

## HT = Higher Tier only equations

kinetic energy = $0.5 \times mass \times (speed)^2$	$E_k = \frac{1}{2} m v^2$
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 × 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 = <u>useful output energy transfer</u> total input energy transfer	
efficiency = useful power output total power input	
charge flow = current × time	Q = I t
potential difference = current × resistance	V = I R
power = potential difference × current	P = VI
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
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 = $\frac{\text{force normal to a surface}}{\text{area of that surface}}$	$p = \frac{F}{A}$
нт	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 = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{\Delta v}{t}$
	(final velocity) <sup>2</sup> – (initial velocity) <sup>2</sup> = $2 \times \text{acceleration} \times \text{distance}$	$v^2 - u^2 = 2 \ a \ s$
	resultant force = mass × acceleration	F = m a
нт	momentum = mass × velocity	p = m v
нт	force = time taken	$F = \frac{m \Delta v}{\Delta t}$
	period = $\frac{1}{\text{frequency}}$	$T = \frac{1}{f}$
	wave speed = frequency × wavelength	$v=f \lambda$
	magnification = $\frac{\text{image height}}{\text{object height}}$	
нт	force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length	F = B I l
нт	$\frac{\text{potential difference across primary coil}}{\text{potential difference across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$	$\frac{V_p}{V_s} = \frac{n_p}{n_s}$
нт	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p I_p = V_s I_s$