**Astrodynamic Constants**

This page contains selected constants commonly used in astrodynamic computations. The term "**constant**" is used loosely. Specifically, some values are derived from other constants and/or results of numerical fits to measured data (e.g. planetary mass ratios). Constants are represented in three groups: "defining", "primary", and "derived". [References are listed below](https://ssd.jpl.nasa.gov/?constants#ref).

**Defining Constants**

|  |  |  |
| --- | --- | --- |
| Julian day | d = | 86400 s |
| Julian year | y = | 365.25 d |
| Julian century | Cy = | 36525 d |
| speed of light | c = | 299792458 m/s |
| astronomical unit | au = | 149597870700 m |

**Primary Constants**

|  |  |  |
| --- | --- | --- |
| mean sidereal day |  | 86164.09054 s [ 23:56:04.09054 ] |
| sidereal year (quasar ref. frame) |  | 365.25636 d |
| gravitational constant | G = | 6.67259 (± 0.00030) x 10-11 kg-1 m3 s-2 |
| general precession in longitude |  | 5028.83 (± 0.04) arcsec/Cy |
| obliquity of ecliptic (J2000) | epsilon = | 84381.412 (± 0.005) arcsec |
| obliquity of ecliptic (J2000) [IAU 1976] |  | 84381.448 arcsec |
| mass ratio: sun/Mercury |  | 6023600. (± 250.) |
| mass ratio: sun/Venus |  | 408523.71 (± 0.06) |
| mass ratio: sun/(Earth+Moon) |  | 328900.56 (± 0.02) |
| mass ratio: sun/(Mars system) |  | 3098708. (± 9.) |
| mass ratio: sun/(Jupiter system) |  | 1047.3486 (± 0.0008) |
| mass ratio: sun/(Saturn system) |  | 3497.898 (± 0.018) |
| mass ratio: sun/(Uranus system) |  | 22902.98 (± 0.03) |
| mass ratio: sun/(Neptune system) |  | 19412.24 (± 0.04) |
| mass ratio: sun/(Pluto system) |  | 1.35 (± 0.07) x 108 |

**Derived Constants**

|  |  |  |  |
| --- | --- | --- | --- |
| light time for 1 au | tauA= | au/c = | 499.004783836 s |
| heliocentric gravitational constant | GMsun = |  | 1.32712440018 x 1020 (± 8 x 109) m3 s-2 |
| mass ratio: Earth / Moon |  |  | 81.30059 (± 0.00001) |