Physics Equations Sheet

GCSE Physics (8463)

FOR USE IN JUNE 2024 ONLY

[Turn over]

HT = Higher Tier only equations

kinetic energy = 0.5 × mass × $(\text{speed})^2$	$E_k = \frac{1}{2} m v^2$
elastic potential energy = 0.5 × spring constant × $(\text{extension})^2$	$E_e = \frac{1}{2} k e^2$
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 = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$

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)^2 × resistance	$P = I^2 R$
energy transferred = power × time	$E = P t$
energy transferred = charge flow × potential difference	$E = Q V$
density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
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 = $\dfrac{\text{change in momentum}}{\text{time taken}}$	$F = \dfrac{m\,\Delta v}{\Delta t}$
	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	$\frac{\text{potential difference across primary coil}}{\text{potential difference across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$	$\frac{V_p}{V_s} = \frac{n_p}{n_s}$
HT	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p I_p = V_s I_s$

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