Section 1: General Physics

$$\text{average speed} = \frac{\text{total distance}}{\text{total time taken}}$$

$$\textbf{acceleration} = \frac{\textbf{change in velocity}}{\textbf{time taken}}$$

$$a = \frac{(v - u)}{t}$$

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

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

$$\text{weight} = \text{mass} \times \text{gravitational field strength}$$

$$W = m \times g$$

$$\textbf{force} = \textbf{spring constant} \times \textbf{extension}$$

$$\mathbf{F = k \times x}$$

$$\textbf{force} = \textbf{mass} \times \textbf{acceleration}$$

$$\mathbf{F = m \times a}$$

$$\textbf{momentum} = \textbf{mass} \times \textbf{velocity}$$

$$\mathbf{p = m \times v}$$

$$\textbf{impulse} = \textbf{change in momentum}$$

$$\boldsymbol{Ft = mv - mu}$$

$$\textbf{kinetic energy} = \frac{1}{2} \times \textbf{mass} \times \textbf{speed}^2$$

$$\mathbf{E_K = \frac{1}{2} \times m \times v^2}$$

$$\textbf{gravitational potential energy} = \textbf{mass} \times \textbf{g} \times \textbf{height}$$

$$\mathbf{E_P = m \times g \times \Delta h}$$

$$\textbf{efficiency} = \frac{\textbf{useful energy output}}{\textbf{energy input}} \times 100\%$$

$$\textbf{efficiency} = \frac{\textbf{useful power output}}{\textbf{power input}} \times 100\%$$

$$\textbf{work done} = \textbf{force} \times \textbf{distance moved}$$

$$\mathbf{W = F \times d = \Delta E}$$

$$\text{energy transferred} = \text{work done}$$

$$\textbf{Power} = \frac{\textbf{Work done}}{\textbf{time taken}} = \frac{\textbf{Energy Transferred}}{\textbf{time taken}}$$

$$\mathbf{P = \frac{W}{t} \text{ or } P = \frac{\Delta E}{t}}$$

$$\textbf{pressure difference} = \textbf{height} \times \textbf{density} \times \textbf{g}$$

$$\mathbf{p = h \times \rho \times g}$$

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

$$p = \frac{F}{A}$$

Equation given in exam:

$$\text{moment} = \text{force} \times \text{perpendicular distance from the pivot}$$

Section 2: Thermal Physics

$$\textbf{pressure} \times \textbf{volume} = \textbf{constant}$$

$$\mathbf{p_1 \times V_1 = p_2 \times V_2}$$

$$\textbf{Thermal capacity} = \textbf{mass} \times \textbf{specific heat capacity}$$

$$\textbf{Thermal capacity} = \mathbf{m \times c}$$

$$\textbf{Energy} = \textbf{mass} \times \textbf{specific heat capacity} \times \textbf{Temp change}$$

$$\mathbf{\Delta E = m \times c \times \Delta T}$$

$$\textbf{Energy} = \textbf{mass} \times \textbf{specific latent heat}$$

$$\mathbf{\Delta E = m \times l}$$

Section 3: Properties of Waves including Light and Sound

$$\textbf{wave speed} = \textbf{frequency} \times \textbf{wavelength}$$

$$\mathbf{v = f \times \lambda}$$

$$\text{angle of incidence} = \text{angle of reflection}$$

$$\textbf{refractive index}, \quad \mathbf{n = \frac{\sin i}{\sin r}}$$

$$\mathbf{\sin C = \frac{1}{n}}$$

C is the critical angle

Section 4: Electricity and Magnetism

$$\textbf{charge} = \textbf{current} \times \textbf{time}$$

$$\mathbf{Q = I \times t}$$

$$\textbf{power} = \textbf{current} \times \textbf{voltage}$$

$$\mathbf{P = I \times V}$$

$$energy = charge \times voltage$$

$$E = Q \times V$$

Not in specification but helps define potential difference or voltage

$$\textbf{energy transferred} = \textbf{current} \times \textbf{voltage} \times \textbf{time}$$

$$\mathbf{E = I \times V \times t}$$

$$\text{voltage} = \text{current} \times \text{resistance}$$

$$V = I \times R$$

For series resistors, $R_{Total} = R_1 + R_2 + \cdots$

For parallel resistors,

$$\frac{1}{R_{Total}} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots$$

$$\frac{\text{input (primary)voltage}}{\text{output (secondary)voltage}} = \frac{\text{primary turns}}{\text{secondary turns}}$$

$$\frac{V_P}{V_S} = \frac{N_P}{N_S}$$

$$\textbf{input power} = \textbf{output power}$$

$$\mathbf{V_P \times I_P = V_S \times I_S}$$

for 100% efficiency

Section 5: Nucleus

Section 5 requires knowledge of nuclear equations for alpha, beta and gamma decay but does not require memorization of equations for calculations.

IGCSE CIE Physics Equations for Coordinated Science Physics or Physics only.

Equations in bold text are extended material only.