

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.

INFORMATION

- This Equation Sheet has **4** pages.

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 $\times$ specific heat capacity $\times$ change in temperature	$\Delta E = mc\Delta\theta$
	thermal energy for a change in state = mass $\times$ specific latent heat	$E = ml$

	P2 Forces	
	distance travelled = speed $\times$ time	$s = vt$
	acceleration = $\frac{\text{change in velocity}}{\text{time}}$	$a = \frac{v - u}{t}$
	(final velocity) ² – (initial velocity) ² = 2 $\times$ acceleration $\times$ 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 $\times$ acceleration	$F = ma$
HT	momentum = mass $\times$ velocity	$p = mv$
	work done = force $\times$ distance (along the line of action of the force)	$W = Fs$
	power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
	force exerted by a spring = spring constant $\times$ extension	$F = kx$
	energy transferred in stretching = $\frac{1}{2} \times \text{spring constant} \times (\text{extension})^2$	$E = \frac{1}{2}kx^2$

	P2 Forces	
	gravitational force = mass $\times$ gravitational field strength	$W = mg$
	gravitational potential energy = mass $\times$ gravitational field strength $\times$ height	$E = mgh$
	P3 Electricity and magnetism	
	charge flow = current $\times$ time	$Q = It$
	potential difference = current $\times$ resistance	$V = IR$
	energy transferred = charge $\times$ potential difference	$E = QV$
	power = potential difference $\times$ current	$P = VI$
	power = (current) ² $\times$ resistance	$P = I^2 R$
	energy transferred = power $\times$ time	$E = Pt$
HT	force on a conductor (at right angles to a magnetic field) carrying a current: force = magnetic flux density $\times$ current $\times$ length	$F = BIl$
	P4 Waves and radioactivity	
	wave speed = frequency $\times$ 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 $\times$ current in primary coil = potential difference across secondary coil $\times$ current in secondary coil	$V_p I_p = V_s I_s$

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