ASTRONOMICAL AND PHYSICAL CONSTANTS

Gaussian gravitational constant	0.01720209895
Astronomical unit (au)	149,597,871 km
Speed of light in vacuo	299,792.458 km s^{-1}
Dynamical form-factor J2 for the Earth	0.001082636
Product of gravitational constant and mass of the Earth	398,600.5 km^3s^{-2}
Earth-Moon mass ratio	81.3006
Moon's sidereal mean motion	$2.661699489 \times 10^{-6}$ radians s^{-1} = 0".5490149294 s^{-1}
Obliquity of the ecliptic (2000)	23° 26' 21".448
Constant of nutation in obliquity (2000)	9".2052331
Solar parallax	8".794143
Light-time for unit distance	499.004784 s = 0.005775518 d
Constant of aberration	20".49551
Mean distance Earth to Moon	384,400 km
Constant of sine Moon's parallax	3422".451
Lunar inequality	6".43987
Parallactic inequality	124".986
Length of the year:	
Tropical (equinox to equinox)	$365^d.24219$
Sidereal (fixed star to fixed star)	$365^d.25636$
Anomalistic (apse to apse)	$365^d.25964$
Eclipse (Moon's node to Moon's node)	$346^d.62003$
Gaussian (Kepler's law for a = 1)	$365^d.25690$
Length of the month:	
Tropical (equinox to equinox)	$27^d.32158$
Sidereal (fixed star to fixed star)	$27^d.32166$
Anomalistic (apse to apse)	$27^d.55455$
Draconic (node to node)	$27^d.21222$
Synodic (New Moon to New Moon)	$29^d.53059$
Length of the day:	
Mean solar day	$24^h\ 03^m\ 56^s.555 = 1^d.00273791$ mean sidereal time
Mean sidereal day	$23^h\ 56^m\ 04^s.091 = 0^d.99726957$ mean solar time
Sidereal rotation period of the Earth	$23^h\ 56^m\ 04^s.099 = 0^d.99726966$ mean solar time
Solar radiation:	
Solar constant	1.39 x 103 J $m^{-2}s^{-1}$
Radiation emitted	3.90 x 1026 J s^{-1}
Radiation emittance at surface.	6.41 x 107 J $m^{-2}s^{-1}$
Total internal radiant energy	2.8 x 1040 J
Radiation emitted per unit mass	1.96×10^{-4} J s^{-1} kg^{-1}
Visual absolute magnitude (Mv)	+4.79
Colour indices (B-V, U-B)	+0.62, +0.10
Spectral type	G2V
Effective temperature	5,800 K

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The Galaxy:

Pole of galactic plane (1950)	$12^h\ 49^m.0$, δ +27° 24'
Point of zero longitude (1950)	$17^h\ 42^m.4$, δ -28° 55'
Galactic Longitude of North Celestial Pole	123°.00
Mass	1.1×10^{11} solar masses = 2.2×10^{41} kg
Average density	0.1 solar mass pc^{-3} = 7 x 10-21 kg m^{-3}
Diameter	25,000 pc
Thickness	4,000 pc
Distance of Sun from centre	8,200 pc
Distance of Sun above galactic plane	8 pc
Solar apex (1950) (from bright stars)	$\alpha\ 18^h\ 06^m$, δ + 30°
Solar motion (from bright stars)	20.0 km s^{-1}
Period of revolution of Sun about centre	2.2×10^8yr

Conversion factors:

Light-year (ly)	9.4607×10^{12}km = 63,240 au = 0.30660 pc
Parsec (pc)	30.857×10^{12}km = 206,265 au = 3.2616 ly

Figure of the Earth:

Equatorial radius	6,378,136.6 m
Polar radius	6,356,751.9 m
Flattening	0.0033528197

* $\rho \sin \varphi' = S \sin \varphi$, $\rho \cos \varphi' = C \cos \varphi$ where:

$S = 0.99497418 - 0.00167082 \cos 2\varphi + 10^{-8} (210 \cos 4\varphi + 15.7\ h)$

$C = 1.00167997 - 0.00168208 \cos 2\varphi + 10^{-8} (212 \cos 4\varphi + 15.7\ h)$

$\rho = 0.99832707 + 0.00167644 \cos 2\varphi - 10^{-8} (352 \cos 4\varphi - 15.7\ h) + 10\text{-}8 \cos 6\varphi$

$\tan \varphi' = 0.9933054 + (0.11 \times 10^{-8}\ h)) \tan \varphi$

$\varphi - \varphi' = 692".74 \sin 2\varphi - 1".16 \sin 4\varphi$

1° of latitude = $[111.1333 - 0.5598 \cos 2\varphi + 0.0012 \cos 4\varphi]$ km

1° of longitude = $[111.4133 \cos \varphi - 0.0935 \cos 3\varphi + 0.0001 \cos 5\varphi]$ km

Acceleration due to gravity

$g = 9.780310 [1 + 0.00530239 \sin^2\varphi - 0.00000587 \sin^2 2\varphi - (31.55 \times 10^{-8})\ h]$ m s^{-2}

Length of seconds pendulum

$l = [0.9935769 - 0.0026272 \cos 2\varphi + 0.0000029 \cos 4\varphi - (3133 \times 10^{-10})\ h]$ m

Constant of gravitation $6.67428 \times 10^{-11} kg^{-1} m^3 s^{-2}$

Centennial general precession $p = 5028".796195 + 2".2108696\ T$†

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* φ = Geographic or geodetic latitude

φ' = Geocentric latitude

ρ = Geocentric distance in equatorial radii

h = Height in metres

† T = Time measured in Julian centuries from J2000.0