

Table of Constants

Fundamental constants

Speed of light in vacuum	c	=	$2.998 \times 10^8 \text{ m s}^{-1}$
Planck constant	h	=	$6.626 \times 10^{-34} \text{ J s}$
Boltzmann constant	k_B	=	$1.381 \times 10^{-23} \text{ J K}^{-1}$
Stefan-Boltzmann constant	σ	=	$5.670 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$
Elementary charge	e	=	$1.602 \times 10^{-19} \text{ C}$
Universal gravitational constant	G	=	$6.674 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
Universal electric constant	ϵ_0	=	$8.854 \times 10^{-12} \text{ m}^{-3} \text{ kg}^{-1} \text{ s}^4 \text{ A}^2$
Universal gas constant	R	=	$8.315 \text{ J mol}^{-1} \text{ K}^{-1}$
Avogadro constant	N_A	=	$6.022 \times 10^{23} \text{ mol}^{-1}$
Wien's displacement constant	$b = \lambda_m T$	=	$2.898 \times 10^{-3} \text{ m K}$
Mass of electron	m_e	=	$9.109 \times 10^{-31} \text{ kg}$
Mass of proton	m_p	=	$1.673 \times 10^{-27} \text{ kg}$
Mass of neutron	m_n	=	$1.675 \times 10^{-27} \text{ kg}$
Mass of Helium nucleus	m_{He}	=	$6.645 \times 10^{-27} \text{ kg}$
Atomic mass unit (a.m.u., Dalton)		=	$1.661 \times 10^{-27} \text{ kg}$

Astronomical data

Hubble constant	H_0	=	$70 \text{ km s}^{-1} \text{ Mpc}^{-1}$
North Ecliptic Pole (J2000.0)	(α_E, δ_E)		$(18^{\text{h}}00^{\text{m}}00^{\text{s}}, +66^{\circ}33'39'')$
North Galactic Pole (J2000.0)	(α_G, δ_G)		$(12^{\text{h}}51^{\text{m}}26^{\text{s}}, +27^{\circ}07'42'')$
1 jansky	1 Jy	=	$10^{-26} \text{ W m}^{-2} \text{ Hz}^{-1}$
1 parsec	1 pc	=	$3.086 \times 10^{16} \text{ m}$ $206\,265 \text{ au}$ 3.262 ly
1 astronomical unit (au)	1 au	=	$1.496 \times 10^{11} \text{ m}$
1 sidereal day	T_{SD}	=	23.93444 h $23^{\text{h}}56^{\text{m}}04^{\text{s}}$
1 tropical year		=	$365.2422 \text{ solar days}$
1 sidereal year		=	$365.2564 \text{ solar days}$

Gauss's formulae

Spherical law of cosines: $\cos a = \cos b \cos c + \sin b \sin c \cos A$

Spherical law of sines: $\frac{\sin A}{\sin a} = \frac{\sin B}{\sin b} = \frac{\sin C}{\sin c}$

Approximations

$$(1+x)^n \approx 1+nx$$

$$(1+x)(1+y) \approx 1+x+y \text{ if } x \ll 1 \text{ and } y \ll 1$$

The Sun

Solar luminosity	$L_{\odot}$	=	3.826×10^{26} W
Apparent angular diameter of Sun	$\theta_{\odot}$	=	$32'$
Effective temperature of Sun	$T_{\text{eff},\odot}$	=	5778 K
Apparent visual magnitude		=	-26.75
Absolute visual magnitude		=	+4.82
Apparent bolometric magnitude		=	-26.83
Absolute bolometric magnitude		=	+4.74
Distance of the Sun from the Galactic centre		$\approx$	8 kpc

The Earth and Moon

Obliquity of the ecliptic (Earth)	ϵ	=	$23.5'$
Platonic year (period of precession of Earth's axis)		=	25 765 years
Apparent visual magnitude of full Moon		=	-12.74
Apparent angular diameter of Moon	θ_L	=	$31'$
Inclination of the lunar orbit to the ecliptic		=	$05^{\circ}08'43''$
Inclination of the lunar equator to its orbital plane		=	6.687°
Lunar sidereal month	T_{SL}	=	27.321661 d 655.71986 h
Synodic month		=	29.530589 d
Tropical month		=	27.321582 d
Anomalistic month		=	27.554550 d
Draconic month		=	27.212221 d

The Solar System

Object	Mean radius [km]	Mass [kg]	Semimajor axis [au]	Eccentricity
Sun	695 700	1.988×10^{30}	—	—
Mercury	2 440	3.301×10^{23}	0.387	0.206
Venus	6 052	4.867×10^{24}	0.723	0.007
Earth	6 378	5.972×10^{24}	1.000	0.016 710
Moon	1 737	7.346×10^{22}	3.844×10^5 km	0.054 900 (range 0.026 – 0.077)
Mars	3 390	6.417×10^{23}	1.524	0.093
Jupiter	69 911	1.898×10^{27}	5.203	0.048
Saturn	58 232	5.683×10^{26}	9.537	0.054
Uranus	25 362	8.681×10^{25}	19.189	0.047
Neptune	24 622	1.024×10^{26}	30.070	0.009