

# OSCULATING ELEMENTS AND INVERSE MASSES OF PERTURBING PLANETS

ECLIPTIC AND EQUINOX J2000.0  
EPOCH 2017 SEPTEMBER 4.0 TT (JD 2458000.5)

Planet	$M$	$\omega$	$\Omega$	$i$	$e$	$\mu$	$a$	$1/m$
Mercury	312.85791	29.17577	48.30857	7.00394	0.2056362	4.09234738	0.3870981	6023600
Venus	313.17303	54.73188	76.62871	3.39448	0.0067852	1.60214472	0.7233279	408523.71
Earth+Moon	240.16943	288.91584	173.97935	0.00239	0.0166996	0.98561045	0.9999991	328900.5614
Mars	162.21802	286.62159	49.50700	1.84836	0.0935099	0.52407175	1.5236163	3098708.
Jupiter	196.54005	273.72963	100.51467	1.30372	0.0489053	0.08310782	5.2021108	1047.3486
Saturn	172.07112	340.23669	113.58969	2.48694	0.0515684	0.03328479	9.5722394	3497.898
Uranus	215.68330	99.23544	74.00557	0.77162	0.0495164	0.01177912	19.1308244	22902.98
Neptune	295.70198	275.76191	131.81586	1.77204	0.0064889	0.00598926	30.0304173	19412.24
Pluto	39.81227	114.23248	110.29622	17.12822	0.2532035	0.00393820	39.7134478	1.352·10 <sup>8</sup>
Ceres	309.49408	73.02370	80.30889	10.59321	0.0756074	0.21408881	2.7674094	2.13·10 <sup>9</sup>
Pallas	291.65134	309.99157	173.08718	34.83791	0.2305975	0.21343186	2.7730852	10.00·10 <sup>9</sup>
Vesta	292.71029	150.94298	103.83595	7.14002	0.0891526	0.27154736	2.3617776	7.69·10 <sup>9</sup>

## SOME CONSTANTS

	$\pi = 3.14159265359$
	1 radian = 57.2957795131°
	1 radian = 206264.806247''
Gaussian constant	$k = 0.01720209895$
Speed of light	$c = 299792.458$ km/s
Light-time for unit distance	$\tau_A = 499.004784$ s
Unit distance	$c\tau_A = 149597870.7$ km
Obliquity of the ecliptic at standard epoch 2000	$\varepsilon = 23.43929111^\circ$
Ratio of mass of Moon to that of Earth	$\mu = 0.01230004$

## JULIAN DAY NUMBER FOR DATES IN 2016 – 2018

Date (commencing at noon)	JD	Date (commencing at noon)	JD
2016 Dec. 0	= 245 7723	2017 July 0	= 245 7935
2017 Jan. 0	= 245 7754	Aug. 0	= 245 7966
Feb. 0	= 245 7785	Sept. 0	= 245 7997
Mar. 0	= 245 7813	Oct. 0	= 245 8027
Apr. 0	= 245 7844	Nov. 0	= 245 8058
May 0	= 245 7874	Dec. 0	= 245 8088
June 0	= 245 7905	2018 Jan. 0	= 245 8119

Standard epoch of elements in EMP-2017:

JD 2458000.5 = 2017 September 4.0 TT