

Astronomical and physical constants

Astronomical unit (AU)	1.4960×10^{11} m
Light year (ly)	9.4605×10^{15} m = 63 240 AU
Parsec (pc)	3.0860×10^{16} m = 206 265 AU
1 Sidereal year	365.2564 solar days
1 Tropical year	365.2422 solar days
1 Calendar year	365.2425 solar days
1 Sidereal day	$23^{\text{h}} 56^{\text{m}} 04^{\text{s}}.091$
1 Solar day	$24^{\text{h}} 03^{\text{m}} 56^{\text{s}}.555$ units of sidereal time
Mass of Earth	5.9736×10^{24} kg
Mean radius of Earth	6.371×10^6 m
Equatorial radius of Earth	6.378×10^6 m
Mean velocity of Earth on its orbit	29.783 km s $^{-1}$
Mass of Moon	7.3490×10^{22} kg
Radius of Moon	1.737×10^6 m
Mean Earth – Moon distance	3.844×10^8 m
Mass of Sun	1.98892×10^{30} kg
Radius of Sun	6.96×10^8 m
Effective temperature of the Sun	5 780 K
Luminosity of the Sun	3.96×10^{26} J s $^{-1}$
Solar constant	1366 W m $^{-2}$
Brightness of the Sun in V-band	-26.8 mag.
Absolute brightness of the Sun in V-band	4.75 mag.
Absolute bolometric brightness of Sun	4.72 mag.
Angular diameter of the Sun	30'
Speed of light in vacuum (c)	2.9979×10^8 m s $^{-1}$
Gravitational constant (G)	6.6738×10^{-11} N m 2 kg $^{-2}$
Boltzmann constant (k)	1.381×10^{-23} m kg s $^{-2}$ K $^{-1}$
Stefan–Boltzmann constant (σ)	5.6704×10^{-8} kg s $^{-3}$ K $^{-4}$
Planck constant (h)	6.6261×10^{-34} J s
Wien's constant (b)	2.8978×10^{-3} m K
Hubble constant (H_0)	70 km s $^{-1}$ Mpc $^{-1}$
electron charge (e)	1.602×10^{-19} C
Current inclination of the ecliptic (ε)	23° 26.3'
Coordinates of the northern ecliptic pole for epoch 2000.0 (α_E , δ_E)	$18^{\text{h}} 00^{\text{m}} 00^{\text{s}}$, + 66° 33.6'
Coordinates of the northern galactic pole for epoch 2000.0 (α_G , δ_G)	$12^{\text{h}} 51^{\text{m}}$, + 27° 08'

You can try to solve an equation $x = f(x)$ using iteration: $x_{n+1} = f(x_n)$.

Basic equations of spherical trigonometry

$$\begin{aligned}\sin a \sin B &= \sin b \sin A, \\ \sin a \cos B &= \cos b \sin c - \sin b \cos c \cos A, \\ \cos a &= \cos b \cos c + \sin b \sin c \cos A.\end{aligned}$$

