

# Useful constants and conversions

## Physics

Speed of light	$c$	$2.998 \times 10^8$	m/s
Gravitational constant	$G$	$6.673 \times 10^{-11}$	$\text{m}^3/\text{kg}/\text{s}^2$
Planck constant	$h$	$6.626 \times 10^{-34}$	Js
Reduced Planck constant	$\hbar = \frac{h}{2\pi}$	$1.055 \times 10^{-34}$	Js
Boltzmann constant	$k$	$1.381 \times 10^{-23}$	J/K
Radiation constant	$\alpha = \frac{\pi^2 k^4}{15 \hbar^3 c^3}$	$7.565 \times 10^{-16}$	$\text{J}/\text{m}^3/\text{K}^4$
Electron charge	$e$	$1.602 \times 10^{-19}$	C
Fine structure constant	$\alpha = \frac{e^2}{\hbar c}$	$7.297 \times 10^{-3}$	
Avogadro's number	$N_A$	$6.022 \times 10^{23}$	1/mol
Proton mass	$m_p$	$1.673 \times 10^{-27}$	kg
Proton mass-energy	$m_p c^2$	938.272	MeV
Neutron mass	$m_n$	$1.675 \times 10^{-27}$	kg
Neutron mass-energy	$m_n c^2$	939.565	MeV
Electron mass	$m_e$	$9.109 \times 10^{-31}$	kg
Electron mass-energy	$m_e c^2$	0.511	MeV
Planck mass	$m_{\text{Pl}} = \sqrt{\frac{\hbar c}{G}}$	$2.177 \times 10^{-8}$	kg
Planck mass-energy	$m_{\text{Pl}} c^2$	$1.221 \times 10^{19}$	GeV
Planck time	$t_{\text{Pl}} = \sqrt{\frac{G \hbar}{c^5}}$	$5.391 \times 10^{-44}$	s
Planck length	$l_{\text{Pl}} = t_{\text{Pl}} c$	$1.616 \times 10^{-35}$	m

## Astronomy

Solar mass	$M_\odot$	$1.989 \times 10^{30}$	kg
Solar luminosity	$L_\odot$	$3.846 \times 10^{26}$	W
Solar radius	$R_\odot$	$6.961 \times 10^8$	m

## Cosmology

Hubble constant	$H_0$	100 $h$	km/s/Mpc
Hubble time	$1/H_0$	9.7/ $h$	Gyr
CMB temperature	$T_0$	2.725	K

## Conversions

1 eV	=	$1.602 \times 10^{-19}$	J
1 erg	=	$10^{-7}$	J
1 pc	=	$3.086 \times 10^{16}$	m
1 ly	=	$9.461 \times 10^{15}$	m
1 AU	=	$1.496 \times 10^{11}$	m
1 yr	=	$3.156 \times 10^7$	s
1 u	=	$1.661 \times 10^{-27}$	kg