

CAMBRIDGE OCR

June 2027

**GCSE (9–1) Combined Science A
(Gateway Science)**

J250 05/06/11/12 Physics

Equation Sheet

INSTRUCTIONS

**You can write on this Equation Sheet but it
will NOT be sent for marking.**

EQUATIONS IN PHYSICS

Key: HT = Higher Tier only

	P1 MATTER	
	density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
	change in thermal energy = mass × specific heat capacity × change in temperature	$\Delta E = m c \Delta \theta$
	thermal energy for a change in state = mass × specific latent heat	$E = m l$

	P2 FORCES	
	distance travelled = speed × time	$s = vt$
	acceleration = $\frac{\text{change in velocity}}{\text{time}}$	$a = \frac{v - u}{t}$
	$(\text{final velocity})^2 - (\text{initial velocity})^2$ = 2 × acceleration × distance	$v^2 - u^2 = 2as$
	kinetic energy = $\frac{1}{2} \times \text{mass} \times (\text{speed})^2$	$E = \frac{1}{2}mv^2$
	force = mass × acceleration	$F = ma$
HT	momentum = mass × velocity	$p = mv$
	work done = force × distance (along the line of action of the force)	$W = Fs$
	power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$

	P2 FORCES	
	force exerted by a spring = spring constant × extension	$F = kx$
	energy transferred in stretching $= \frac{1}{2} \times \text{spring constant} \times (\text{extension})^2$	$E = \frac{1}{2} kx^2$
	gravitational force = mass × gravitational field strength	$W = mg$
	gravitational potential energy = mass × gravitational field strength × height	$E = mgh$

	P3 ELECTRICITY AND MAGNETISM	
	charge flow = current × time	$Q = It$
	potential difference = current × resistance	$V = IR$
	energy transferred = charge × potential difference	$E = QV$
	power = potential difference × current	$P = VI$
	power = (current)² × resistance	$P = I^2R$
	energy transferred = power × time	$E = Pt$
HT	force on a conductor (at right angles to a magnetic field) carrying a current: force = magnetic flux density × current × length	$F = BIl$

	P4 WAVES AND RADIOACTIVITY	
	wave speed = frequency × wavelength	$v = f\lambda$
	P5 ENERGY	
	efficiency = $\frac{\text{useful output energy transfer}}{\text{input energy transfer}}$	
	P6 GLOBAL CHALLENGES	
	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p I_p = V_s I_s$

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