



# Physics Equations Sheet

## GCSE Combined Science: Trilogy (8464) and GCSE Combined Science: Synergy (8465)

FOR USE IN JUNE 2023 ONLY

HT = Higher Tier only equations

kinetic energy = $0.5 \times \text{mass} \times (\text{speed})^2$	$E_k = \frac{1}{2} m v^2$
elastic potential energy = $0.5 \times \text{spring constant} \times (\text{extension})^2$	$E_e = \frac{1}{2} k e^2$
gravitational potential energy = $\text{mass} \times \text{gravitational field strength} \times \text{height}$	$E_p = m g h$
change in thermal energy = $\text{mass} \times \text{specific heat capacity} \times \text{temperature change}$	$\Delta E = m c \Delta \theta$
power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$	
efficiency = $\frac{\text{useful power output}}{\text{total power input}}$	
charge flow = $\text{current} \times \text{time}$	$Q = I t$
potential difference = $\text{current} \times \text{resistance}$	$V = I R$
power = $\text{potential difference} \times \text{current}$	$P = V I$
power = $(\text{current})^2 \times \text{resistance}$	$P = I^2 R$
energy transferred = $\text{power} \times \text{time}$	$E = P t$

	energy transferred = charge flow × potential difference	$E = QV$
HT	<b>potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil</b>	$V_p I_p = V_s I_s$
	density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
	thermal energy for a change of state = mass × specific latent heat	$E = mL$
	weight = mass × gravitational field strength	$W = mg$
	work done = force × distance (along the line of action of the force)	$W = Fs$
	force = spring constant × extension	$F = ke$
	distance travelled = speed × time	$s = vt$
	acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{\Delta v}{t}$
	(final velocity) <sup>2</sup> – (initial velocity) <sup>2</sup> = 2 × acceleration × distance	$v^2 - u^2 = 2as$
	resultant force = mass × acceleration	$F = ma$
HT	<b>momentum = mass × velocity</b>	$p = mv$
	period = $\frac{1}{\text{frequency}}$	$T = \frac{1}{f}$
	wave speed = frequency × wavelength	$v = f\lambda$
HT	<b>force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length</b>	$F = BIl$