Package 'calcal'

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Title Calendrical Calculations

Version 1.0.4

Description An R implementation of the algorithms described in Reingold and Dershowitz (4th ed., Cambridge University Press, 2018) <doi:10.1017/9781107415058>, allowing conversion between many different calendar systems. Cultural and religious holidays from several calendars can be calculated.

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NeedsCompilation no

Author Rob Hyndman [aut, cre, cph] (ORCID: <https://orcid.org/0000-0002-2140-5352>), Edward Reingold [cph, ctb] (Original Lisp code), Nachum Dershowitz [cph, ctb] (Original Lisp code)

Maintainer Rob Hyndman <Rob.Hyndman@monash.edu>

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Contents

advent *Christian Ecclesiastical Holidays*

Description

Functions to return Gregorian dates for various Christian ecclesiastical holidays and other special days

Coptic Christmas is celebrated on 29th of Koiak in the Coptic calendar, which currently corresponds to 7 or 8 January in the Gregorian calendar.

Usage

```
advent(year)

christmas(year)

orthodox_christmas(year)

epiphany(year)

easter(year)

orthodox_easter(year)

pentecost(year)

coptic_christmas(year)

astronomical_easter(year)
```

Arguments

year	Gregorian year

Value

A vector of dates on the Gregorian calendar

Examples

```
tibble::tibble(
  year = 2025:2030,
  advent = advent(year),
  christmas = christmas(year),
  orthodox_christmas = orthodox_christmas(year),
  epiphany = epiphany(year),
  easter = easter(year),
  orthodox_easter = orthodox_easter(year),
```

```
  pentecost = pentecost(year)
)
```

`as_date` *Create a new date vector or convert a date vector to a new calendar*

Description

New dates can be calculated using `new_date()` for any calendar. Dates can be converted from one calendar to another using `as_date()`. `as_date()` also works with the native R `Date` class and several other classes. When applied to integers, the conversion is from the RD day number (with day 1 being 01-01-01 on the Gregorian calendar).

Usage

```
as_date(date, calendar)

new_date(..., calendar)
```

Arguments

`date`	Date vector on some calendar
`calendar`	Target calendar of class "calendar"
`...`	Named arguments denoting the granularities required for `calendar`.

Value

A date vector of class "rdvec" with the specified calendar.

Examples

```
april2025 <- new_date(year = 2025, month = 4, day = 1:30, calendar = cal_gregorian)
as_date(april2025, calendar = cal_iso)
```

`as_time_of_day` *Convert to time of day*

Description

Convert to time of day

Usage

```
as_time_of_day(x, ...)
```

Arguments

x	Vector of times
...	Additional arguments not currently used

Value

A vector containing "time_of_day" objects

See Also

time_of_day

Examples

```
as_time_of_day(Sys.time())
```

---

babylonian_date *Babylonian calendar dates*

Description

The classical Babylonian calendar was a lunisolar calendar with a fixed 19-year Metonic cycle.

Usage

```
babylonian_date(
  year = integer(),
  month = integer(),
  leap_month = logical(),
  day = integer()
)

as_babylonian(date)
```

Arguments

year	Numeric vector of years
month	Numeric vector of months
leap_month	Logical vector of leap months
day	Numeric vector of days
date	Vector of dates on some calendar.

Value

A babylonian vector object

See Also

cal_babylonian

Examples

```
## Not run:
tibble::tibble(
  gregorian = gregorian_date(2335, 1, 1:2),
  babylonian = as_babylonian(gregorian)
)
babylonian_date(2335, 6, FALSE, 1:2)

## End(Not run)
```

---

bahai_date *Bahá'í calendar dates*

Description

The Bahá'í calendar is a solar calendar used in the Bahá'í faith comprising 18 months, with four or five intercalary days each year. The New Year is at the northern Spring equinox, corresponding to 21 March on the Gregorian calendar. Ayyám-i-Há is specified as month 20.

Usage

```
bahai_date(
  major = integer(),
  cycle = integer(),
  year = integer(),
  month = integer(),
  day = integer()
)

as_bahai(date)
```

Arguments

major	A numeric vector of major periods
cycle	A numeric vector of cycles
year	A numeric vector of years within the cycles
month	A numeric vector of months
day	A numeric vector of days
date	A numeric vector of dates

Value

A bahai vector object

See Also

cal_bahai, bahai_new_year

Examples

```
tibble::tibble(
  gregorian = gregorian_date(2025, 2, 15) + 0:30,
  bahai = as_bahai(gregorian)
)
bahai_date(1, 10, 11, 3, 5:7)
```

---

bahai_new_year *Bahá'í holidays*

Description

Dates are returned as Gregorian dates

Usage

```
bahai_new_year(year)

naw_ruz(year)

feast_of_ridvan(year)

birth_of_the_bab(year)
```

Arguments

year	The year on the Gregorian calendar

Value

A vector of dates on the Gregorian calendar

See Also

bahai_date

Examples

```
tibble::tibble(
  year = 2025:2030,
  new_year = bahai_new_year(year),
  naw_ruz = naw_ruz(year),
  ridvan = feast_of_ridvan(year),
  birth_bab = birth_of_the_bab(year)
)
```

`balinese_date` *Balinese Pawukon calendar dates*

Description

The Balinese calendar repeats every 210 days. It has 10 concurrent weeks, of lengths 1, 2, ..., 10 days. The 210 day cycles are unnumbered, so there is no way to convert a Balinese date into a unique date on another calendar.

Usage

```
balinese_date(
  luang = integer(),
  dwiwara = integer(),
  triwara = integer(),
  caturwara = integer(),
  pancawara = integer(),
  sadwara = integer(),
  saptawara = integer(),
  asatawara = integer(),
  sangawara = integer(),
  dasawara = integer()
)

as_balinese(date)
```

Arguments

`luang`	A numeric vector
`dwiwara`	A numeric vector
`triwara`	A numeric vector
`caturwara`	A numeric vector
`pancawara`	A numeric vector
`sadwara`	A numeric vector
`saptawara`	A numeric vector
`asatawara`	A numeric vector
`sangawara`	A numeric vector
`dasawara`	A numeric vector
`date`	A vector of dates on some calendar.

Value

A balinese vector object

See Also

kajeng_keliwon

Examples

```
gregorian_date(2025, 6, 1:10) |>
  as_balinese()
```

---

chinese_date *Chinese, Japanese, Korean and Vietnamese calendar dates*

Description

The traditional Chinese lunisolar calendar uses a 60-year cycle with 12 months per year. The Japanese, Korean and Vietnamese calendars are almost identical, but with different locations for determining astronomical positions.

Usage

```
chinese_date(
  cycle = integer(),
  year = integer(),
  month = integer(),
  leap_month = logical(),
  day = integer()
)

japanese_date(
  cycle = integer(),
  year = integer(),
  month = integer(),
  leap_month = logical(),
  day = integer()
)

korean_date(
  year = integer(),
  month = integer(),
  leap_month = logical(),
  day = integer()
)

vietnamese_date(
  cycle = integer(),
  year = integer(),
  month = integer(),
  leap_month = logical(),
```

```
  day = integer()
)

as_chinese(date)

as_japanese(date)

as_korean(date)

as_vietnamese(date)
```

Arguments

cycle	A numeric vector of cycles
year	A numeric vector of years within the cycles
month	A numeric vector of months
leap_month	A logical vector indicating leap months
day	A numeric vector of days
date	A numeric vector of dates

Value

A chinese vector object

See Also

cal_chinese, chinese_new_year

Examples

```
chinese <- new_date(
  cycle = 78, year = 42, month = 5, leap_month = FALSE, day = 16:18,
  calendar = cal_chinese
)
chinese
chinese_date(78, 42, 5, FALSE, 16:18)
as_date(chinese, calendar = cal_gregorian)
as_date(Sys.Date(), calendar = cal_chinese)
tibble::tibble(
  gregorian = gregorian_date(2025, 1, 1) + 0:364,
  chinese = as_chinese(gregorian)
)
as_gregorian(chinese_date(78, 41, 12, FALSE, 3:30))
as_chinese(gregorian_date(2025, 1, 1:28))
as_chinese("2016-01-01")
as_chinese(Sys.Date())
```

chinese_new_year *Chinese holidays*

Description

Dates are returned as Gregorian dates

Usage

```
chinese_new_year(year)

dragon_festival(year)

qing_ming(year)
```

Arguments

year	The year on the Gregorian calendar

Value

A vector of dates on the Gregorian calendar

See Also

chinese_date

Examples

```
tibble::tibble(
  year = 2025:2030,
  cny = chinese_new_year(year),
  qm = qing_ming(year),
  dbf = dragon_festival(year)
)
```

coptic_date *Coptic and Ethoiopic calendar dates*

Description

These two calendars are identical apart from the starting point or epoch. The Coptic calendar (also called the Alexandrian calendar) starts on 29 August 284 CE in the Julian calendar, while the Ethiopic (or Ethiopian) calendar starts on 29 August 8 CE in the Julian calendar. The Coptic calendar is used by the Coptic Orthodox and Coptic Catholic Churches, while the Ethiopic calendar is the official state calendar of Ethiopia, and unofficial calendar of Eritrea, and is used by the Ethiopian and Eritrean Orthodox Churches. Both calendars have 13 months, with 12 months of 30 days and a 13th month of 5 or 6 days depending on whether it is a leap year. Leap years occur every 4 years.

Usage

```
coptic_date(year = integer(), month = integer(), day = integer())

ethiopic_date(year = integer(), month = integer(), day = integer())

as_coptic(date)

as_ethiopic(date)
```

Arguments

year	A numeric vector of years
month	A numeric vector of months
day	A numeric vector of days
date	A numeric vector of dates

Value

A coptic or ethiopic vector object

See Also

cal_coptic, cal_ethiopic, coptic_christmas

Examples

```
tibble::tibble(
  gregorian = gregorian_date(2025, 1, 1:31),
  coptic = as_coptic(gregorian),
  ethiopic = as_ethiopic(gregorian)
)
coptic_date(1741, 5, 16:18)
as_date(Sys.Date(), calendar = cal_ethiopic)
as_coptic("2016-01-01")
as_ethiopic(Sys.Date())
```

---

day_of_week *Compute granularities from dates*

Description

Compute days, weeks, or months from a vector of dates. These work for Gregorian dates, and for some other calendars where it makes sense. In particular, `day_of_week` has been implemented for many calendars that contain the concept of a week. Similarly, `day_of_month`, `day_of_year` and `days_remaining` will work for several calendars.

Usage

```
day_of_week(date, ...)

day_of_month(date)

day_of_year(date)

days_remaining(date)

week_of_month(date, first_day = "Monday")

week_of_year(date, first_day = "Monday")

month_of_year(date)

year(date)
```

Arguments

`date`	A vector of dates
`...`	Other arguments used for specific calendars
`first_day`	Character denoting first day of the week. Default is `"Monday"`

Details

`week_of_year()` returns the ISO 8601 week number with `first_day` as Monday. Under this standard, week 1 of a year is defined as the first week with at least 4 days in the year; equivalently, it is the week containing 4 January. There is no week 0; instead week 1 of a year may begin in the previous calendar year.

`week_of_month()` is defined analogously where week 1 of a month is the first week with at least 4 days in the month; equivalently, it is the week containing the 4th day of the month. There is no week 0; instead week 1 of a month may begin in the previous calendar month.

`days_remaining()` returns the number of days remaining in the year.

Other functions should be self-explanatory.

Value

A vector of numerical values for the requested granularity. In the case of `day_of_week()`, it returns a character vector of the name of the day of the week, or a numeric vector if `numeric = TRUE` is specified.

Examples

```
april2025 <- gregorian_date(2025, 4, 1:30)
day_of_week(april2025)
day_of_month(april2025)
day_of_year(april2025)
days_remaining(april2025)
```

```
week_of_month(april2025)
week_of_year(april2025)
month_of_year(april2025)
```

`egyptian_date` *Egyptian and Armenian calendar dates*

Description

The ancient Egyptian calendar is a 365-day solar calendar with 12 months of 30 days each, plus a 13th month of 5 days. The Armenian calendar is similar but has a different epoch and month names.

Usage

```
egyptian_date(year = integer(), month = integer(), day = integer())

armenian_date(year = integer(), month = integer(), day = integer())

as_egyptian(date)

as_armenian(date)
```

Arguments

`year`	Numeric vector of years
`month`	Numeric vector of months
`day`	Numeric vector of days
`date`	Vector of dates on some calendar

Value

An egyptian or armenian vector object

Examples

```
tibble::tibble(
  gregorian = gregorian_date(2025, 5, 1:10),
  egyptian = as_egyptian(gregorian),
  armenian = as_armenian(gregorian)
)
```

`french_date` *French Revolutionary calendar dates*

Description

There are two versions of the French Revolutionary Calendar. The original version, used from 1793, was kept in sync with the solar year by setting the first day of Vendemiaire to the autumnal equinox. The second version, proposed in 1795, was a simpler arithmetic calendar, but was never used. We distinguish the two by using "afrench" (for Arithmetic French) for the second form.

Usage

```
french_date(year = integer(), month = integer(), day = integer())

afrench_date(year = integer(), month = integer(), day = integer())

as_french(date)

as_afrench(date)
```

Arguments

`year`	year
`month`	month
`day`	day
`date`	A vector of dates on some calendar

Value

A vector of dates on the French Revolutionary calendar

Examples

```
french_date(1, 1, 1:15) |>
  as_gregorian()
french_date(1, 1, 1:15) |>
  day_of_week()
```

`granularity_names` *Canonical granularities*

Description

`granularities()` will return a character vector of canonical granularity names for the relevant calendar. These are the granularities used to define dates on the calendar. `granularity()` will return a vector of numerical values for a given canonical granularity.

Usage

```
granularity_names(calendar)

granularity(date, granularity)
```

Arguments

`calendar`	An object defining a calendar, of "calendar" class.
`date`	A date vector on some calendar
`granularity`	A character string indicating the granularity to extract

Value

A character vector of granularity names or a vector of numerical values for the specified granularity.

See Also

week_of_year for some non-canonical granularities.

Examples

```
granularity_names(cal_iso)
granularity_names(cal_gregorian)
date_iso <- new_date(year = 2025, week = 23, day = 2, calendar = cal_iso)
granularity(date_iso, "week")
date_gregorian <- new_date(year = 2025, month = 1, day = 1, calendar = cal_gregorian)
granularity(date_gregorian, "month")
```

`gregorian_date` *Gregorian calendar dates*

Description

The Gregorian calendar is the standard calendar used by most of the world. It was named for Pope Gregory XIII who introduced it in 1582. It is a modification of the Julian calendar which was in use at the time.

Usage

```
gregorian_date(year = integer(), month = integer(), day = integer())

as_gregorian(date)
```

Arguments

`year`	A numeric vector of years
`month`	A numeric vector of months
`day`	A numeric vector of days
`date`	Vector of dates on some calendar

Value

A gregorian vector object

See Also

cal_gregorian

Examples

```
new_date(year = 2025, month = 3, day = 2:4, calendar = cal_gregorian)
gregorian_date(2025, 4, 19:30)
as_date(Sys.Date(), calendar = cal_gregorian)
as_gregorian(Sys.Date())
as_gregorian("2016-01-01")
tibble::tibble(
  x = seq(as.Date("2025-01-01"), as.Date("2025-12-31"), by = "day"),
  y = as_gregorian(x),
  z = as_date(x, calendar = cal_gregorian)
)
```

`hebrew_date` *Hebrew calendar dates*

Description

The Hebrew (or Jewish) calendar is an official calendar of Israel, and is used for Jewish religious holidays. It is a lunisolar calendar comprising months of 29 or 30 days, which begin and end at approximately the time of the new moon. An extra lunar month is added every 2 or 3 years, so the calendar has either 12 or 13 months per year.

Usage

```
hebrew_date(year = integer(), month = integer(), day = integer())

as_hebrew(date)

ohebrew_date(year = integer(), month = integer(), day = integer())

as_ohebrew(date)

samaritan_date(year = integer(), month = integer(), day = integer())

as_samaritan(date)
```

Arguments

`year`	A numeric vector of years
`month`	A numeric vector of months
`day`	A numeric vector of days
`date`	Vector of dates on some calendar

Details

The observational Hebrew calendar ("ohebrew") is the classical calendar where the new month began with the reported observation of the crescent new moon. In this implementation, Haifa is taken as the point of observation.

The Samaritan calendar is similar, but the moment of new moon marking the start of each new month is based on a traditional reckoning of the lunar cycle,

Value

A hebrew vector object

See Also

cal_hebrew, rosh_hashanah

Examples

```
heb <- new_date(year = 5785, month = 3, day = 2:4, calendar = cal_hebrew)
heb
hebrew_date(5785, 3, 2:4)
as_date(heb, calendar = cal_gregorian)
as_date(Sys.Date(), calendar = cal_hebrew)
tibble::tibble(
  gregorian = gregorian_date(2025, 1, 1) + 0:364,
  hebrew = as_date(gregorian, calendar = cal_hebrew),
)
as_gregorian(hebrew_date(5785, 3, 2:4))
as_hebrew(gregorian_date(2025, 1, 1:31))
as_hebrew("2016-01-01")
as_hebrew(Sys.Date())
hebrew_date(5785, 3, 1:10) |> day_of_week()
```

---

hindu_lunar_new_year *Hindu holidays and special days*

Description

Functions to return Gregorian dates for various Hindu holidays based on the Hindu calendars. Hindu Lunar New Year is the first day of the lunar month of Caitra (month 1). The Birthday of Rama is on the 8th or 9th day of the first month (Caitra). Diwali is on the new moon day in the month of Kartik (month 8). The Great Night of Shiva is at the end of the 11 month of Magha. Mesha Sankranti is the day when the sun enters the sign of Aries (Mesha). Sacred Wednesdays are the 8th day of the lunar month that falls on a Wednesday. Dates may vary by a day or two due to variations of the lunar calendar and local traditions.

Usage

```
hindu_lunar_new_year(year)

mesha_sankranti(year)

diwali(year)

shiva(year)

rama(year)

sacred_wednesdays(year)
```

Arguments

year	A numeric vector of Gregorian years

Value

A vector of dates on the Gregorian calendar

See Also

hindu_lunar_date

Examples

```
shiva(2025:2026)
hindu_lunar_new_year(2025:2026)
rama(2025:2026)
mesha_sankranti(2025:2026)
diwali(2025:2026)
sacred_wednesdays(2025:2026)
```

---

hindu_solar_date *Hindu solar and lunar calendar dates*

Description

There are four Hindu calendars implemented: modern Hindu solar and lunar calendars, and the old Hindu solar and lunar calendars. Hindu solar months are 1/12 of a solar year (approximately 30.44 days), while lunar months are based on the lunar cycle (approximately 29.53 days).

Usage

```
hindu_solar_date(year, month, day)

hindu_lunar_date(year, month, leap_month, day, leap_day)

as_hindu_solar(date)

as_hindu_lunar(date)

old_hindu_solar_date(year = integer(), month = integer(), day = integer())

old_hindu_lunar_date(
  year = integer(),
  month = integer(),
  leap_month = logical(),
  day = integer()
)

as_old_hindu_solar(date)

as_old_hindu_lunar(date)
```

Arguments

year	A numeric vector of years
month	A numeric vector of months
day	A numeric vector of days
leap_month	A logical vector indicating if year is a leap year
leap_day	A logical vector indicating if day is a leap day
date	A date vector on some calendar

Value

A vector object of Hindu dates.

See Also

cal_hindu_solar, cal_hindu_lunar, cal_old_hindu_solar, cal_old_hindu_lunar, diwali

Examples

```
gregorian_date(2025, 1, 1:31) |>
  as_hindu_solar()
gregorian_date(2025, 1, 1:31) |>
  as_hindu_lunar()
```

---

icelandic_date *Icelandic calendar dates*

Description

The Icelandic calendar, still in use in Iceland, divides times into 7-day weeks and two seasons: Summer and Winter. Summer starts on the first Thursday after April 18th, and Winter 180 days earlier. Ordinary years have 52 weeks with leap years having 53 weeks. The leap week occurs every 5-7 years in midsummer.

Usage

```
icelandic_date(
  year = integer(),
  season = integer(),
  week = integer(),
  weekday = integer()
)

as_icelandic(date)
```

Arguments

year	A numeric vector of years
season	A numeric vector of seasons (1 = Summer, 2 = Winter)
week	A numeric vector of weeks within the season (1 to 28)
weekday	A number vector containing day of week (0 = Sunday, 1 = Monday, ..., 6 = Saturday))
date	A numeric vector of dates

Value

An icelandic vector object

Examples

```
gregorian_date(2025, 4, 20:30) |>
  as_icelandic()
icelandic_date(2025, 1, 6, 0:6) |>
  day_of_week()
```

---

islamic_date *Islamic calendar dates*

Description

The Islamic (or Hijri) calendar is a lunar calendar comprising 12 lunar months in a year of 354 or 355 days. It is widely used in for Islamic holidays, and in countries where the predominant religion is Islam.

Usage

```
islamic_date(year = integer(), month = integer(), day = integer())

as_islamic(date)

oislamic_date(year = integer(), month = integer(), day = integer())

as_oislamic(date)

saudi_date(year = integer(), month = integer(), day = integer())

as_saudi(date)
```

Arguments

year	A numeric vector of years
month	A numeric vector of months
day	A numeric vector of days
date	Vector of dates on some calendar

Details

Three variations are implemented here. The standard Islamic calendar is available using `as_islamic` and `islamic_date`. The Saudi Islamic calendar uses `as_saudi` and `saudi_date`, while the traditional observational Islamic calendar is available using `as_oislamic` and `oislamic_date`.

Value

An islamic vector object

See Also

cal_islamic, ramadan

Examples

```
islamic_date(2025, 5, 1:30)
as_islamic("2016-01-01")
as_islamic(Sys.Date())
tibble::tibble(
  x = seq(as.Date("2025-01-01"), as.Date("2025-12-31"), by = "day"),
  y = as_islamic(x)
)
islamic_date(2025, 5, 1:10) |> day_of_week()
islamic_date(2025, 4, 19:30)
```

---

islamic_new_year *Islamic holidays*

Description

Functions to return Gregorian dates for various Islamic holidays. Specific dates can vary slightly based on moon sightings in different regions.

Usage

```
islamic_new_year(year)

mawlid(year)

ramadan(year)

eid_al_fitr(year)

eid_al_adha(year)
```

Arguments

`year`	A numeric vector of Gregorian years

Value

A vector of dates on the Gregorian calendar

See Also

islamic_date

Examples

```
tibble::tibble(
  year = 2025:2029,
  `New year` = islamic_new_year(year),
  Mawlid = mawlid(year),
  Ramadan = ramadan(year),
  `Eid al-Fitr` = eid_al_fitr(year),
  `Eid al-Adha` = eid_al_adha(year)
)
ramadan(2030)
```

---

iso_date *ISO calendar dates*

Description

In ISO 8601 date objects, weeks are defined as starting on Mondays. Week 1 is the first week with at least 4 days in the year. Equivalently, it is the week containing 4 January. There is no week 0; instead week 1 of a year may begin in the previous calendar year.

Usage

```
iso_date(year = integer(), week = integer(), day = integer())

as_iso(date)
```

Arguments

year	A numeric vector of years
week	A numeric vector of weeks
day	A numeric vector of days
date	Vector of dates on some calendar

Details

More flexible week numbering is possible using Gregorian dates with week_of_year().

Value

An iso vector object

See Also

cal_iso, week_of_year

Examples

```
iso <- new_date(year = 2025, week = 23, day = 2:4, calendar = cal_iso)
iso
iso_date(2025, 23, 2:4)
as_gregorian(iso_date(2025, 23, 2:4))
as_iso(gregorian_date(2025, 1, 1:31))
as_iso("2016-01-01")
as_iso(Sys.Date())
tibble::tibble(
  x = seq(as.Date("2025-01-01"), as.Date("2025-12-31"), by = "day"),
  y = as_iso(x)
)
```

---

julian_date *Julian calendar dates*

Description

The Julian calendar is the calendar used by the Roman Empire, and takes its name from Julius Caesar, who introduced it in 46 BC. It is still used as a religious calendar in parts of the Eastern Orthodox Church.

Usage

```
julian_date(year = integer(), month = integer(), day = integer())

as_julian(date)
```

Arguments

year	A numeric vector of years
month	A numeric vector of months
day	A numeric vector of days
date	Vector of dates on some calendar

Value

A julian vector object

See Also

cal_julian

Examples

```
as_date("2016-01-01", calendar = cal_julian)
as_date(Sys.Date(), calendar = cal_julian)
tibble::tibble(
  x = seq(as.Date("2025-01-01"), as.Date("2025-12-31"), by = "day"),
  y = as_date(x, calendar = cal_gregorian),
  z = as_date(x, calendar = cal_julian)
)
new_date(year = 2025, month = 4, day = 19:30, calendar = cal_julian)
julian_date(2025, 4, 19:30)
as_julian("2016-01-01")
as_julian(Sys.Date())
tibble::tibble(
  x = seq(as.Date("2025-01-01"), as.Date("2025-12-31"), by = "day"),
  y = as_julian(x)
)
```

---

kajeng_keliwon *Balinese special days*

Description

Find all occurrences of Kajeng Keliwon and Tumpek in a vector of Gregorian years.

Usage

```
kajeng_keliwon(year)

tumpek(year)
```

Arguments

year	A numeric vector of Gregorian years

Value

A vector of dates on the Gregorian calendar

See Also

balinese_date

Examples

```
kajeng_keliwon(2025)
tumpek(2025)
```

location *Locations*

Description

Create a location object. These are used for calculating the timing of astronomical events such as sunrise and sunset.

Usage

```
location(
  latitude = numeric(),
  longitude = numeric(),
  elevation = numeric(),
  zone = numeric()
)
```

Arguments

latitude	A numeric vector of latitudes
longitude	A numeric vector of longitudes
elevation	A numeric vector of elevations above sea level (in metres)
zone	A numeric vector of time zones (in hours, relative to UTC)

Value

A location vector object

Examples

```
melbourne <- location(-37.8136, 144.9631, 31, 10)
sunrise("2025-01-01", melbourne)
```

lunar_phase *Lunar phase at date*

Description

Lunar phase at date, as an angle in degrees. An angle of 0 means a new moon, 90 degrees means the first quarter, 180 means a full moon, and 270 degrees means the last quarter.

Usage

```
lunar_phase(date)
```

Arguments

date	Date vector

Value

A numeric vector of angles in degrees representing the lunar phase at the given dates.

Examples

```
april2025 <- gregorian_date(2025, 4, 1:30)
lunar_phase(april2025)
```

---

mayan_date *Mayan calendar dates*

Description

There are three Mayan calendars: the famous "long count" calendar, the "Haab" calendar, and the "Tzolkin" calendar. Of these, only the long count calendar can be converted to and from other calendars, so it is the only one that has been implemented here.

Usage

```
mayan_date(
  baktun = integer(),
  katun = integer(),
  tun = integer(),
  uinal = integer(),
  kin = integer()
)

as_mayan(date)
```

Arguments

baktun	Numeric vector
katun	Numeric vector
tun	Numeric vector
uinal	Numeric vector
kin	Numeric vector
date	Vector of dates on some calendar

Details

The Mayan long count calendar is a vigesimal (base-20) calendar with five components: kin (1 day), uinal (20 kin), tun (18 uinal), katun (20 tun), and baktun (20 katun). So the full cycle repeats every 20x18x20x20 = 144,000 days (approximately 394 years).

Value

A mayan vector object

See Also

cal_mayan

Examples

```
gregorian_date(2012, 12, 10:30) |>
  as_mayan()
```

`new_calendar` *Define calendar objects*

Description

Generate a calendar object of class "calendar". Examples of calendars produced in this way include `cal_chinese`, `cal_gregorian`, `cal_hebrew`, `cal_islamic`, and `cal_iso`.

Usage

```
new_calendar(
  name,
  short_name,
  granularities,
  validate_granularities,
  format,
  from_rd,
  to_rd
)

cal_babylonian

cal_bahai

cal_balinese

cal_chinese

cal_japanese
```

cal_korean

cal_vietnamese

cal_coptic

cal_ethiopic

cal_egyptian

cal_armenian

cal_french

cal_afrench

cal_gregorian

cal_hebrew

cal_icelandic

cal_islamic

cal_iso

cal_julian

cal_oislamic

cal_saudi

cal_ohebrew

cal_samaritan

cal_mayan

cal_hindu_lunar

cal_hindu_solar

cal_old_hindu_solar

cal_old_hindu_lunar

cal_persian

`cal_apersian`

`cal_roman`

`cal_tibetan`

Arguments

`name`	Name of calendar
`short_name`	Short name of calendar
`granularities`	Character vector with names of granularities of calendar (e.g., for the Gregorian calendar, the granularities are `year`, `month`, and `day`).
`validate_granularities`	Function to check granularities are valid (e.g., Gregorian months should be between 1 and 12).
`format`	Function to specify date format as a character string.
`from_rd`	Function to convert from RD to calendar date.
`to_rd`	Function to convert from calendar date to RD.

Value

A calendar object of class "calendar"

Examples

```
cal_gregorian
tibble::tibble(
  x = new_date(year = 2025, month = 5, day = 1:31, calendar = cal_gregorian),
  y = as_date(x, calendar = cal_islamic)
)
```

`new_moons` *Full moons and new moons in Gregorian years*

Description

Calculate all the near-full or near-new moons in a vector of Gregorian years

Usage

```
new_moons(year)

full_moons(year)
```

Arguments

year	A vector of Gregorian years

Value

A vector of Gregorian dates representing the full moons or new moons in the given years.

A vector of dates

Examples

```
full_moons(2025)
new_moons(2025)
```

---

persian_date *Persian dates*

Description

The modern Persian calendar was adopted in 1925 in Iran and in 1957 in Afghanistan. An alternative version of the calendar, using only arithmetic (rather than astronomical) calculations is available as the apersian calendar.

Usage

```
persian_date(year = integer(), month = integer(), day = integer())

apersian_date(year = integer(), month = integer(), day = integer())

as_persian(date)

as_apersian(date)
```

Arguments

year	Numeric vector of years
month	Numeric vector of months
day	Numeric vector of days
date	Vector of dates on some calendar

Value

A persian vector object

Examples

```
gregorian_date(2025, 5, 1:20) |>
  as_persian()
```

roman_date *Roman calendar dates*

Description

The Roman calendar (as defined here) is the same as the Julian calendar but with different nomenclature. Rather than use a (year, month, day) triple for each date, it specifies dates using year, month, event, count.

Usage

```
roman_date(
  year = integer(),
  month = integer(),
  event = integer(),
  count = integer(),
  leap_day = logical()
)

as_roman(date)
```

Arguments

year	A numeric vector of years
month	A numeric vector of months
event	A numeric vector of events: 1 = Kalends, 2 = Nones, 3 = Ides
count	A numeric vector of counts
leap_day	A logical vector indicating if day is a leap day
date	Vector of dates on some calendar

Value

A roman vector object

See Also

cal_roman

Examples

```
roman_date(66, 4, 1, 1, FALSE)
new_date(year = 66, month = 4, event = 1, count = 1, leap_day = FALSE, calendar = cal_roman)
as_roman("2016-01-01")
tibble::tibble(
  x = seq(as.Date("2025-01-01"), as.Date("2025-12-31"), by = "day"),
  y = as_roman(x)
)
```

sunrise *Sun and moon rise and set given a date and location*

Description

Calculate the time of sunrise, sunset, moonrise and moonset at a specific location and date. The time zone of the location is used as specified in the `location` object. No adjustments are made for daylight saving.

Usage

```
sunrise(date, location)

sunset(date, location)

moonset(date, location)

moonrise(date, location)
```

Arguments

`date`	Vector of dates on some calendar.
`location`	Vector of locations of class "location", usually the output from the `location` function

Value

Time of sunrise

Examples

```
melbourne <- location(-37.8136, 144.9631, 31, 10)
sydney <- location(-33.8688, 151.2093, 3, 10)
sunrise(gregorian_date(2025, 1, 1), c(melbourne, sydney))
sunset(gregorian_date(2025, 1, 1), c(melbourne, sydney))
moonrise(gregorian_date(2025, 1, 1), c(melbourne, sydney))
moonset(gregorian_date(2025, 1, 1), c(melbourne, sydney))
```

tibetan_date *Tibetan calendar dates*

Description

There are several Tibetan calendars. These functions implement the official Phuglugs version of the Kalachakra calendar, which is similar to the Hindu lunisolar calendars.

Usage

```
tibetan_date(
  year = integer(),
  month = integer(),
  leap_month = logical(),
  day = integer(),
  leap_day = logical()
)

as_tibetan(date)
```

Arguments

year	A numeric vector of years
month	A numeric vector of months
leap_month	A logical vector of leap months
day	A numeric vector of days
leap_day	A logical vector of leap days
date	A vector of dates on some calendar

Value

A tibetan_date object

See Also

tibetan_new_year

Examples

```
gregorian_date(2025, 6, 1:10) |> as_tibetan()
```

---

tibetan_new_year *Tibetan holidays*

Description

The Tibetan New Year occurs on the first day of the Tibetan calendar. These functions calculate the date given either a Gregorian year or a Tibetan year. Both return a Gregorian date.

Usage

```
tibetan_new_year(year)

losar(t_year)
```

Arguments

year	A vector of Gregorian years
t_year	A vector of Tibetan years

Value

A vector of Gregorian dates corresponding to the Tibetan New Year

See Also

tibetan_date

Examples

```
tibetan_new_year(2025:2028)
losar(2152:2154)
```

---

time_of_day *Time of day*

Description

Create a time object

Usage

```
time_of_day(hour = integer(), minute = integer(), second = numeric())
```

Arguments

hour	A numeric vector of hours
minute	A numeric vector of minutes
second	A numeric vector of seconds

Value

A time_of_day vector object, stored as a vctrs record containing hours, minutes and seconds.

us_memorial_day *US Holidays*

Description

Functions to return Gregorian dates for US holidays and other special days

Usage

```
us_memorial_day(year)

us_independence_day(year)

us_labor_day(year)

us_election_day(year)

us_daylight_saving_start(year)

us_daylight_saving_end(year)

unlucky_fridays(year)
```

Arguments

year	Gregorian year

Value

A vector of Gregorian dates corresponding to the US holidays or special days.

Examples

```
us_memorial_day(2025)
us_independence_day(2025)
us_labor_day(2025)
us_election_day(2025)
us_daylight_saving_start(2025)
us_daylight_saving_end(2025)
unlucky_fridays(2025)
```

yom_kippur *Jewish Holidays*

Description

Functions to return Gregorian dates for various Jewish holidays

Usage

```
yom_kippur(year)

passover(year)

purim(year)

ta_anit_esther(year)

tishah_be_av(year)

hanukkah(year)

rosh_hashanah(year)

sukkot(year)

shavuot(year)
```

Arguments

year	A numeric vector of Gregorian years

Value

A vector of dates on the Gregorian calendar

See Also

hebrew_date

Examples

```
tibble::tibble(
  year = 2025:2030,
  ta_anit_esther = ta_anit_esther(year),
  purim = purim(year),
  passover = passover(year),
  shavuot = shavuot(year),
  tishah_be_av = tishah_be_av(year),
```

```
  rosh_hashanah = rosh_hashanah(year),
  yom_kippur = yom_kippur(year),
  sukkot = sukkot(year),
  hanukkah = hanukkah(year)
)
```

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