PHYSICS FORMULAE

Vector Kinematics in Two Dimensions:

$$v = v_0 + at \qquad \overline{v} = \frac{v + v_0}{2}$$

$$v^2 = v_0{}^2 + 2ad \qquad d = v_0 t + \frac{1}{2}at^2$$

Vector Dynamics:

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

$$F_{fr} = \mu F_N$$

Work, Energy, and Power:

$$W = Fd \qquad E_p = mgh$$

$$E_k = \frac{1}{2}mv^2 \qquad P = \frac{W}{\Delta t}$$

Momentum:

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

Equilibrium:

$$\tau = Fd$$

Circular Motion:

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

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

Gravitation:

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

Electrostatics:

$$F = k\frac{Q_1 Q_2}{r^2} \qquad E = \frac{F}{Q} \qquad E = \frac{kQ}{r^2}$$

$$\Delta V = \frac{\Delta E_p}{Q} \qquad E = \frac{\Delta V}{d}$$

$$E_p = k\frac{Q_1 Q_2}{r} \qquad V = \frac{kQ}{r}$$

Electric Circuits:

$$I = \frac{Q}{\Delta t} \qquad V = IR$$

$$V_{terminal} = \mathcal{E} \pm Ir \qquad P = VI$$

Electromagnetism:

$$F = BIl \qquad F = QvB$$

$$B = \mu_0 nI = \mu_0 \frac{N}{l} I \qquad \mathcal{E} = Blv$$

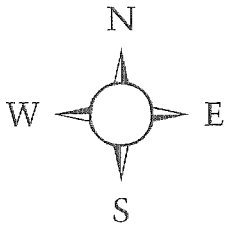
$$\Phi = BA \qquad \mathcal{E} = -N\frac{\Delta\Phi}{\Delta t}$$

$$V_{back} = \mathcal{E} - Ir$$

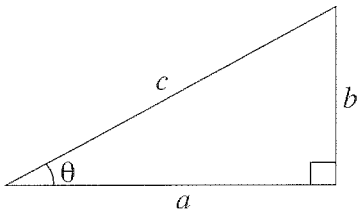
$$\frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{I_p}{I_s}$$

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:

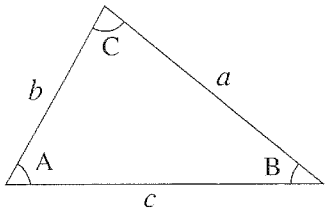


$$a^2 + b^2 = c^2$$

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

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

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:

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

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		$= 1.98 \times 10^{30}\ \text{kg}$