

OSCULATING ELEMENTS AND INVERSE MASSES OF PERTURBING PLANETS

ECLIPTIC AND EQUINOX J2000.0
EPOCH 2021 JULY 5.0 TT (JD 2459400.5)

Planet	M	ω	Ω	i	e	μ	a	$1/m$
Mercury	282.13081	29.18639	48.30388	7.00366	0.2056306	4.09234095	0.3870985	6023600
Venus	35.70881	55.18667	76.62194	3.39450	0.0067901	1.60213980	0.7233294	408523.71
Earth+Moon	179.99104	286.75133	176.17585	0.00272	0.0167068	0.98560703	1.0000014	328900.5614
Mars	175.79975	286.69106	49.49196	1.84789	0.0933320	0.52400734	1.5237411	3098708.
Jupiter	313.16945	273.39267	100.51604	1.30355	0.0485267	0.08307389	5.2035274	1047.3486
Saturn	223.48246	335.87029	113.59499	2.48623	0.0520842	0.03323611	9.5815839	3497.898
Uranus	234.85298	96.20262	74.09508	0.77035	0.0445034	0.01168781	19.2303370	22902.98
Neptune	334.46989	245.50682	131.74716	1.76905	0.0131754	0.00591456	30.2827411	19412.24
Pluto	44.68047	115.34867	110.29813	17.10279	0.2509635	0.00392565	39.7980099	1.352·10 ⁸
Ceres	248.40799	73.73768	80.26763	10.58820	0.0783942	0.21429254	2.7656552	2.13·10 ⁹
Pallas	230.07778	310.44123	172.91972	34.89866	0.2297622	0.21335178	2.7737792	10.00·10 ⁹
Vesta	312.77625	151.01769	103.80607	7.14154	0.0883491	0.27156941	2.3616498	7.69·10 ⁹

SOME CONSTANTS

	$\pi = 3.14159265359$
	1 radian = 57.2957795131°
	1 radian = 206264.806247''
Gaussian constant	$k = 0.01720209895 \text{ AU}^{3/2} \cdot \text{day}^{-1} \cdot M_{\text{Sun}}^{-1/2}$
Speed of light	$c = 299792.458 \text{ km/s}$
Light-time for unit distance	$\tau_A = 499.004784 \text{ s}$
Unit distance	$c\tau_A = 149597870.7 \text{ km}$
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 2020 – 2022

Date	JD	Date	JD
(commencing at noon)		(commencing at noon)	
2020 Dec. 0	= 245 9184	2021 July 0	= 245 9396
2021 Jan. 0	= 245 9215	Aug. 0	= 245 9427
Feb. 0	= 245 9246	Sept. 0	= 245 9458
Mar. 0	= 245 9274	Oct. 0	= 245 9488
Apr. 0	= 245 9305	Nov. 0	= 245 9519
May 0	= 245 9335	Dec. 0	= 245 9549
June 0	= 245 9366	2022 Jan. 0	= 245 9580

Standard epoch of elements in EMP-2021:

JD 2459400.5 = 2021 July 5.0 TT