This should not be taken as a complete list - use it as a guide only.

1 Useful Maths Equations

There is an easy way to remember the pattern for values of $\sin\theta$, $\cos\theta$ and $\tan\theta$ which you should know. Notice how the number under the square root starts at zero (for sin) and goes up by one each time. The pattern for cos is reversed. The values for tan are found by remembering $\tan\theta = \frac{\sin\theta}{\cos\theta}$.

θ	0	30	45	60	90
$\sin\theta$	$\frac{\sqrt{0}}{2} = 0$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$	$\frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2} = 1$
$\cos\theta$	$\frac{\sqrt{4}}{2} = 1$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$	$\frac{\sqrt{0}}{2} = 0$
$\tan\theta$	$\frac{0}{1} = 0$	$\frac{1\times2}{2\sqrt{3}} = \frac{1}{\sqrt{3}}$	$\frac{\sqrt{2}}{\sqrt{2}}$	$\frac{2\sqrt{3}}{2\times1} = \sqrt{3}$	∞

Trig identities:

$$\sin^2\theta + \cos^2\theta = 1 \tag{1}$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \tag{2}$$

$$\sin 2\theta = 2\sin\theta\cos\theta \tag{3}$$

$$\begin{aligned} \cos 2\theta &= \cos^2\theta - \sin^2\theta & (4)\\ &= 2\cos^2\theta - 1 & (5)\\ &= 1 - 2\sin^2\theta & (6) \end{aligned}$$

Maclaurin Series

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} \tag{7}$$

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} \tag{8}$$

Quadratic Formula solutions of $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{9}$$

The binomial expansion:

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + ... + \frac{n(n-1)...(n-r+1)}{r!}x^r + ... + x^n \tag{10}$$

Integration by parts

$$\int udv = uv - \int vdu \tag{11}$$

Logs

$$\begin{aligned} x &= b^y & (12) \\ y &= \log_b x & (13) \\ \log x + \log y &= \log xy & (14) \\ \log x - \log y &= \log \frac{x}{y} & (15) \\ \log_b a &= \frac{\log_c a}{\log_c b} & (16) \end{aligned}$$

Angles in a triangle:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \tag{17}$$

$$a^2 = b^2 + c^2 - 2bc\cos A \tag{18}$$

Area of a Triangle:

$$A = \frac{1}{2}ab\sin C \tag{19}$$

Equation of a circle with centre (a,b) and radius r

$$(x-a)^2 + (y-b)^2 = r^2 \tag{20}$$

Area of sector a circle

$$A = \frac{1}{2}r^2\theta \tag{21}$$

Arithmetic Series

$$S_n = \frac{1}{2}n(a+l) = \frac{1}{2}n\left[2a + (n-1)d\right] \tag{22}$$

Geometric Series

$$S_n = \frac{a(1-r^n)}{1-r} \tag{23}$$

$$S_\infty = \frac{a}{1-r} \tag{24}$$

2 Useful Physics Equations

$$E = mc\theta \tag{25}$$

Where E is energy (J), m is mass (kg), c is specific heat capacity ($4200Jkg^{-1}K^{-1}$) and θ is change in temperature (K).

$$E = Pt \tag{26}$$

Where E is energy (J), P is power (W) and t is time (s).

$$P = Fv \tag{27}$$

Where P is power (W), F is force (N) and v is velocity (m/s).

$$v = f\lambda \tag{28}$$

Where v is wave speed (m/s), f is frequency (Hz) and λ is wavelength (m).

$$F = ma \tag{29}$$

Where F is force (N), m is mass (kg) and a is acceleration (m/s^2).

$$a = \frac{v-u}{t} \tag{30}$$

Where a is acceleration (m/s^2), v is final velocity (m/s), u is initial velocity (m/s) and t is time (s).

$$W = mg \tag{31}$$

Where W is weight (N), m is mass (kg) and g is 9.81m/s^2.

$$F = kx \tag{32}$$

Where F is force (N), k is the spring constant (N/m) and x is extension (m).

$$E = \frac{1}{2}Fx = \frac{1}{2}kx^2 \tag{33}$$

Where E in the energy stored in a spring (J), F is the force (N) and x is the extension (m).

$$W = Fd \tag{34}$$

Where W is the work done (J), F is the force (N) and d is the distance moved in the direction of the force (m).

$$E = mgh \tag{35}$$

Where E is the gravitational potential energy (J), m is the mass (kg), g is 9.81m/s^2

$$E = \frac{1}{2}mv^2 \tag{36}$$

Where E is the kinetic energy (J), m is the mass (kg) and v is the velocity (m/s).

$$p = mv \tag{37}$$

Where p is momentum (kgm/s), m is the mass (kg) and v is the velocity (m/s).

$$Q = It \tag{38}$$

Where Q is the electric charge (C), I is the current (A) and t is the time (s).

$$W = QV \tag{39}$$

Where W is the work done (J), Q is the electric charge (C) and V is the potential difference (V).

$$V = IR \tag{40}$$

Where V is the potential difference (V), I is the current (A) and R is the resistance (Ω).

$$P = IV = I^2R = \frac{V^2}{R} \tag{41}$$

Where P is the power (W), I is the current (A), R is the resistance (Ω) and V is the potential difference (V).

$$v = \frac{d}{t} \tag{42}$$

Where v is the velocity (m/s), d is the distance (m) and t is the time (s).

$$f = \frac{1}{T} \tag{43}$$

Where f is the frequency (Hz) and T is the time period (s).

$$M = Fd \tag{44}$$

Where M is the moment (Nm), F is the force (N) and d is the perpendicular distance (m).

$$P = \frac{F}{A} \tag{45}$$

Where P is the pressure (Pa), F is the force (N) and A is the area (m^2).

$$\frac{V_p}{V_s} = \frac{N_p}{N_s} \tag{46}$$

Where V_p is the voltage across the primary coil of a transformer, V_s is the voltage across the secondary coil, N_p is the number of turns on the primary coil and N_s is the number of turns on the secondary coil.

$$\begin{aligned} s &= ut + \frac{1}{2}at^2 && (47) \\ s &= \frac{u+v}{2} \times t && (48) \\ v &= u + at && (49) \\ v^2 &= u^2 + 2as && (50) \end{aligned}$$

Where s is the distance (m), u is the initial velocity (m/s), v is the final velocity (m/s), a is the acceleration (m/s^2) and t is the time (s).

$$R = \frac{\rho L}{A} \tag{51}$$

R is resistance (Ω), ρ is the resistivity (Ωm), L is the length (m) and A is the area (m^2).

$$\rho = \frac{m}{V} \tag{52}$$

Where ρ is the density (kgm^{-3}), m is the mass (kg) and V is the volume (m^3).

$$n\lambda = d\sin\theta \tag{53}$$

Where n is the order, λ is the wavelength (m), d is the slit width (m) and θ is the angle of the maxima in degrees.

$$\lambda = \frac{dx}{L} \tag{54}$$

Where λ is the wavelength (m), d is the slit width (m), x is the fringe spacing (m), and L is the distance from the slits to the screen (m).

$$E = mc^2 \tag{55}$$

Where E is the energy (J), m is the mass (kg) and c is the speed of light ($3 \times 10^8 m/s$).

$$E = hf \tag{56}$$

Where E is the energy (J), h is Planc's constant ($6.63 \times 10^{-34} Js$) and f is the frequency (Hz).

$$\lambda = \frac{h}{p} \tag{57}$$

Where λ is the wavelength (m), h is Planc's constant ($6.63 \times 10^{-34} Js$) and p is the momentum (kgm/s).

$$PV = nRT \tag{58}$$

Where P is the pressure (Pa), V is the volume (m^3), n is the number of moles, R is the gas constant (8.31 $Jmol^{-1}K^{-1}$) and T is the temperature (K).

$$a = \frac{v^2}{r} \tag{59}$$

Where a is the acceleration in a circle (m/s^2), v is the velocity (m/s) and r is radius (m).

$$v = \omega r \tag{60}$$

Where v is the velocity (m/s), ω is the angular velocity (rad/s) and r is radius (m).

$$F = \frac{mv^2}{r} \tag{61}$$

Where F is the force (N), m is the mass (kg), v is the velocity (m/s) and r is radius (m).

$$F = \frac{GMm}{r^2} \tag{62}$$

Where F is the gravitational force (N), G is the gravitational constant ($6.67 \times 10^{-11} Nm^2kg^{-2}$), M is the mass (kg), m is the other mass(kg) and r is the distance between the masses (m).