154 = {
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                ucode = 'km/h',
        },
        Q180892 = {
                label = 'solar mass',
                ucode = 'solar mass',
        },
        Q1811 = {
                label = 'astronomical unit',
                ucode = 'au',
        },
        Q1815100 = {
                label = 'centilitre',
                ucode = 'cl',
        },
        Q182098 = {
                label = 'kilowatt hour',
                ucode = 'kW.h',
        },
        Q1823150 = {
                label = 'microwatt',
                ucode = 'uW',
        },
        Q182429 = {
                label = 'metre per second',
                ucode = 'm/s',
        },
        Q1826195 = {
                label = 'decilitre',
                ucode = 'dl',
        },
        Q185078 = {
                label = 'are',
                ucode = 'a',
        },
        Q185153 = {
                label = 'erg',
                ucode = 'erg',
        },
        Q185648 = {
                label = 'torr',
                ucode = 'Torr',
        },
        Q190095 = {
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                ucode = 'Gy',
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        Q191118 = {
```

```
                label = 'tonne',
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        Q1913097 = {
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                ucode = 'fg',
        },
        Q192274 = {
                label = 'picometre',
                ucode = 'pm',
        },
        Q1972579 = {
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                ucode = 'pdl',
        },
        Q200323 = {
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                ucode = 'dm',
        },
        Q201933 = {
                label = 'dyne',
                ucode = 'dyn',
        },
        Q2029519 = {
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                ucode = 'hl',
        },
        Q2051195 = {
                label = 'gigawatt hour',
                ucode = 'GW.h',
        },
        Q207488 = {
                label = 'Rankine scale',
                ucode = 'R',
        },
        Q208788 = {
                label = 'femtometre',
                ucode = 'fm',
        },
        Q2101 = {
                label = 'elementary charge',
                ucode = 'e',
        },
        Q21014455 = {
                label = 'metre per minute',
                ucode = 'm/min',
        },
        Q21062777 = {
                label = 'megapascal',
                ucode = 'MPa',
        },
        Q21064807 = {
                label = 'kilopascal',
                ucode = 'kPa',
        },
        Q211256 = {
                label = 'mile per hour',
                ucode = 'mph',
        },
        Q21178489 = {
                label = 'barrels per day',
                ucode = 'oilbbl/d',
        },
        Q2143992 = {
```

```
                label = 'kilohertz',
                ucode = 'kHz',
        },
        Q21467992 = {
                label = 'cubic foot per second',
                ucode = 'cuft/s',
        },
        Q215571 = {
                label = 'newton metre',
                ucode = 'Nm',
        },
        Q216795 = {
                label = 'dunam',
                ucode = 'dunam',
        },
        Q216880 = {
                label = 'kilogram-force',
                ucode = 'kgf',
        },
        Q18413919 = {
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                ucode = 'cm/s',
        },
        Q218593 = {
                label = 'inch',
                ucode = 'in',
        },
        Q2282891 = {
                label = 'microlitre',
                ucode = 'ul',
        },
        Q2282906 = {
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                ucode = 'ng',
        },
        Q229354 = {
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                ucode = 'Ci',
        },
        Q232291 = {
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                ucode = 'sqmi',
        },
        Q2332346 = {
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                ucode = 'ml',
        },
        Q23387 = {
                label = 'week',
                ucode = 'week',
        },
        Q23823681 = {
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                ucode = 'TW',
        },
        Q23925410 = {
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                ucode = 'impgal',
        },
        Q23925413 = {
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                ucode = 'USgal',
        },
        Q2438073 = {
```

```
                label = 'attogram',
                ucode = 'ag',
        },
        Q2474258 = {
                label = 'millisievert',
                ucode = 'mSv',
        },
        Q2483628 = {
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                ucode = 'as',
        },
        Q2489298 = {
                label = 'square centimetre',
                ucode = 'cm2',
        },
        Q2518569 = {
                label = 'nanosievert',
                ucode = 'nSv',
        },
        Q25235 = {
                label = 'hour',
                ucode = 'h',
        },
        Q25236 = {
                label = 'watt',
                ucode = 'W',
        },
        Q25267 = {
                label = 'degree Celsius',
                ucode = 'C',
        },
        Q25269 = {
                label = 'joule',
                ucode = 'J',
        },
        Q253276 = {
                label = 'mile',
                ucode = 'mi',
        },
        Q25343 = {
                label = 'square metre',
                ucode = 'm2',
        },
        Q25406 = {
                label = 'coulomb',
                ucode = 'coulomb',
        },
        Q25517 = {
                label = 'cubic metre',
                ucode = 'm3',
        },
        Q260126 = {
                label = 'Roentgen equivalent man',
                ucode = 'rem',
        },
        Q2612219 = {
                label = 'petagram',
                ucode = 'Pg',
        },
        Q2619500 = {
                label = 'foe',
                ucode = 'foe',
        },
        Q2637946 = {
```

```
                label = 'decalitre',
                ucode = 'dal',
        },
        Q2655272 = {
                label = 'exagram',
                ucode = 'Eg',
        },
        Q2691798 = {
                label = 'centigram',
                ucode = 'cg',
        },
        Q2739114 = {
                label = 'microsievert',
                ucode = 'uSv',
        },
        Q2799294 = {
                label = 'gigagram',
                ucode = 'Gg',
        },
        Q3013059 = {
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                ucode = 'millennium',
        },
        Q305896 = {
                label = 'dots per inch',
                ucode = 'dpi',
        },
        Q3207456 = {
                label = 'milliwatt',
                ucode = 'mW',
        },
        Q3221356 = {
                label = 'yoctometre',
                ucode = 'ym',
        },
        Q3239557 = {
                label = 'picogram',
                ucode = 'pg',
        },
        Q3241121 = {
                label = 'milligram',
                ucode = 'mg',
        },
        Q3267417 = {
                label = 'terametre',
                ucode = 'Tm',
        },
        Q3270676 = {
                label = 'zeptometre',
                ucode = 'zm',
        },
        Q3276763 = {
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                ucode = 'GHz',
        },
        Q3277907 = {
                label = 'exametre',
                ucode = 'Em',
        },
        Q3277915 = {
                label = 'zettametre',
                ucode = 'Zm',
        },
        Q3277919 = {
```

```
                label = 'petametre',
                ucode = 'Pm',
        },
        Q3312063 = {
                label = 'femtolitre',
                ucode = 'fl',
        },
        Q3320608 = {
                label = 'kilowatt',
                ucode = 'kW',
        },
        Q3332822 = {
                label = 'megaton of TNT',
                ucode = 'Mt(TNT)',
        },
        Q35852 = {
                label = 'hectare',
                ucode = 'ha',
        },
        Q3675550 = {
                label = 'cubic millimetre',
                ucode = 'mm3',
        },
        Q3710 = {
                label = 'foot',
                ucode = 'ft',
        },
        Q3773454 = {
                label = 'megaparsec',
                ucode = 'Mpc',
        },
        Q3902688 = {
                label = 'picolitre',
                ucode = 'pl',
        },
        Q3902709 = {
                label = 'picosecond',
                ucode = 'ps',
        },
        Q39369 = {
                label = 'hertz',
                ucode = 'Hz',
        },
        Q3972226 = {
                label = 'kilolitre',
                ucode = 'kl',
        },
        Q4068266 = {
                label = "apothecaries' drachm",
                ucode = 'drachm',
        },
        Q41803 = {
                label = 'gram',
                ucode = 'g',
        },
        Q4220561 = {
                label = 'kilometre per second',
                ucode = 'km/s',
        },
        Q42289 = {
                label = 'degree Fahrenheit',
                ucode = 'F',
        },
        Q4243638 = {
```

```
                label = 'cubic kilometre',
                ucode = 'km3',
        },
        Q44395 = {
                label = 'pascal',
                ucode = 'Pa',
        },
        Q48013 = {
                label = 'ounce',
                ucode = 'oz',
        },
        Q482798 = {
                label = 'yard',
                ucode = 'yd',
        },
        Q4989854 = {
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                ucode = 'kJ',
        },
        Q4992853 = {
                label = 'kiloton of TNT',
                ucode = 'kt(TNT)',
        },
        Q5139563 = {
                label = 'hectopascal',
                ucode = 'hPa',
        },
        Q5151 = {
                label = 'month',
                ucode = 'month',
        },
        Q531 = {
                label = 'light-year',
                ucode = 'ly',
        },
        Q5465723 = {
                label = 'foot-poundal',
                ucode = 'ftpdl',
        },
        Q573 = {
                label = 'day',
                ucode = 'd',
        },
        Q577 = {
                label = 'year',
                ucode = 'year',
        },
        Q5879479 = {
                label = 'gigawatt',
                ucode = 'GW',
        },
        Q6003257 = {
                label = 'attometre',
                ucode = 'am',
        },
        Q613726 = {
                label = 'yottagram',
                ucode = 'Yg',
        },
        Q6170164 = {
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                ucode = 'yg',
        },
        Q667419 = {
```

```
                label = 'long ton',
                ucode = 'LT',
        },
        Q673166 = {
                label = 'gravity of Earth',
                ucode = 'g0',
        },
        Q693944 = {
                label = 'grain',
                ucode = 'gr',
        },
        Q6982035 = {
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                ucode = 'MW',
        },
        Q712226 = {
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                ucode = 'km2',
        },
        Q723733 = {
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        },
        Q732454 = {
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                ucode = 'Myr',
        },
        Q732707 = {
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                ucode = 'MHz',
        },
        Q752079 = {
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                ucode = 'grt',
        },
        Q752197 = {
                label = 'kilojoule per mole',
                ucode = 'kJ/mol',
        },
        Q7727 = {
                label = 'minute',
                ucode = 'min',
        },
        Q794261 = {
                label = 'cubic metre per second',
                ucode = 'm3/s',
        },
        Q809678 = {
                label = 'barye',
                ucode = 'Ba',
        },
        Q81292 = {
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                ucode = 'acre',
        },
        Q81454 = {
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                ucode = 'angstrom',
        },
        Q828224 = {
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                ucode = 'km',
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        Q83327 = {
```

```
                label = 'electronvolt',
                ucode = 'eV',
        },
        Q838801 = {
                label = 'nanosecond',
                ucode = 'ns',
        },
        Q842015 = {
                label = 'microsecond',
                ucode = 'us',
        },
        Q844211 = {
                label = 'kilogram per cubic metre',
                ucode = 'kg/m3',
        },
        Q844338 = {
                label = 'hectometre',
                ucode = 'hm',
        },
        Q844976 = {
                label = 'oersted',
                ucode = 'Oe',
        },
        Q848856 = {
                label = 'decametre',
                ucode = 'dam',
        },
        Q854546 = {
                label = 'gigametre',
                ucode = 'Gm',
        },
        Q857027 = {
                label = 'square foot',
                ucode = 'sqft',
        },
        Q9048643 = {
                label = 'nanolitre',
                ucode = 'nl',
        },
        Q93318 = {
                label = 'nautical mile',
                ucode = 'nmi',
        },
}

return { wikidata_units = wikidata_units }
```

Modul:Convert/wikidata/sandbox

Die Dokumentation für dieses Modul kann unter Modul:Convert/wikidata/sandbox/Doku erstellt werden

```
-- Functions to access Wikidata for Module:Convert.

local Collection = {}
Collection.__index = Collection
do
	function Collection:add(item)
		if item ~= nil then
			self.n = self.n + 1
			self[self.n] = item
		end
	end
	function Collection:join(sep)
		return table.concat(self, sep)
	end
	function Collection:remove(pos)
		if self.n > 0 and (pos == nil or (0 < pos and pos <= self.n)) the
			self.n = self.n - 1
			return table.remove(self, pos)
		end
	end
	function Collection:sort(comp)
		table.sort(self, comp)
	end
	function Collection.new()
		return setmetatable({n = 0}, Collection)
	end
end

local function strip_to_nil(text)
	-- If text is a non-empty string, return its trimmed content,
	-- otherwise return nothing (empty string or not a string).
	if type(text) == 'string' then
		return text:match('(%S.-)%s*$')
	end
end

local function frequency_unit(value, unit_table)
	-- For use when converting m to Hz.
	-- Return true, s where s = name of unit's default output unit,
	-- or return false, t where t is an error message table.
	-- However, for simplicity a valid result is always returned.
	local unit
	if unit_table._symbol == 'm' then
		-- c = speed of light in a vacuum = 299792458 m/s
		-- frequency = c / wavelength
		local w = value * (unit_table.scale or 1)
		local f = 299792458 / w  -- if w == 0, f = math.huge which works
		if f >= 1e12 then
			unit = 'THz'
		elseif f >= 1e9 then
			unit = 'GHz'
		elseif f >= 1e6 then
			unit = 'MHz'
		elseif f >= 1e3 then
```

```
                        unit = 'kHz'
                else
                        unit = 'Hz'
                end
        end
        return true, unit or 'Hz'
end

local function wavelength_unit(value, unit_table)
        -- Like frequency_unit but for use when converting Hz to m.
        local unit
        if unit_table._symbol == 'Hz' then
                -- Using 0.9993 rather than 1 avoids rounding which would give re
                -- like converting 300 MHz to 100 cm instead of 1 m.
                local w = 1 / (value * (unit_table.scale or 1))  -- Hz scale is i
                if w >= 0.9993e6 then
                        unit = 'Mm'
                elseif w >= 0.9993e3 then
                        unit = 'km'
                elseif w >= 0.9993 then
                        unit = 'm'
                elseif w >= 0.9993e-2 then
                        unit = 'cm'
                elseif w >= 0.9993e-3 then
                        unit = 'mm'
                else
                        unit = 'um'
                end
        end
        return true, unit or 'm'
end

local specials = {
        frequency = { frequency_unit },
        wavelength = { wavelength_unit },
        ------------------------------------------------------------------------
        -- Following is a removed experiment to show two values as a range
        -- using '-' as the separator.
        -- frequencyrange = { frequency_unit, '-' },
        -- wavelengthrange = { wavelength_unit, '-' },
}

local function make_unit(units, parms, uid)
        -- Return a unit code for convert or nil if unit unknown.
        -- If necessary, add a dummy unit to parms so convert will use it
        -- for the input without attempting a conversion since nothing
        -- useful is available (for example, with unit volt).
        local unit = units[uid]
        if type(unit) ~= 'table' then
                return nil
        end
        local ucode = unit.ucode
        if ucode and not unit.si then
                return ucode                -- a unit known to convert
        end
        parms.opt_ignore_error = true
        ucode = ucode or unit._ucode    -- must be a non-empty string
        local ukey, utable
        if unit.si then
                local base = units[unit.si]
                ukey = base.symbol          -- must be a non-empty string
                local n1 = base.name1
                local n2 = base.name2
                if not n1 then
```

```
                        n1 = ukey
                        n2 = n2 or n1           -- do not append 's'
                end
                utable = {
                        _symbol = ukey,
                        _name1 = n1,
                        _name2 = n2,
                        link = unit.link or base.link,
                        utype = n1,
                        prefixes = 1,
                }
        else
                ukey = ucode
                utable = {
                        symbol = ucode,         -- must be a non-empty string
                        name1 = unit.name1,     -- if nil, uses symbol
                        name2 = unit.name2,     -- if nil, uses name1..'s'
                        link = unit.link,       -- if nil, uses name1
                        utype = unit.name1 or ucode,
                }
        end
        utable.scale = 1
        utable.default = ''
        utable.defkey = ''
        utable.linkey = ''
        utable.bad_mcode = ''
        parms.unittable = { [ukey] = utable }
        return ucode
end

local function matches_qualifier(statement, qual)
        -- Return:
        --   false, nil : if statement does not match specification
        --   true, nil  : if matches, and statement has no qualifier
        --   true, sq   : if matches, where sq is the statement's qualifier
        -- A match means that no qualifier was specified (qual == nil), or that
        -- the statement has a qualifier matching the specification.
        -- If a match occurs, the caller needs the statement's qualifier (if any)
        -- so statements that duplicate the qualifier are not used, after the fi
        -- Then, if convert is showing all values for a property such as the diam
        -- of a telescope's mirror (diameters of primary and secondary mirrors),
        -- will not show alternative values that could in principle be present fo
        -- same item (telescope) and property (diameter) and qualifier (primary/s
        local target = (statement.qualifiers or {}).P518  -- P518 is "applies to
        if type(target) == 'table' then
                for _, q in ipairs(target) do
                        if type(q) == 'table' then
                                local value = (q.datavalue or {}).value
                                if value then
                                        if qual == nil or qual == value.id then
                                                return true, value.id
                                        end
                                end
                        end
                end
        end
        if qual == nil then
                return true, nil  -- only occurs if statement has no qualifier
        end
        return false, nil  -- statement's qualifier is not relevant because state
end

local function get_statements(parms, pid)
        -- Get specified item and return a list of tables with each statement for
```

```
        -- Each table is of form {statqual=sq, stmt=statement} where sq = stateme
        -- Statements are in Wikidata's order except that those with preferred ra
        -- are first, then normal rank. Any other rank is ignored.
        local stored = {}  -- qualifiers of statements that are first for the qua
        local qid = strip_to_nil(parms.qid)  -- nil for current page's item, or a
        local qual = strip_to_nil(parms.qual)  -- nil or id of wanted P518 (appli
        local result = Collection.new()
        local entity = mw.wikibase.getEntity(qid)
        if type(entity) == 'table' then
                local statements = (entity.claims or {})[pid]
                if type(statements) == 'table' then
                        for _, rank in ipairs({ 'preferred', 'normal' }) do
                                for _, statement in ipairs(statements) do
                                        if type(statement) == 'table' and rank ==
                                                local is_match, statqual = matche
                                                if is_match then
                                                        result:add({ statqual = s
                                                end
                                        end
                                end
                        end
                end
        end
        return result
end

local function input_from_property(tdata, parms, pid)
        -- Given that pid is a Wikidata property identifier like 'P123',
        -- return a collection of {amount, ucode} pairs (two strings)
        -- for each matching item/property, or return nothing.
        ------------------------------------------------------------------------
        -- There appear to be few restrictions on how Wikidata is organized so it
        -- very likely that any decision a module makes about how to handle data
        -- will be wrong for some cases at some time. This meets current requirem
        -- For each qualifier (or if no qualifier), if there are any preferred
        -- statements, use them and ignore any normal statements.
        -- For each qualifier, for the preferred statements if any, or for
        -- the normal statements (but not both):
        -- * Accept each statement if it has no qualifier (this will not occur
        --   if qual=x is specified because other code already ensures that in th
        --   case, only statements with a qualifier matching x are considered).
        -- * Ignore any statements after the first if it has a qualifier.
        -- The rationale is that for the diameter at [[South Pole Telescope]], wa
        -- convert to show the diameters for both the primary and secondary mirro
        -- if the convert does not specify which diameter is wanted.
        -- However, if convert is given the wanted qualifier, only one value
        -- (_the_ diameter) is wanted. For simplicity/consistency, that is also d
        -- even if no qual=x is specified. Unclear what should happen.
        -- For the wavelength at [[Nançay Radio Telescope]], want to show all thr
        -- values, and the values have no qualifiers.
        ------------------------------------------------------------------------
        local result = Collection.new()
        local done = {}
        local skip_normal
        for _, t in ipairs(get_statements(parms, pid)) do
                local statement = t.stmt
                if statement.mainsnak and statement.mainsnak.datatype == 'quantit
                        local value = (statement.mainsnak.datavalue or {}).value
                        if value then
                                local amount = value.amount
                                if amount then
                                        amount = tostring(amount)  -- in case amo
                                        if amount:sub(1, 1) == '+' then
                                                amount = amount:sub(2)
```

```
                                        end
                                        local unit = value.unit
                                        if type(unit) == 'string' then
                                                unit = unit:match('Q%d+$')  -- ur
                                                local ucode = make_unit(tdata.wik
                                                if ucode then
                                                        local skip
                                                        if t.statqual then
                                                                if done[t.statqua
                                                                        skip = tr
                                                                else
                                                                        done[t.st
                                                                end
                                                        else
                                                                if statement.rank
                                                                        skip_norm
                                                                elseif skip_norma
                                                                        skip = tr
                                                                end
                                                        end
                                                        if not skip then
                                                                result:add({ amou
                                                        end
                                                end
                                        end
                                end
                        end
                end
        end
        return result
end

local function input_from_text(tdata, parms, text, insert2)
        -- Given string should be of form "<value><space><unit>" or
        -- "<value1><space>ft<space><value2><space>in" for a special case (feet a
        -- Return true if values/units were extracted and inserted, or return not
        text = text:gsub(' ', ' '):gsub('%s+', ' ')
        local pos = text:find(' ', 1, true)
        if pos then
                -- Leave checking of value to convert which can handle fractions
                local value = text:sub(1, pos - 1)
                local uid = text:sub(pos + 1)
                if uid:sub(1, 3) == 'ft ' and uid:sub(-3) == ' in' then
                        -- Special case for enwiki to allow {{convert|input=5 ft
                        insert2(uid:sub(4, -4), 'in')
                        insert2(value, 'ft')
                else
                        insert2(value, make_unit(tdata.wikidata_units, parms, uid
                end
                return true
        end
end

local function adjustparameters(tdata, parms, index)
        -- For Module:Convert, adjust parms (a table of {{convert}} parameters).
        -- Return true if successful or return false, t where t is an error messa
        -- This is intended mainly for use in infoboxes where the input might be
        --    <value><space><unit>    or
        --    <wikidata-property-id>
        -- If successful, insert values and units in parms, before given index.
        local text = parms.input  -- should be a trimmed, non-empty string
        local pid = text:match('^P%d+$')
        local sep = ','
        local special = specials[parms[index]]
```

```
	if special then
		parms.out_unit = special[1]
		sep = special[2] or sep
		table.remove(parms, index)
	end
	local function quit()
		return false, pid and { 'cvt_no_output' } or { 'cvt_bad_input', t
	end
	local function insert2(first, second)
		table.insert(parms, index, second)
		table.insert(parms, index, first)
	end
	if pid then
		parms.input_text = ''  -- output an empty string if an error occu
		local result = input_from_property(tdata, parms, pid)
		if result.n == 0 then
			return quit()
		end
		local ucode
		for i, t in ipairs(result) do
			-- Convert requires each input unit to be identical.
			if i == 1 then
				ucode = t[2]
			elseif ucode ~= t[2] then
				return quit()
			end
		end
		local item = ucode
		if item == parms[index] then
			-- Remove specified output unit if it is the same as the
			-- For example, {{convert|input=P2044|km}} with property
			table.remove(parms, index)
		end
		for i = result.n, 1, -1 do
			insert2(result[i][1], item)
			item = sep
		end
		return true
	else
		if input_from_text(tdata, parms, text, insert2) then
			return true
		end
	end
	return quit()
end

-----------------------------------------------------------------------------
--- List units and check syntax of definitions ------------------------------
-----------------------------------------------------------------------------
local specifications = {
	-- seq = sequence in which fields are displayed
	base = {
		title = 'SI base units',
		fields = {
			symbol = { seq = 2, mandatory = true },
			name1  = { seq = 3, mandatory = true },
			name2  = { seq = 4 },
			link   = { seq = 5 },
		},
		noteseq = 6,
		header = '{| class="wikitable"\n!si !!symbol !!name1 !!name2 !!li
		item = '|-\n|%s ||%s ||%s ||%s ||%s ||%s',
		footer = '|}',
	},
```

```
	alias = {
		title = 'Aliases for convert',
		fields = {
			ucode  = { seq = 2, mandatory = true },
			si     = { seq = 3 },
		},
		noteseq = 4,
		header = '{| class="wikitable"\n!alias !!ucode !!base !!note',
		item = '|-\n|%s ||%s ||%s ||%s',
		footer = '|}',
	},
	known = {
		title = 'Units known to convert',
		fields = {
			ucode  = { seq = 2, mandatory = true },
			label  = { seq = 3, mandatory = true },
		},
		noteseq = 4,
		header = '{| class="wikitable"\n!qid !!ucode !!label !!note',
		item = '|-\n|%s ||%s ||%s ||%s',
		footer = '|}',
	},
	unknown = {
		title = 'Units not known to convert',
		fields = {
			_ucode = { seq = 2, mandatory = true },
			si     = { seq = 3 },
			name1  = { seq = 4 },
			name2  = { seq = 5 },
			link   = { seq = 6 },
			label  = { seq = 7, mandatory = true },
		},
		noteseq = 8,
		header = '{| class="wikitable"\n!qid !!_ucode !!base !!name1 !!na
		item = '|-\n|%s ||%s ||%s ||%s ||%s ||%s ||%s',
		footer = '|}',
	},
}

local function listunits(tdata, ulookup)
	-- For Module:Convert, make wikitext to list the built-in Wikidata units
	-- Return true, wikitext if successful or return false, t where t is an
	-- error message table. Currently, an error return never occurs.
	-- The syntax of each unit definition is checked and a note is added if
	-- a problem is detected.
	local function safe_cells(t)
		-- This is not currently needed, but in case definitions ever use
		-- like '[[kilogram|kg]]', escape the text so it works in a table
		local result = {}
		for i, v in ipairs(t) do
			if v:find('|', 1, true) then
				v = v:gsub('(%[%[[^%[%]]-)|(.-%]%])', '%1\0%2')
				v = v:gsub('|', '&#124;')
				v = v:gsub('%z', '|')
			end
			result[i] = v:gsub('{', '&#123;')                    -- e
		end
		return unpack(result)
	end
	local wdunits = tdata.wikidata_units
	local speckeys = { 'base', 'alias', 'unknown', 'known' }
	for _, sid in ipairs(speckeys) do
		specifications[sid].units = Collection.new()
	end
```

```
	local keys = Collection.new()
	for k, v in pairs(wdunits) do
		keys:add(k)
	end
	table.sort(keys)
	local note_count = 0
	for _, key in ipairs(keys) do
		local unit = wdunits[key]
		local ktext, sid
		if key:match('^Q%d+$') then
			ktext = '[[d:' .. key .. '|' .. key .. ']]'
			if unit.ucode then
				sid = 'known'
			else
				sid = 'unknown'
			end
		elseif unit.ucode then
			ktext = key
			sid = 'alias'
		else
			ktext = key
			sid = 'base'
		end
		local result = { ktext }
		local spec = specifications[sid]
		local fields = spec.fields
		local note = Collection.new()
		for k, v in pairs(unit) do
			if fields[k] then
				local seq = fields[k].seq
				if result[seq] then
					note:add('duplicate ' .. k)  -- cannot ha
				else
					result[seq] = v
				end
			else
				note:add('invalid ' .. k)
			end
		end
		for k, v in pairs(fields) do
			local value = result[v.seq]
			if value then
				if k == 'si' and not wdunits[value] then
					note:add('need si ' .. value)
				end
				if k == 'label' then
					local wdl = mw.wikibase.getLabel(key)
					if wdl ~= value then
						note:add('label changed to ' .. t
					end
				end
			else
				result[v.seq] = ''
				if v.mandatory then
					note:add('missing ' .. k)
				end
			end
		end
		local text
		if note.n > 0 then
			note_count = note_count + 1
			text = '*' .. note:join('<br />')
		end
		result[spec.noteseq] = text or ''
```

```
                spec.units:add(result)
        end
        local results = Collection.new()
        if note_count > 0 then
                local text = note_count .. (note_count == 1 and ' note' or ' note
                results:add("'''Search for * to see " .. text .. "'''\n")
        end
        for _, sid in ipairs(speckeys) do
                local spec = specifications[sid]
                results:add("''''" .. spec.title .. "''''")
                results:add(spec.header)
                local fmt = spec.item
                for _, unit in ipairs(spec.units) do
                        results:add(string.format(fmt, safe_cells(unit)))
                end
                results:add(spec.footer)
        end
        return true, results:join('\n')
end

return { _adjustparameters = adjustparameters, _listunits = listunits }
```