

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

Unit 1: Energy

| Equations to Learn | |
|--|---------------------------------|
| kinetic energy = $\frac{1}{2} \times \text{mass} \times \text{speed}^2$ | $E_k = \frac{1}{2}mv^2$ |
| GPE = mass \times gravitational field strength \times 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 = $\frac{\text{useful power output}}{\text{total power input}}$ | |
| Equations often in the exam | |
| elastic potential energy = $0.5 \times \text{spring constant} \times (\text{extension})^2$ | $E_e = \frac{1}{2}kx^2$ |
| change in thermal energy = mass \times specific heat capacity \times temperature change | $\Delta E = mc\Delta\theta$ |

Unit 2: Electricity

| Equations to Learn | |
|--|-------------------|
| charge flow = current \times time | $Q = It$ |
| potential difference = current \times resistance | $V = IR$ |
| total resistance = resistance of component 1 + resistance of component 2 | $R_t = R_1 + R_2$ |
| power = current \times potential difference | $P = IV$ |
| power = (current) ² \times resistance | $P = I^2R$ |
| energy transferred = power \times time | $E = Pt$ |
| energy transferred = charge flow \times potential difference | $E = QV$ |

* Higher tier only

* Separate Physics only

Unit 3: Particle Model of Matter

| Equations to Learn | |
|---|-----------------------------|
| density = $\frac{\text{mass}}{\text{volume}}$ | $\rho = \frac{m}{V}$ |
| Equations often in the exam | |
| change in thermal energy = mass \times specific heat capacity \times temperature change | $\Delta E = mc\Delta\theta$ |
| thermal energy for a change in state = mass \times specific latent heat | $E = mL$ |
| * for a gas, pressure \times volume = constant | $pV = \text{constant}$ |

Unit 6: Waves

| Equations to Learn | |
|--|--|
| wave speed = frequency \times wavelength | $v = f\lambda$ |
| Equations often in the exam | |
| 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

| Equations often in the exam | |
|---|-------------------------------------|
| * Force = magnetic flux density \times current \times 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 \times current in primary = p.d. across secondary \times current in secondary | $V_p I_p = V_s I_s$ |

Unit 5: Forces

| Equations to Learn | |
|---|---------------------------|
| weight = mass \times gravitational field strength | $W = mg$ |
| work done = force \times distance (moved along the line of action of the force) | $W = Fs$ |
| force = spring constant \times extension | $F = kx$ |
| moment of a force = force \times distance (perpendicular to the direction of the force) | $M = Fd$ |
| pressure = $\frac{\text{force normal to a surface}}{\text{area of that surface}}$ | $P = \frac{F}{A}$ |
| distance travelled = speed \times time | $s = vt$ |
| 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 \times acceleration | $F = ma$ |
| * momentum = mass \times velocity | $p = mv$ |
| Equations often in the exam | |
| * * Pressure = height of column \times density of liquid \times gravitational field strength | $p = h\rho g$ |
| * final velocity ² - (initial velocity) ² = 2 \times acceleration \times distance | $v^2 - u^2 = 2as$ |
| * * 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

As Level Physics A

Patrick Vollmar



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1. Understanding the eBook As Level Physics A
 - The Rise of Digital Reading As Level Physics A
 - Advantages of eBooks Over Traditional Books
2. Identifying As Level Physics A
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an As Level Physics A
 - User-Friendly Interface
4. Exploring eBook Recommendations from As Level Physics A
 - Personalized Recommendations
 - As Level Physics A User Reviews and Ratings
 - As Level Physics A and Bestseller Lists

5. Accessing As Level Physics A Free and Paid eBooks
 - As Level Physics A Public Domain eBooks
 - As Level Physics A eBook Subscription Services
 - As Level Physics A Budget-Friendly Options
6. Navigating As Level Physics A eBook Formats
 - ePub, PDF, MOBI, and More
 - As Level Physics A Compatibility with Devices
 - As Level Physics A Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of As Level Physics A
 - Highlighting and Note-Taking As Level Physics A
 - Interactive Elements As Level Physics A
8. Staying Engaged with As Level Physics A
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers As Level Physics A
9. Balancing eBooks and Physical Books As Level Physics A
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection As Level Physics A
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine As Level Physics A
 - Setting Reading Goals As Level Physics A
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of As Level Physics A
 - Fact-Checking eBook Content of As Level Physics A
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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