PHYSICS FORMULAE

Kinematics

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

$$d = v_i t + \frac{1}{2} a t^2 \qquad v_f^2 = v_i^2 + 2ad$$

Dynamics

$$F_g = mg \qquad F_{net} = ma$$

$$F_f = \mu F_N$$

Equilibrium

$$\tau = Fd$$

Momentum

$$p = mv \qquad \Delta p = F\Delta t$$

Energy

$$E_k = \frac{1}{2} m v^2 \qquad E_p = mgh$$

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

Circular Motion

$$T = \frac{1}{f} \qquad a_c = \frac{v^2}{r} = \frac{4\pi^2 r}{T^2}$$

Gravitation

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

Electrostatics

$$F_E = k\frac{q_1 q_2}{r^2} \qquad E = \frac{F_E}{q} \qquad E = k\frac{q}{r^2}$$

$$E_p = k\frac{q_1 q_2}{r} \qquad V = \frac{E_p}{q} \qquad V = k\frac{q}{r}$$

$$E = \frac{\Delta V}{d}$$

Circuits

$$I = \frac{Q}{\Delta t} \qquad R = \frac{\rho \ell}{A}$$

$$V = IR \qquad P = IV$$

Electromagnetism

$$B = \frac{\mu_0 I}{2\pi d} \qquad B = \mu_0 n I$$

$$F_B = qvB \qquad F_B = IlB$$

Electromagnetic Induction

$$\varepsilon = Blv \qquad \Phi_B = BA$$

$$\varepsilon = -N\frac{\Delta \Phi_B}{\Delta t} \qquad \frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{I_p}{I_s}$$

Special Relativity

$$t = \frac{t_0}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad l = l_0\sqrt{1 - \frac{v^2}{c^2}}$$

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad u = \frac{u' + v}{1 + \frac{u'v}{c^2}}$$

$$E = mc^2$$

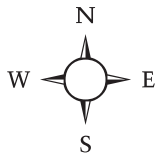
FUNDAMENTAL CONSTANTS AND PHYSICAL DATA

Gravitational constant	G	$= 6.67 \times 10^{-11}\ \text{N} \cdot \text{m}^2/\text{kg}^2$
Constant in Coulomb's Law	k	$= 9.00 \times 10^{9}\ \text{N} \cdot \text{m}^2/\text{C}^2$
Elementary charge	e	$= 1.60 \times 10^{-19}\ \text{C}$
Mass of electron	m_e	$= 9.11 \times 10^{-31}\ \text{kg}$
Mass of proton	m_p	$= 1.67 \times 10^{-27}\ \text{kg}$
Permeability of free space	μ_o	$= 4\pi \times 10^{-7}\ \text{T} \cdot \text{m/A}$
Speed of light	c	$= 3.00 \times 10^{8}\ \text{m/s}$
Earth		
radius		$= 6.38 \times 10^{6}\ \text{m}$
mass		$= 5.98 \times 10^{24}\ \text{kg}$
acceleration due to gravity at the surface of Earth (for the purposes of this examination)	g	$= 9.80\ \text{m/s}^2$
period of rotation		$= 8.61 \times 10^{4}\ \text{s}$
radius of orbit around Sun		$= 1.50 \times 10^{11}\ \text{m}$
period of orbit around Sun		$= 3.16 \times 10^{7}\ \text{s}$
Moon		
radius		$= 1.74 \times 10^{6}\ \text{m}$
mass		$= 7.35 \times 10^{22}\ \text{kg}$
period of rotation		$= 2.36 \times 10^{6}\ \text{s}$
radius of orbit around Earth		$= 3.84 \times 10^{8}\ \text{m}$
period of orbit around Earth		$= 2.36 \times 10^{6}\ \text{s}$
Sun		
mass		$= 1.98 \times 10^{30}\ \text{kg}$

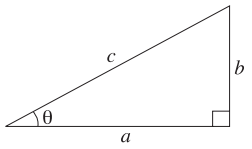
MATHEMATICAL FORMULAE

METRIC PREFIXES

Prefix	Symbol	Numerical	Exponential
mega	M	1 000 000	10^{6}
kilo	k	1 000	10^{3}
hecto	h	100	10^{2}
deca	da	10	10^{1}
		1	10^{0}
deci	d	0.1	10^{-1}
centi	c	0.01	10^{-2}
milli	m	0.001	10^{-3}
micro	μ	0.000001	10^{-6}



For Right-angled Triangles:

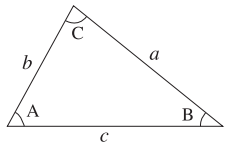


$$a^2 + b^2 = c^2$$

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

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

For All Triangles:



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

Sine Law : $\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$

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

Circle:

$$\text{Circumference} = 2\pi r$$

$$\text{Area} = \pi r^2$$

Quadratic Equation:

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