

## PHYSICS FORMULAE

### Kinematics

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

$$v_f = v_i + at$$

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

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

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

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

### Circuits

$$I = \frac{Q}{\Delta t}$$

$$V = IR$$

$$R_s = \sum_i R_i$$

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

$$P = IV$$

$$\frac{1}{R_p} = \sum_i \frac{1}{R_i}$$

### Dynamics

$$F_g = mg$$

$$F_f = \mu F_N$$

$$F_{\text{net}} = ma$$

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

$$F_s = k \Delta x$$

### Waves

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

$$v = f\lambda$$

### Energy

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

$$W = Fd$$

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

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

$$E_p = mgh$$

$$W = \Delta E$$

$$Q = mc\Delta T$$

## 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 at the surface of Earth .....	$g = 9.8 \text{ m/s}^2$

### Moon

radius .....	$= 1.74 \times 10^6 \text{ m}$
mass .....	$= 7.35 \times 10^{22} \text{ kg}$

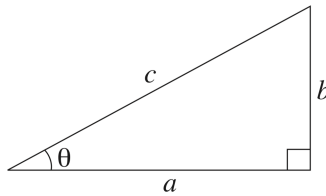
### Sun

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	$\mu$	$10^{-6}$
nano	n	$10^{-9}$
pico	p	$10^{-12}$

### Right Triangles

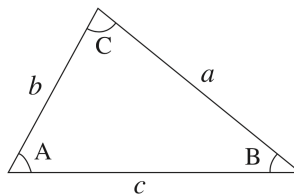


$$a^2 + b^2 = c^2$$

$$\sin \theta = \frac{b}{c} \quad \cos \theta = \frac{a}{c} \quad \tan \theta = \frac{b}{a}$$

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

### All Triangles



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

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

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

### Quadratic Equation

$$\text{If } ax^2 + bx + c = 0, \text{ then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$