

AQA GCSE Physics – Equations & Formulae (specification 8463 & 8464)

Unit 1: Energy

| <u>Equations to Learn</u> | |
|--|---------------------------------|
| kinetic energy = $\frac{1}{2} \times \text{mass} \times \text{speed}^2$ | $E_K = \frac{1}{2} mv^2$ |
| GPE = mass × gravitational field strength × height | $E_p = mgh$ |
| power = $\frac{\text{work done}}{\text{time taken}} = \frac{\text{energy transferred}}{\text{time taken}}$ | $P = \frac{W}{t} = \frac{E}{t}$ |
| efficiency = $\frac{\text{useful energy output}}{\text{total energy input}}$ | |
| efficiency = $\frac{\text{useful power output}}{\text{total power input}}$ | |
| <u>Equations given in the exam</u> | |
| elastic potential energy = $0.5 \times \text{spring constant} \times (\text{extension})^2$ | $E_e = \frac{1}{2} ke^2$ |
| change in thermal energy = mass × specific heat capacity × temperature change | $\Delta E = mc\Delta\theta$ |

Unit 2: Electricity

| <u>Equations to Learn</u> | |
|--|-------------------|
| charge flow = current × time | $Q = I t$ |
| potential difference = current × resistance | $V = I R$ |
| total resistance = resistance of component 1 + resistance of component 2 | $R_T = R_1 + R_2$ |
| power = current × potential difference | $P = I V$ |
| power = (current) ² × resistance | $P = I^2 R$ |
| energy transferred = power × time | $E = P t$ |
| energy transferred = charge flow × potential difference | $E = Q V$ |

* Higher tier only

^ Separate Physics only

Unit 3: Particle Model of Matter

| <u>Equations to Learn</u> | |
|---|-----------------------------|
| density = $\frac{\text{mass}}{\text{volume}}$ | $\rho = \frac{m}{V}$ |
| <u>Equations given in the exam</u> | |
| change in thermal energy = mass × specific heat capacity × temperature change | $\Delta E = mc\Delta\theta$ |
| thermal energy for a change in state = mass × specific latent heat | $E = mL$ |
| ^ for a gas: pressure × volume = constant | $pV = \text{constant}$ |

Unit 6: Waves

| <u>Equations to Learn</u> | |
|--|--|
| wave speed = frequency × wavelength | $v = f \lambda$ |
| <u>Equations given in the exam</u> | |
| time period = $\frac{1}{\text{frequency}}$ | $T = \frac{1}{f}$ |
| ^ magnification = $\frac{\text{image height}}{\text{object height}}$ | $M = \frac{h_{\text{image}}}{h_{\text{object}}}$ |

Unit 7: Magnetism and Electromagnetism

| <u>Equations given in the exam</u> | |
|---|-------------------------------------|
| * Force = magnetic flux density × current × length of conductor in magnetic field | $F = BIl$ |
| * $\frac{\text{potential difference across primary coil}}{\text{potential difference across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$ | $\frac{V_P}{V_S} = \frac{N_P}{N_S}$ |
| * ^ p.d across primary × current in primary = p.d. across secondary × current in secondary | $V_P I_P = V_S I_S$ |

Unit 5: Forces

| <u>Equations to Learn</u> | |
|---|----------------------------|
| weight = mass × gravitational field strength | $W = m g$ |
| work done = force × distance (moved along the line of action of the force) | $W = F s$ |
| force = spring constant × extension | $F = k e$ |
| moment of a force = force × distance (perpendicular to the direction of the force) | $M = F d$ |
| pressure = $\frac{\text{force normal to a surface}}{\text{area of that surface}}$ | $p = \frac{F}{A}$ |
| distance travelled = speed × time | $s = v t$ |
| acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$ | $a = \frac{\Delta v}{t}$ |
| = $\frac{\text{final velocity} - \text{initial velocity}}{\text{time taken}}$ | $= \frac{v - u}{t}$ |
| resultant force = mass × acceleration | $F = m a$ |
| * momentum = mass × velocity | $p = m v$ |
| <u>Equations given in the exam</u> | |
| * ^ Pressure = height of column × density of liquid × gravitational field strength | $p = h \rho g$ |
| ^ (final velocity) ² – (initial velocity) ² = 2 × acceleration × distance | $v^2 - u^2 = 2 a s$ |
| * ^ Force = $\frac{\text{change in momentum}}{\text{time taken}}$ | $F = \frac{m \Delta v}{t}$ |

Unit 4: Atomic Structure & Unit 8: Space

There are no equations in these sections of the course