Year

A **year** is the time between two recurrences of an event related to the orbit of the Earth around the Sun. By extension, this can be applied to any planet: for example, a "Martian year" is the time in which Mars completes its own orbit.

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Calendar year Edit

A calendar year is the time between two dates with the same name in a calendar.

Solar calendars usually aim to predict the seasons, but because the length of individual seasonal years varies significantly, they instead use an astronomical year as a surrogate. For example, the ancient Egyptians used the heliacal rising of Sirius to predict the flooding of the Nile.

The Gregorian calendar aims to keep the vernal equinox on or close to March 21; hence it follows the vernal equinox year. The average length of its year is 365.2425 days.

Among solar calendars in wide use today, the Persian calendar is one of the most precise. Rather than being based on numerical rules, the Persian year begins on the day (for the time zone of Tehran) on which the vernal equinox actually falls, as determined by precise astronomical computations.

No astronomical year has an integer number of days or lunar months, so any calendar that follows an astronomical year must have a system of intercalation such as leap years.

In the Julian Calendar, the average length of a year was 365.25 days. This is still used as a convenient time unit in astronomy, see below.

Seasonal year Edit

A seasonal year is the time between successive recurrences of a seasonal event such as the flooding of a river, the migration of a species of bird, the flowering of a species of plant, the first frost, or the first scheduled game of a certain sport. All of these events can have wide variations of more than a month from year to year.

Astronomical years Edit

Julian year Edit

The **Julian year**, as used in astronomy and other sciences, is a time unit defined as exactly 365.25 days. This is the normal meaning of the unit "year" (symbol "a" from the Latin *annus*, *annata*) used in various scientific contexts. The Julian century of 36525 days and the Julian millennium of 365250 days are used in astronomical calculations. Fundamentally, expressing a time interval in Julian years is a way to precisely specify how many days (not how many "real" years), for long time intervals where stating the number of days would be unwieldy and unintuitive. For the distance unit light year, by convention the Julian year is used in the computation.

Sidereal year Edit

The **sidereal year** is the time for the Earth to complete one revolution of its orbit, as measured in a fixed frame of reference (such as the fixed stars, Latin *sidus*). Its duration in SI days of 86,400 SI seconds each is on average:

> 365.256 363 051 days (365 d 6 h 9 min 9 s) (at the epoch J2000.0 = 2000 January 1 12:00:00 Terrestrial Time).

Tropical year Edit

A **tropical year** is the time for the Earth to complete one revolution with respect to the framework provided by the intersection of the ecliptic (the plane of the orbit of the Earth) and the plane of the equator] (the plane perpendicular to the rotation axis of the Earth). Because of the precession of the equinoxes, this framework moves slowly westward along the ecliptic with respect to the fixed stars (with a period of about 26,000 tropical years); as a consequence, the Earth completes this year before it completes a full orbit as measured in a fixed reference frame. Therefore a tropical year is shorter than the sidereal year. The exact length of a tropical year depends on the chosen starting point: for example the **vernal equinox year** is the time between successive vernal equinoxes. The **mean tropical year** (averaged over all ecliptic points) is:

> 365.242 189 67 days (365 d 5 h 48 min 45 s) (at the epoch J2000.0).

Anomalistic year Edit

The **anomalistic year** is the time for the Earth to complete one revolution with respect to its apsides. The orbit of the Earth is elliptical; the extreme points, called apsides, are the perihelion, where the Earth is closest to the Sun (January 2 in 2000), and the aphelion, where the Earth is farthest from the Sun (July 2 in 2000).

Because of gravitational disturbances by the other planets, the shape and orientation of the orbit are not fixed, and the apsides slowly move with respect to a fixed frame of reference. Therefore the anomalistic year is slightly longer than the sidereal year. It takes about 112,000 years for the ellipse to revolve once relative to the fixed stars. The anomalistic year is

also longer than the tropical year (which calendars attempt to track) and so the date of the perihelion gradually advances every year. It takes about 21,000 years for the ellipse to revolve once relative to the vernal equinox, thus for the date of perihelion to return to the same place (given a calendar that tracks the seasons perfectly).

The average duration of the anomalistic year is:

> 365.259 635 864 days (365 d 6 h 13 min 52 s) (at the epoch J2000.0).

Draconic year Edit

The **draconitic year**, **eclipse year** or **ecliptic year** is the time for the Sun (as seen from the Earth) to complete one revolution with respect to the same lunar node (a point where the Moon's orbit intersects the ecliptic). This period is associated with eclipses: these occur only when both the Sun and the Moon are near these nodes; so eclipses occur within about a month of every half eclipse year. Hence there are *two eclipse seasons* every eclipse year. The average duration of the eclipse year is:

> 346.620 075 883 days (346 d 14 h 52 min 54 s) (at the epoch J2000.0).

This term is sometimes also used to designate the time it takes for a complete revolution of the Moon's ascending node around the ecliptic: 18.612 815 932 years (6798.331 019 days; at the epoch J2000.0).

Fumocy Edit

The **full moon cycle** or **fumocy** is the time for the Sun (as seen from the Earth) to complete one revolution with respect to the perigee of the Moon's orbit. This period is associated with the apparent size of the full moon, and also with the varying duration of the synodic month. The duration of one full moon cycle is:

> 411.784 430 29 days (411 d 18 h 49 min 34 s) (at the epoch J2000.0).

Besselian year Edit

The **Besselian year** is a tropical year that starts when the fictitious mean Sun reaches an ecliptic longitude of 280°. This is currently on or close to 1 January. It is named after the 19th century German astronomer and mathematician Friedrich Bessel. An approximate formula to compute the current time in Besselian years from the Julian day is:

> B = 2,000 + (JD - 2,451,544.53) /365.242189

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