Physics · Revision

Key Equations

The main GCSE equations with their units. Boards give some in the exam and expect you to memorise others, so check your own board's equation list.

Forces and motion

Equation	Symbols and units
$s = v \times t$	distance (m), speed (m/s), time (s)
$a = \Delta v \div t$	acceleration (m/s^2), change in velocity (m/s), time (s)
$v^2 - u^2 = 2as$	final and initial velocity (m/s), acceleration (m/s^2), distance (m)
$F = m \times a$	force (N), mass (kg), acceleration (m/s^2)
$W = m \times g$	weight (N), mass (kg), gravitational field strength (N/kg)
$F = k \times e$	force (N), spring constant (N/m), extension (m)
$M = F \times d$	moment (Nm), force (N), perpendicular distance (m)
$p = m \times v$	momentum (kg m/s), mass (kg), velocity (m/s)
$p = F \div A$	pressure (Pa), force (N), area (m^2)

Energy

Equation	Symbols and units
$E_k = \frac{1}{2} \times m \times v^2$	kinetic energy (J), mass (kg), speed (m/s)
$E_p = m \times g \times h$	gravitational potential energy (J), mass (kg), g (N/kg), height (m)
$W = F \times s$	work done (J), force (N), distance (m)
$P = E \div t$	power (W), energy transferred (J), time (s)
efficiency = useful output ÷ total input	energy or power, as a decimal or × 100 for %
$\Delta E = m \times c \times \Delta\theta$	energy (J), mass (kg), specific heat capacity (J/kg °C), temperature change (°C)
$E = m \times L$	energy (J), mass (kg), specific latent heat (J/kg)

Electricity

Equation	Symbols and units
$Q = I \times t$	charge (C), current (A), time (s)
$V = I \times R$	potential difference (V), current (A), resistance (Ω)
$P = I \times V$	power (W), current (A), potential difference (V)
$P = I^2 \times R$	power (W), current (A), resistance (Ω)
$E = P \times t$	energy (J), power (W), time (s)
$E = Q \times V$	energy (J), charge (C), potential difference (V)

Waves and matter

Equation	Symbols and units
$v = f \times \lambda$	wave speed (m/s), frequency (Hz), wavelength (m)
$T = 1 \div f$	period (s), frequency (Hz)
$\rho = m \div V$	density (kg/m^3), mass (kg), volume (m^3)
$V_p \div V_s = N_p \div N_s$	transformer voltages (V), number of turns

Before you use any equation

- Convert to standard units first: km to m, minutes to s, g to kg, kJ to J.
- Write the equation, substitute, then calculate. You can earn marks for each stage.
- Finish with the unit. On Earth, g is about 9.8 N/kg, or 10 N/kg if the question says so.