

PHYSICS FORMULAE

Kinematics

$$v = \frac{d}{\Delta t}$$

$$a = \frac{\Delta v}{\Delta t}$$

$$v_f = v_i + at$$

$$d = \left(\frac{v_i + v_f}{2}\right)t$$

$$d = v_i t + \frac{1}{2}at^2$$

$$v_f^2 = v_i^2 + 2ad$$

Dynamics

$$F_f = \mu F_N$$

$$F_s = k\Delta x$$

$$F_{\text{net}} = m_T a$$

$$g = G \frac{m_2}{r^2}$$

$$F_g = m_1 g$$

$$F_g = G \frac{m_1 m_2}{r^2}$$

$$T = ma + mg$$

Energy

$$E_k = \frac{1}{2}mv^2$$

$$E_p = mgh$$

$$W = Fd$$

$$W = \Delta E$$

$$P = \frac{W}{\Delta t}$$

$$Q = mc\Delta T$$

$$\text{efficiency} = \frac{W_{\text{out}}}{W_{\text{in}}} = \frac{P_{\text{out}}}{P_{\text{in}}}$$

Circuits

$$V = IR$$

Series resistance:

$$R_s = R_1 + R_2 + \dots$$

Parallel resistance:

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

$$V_{\text{terminal}} = \mathcal{E} \pm Ir$$

$$P = IV$$

$$P = I^2 R$$

$$Q = It$$

$$E = Pt$$

$$R = \rho \frac{L}{A}$$

Waves

$$T = \frac{1}{f}$$

$$v = f\lambda$$

$$y = A \sin\left(\frac{2\pi}{\lambda}x\right)$$

$$y = A \sin\left(\frac{2\pi}{T}t\right)$$

$$f_{\text{obs}} = f_s \left(\frac{v_w}{v_w \pm v_s}\right)$$

$$n = \frac{c}{v}$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

FUNDAMENTAL CONSTANTS AND PHYSICAL DATA

Gravitational constant:..... $G = 6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$

Elementary charge:..... $e = 1.60 \times 10^{-19} \text{ C}$

Speed of light:..... $c = 3.00 \times 10^8 \text{ m/s}$

Earth

- Radius:..... $R_E = 6.38 \times 10^6 \text{ m}$
- Mass:..... $M_E = 5.98 \times 10^{24} \text{ kg}$
- Acceleration due to gravity..... $g = 9.8 \text{ m/s}^2$

Moon

- Radius:..... $1.74 \times 10^6 \text{ m}$
- Mass:..... $7.35 \times 10^{22} \text{ kg}$

Sun

- Mass:..... $M_S = 1.98 \times 10^{30} \text{ kg}$

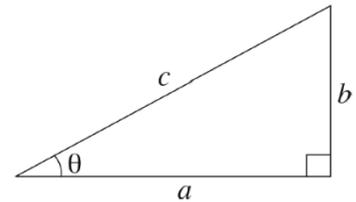
MATHEMATICAL FORMULAE

Metric Prefixes

Prefix	Symbol	Factor
tera	T	10^{12}
giga	G	10^9
mega	M	10^6
kilo	k	10^3
centi	c	10^{-2}
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}

Right Triangles

$$a^2 + b^2 = c^2$$



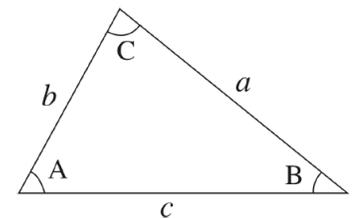
$$\sin \theta = \frac{b}{c}$$

$$\cos \theta = \frac{a}{c}$$

$$\tan \theta = \frac{b}{a}$$

$$\text{area} = \frac{1}{2}ab$$

All Triangles



$$\text{area} = \frac{1}{2}(\text{base})(\text{height})$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

Quadratic Equation

For quadratics in general form: $ax^2 + bx + c = 0$

$$\Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$