

Useful constants, units, and formulae:

Gravitational constant	$G = 6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
Speed of light	$c = 3.00 \times 10^8 \text{ m s}^{-1}$
Planck constant	$h = 6.626 \times 10^{-34} \text{ J s}$
Boltzmann constant	$k = 1.38 \times 10^{-23} \text{ J K}^{-1}$
Stefan-Boltzmann constant	$\sigma = 5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$
Radiation density constant	$a = 7.55 \times 10^{-16} \text{ J m}^{-3} \text{ K}^{-4}$
Mass of the hydrogen atom	$m_H = 1.67 \times 10^{-27} \text{ kg}$
Mass of the electron	$m_e = 9.11 \times 10^{-31} \text{ kg}$
Solar mass	$M_\odot = 1.99 \times 10^{30} \text{ kg}$
Solar radius	$R_\odot = 6.96 \times 10^8 \text{ m}$
Solar luminosity	$L_\odot = 3.90 \times 10^{26} \text{ W}$
Earth mass	$M_\oplus = 5.98 \times 10^{24} \text{ kg}$
Equatorial radius of Earth	$R_\oplus = 6.378 \times 10^6 \text{ m}$
Mass of moon	$M_{moon} = 7.3 \times 10^{22} \text{ kg}$
Astronomical unit	$\text{AU} = 1.50 \times 10^{11} \text{ m}$
Parsec	$\text{pc} = 3.09 \times 10^{16} \text{ m}$
Hubble's constant	$H_0 = 70 \text{ km s}^{-1} \text{ Mpc}^{-1}$
1 year	$= 3.16 \times 10^7 \text{ s}$
Absolute magnitude	$M = m - 5 \log_{10}(d/10)$
Apparent magnitude	$m_1 - m_2 = 2.5 \log_{10}(f_2/f_1)$
Energy and frequency	$E = h\nu$
Frequency and wavelength	$c = \nu\lambda$
Ideal gas equation	$P_{gas} = nkT$
Radiation pressure	$P_{rad} = \frac{1}{3}aT^4$
Gravitational potential energy	$\Omega = -\int \frac{GM(r)}{r} dM$
Internal energy per unit volume	$\varepsilon = \frac{3}{2}nkT$
Virial theorem	$2U + \Omega = 0$
Luminosity	$L = 4\pi r^2 \sigma T^4$
Integration by parts	$\int u dv = uv - \int v du$