Equations for AQA Physics

Triple Award

Recall and apply equations

You will have to learn each of the following equations off by heart for each exam paper, and know when and how to use them. Equation 9 is required for the Higher Tier papers only (as indicated by the symbol **HT**).

EQUATION	WORD EQUATION	SYMBOL EQUATION
1	weight = mass × gravitational field strength (g)	$W=m\,g$
2	work done = force × distance (along the line of action of the force)	$W=F\,d$
3	force applied to spring = spring constant × extension	$F=k\,e$
4	moment of a force = force × distance (normal to direction of force)	$M=F\,d$
5	$\text{pressure}=\frac{\text{(force normal to surface)}}{\text{(area of surface)}}$	$p=\frac{F}{A}$
6	Distance travelled = speed × time	$s=v\,t$
7	$\text{acceleration}=\frac{\text{(change in velocity)}}{\text{(time taken)}}$	$a=\frac{\Delta v}{t}$
8	Resultant force = mass × acceleration	$F=m\,a$
9 HT	**Momentum = mass × velocity**	$\mathbf{p=m\,v}$
10	Kinetic energy = 0.5 × mass × (speed)^2	$E_k=\frac{1}{2}\,m\,v^2$
11	Gravitational potential energy = mass × gravitational field strength (g) × height	$E_p=m\,g\,h$
12	$\text{power}=\frac{\text{(energy transferred)}}{\text{(time taken)}}$	$P=\frac{E}{t}$

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EQUATION	WORD EQUATION	SYMBOL EQUATION	
13	power = $\frac{\text{(work done)}}{\text{(time taken)}}$	$P = \frac{W}{t}$	
14	efficiency = $\frac{\text{(useful output energy transfer)}}{\text{(total input energy transfer)}}$		
15	efficiency = $\frac{\text{(useful power output)}}{\text{(total power input)}}$		
16	wave speed = frequency × wavelength	$v = f \lambda$	
17	charge flow = current × time	$Q = I t$	
18	potential difference = current × resistance	$V = I R$	
19	power = potential difference × current	$P = V I$	
20	power = (current)^2 × resistance	$P = I^2 R$	
21	energy transferred = power × time	$E = P t$	
22	energy transferred = charge flow × potential difference	$E = Q V$	
23	density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$	

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Select and apply equations

These equations will be provided in your exam papers, but you will have to know when and how to use them. Equations 1, 3, 8, 10 and 11 are required for the Higher Tier papers only.

EQUATION	WORD EQUATION	SYMBOL EQUATION
1 HT	**pressure due to a column of liquid = height of column × density of liquid × gravitational field strength**	**$p = h \rho g$**
2	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2as$
3 HT	**force = (change in momentum) / (time taken)**	**$F = \frac{m\Delta v}{\Delta t}$**
4	elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2} k e^2$
5	change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta\theta$
6	period = 1 / frequency	$T = \frac{1}{f}$
7	magnfication = (image height) / (object height)	
8 HT	**force on a conductor (carrying a current at right angles to a magnetic field) = magnetic flux density × current × length**	**$F = B I l$**
9	thermal energy for a change of state = mass × specific latent heat	$E = m L$
10 HT	**potential difference across primary coil / potential difference across secondary coil = number of turns in primary coil / number of turns in secondary coil**	**$\frac{V_P}{V_S} = \frac{N_P}{N_S}$**
11 HT	**potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil**	**$V_P I_P = V_S I_S$**
12	For (ideal) gases: pressure × volume = constant	$p V = constant$