



Oxford Cambridge and RSA

June 2025

**GCSE (9–1) Combined Science Physics B  
(Twenty First Century Science)**

**J260 03/07**

**Equation Sheet**



**INSTRUCTIONS**

- Do **not** send this Equation Sheet for marking. Keep it in the centre or recycle it.

**INFORMATION**

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

# Equations in physics

Key: HT = Higher Tier only

<b>P1 Radiation and waves</b>	
wave speed = frequency $\times$ wavelength	$v = f\lambda$

<b>P2 Sustainable energy</b>	
energy transferred = power $\times$ time	$E = Pt$
efficiency = $\frac{\text{useful energy transferred}}{\text{total energy transferred}}$	

<b>P3 Electric circuits</b>	
charge = current $\times$ time	$Q = It$
potential difference = current $\times$ resistance	$V = IR$
potential difference = $\frac{\text{work done (energy transferred)}}{\text{charge}}$	$V = \frac{W}{Q}$
power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
energy transferred (work done) = charge $\times$ potential difference	$E = QV$
power = potential difference $\times$ current	$P = VI$
power = (current) <sup>2</sup> $\times$ resistance	$P = I^2R$
potential difference across primary coil $\times$ current in primary coil = potential difference across secondary coil $\times$ current in secondary coil	$V_p I_p = V_s I_s$
force = magnetic flux density $\times$ current $\times$ length of conductor	$F = BIl$
<b>HT</b>	

	<b>P4 Explaining motion</b>	
	weight = mass × gravitational field strength	$W = mg$
	average speed = $\frac{\text{distance}}{\text{time}}$	$v = \frac{s}{t}$
	acceleration = $\frac{\text{change in speed}}{\text{time taken}}$	$a = \frac{v-u}{t}$
	(final speed) <sup>2</sup> – (initial speed) <sup>2</sup> = 2 × acceleration × distance	$v^2 - u^2 = 2as$
<b>HT</b>	momentum = mass × velocity	$p = mv$
<b>HT</b>	change in momentum = resultant force × time for which it acts	$\Delta p = Ft$
	force = mass × acceleration	$F = ma$
	work done = force × distance (along the line of action of the force)	$W = Fs$
	kinetic energy = $\frac{1}{2}$ × mass × (speed) <sup>2</sup>	$E = \frac{1}{2}mv^2$
	gravitational potential energy = mass × gravitational field strength × height	$E = mgh$
	power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$

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	<b>P6 Matter – models and explanations</b>	
	density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
	change in internal energy = mass × specific heat capacity × change in temperature	$\Delta E = mc\Delta\theta$
	energy to cause a change of state = mass × specific latent heat	$E = ml$
	force exerted by a spring = spring constant × extension	$F = kx$
	energy stored in a stretched spring = $\frac{1}{2}$ × spring constant × (extension) <sup>2</sup>	$E = \frac{1}{2}kx^2$

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