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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

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 = $\text{mass} \times \text{gravitational field strength} \times$ height	$E_p = m g h$
change in thermal energy = $\text{mass} \times \text{specific heat capacity} \times$ 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	$P = V I$

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[Turn over]

HT

power = (current)² × resistance	$P = I^2 R$
energy transferred = power × time	$E = P t$
energy transferred = charge flow × potential difference	$E = Q V$
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 = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
thermal energy for a change of state = mass × specific latent heat	$E = m L$
weight = mass × gravitational field strength	$W = m g$

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

[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