

A



# **Physics Equations Sheet**

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

**FOR USE IN JUNE 2023 ONLY**

**[Turn over]**

## HT = Higher Tier only equations

<b>kinetic energy = <math>0.5 \times \text{mass} \times (\text{speed})^2</math></b>	<b><math>E_k = \frac{1}{2} m v^2</math></b>
<b>elastic potential energy = <math>0.5 \times \text{spring constant} \times (\text{extension})^2</math></b>	<b><math>E_e = \frac{1}{2} k e^2</math></b>
<b>gravitational potential energy = <math>\text{mass} \times \text{gravitational field strength} \times</math> <b>height</b></b>	<b><math>E_p = m g h</math></b>
<b>change in thermal energy = <math>\text{mass} \times \text{specific heat capacity} \times</math> <b>temperature change</b></b>	<b><math>\Delta E = m c \Delta \theta</math></b>
<b>power = <math>\frac{\text{energy transferred}}{\text{time}}</math></b>	<b><math>P = \frac{E}{t}</math></b>

<b>power = <math>\frac{\text{work done}}{\text{time}}</math></b>	<b><math>P = \frac{W}{t}</math></b>
<b>efficiency = <math>\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}</math></b>	
<b>efficiency = <math>\frac{\text{useful power output}}{\text{total power input}}</math></b>	
<b>charge flow = current × time</b>	<b><math>Q = I t</math></b>
<b>potential difference = current × resistance</b>	<b><math>V = I R</math></b>
<b>power = potential difference × current</b>	<b><math>P = V I</math></b>

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HT

<b>power = (current)<sup>2</sup> × resistance</b>	$P = I^2 R$
<b>energy transferred = power × time</b>	$E = P t$
<b>energy transferred = charge flow × potential difference</b>	$E = Q V$
<b>potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil</b>	$V_p I_p = V_s I_s$
<b>density = <math>\frac{\text{mass}}{\text{volume}}</math></b>	$\rho = \frac{m}{V}$
<b>thermal energy for a change of state = mass × specific latent heat</b>	$E = m L$
<b>weight = mass × gravitational field strength</b>	$W = m g$

	<b>work done = force × distance (along the line of action of the force)</b>	$W = F s$
	<b>force = spring constant × extension</b>	$F = k e$
	<b>distance travelled = speed × time</b>	$s = v t$
	<b>acceleration = <math>\frac{\text{change in velocity}}{\text{time taken}}</math></b>	$a = \frac{\Delta v}{t}$
	<b>(final velocity)<sup>2</sup> – (initial velocity)<sup>2</sup> = 2 × acceleration × distance</b>	$v^2 - u^2 = 2 a s$
	<b>resultant force = mass × acceleration</b>	$F = m a$
<b>HT</b>	<b>momentum = mass × velocity</b>	$p = m v$

**[Turn over]**

	$\text{period} = \frac{1}{\text{frequency}}$	$T = \frac{1}{f}$
	$\text{wave speed} = \text{frequency} \times \text{wavelength}$	$v = f \lambda$
HT	$\text{force on a conductor (at right angles to a magnetic field) carrying a current} =$ $\text{magnetic flux density} \times \text{current} \times \text{length}$	$F = B I l$

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**WP/M/CH/Jun23/8464/8465/INS/E1**