Physics Equations Sheet
GCSE Physics (8463)
FOR USE IN JUNE 2023 ONLY

HT = Higher Tier only equations

kinetic energy = 0.5 × mass × (speed)^2	$E_k = \dfrac{1}{2}\, m\, v^2$
elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \dfrac{1}{2}\, k\, e^2$
gravitational potential energy = mass × gravitational field strength × height	$E_p = m\, g\, h$
change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m\, c\, \Delta\theta$
power = $\dfrac{\text{energy transferred}}{\text{time}}$	$P = \dfrac{E}{t}$
power = $\dfrac{\text{work done}}{\text{time}}$	$P = \dfrac{W}{t}$
efficiency = $\dfrac{\text{useful output energy transfer}}{\text{total input energy transfer}}$	
efficiency = $\dfrac{\text{useful power output}}{\text{total power input}}$	
charge flow = current × time	$Q = I\, t$
potential difference = current × resistance	$V = I\, R$
power = potential difference × current	$P = V\, I$
power = (current)^2 × resistance	$P = I^2\, R$
energy transferred = power × time	$E = P\, t$
energy transferred = charge flow × potential difference	$E = Q\, V$
density = $\dfrac{\text{mass}}{\text{volume}}$	$\rho = \dfrac{m}{V}$

	thermal energy for a change of state = mass × specific latent heat	$E = m L$
	For gases: pressure × volume = constant	$p V = constant$
	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	$F = k e$
	moment of a force = force × distance (normal to direction of force)	$M = F d$
	pressure = $\dfrac{\text{force normal to a surface}}{\text{area of that surface}}$	$p = \dfrac{F}{A}$
HT	**pressure due to a column of liquid =** **height of column × density of liquid × gravitational field strength**	$p = h \rho g$
	distance travelled = speed × time	$s = v t$
	acceleration = $\dfrac{\text{change in velocity}}{\text{time taken}}$	$a = \dfrac{\Delta v}{t}$
	(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**	$p = m v$
HT	**force =** $\dfrac{\textbf{change in momentum}}{\textbf{time taken}}$	$F = \dfrac{m \, \Delta v}{\Delta t}$
	period = $\dfrac{1}{\text{frequency}}$	$T = \dfrac{1}{f}$
	wave speed = frequency × wavelength	$v = f \lambda$
	magnification = $\dfrac{\text{image height}}{\text{object height}}$	
HT	**force on a conductor (at right angles to a magnetic field) carrying a current =** **magnetic flux density × current × length**	$F = B I l$
HT	$\dfrac{\textbf{potential difference across primary coil}}{\textbf{potential difference across secondary coil}} = \dfrac{\textbf{number of turns in primary coil}}{\textbf{number of turns in secondary coil}}$	$\dfrac{V_p}{V_s} = \dfrac{n_p}{n_s}$
HT	**potential difference across primary coil × current in primary coil =** **potential difference across secondary coil × current in secondary coil**	$V_p I_p = V_s I_s$