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## **Physics Equations Sheet**

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

**FOR USE IN JUNE 2022 ONLY**

**[Turn over]**

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 = mass $\times$ gravitational field strength $\times$ height	$E_p = m g h$
change in thermal energy = mass $\times$ specific heat capacity $\times$ 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 = current × time	$Q = I t$
potential difference = current × resistance	$V = I R$
power = potential difference × current	$P = V I$
power = (current) <sup>2</sup> × resistance	$P = I^2 R$
energy transferred = power × time	$E = P t$
energy transferred = charge flow × potential difference	$E = Q V$
HT potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p I_p = V_s I_s$
density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$

[Turn over]

<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>	$F = m a$

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

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