

Physics constants to memorize

Speed of light <i>in a vacuum</i>	$c = 2.998 \times 10^8 \text{ ms}^{-1}$
Planck's constant	$h = 6.626 \times 10^{-34} \text{ Js}$
Boltzmann's constant	$k_B = 1.381 \times 10^{-23} \text{ JK}^{-1}$
Charge on the electron	$e = 1.602 \times 10^{-19} \text{ C}$
Permittivity of free space	$\epsilon_0 = 8.854 \times 10^{-12} \text{ Fm}^{-1}$
Permeability of free space	$\mu_0 = 4\pi \times 10^{-7} \text{ Hm}^{-1}$
Electron mass	$m_e = 9.109 \times 10^{-31} \text{ kg}$
Proton mass	$m_p = 1.673 \times 10^{-27} \text{ kg} = 0.9386 \frac{\text{GeV}}{c^2}$
Neutron mass	$m_n = 1.675 \times 10^{-27} \text{ kg} = 0.9398 \frac{\text{GeV}}{c^2}$
Atomic mass unit ¹	$u = 1.660 \times 10^{-27} \text{ kg} = 0.9313 \frac{\text{GeV}}{c^2}$
Avogadro constant	$N_A = 6.022 \times 10^{23}$
Molar gas constant	$R = 8.314 \text{ Jmol}^{-1} \text{ K}^{-1}$
Fine structure constant	$\alpha \approx \frac{1}{137.036}$
Ionization energy of Hydrogen ²	$E \approx 13.6 \text{ eV}$
Electrical breakdown voltage for air	3 million volts per metre
Density of air	$\rho_a = 1.225 \text{ kgm}^{-3}$
Density of water	$\rho_w = 1000 \text{ kgm}^{-3}$
Density of iron	$\rho_{\text{Fe}} = 7,874 \text{ kgm}^{-3}$
Density of gold	$\rho_{\text{Au}} = 19,300 \text{ kgm}^{-3}$
Standard <i>ambient</i> temperature and pressure	$T = 298.15 \text{ K}, P = 10^5 \text{ Pa}$

¹ A twelfth of the mass of a Carbon-12 atom

² Nuclear particle energies in MeV. Electrical energies of particles in eV or keV.

Gravitational field strength on Earth	$g = 9.81\text{ms}^{-2}$
Gravitational field strength on the Moon	$g = 1.62\text{ms}^{-2}$
Gravitational field strength on Mars	$g = 3.71\text{ms}^{-2}$
Gravitational force constant	$G = 6.67 \times 10^{-11} \text{m}^3\text{kg}^{-1}\text{s}^{-2}$
Mass of the Sun	$M_{\odot} = 1.989 \times 10^{30} \text{kg}$
Radius of the Sun	$R_{\odot} = 6.960 \times 10^8 \text{m}$
Mass of the Earth	$M_{\oplus} = 5.974 \times 10^{24} \text{kg}$
Radius of the Earth	$R_{\oplus} = 6.378 \times 10^6 \text{m}$
Mass of the Moon	$M_m = 7.348 \times 10^{22} \text{kg}$
Radius of the Moon	$R_m = 1.737 \times 10^6 \text{m}$
Solar constant ³	$\sigma = 1367.7\text{Wm}^{-2}$
Astronomical Unit ⁴	$\text{AU} = 1.496 \times 10^{11} \text{m}$
1 light year	$\text{ly} = 9.461 \times 10^{15} \text{m}$
1 parsec	$\text{parsec} = 3.086 \times 10^{16} \text{m}$
Age of Universe	13.772 billion ⁵ years
Age of Earth	4.543 billion years
Seconds in a year	$\text{yr} = 3.154 \times 10^7 \text{s}$
1 mile	$\text{mile} = 1609\text{m}$
1 nautical mile	$\text{nmile} = 1852\text{m}$
miles per hour	$\text{ms}^{-1} = 2.237\text{mph}$
km per hour	$\text{ms}^{-1} = 3.600\text{kmh}^{-1}$

³ Average solar energy incident upon the Earth per square metre, per second

⁴ Mean Earth-Sun separation

⁵ billion = 10^9