GCSE PHYSICS · AQA 8463 AND 8464

Physics Equations to Learn

The 23 equations you must recall from memory, plus the ones given on the exam equation sheet, with units for every quantity.

FREE!



Professor Hoot: Make a silly sentence for each equation and the letters stick. **V = I R**: *Very Interesting Raspberry*. **v = f λ**: *Very Fast Lambs*. The sillier, the better!

Combined and Physics | Physics (separate science) only | Higher tier only

1 · weight = mass × gravitational field strength

W = m g

Units: N = kg × N/kg

2 · work done = force × distance (along the line of action of the force)

W = F s

Units: J = N × m

3 · force applied to a spring = spring constant × extension

F = k e

Units: N = N/m × m

4 · Physics only · moment of a force = force × distance (normal to direction of force)

M = F d

Units: N m = N × m

5 · Physics only · pressure = force normal to a surface ÷ area of that surface

p = F / A

Units: Pa = N ÷ m²

6 · distance travelled = speed × time

s = v t

Units: m = m/s × s

7 · acceleration = change in velocity ÷ time taken

a = Δv / t

Units: m/s² = m/s ÷ s

8 · resultant force = mass × acceleration

F = m a

Units: N = kg × m/s²

9 · Higher · momentum = mass × velocity

p = m v

Units: kg m/s = kg × m/s

10 · kinetic energy = 0.5 × mass × (speed)²

E_k = ½ m v²

Units: J = kg × (m/s)²

Equations to recall

you must learn these

11 gravitational potential energy = mass × gravitational field strength × height

$E_p = m\ g\ h$

Units: J = kg × N/kg × m

12 power = energy transferred ÷ time

$P = E / t$

Units: W = J ÷ s

13 power = work done ÷ time

$P = W / t$

Units: W = J ÷ s

14 efficiency = useful output energy transfer ÷ total input energy transfer

efficiency = useful ÷ total

Units: no units (or ×100 for %)

15 efficiency = useful power output ÷ total power input

efficiency = useful ÷ total

Units: no units (or ×100 for %)

16 wave speed = frequency × wavelength

$v = f \lambda$

Units: m/s = Hz × m

17 charge flow = current × time

$Q = I\ t$

Units: C = A × s

18 potential difference = current × resistance

$V = I\ R$

Units: V = A × Ω

19 power = potential difference × current

$P = V\ I$

Units: W = V × A

20 power = (current)² × resistance

$P = I^2\ R$

Units: W = A² × Ω

21 energy transferred = power × time

$E = P\ t$

Units: J = W × s

22 energy transferred = charge flow × potential difference

$E = Q\ V$

Units: J = C × V

23 density = mass ÷ volume

$\rho = m / V$

Units: kg/m³ = kg ÷ m³



Professor Hoot: Learn the equation in **words** first. Examiners accept either, and words help you remember what each letter means.

Given on the equation sheet

use, don't memorise

These are printed on the Physics Equations Sheet in the exam. You still need to know **when** to use them and the units.

1
(final velocity)² - (initial velocity)² = 2 × acceleration × distance

$$v^2 - u^2 = 2 a s$$

Units: m/s, m/s², m

2
elastic potential energy = 0.5 × spring constant × (extension)²

$$E_e = \frac{1}{2} k e^2$$

Units: J = N/m × m²

3
change in thermal energy = mass × specific heat capacity × temperature change

$$\Delta E = m c \Delta\theta$$

Units: J = kg × J/kg °C × °C

4
period = 1 ÷ frequency

$$T = 1 / f$$

Units: s = 1 ÷ Hz

5
thermal energy for a change of state = mass × specific latent heat

$$E = m L$$

Units: J = kg × J/kg

6 · Higher
force on a conductor = magnetic flux density × current × length

$$F = B I l$$

Units: N = T × A × m

7 · Physics only
pd across primary × current in primary = pd across secondary × current in secondary

$$V_p I_p = V_s I_s$$

Units: V × A = V × A

8 · Physics only
pressure due to a column of liquid = height × density × g

$$p = h \rho g$$

Units: Pa = m × kg/m³ × N/kg

9 · Physics only
force = change in momentum ÷ time taken

$$F = m \Delta v / \Delta t$$

Units: N = kg × m/s ÷ s

10 · Physics only
magnification = image height ÷ object height

magnification = image ÷ object

Units: no units

Unit traps

easy marks lost

Watch out for	Convert to
kilojoules (kJ), kilowatts (kW)	× 1,000 → J, W
grams (g)	÷ 1,000 → kg
centimetres (cm)	÷ 100 → m
minutes or hours	× 60 or × 3,600 → s
milliamps (mA)	÷ 1,000 → A



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