PHYSICS 11 FORMULAE

Waves

$v = \lambda f$

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

$f_d = f_s\left(\frac{v - v_d}{v - v_s}\right)$

$v = 331 + 0.6\,T$

Electric Circuits

$P = IV$

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

$V = IR$

$V_{terminal} = \varepsilon \pm Ir$

Dynamics

$F_g = mg$

$F_f = \mu F_N$

$F_{net} = ma$

$F_s = -kx$

Kinematics

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

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

$d = \bar{v}t$

$\bar{v} = \frac{v_f + v_i}{2}$

$v_f = v_i + at$

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

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

Energy

$W = Fd$

$W = F\cos\theta d$

$W = \Delta E$

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

$PE = E_p = mgh$

$PE_s = E_p = \frac{1}{2}kx^2$

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

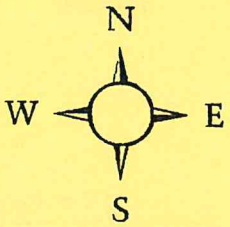
$Eff = \frac{W_{out}}{W_{in}} = \frac{P_{out}}{P_{in}}$

$\Delta E = Q = mC\Delta T$

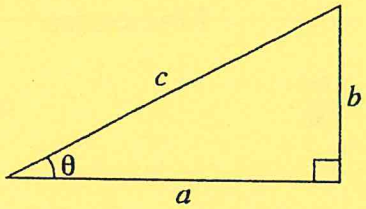
$m_A C_A(T_{fA} - T_{iA}) = -m_B C_B(T_{fB} - T_{iB})$

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:

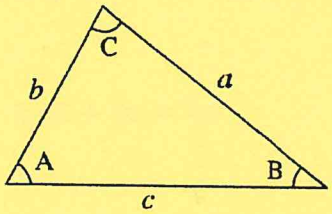


$$a^2 + b^2 = c^2$$

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

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

For All Triangles:



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

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:

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

FUNDAMENTAL CONSTANTS AND PHYSICAL DATA

Gravitational constant	$G = 6.67 \times 10^{-11}\ \mathrm{N \cdot m^2/kg^2}$
Constant in Coulomb's Law	$k = 9.00 \times 10^{9}\ \mathrm{N \cdot m^2/C^2}$
Elementary charge	$e = 1.60 \times 10^{-19}\ \mathrm{C}$
Mass of electron	$m_e = 9.11 \times 10^{-31}\ \mathrm{kg}$
Mass of proton	$m_p = 1.67 \times 10^{-27}\ \mathrm{kg}$
Permeability of free space	$\mu_o = 4\pi \times 10^{-7}\ \mathrm{T \cdot m/A}$
Speed of light	$c = 3.00 \times 10^{8}\ \mathrm{m/s}$

Earth

radius	$= 6.38 \times 10^{6}\ \mathrm{m}$
mass	$= 5.98 \times 10^{24}\ \mathrm{kg}$
acceleration due to gravity at the surface of Earth (for the purposes of this examination)	$g = 9.80\ \mathrm{m/s^2}$
period of rotation	$= 8.61 \times 10^{4}\ \mathrm{s}$
radius of orbit around Sun	$= 1.50 \times 10^{11}\ \mathrm{m}$
period of orbit around Sun	$= 3.16 \times 10^{7}\ \mathrm{s}$

Moon

radius	$= 1.74 \times 10^{6}\ \mathrm{m}$
mass	$= 7.35 \times 10^{22}\ \mathrm{kg}$
period of rotation	$= 2.36 \times 10^{6}\ \mathrm{s}$
radius of orbit around Earth	$= 3.84 \times 10^{8}\ \mathrm{m}$
period of orbit around Earth	$= 2.36 \times 10^{6}\ \mathrm{s}$

Sun

mass	$= 1.98 \times 10^{30}\ \mathrm{kg}$

Material	Specific Heat [J/kg· °C]	Material	Specific Heat [J/kg· °C]
Aluminium	897	Water	4180
Copper	385	Lead	130
Steel	420	Zinc	388