Astronomical Constants

Solar mass	$1\ M_\odot$	$=$	1.9891×10^{30} kg
Solar irradiance	S	$=$	$1.365(2) \times 10^{3}$ W m^{-2}
Solar luminosity	$1\ L_\odot$	$=$	$3.839(5) \times 10^{26}$ W
Solar radius	$1\ R_\odot$	$=$	$6.95508(26) \times 10^{8}$ m
Solar effective temperature	$T_{e,\odot}$	$\equiv$	$L_\odot/(4\pi\sigma R_\odot^2)^{1/4}$
		$=$	5777(2) K
Solar absolute bolometric magnitdue	M_{bol}	$=$	4.74
Solar apparent bolometric magnitude	m_{bol}	$=$	-26.83
Solar apparent ultraviolet magnitude	U	$=$	-25.91
Solar apparent blue magnitude	B	$=$	-26.10
Solar apparent visual magnitude	V	$=$	-26.75
Solar bolometric correction	BC	$=$	-0.08
Earth mass	$1\ M_\oplus$	$=$	5.9736×10^{24} kg
Earth radius (equatorial)	$1\ R_\oplus$	$=$	6.378136×10^{6} m
Astronomical unit	1 AU	$=$	$1.4959787066 \times 10^{11}$ m
Light (Julian) year	1 ly	$=$	$9.460730472 \times 10^{15}$ m
Parsec	1 pc	$=$	206264.806 AU
		$=$	3.0856776×10^{16} m
		$=$	3.2615638 ly (Julian)
Sidereal day		$=$	$23^{\mathrm{h}}56^{\mathrm{m}}04.0905309^{\mathrm{s}}$
Solar day		$=$	86400 s
Sidereal year		$=$	3.15581450×10^{7} s
		$=$	365.256308 d
Tropical year		$=$	$3.155692519 \times 10^{7}$ s
		$=$	365.2421897 d
Julian year		$\equiv$	3.1557600×10^{7} s
		$\equiv$	365.25 d
Gregorian year		$\equiv$	3.1556952×10^{7} s
		$\equiv$	365.2425 d

Note: Uncertainties in the last digits are indicated in parentheses. For instance, the solar radius, $1\ R_\odot$, has an uncertainty of $\pm 0.00026 \times 10^{8}$ m.

Physical Constants

Gravitational constant	G	$=$	$6.673(10) \times 10^{-11}$ N m^2 kg^{-2}
Speed of light (exact)	c	$\equiv$	2.99792458×10^8 m s^{-1}
Permeability of free space	μ_0	$\equiv$	$4\pi \times 10^{-7}$ N A^{-2}
Permittivity of free space	ϵ_0	$\equiv$	$1/\mu_0 c^2$
		$=$	$8.854187817\ldots \times 10^{-12}$ F m^{-1}
Electric charge	e	$=$	$1.602176462(63) \times 10^{-19}$ C
Electron volt	1 eV	$=$	$1.602176462(63) \times 10^{-19}$ J
Planck's constant	h	$=$	$6.62606876(52) \times 10^{-34}$ J s
		$=$	$4.13566727(16) \times 10^{-15}$ eV s
	$\hbar$	$\equiv$	$h/2\pi$
		$=$	$1.054571596(82) \times 10^{-34}$ J s
		$=$	$6.58211889(26) \times 10^{-16}$ eV s
Planck's constant $\times$ speed of light	hc	$=$	$1.23984186(16) \times 10^3$ eV nm
		$\simeq$	1240 eV nm
Boltzmann's constant	k	$=$	$1.3806503(24) \times 10^{-23}$ J K^{-1}
		$=$	$8.6173423(153) \times 10^{-5}$ eV K^{-1}
Stefan–Boltzmann constant	σ	$\equiv$	$2\pi^5 k^4/(15c^2h^3)$
		$=$	$5.670400(40) \times 10^{-8}$ W m^{-2} K^{-4}
Radiation constant	a	$=$	$4\sigma/c$
		$=$	$7.565767(54) \times 10^{-16}$ J m^{-3} K^{-4}
Atomic mass unit	1 u	$=$	$1.66053873(13) \times 10^{-27}$ kg
		$=$	$931.494013(37)$ MeV$/c^2$
Electron mass	m_e	$=$	$9.10938188(72) \times 10^{-31}$ kg
		$=$	$5.485799110(12) \times 10^{-4}$ u
Proton mass	m_p	$=$	$1.67262158(13) \times 10^{-27}$ kg
		$=$	$1.00727646688(13)$ u
Neutron mass	m_n	$=$	$1.67492716(13) \times 10^{-27}$ kg
		$=$	$1.00866491578(55)$ u
Hydrogen mass	m_H	$=$	$1.673532499(13) \times 10^{-27}$ kg
		$=$	$1.00782503214(35)$ u
Avogadro's number	N_A	$=$	$6.02214199(47) \times 10^{23}$ mol^{-1}
Gas constant	R	$=$	$8.314472(15)$ J mol^{-1} K^{-1}
Bohr radius	$a_{0,\infty}$	$\equiv$	$4\pi\epsilon_0\hbar^2/m_e e^2$
		$=$	$5.291772083(19) \times 10^{-11}$ m
	$a_{0,H}$	$\equiv$	$(m_e/\mu)a_{0,\infty}$
		$=$	$5.294654075(20) \times 10^{-11}$ m
Rydberg constant	R_∞	$\equiv$	$m_e e^4/64\pi^3\epsilon_0^2\hbar^3 c$
		$=$	$1.0973731568549(83) \times 10^7$ m^{-1}
	R_H	$\equiv$	$(\mu/m_e)R_\infty$
		$=$	$1.09677583(13) \times 10^7$ m^{-1}

Note: Uncertainties in the last digits are indicated in parentheses. For instance, the universal gravitational constant, G, has an uncertainty of $\pm 0.010 \times 10^{-11}$ N m^2 kg^{-2}.

SI to cgs Unit Conversions

Quantity	SI Unit	cgs Unit	Conversion Factor[a]
Distance	meter (m)	centimeter (cm)	10^{-2}
Mass	kilogram (kg)	gram (g)	10^{-3}
Time	second (s)	second (s)	1
Current[b]	ampere (A)	esu s^{-1}	$3.335640952 \times 10^{-10}$
Charge[c]	coulomb (C; A s)	esu	$3.335640952 \times 10^{-10}$
Velocity	m s^{-1}	cm s^{-1}	10^{-2}
Acceleration	m s^{-2}	cm s^{-2}	10^{-2}
Linear momentum	kg m s^{-1}	g cm s^{-1}	10^{-5}
Angular momentum	kg m^2 s^{-1}	g cm^2 s^{-1}	10^{-7}
Force	newton (N; kg m s^{-2})	dyne (g cm s^{-2})	10^{-5}
Energy (work)	joule (J; N m)	erg (dyne cm)	10^{-7}
Power (luminosity)	watt (W; J s^{-1})	erg s^{-1}	10^{-7}
Pressure	pascal (Pa; N m^{-2})	dyne cm^{-2}	10^{-1}
Mass density	kg m^{-3}	g cm^{-3}	10^{3}
Charge density	C m^{-3}	esu cm^{-3}	$3.335640952 \times 10^{-4}$
Current density	A m^{-2}	esu s^{-1} cm^{-2}	$3.335640952 \times 10^{-6}$
Electric potential	volt (V; J C^{-1})	statvolt (erg esu^{-1})	$2.997924580 \times 10^{2}$
Electric field	V m^{-1}	statvolt cm^{-1}	$2.997924580 \times 10^{4}$
Magnetic field	tesla (T; N A^{-1} m^{-1})	gauss (G; dyne esu^{-1})	10^{-4}
Magnetic flux	weber (Wb; T m^2)	G cm^2	10^{-8}

[a]Multiply the SI unit by the conversion factor to obtain the equivalent cgs unit; e.g., 10^{-2} m = 1 cm.

[b]The ampere is the fundamental electromagnetic unit in the SI system.

[c]The esu (*electrostatic unit*) is the fundamental electromagnetic unit in the cgs system.

SI to Miscellaneous Unit Conversions			
Quantity	SI Unit	Misc. Unit	Conversion Factor (SI to Misc.)[d]
Distance	meter (m)	angstrom (Å)	10^{-10}
Distance	nanometer (nm)	angstrom (Å)	10^{-1}
Spectral flux density	W m^{-2} Hz^{-1}	jansky (Jy)	10^{-26}

[d]Multiply the SI unit by the conversion factor to obtain the equivalent micellaneous unit.

SI–cgs Electromagnetic Equation Conversions			
Selected Equations of Electromagnetism	SI Version	cgs Version	Text Equation
Poynting Vector	$\langle S \rangle = \frac{1}{2\mu_0} E_0 B_0$	$\langle S \rangle = \frac{c}{8\pi} E_0 B_0$	(3.12)
Coulomb's Law	$F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$	$F = \frac{q_1 q_2}{r^2}$	(5.9)
Lorentz Equation	$\mathbf{F} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B})$	$\mathbf{F} = q\left(\mathbf{E} + \frac{\mathbf{v}}{c} \times \mathbf{B}\right)$	(11.2)
Magnetic pressure	$P = \frac{B^2}{2\mu_0}$	$P = \frac{B^2}{8\pi}$	(11.10)