Physics equations and units

In 2027 every equation is on your equation sheet. The marks come from choosing the right one, rearranging it and using the right units. Page 1: the equations you would normally learn.

Equations to know well NORMALLY LEARNT

In words	Symbols	Units	
weight = mass × gravitational field strength	$W = mg$	N, kg, N/kg	
work done = force × distance	$W = Fs$	J, N, m	
force = spring constant × extension	$F = ke$	N, N/m, m	
moment = force × distance	$M = Fd$	N m, N, m	PHYSICS ONLY
pressure = force ÷ area	$p = F/A$	Pa, N, m²	PHYSICS ONLY
distance = speed × time	$s = vt$	m, m/s, s	
acceleration = change in velocity ÷ time	$a = \Delta v/t$	m/s², m/s, s	
resultant force = mass × acceleration	$F = ma$	N, kg, m/s²	
momentum = mass × velocity	$p = mv$	kg m/s, kg, m/s	HIGHER
kinetic energy = ½ × mass × speed²	$E_k = \frac{1}{2}mv^2$	J, kg, m/s	
GPE = mass × g × height	$E_p = mgh$	J, kg, N/kg, m	
power = energy transferred ÷ time	$P = E/t$	W, J, s	
power = work done ÷ time	$P = W/t$	W, J, s	
efficiency = useful output ÷ total input	(energy or power)	no unit	
wave speed = frequency × wavelength	$v = f\lambda$	m/s, Hz, m	
charge flow = current × time	$Q = It$	C, A, s	
potential difference = current × resistance	$V = IR$	V, A, Ω	
power = potential difference × current	$P = VI$	W, V, A	
power = current² × resistance	$P = I^2R$	W, A, Ω	
energy transferred = power × time	$E = Pt$	J, W, s	
energy transferred = charge × potential difference	$E = QV$	J, C, V	
density = mass ÷ volume	$\rho = m/V$	kg/m³, kg, m³	

Combined Science (Trilogy) students need all of these except the two marked Physics only. Units are listed in the same order as the letters.

Physics equations (continued)

Equations always given on the sheet GIVEN

In words	Symbols	Units	
pressure in a liquid = height × density × g	$p = h\rho g$	Pa, m, kg/m³, N/kg	PHYSICS ONLY HIGHER
final velocity² − initial velocity² = 2 × acceleration × distance	$v^2 - u^2 = 2as$	m/s, m/s², m	
force = change in momentum ÷ time	$F = m\Delta v/\Delta t$	N, kg, m/s, s	PHYSICS ONLY HIGHER
elastic potential energy = ½ × spring constant × extension²	$E_e = \frac{1}{2}ke^2$	J, N/m, m	
change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = mc\Delta\theta$	J, kg, J/kg °C, °C	
period = 1 ÷ frequency	$T = 1/f$	s, Hz	
magnification = image height ÷ object height		no unit	PHYSICS ONLY
force on a wire = flux density × current × length	$F = BIl$	N, T, A, m	HIGHER
energy for a change of state = mass × specific latent heat	$E = mL$	J, kg, J/kg	
Vp ÷ Vs = turns on primary ÷ turns on secondary	$V_p/V_s = n_p/n_s$	V	PHYSICS ONLY HIGHER
Vp × Ip = Vs × Is (transformer)	$V_pI_p = V_sI_s$	V, A	HIGHER
pressure × volume = constant (gas, fixed temperature)	$pV = \text{constant}$	Pa, m³	PHYSICS ONLY

Convert before you calculate

g → kg: ÷ 1000 · cm → m: ÷ 100 · km → m: × 1000
kJ → J: × 1000 · minutes → s: × 60 · hours → s: × 3600
mA → A: ÷ 1000 · cm² → m²: ÷ 10 000

Rearranging in three steps

1. Write the equation from the sheet.
2. Put the numbers in, with units converted.
3. Rearrange to get the unknown on its own, then give the answer with its unit.

Edexcel or OCR? The physics is the same but some letters differ (Edexcel uses x for distance and extension). Use your own board's equation sheet when you practise.

Sources: AQA GCSE Physics (8463) and Combined Science: Trilogy (8464) specifications, equation appendices; AQA 2027 physics equation sheets; Ofqual decision on equation sheets for 2025 to 2027.

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