

## 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.](#)

### 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 =	$6.67259 (\pm 0.00030) \times 10^{-11} \text{ kg}^{-1} \text{ m}^3 \text{ s}^{-2}$
general precession in longitude		5028.83 ( $\pm 0.04$ ) arcsec/Cy
obliquity of ecliptic (J2000)	epsilon =	84381.412 ( $\pm 0.005$ ) arcsec
obliquity of ecliptic (J2000) [IAU 1976]		84381.448 arcsec
mass ratio: sun/Mercury		6023600. ( $\pm 250.$ )
mass ratio: sun/Venus		408523.71 ( $\pm 0.06$ )
mass ratio: sun/(Earth+Moon)		328900.56 ( $\pm 0.02$ )
mass ratio: sun/(Mars system)		3098708. ( $\pm 9.$ )
mass ratio: sun/(Jupiter system)		1047.3486 ( $\pm 0.0008$ )
mass ratio: sun/(Saturn system)		3497.898 ( $\pm 0.018$ )
mass ratio: sun/(Uranus system)		22902.98 ( $\pm 0.03$ )
mass ratio: sun/(Neptune system)		19412.24 ( $\pm 0.04$ )
mass ratio: sun/(Pluto system)		$1.35 (\pm 0.07) \times 10^8$

### Derived Constants

light time for 1 au	tau <sub>A</sub> = au/c =	499.004783836 s
heliocentric gravitational constant	GM <sub>sun</sub> =	$1.32712440018 \times 10^{20} (\pm 8 \times 10^9) \text{ m}^3 \text{ s}^{-2}$
mass ratio: Earth / Moon		81.30059 ( $\pm 0.00001$ )