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A-Level Physics

How to Answer Every Question - Exam Technique Guide

Edexcel Physics (9PH0) | **A-Level** | **8 question types**

THE NILE METHOD - every question, every time

1. Read the COMMAND WORD first - it tells you the skill (state / explain / evaluate).
2. Check the MARKS - roughly one developed point (or mark-scheme line) per mark.
3. Match the ASSESSMENT OBJECTIVES the marks reward (AO1 knowledge / AO2 application / AO3 evaluation).
4. PLAN before long answers - jot points, then write in clear PEEL / chain-of-reasoning paragraphs.
5. Use precise terminology, evidence and (where relevant) named studies or data.
6. For evaluation, write developed chains and a justified judgement - not a list.

Multiple choice · “Which / Select the correct option”

TESTS	AO1/AO2 recall and quick reasoning · 1 mark each, Section A of Paper 3 and scattered in Papers 1 and 2
METHOD	**1.** Read the stem and decide what is actually asked before glancing at the options. **2.** Work the physics yourself on the side - do a quick calculation or sketch - rather than pattern-matching an answer. **3.** Use units and powers of ten to eliminate distractors: wrong-unit or wrong-magnitude options are deliberate traps. **4.** Cross off the impossible, then choose between what remains; never leave a 1-mark item blank. **5.** Transfer one clear letter to the grid and check it matches your working.
STRUCTURE	Decode the question → solve independently → eliminate distractors by unit and magnitude → commit to a single letter.
MODEL	*A photon has energy 3.0×10^{-19} J. Using $E = hf$, $f = E / h = 3.0 \times 10^{-19} / 6.63 \times 10^{-34} \approx 4.5 \times 10^{14}$ Hz, so the visible-light option is correct, not the radio or X-ray distractors.*
PITFALLS	› Picking the first plausible option without doing the working - distractors are designed to look reasonable. › Ignoring the power of ten and choosing a value that is right in digits but wrong by a factor of 10^n.

State / define · “State, Define, Name, Give”

TESTS	AO1 recall of definitions, laws and quantities · 1 to 2 marks
METHOD	**1.** Give the exact textbook statement - no scenario, no padding. **2.** For a defined quantity, state what it is the ratio of, including the condition (for example 'per unit ...'). **3.** Quote the unit only if the question asks for it, and use correct index notation. **4.** Keep it to one precise sentence; a longer answer risks contradicting the mark point.
STRUCTURE	One mark-scheme-matched sentence stating the definition or law in full, with the defining condition included.
MODEL	*The electromotive force of a source is the energy transferred to electrical energy per unit charge driven around the circuit, measured in volts ($J\ C^{-1}$).*
PITFALLS	› Defining e.m.f. as a 'force' - it is an energy-per-charge, not a force. › Omitting the 'per unit ...' part, so the definition is incomplete and scores zero.

Multi-step calculation · "Calculate, Determine, Find"

TESTS	AO2 selecting and applying equations · 2 to 5 marks, units and significant figures assessed
METHOD	**1.** Quote the equation in symbols first (from recall or the data-formulae booklet). **2.** Rearrange algebraically before substituting, then put in values with consistent SI units. **3.** Convert prefixes and powers of ten (cm → m, kW → W, μ → 10^{-6}) before the numbers go in. **4.** Evaluate, then attach the correct unit and round to the same significant figures as the data (usually 2 or 3). **5.** Sanity-check the magnitude - is 10^8 m s^{-1} physically sensible for a speed?
STRUCTURE	Equation → rearrange → substitute SI values → evaluate → unit and significant figures → quick plausibility check.
MODEL	*Kinetic energy: $E_k = ½\, m\, v^2 = ½ \times 0.045 \times (38)^2 = 32.49$ J ≈ 32 J (2 s.f.), the same precision as the data given.*
PITFALLS	› Rounding intermediate values early, which shifts the final answer - keep full precision until the last line. › Dropping the unit or quoting too many significant figures, both of which lose the final mark.

Show that · "Show that, Verify"

TESTS	AO2 reaching a quoted value, proving you can do the steps · 2 to 4 marks
METHOD	**1.** Treat the target value as confirmation, not as something to substitute in - work toward it independently. **2.** Lay out every line of working so the route to the value is fully visible. **3.** Carry one extra significant figure beyond the quoted answer so the agreement is convincing. **4.** Finish by writing your computed value next to the target and stating that they agree.
STRUCTURE	State equation → substitute → evaluate to one extra significant figure → compare with the quoted value and confirm.
MODEL	*Show that the acceleration is about 6 m s^{-2}: $a = (v - u) / t = (24 - 6) / 3.0 = 6.0$ m s^{-2}, which agrees with the value of about 6 m s^{-2}.*
PITFALLS	› Plugging the given answer back in instead of deriving it - examiners credit the route, not the destination. › Rounding to the quoted figure too soon so the working cannot be seen to land on the value.

Explain · "Explain, Justify, Account for"

TESTS	AO1/AO2 linked reasoning from cause to effect · 2 to 4 marks
METHOD	**1.** Identify the physics principle the question is built on (a law, conservation rule or relationship). **2.** Build a linked chain: each statement must cause the next, using connectives such as 'because', 'therefore', 'so that'. **3.** Refer to the named quantities in the stem rather than answering in the abstract. **4.** Make sure the chain ends on the effect the question asks about, closing the logical loop.
STRUCTURE	State the principle → because ... → therefore ... → so the stated effect follows, each link tied to the named quantity.
MODEL	*As the resistor heats up, lattice ions vibrate with greater amplitude, so electrons collide more frequently; this raises resistance, therefore for a fixed voltage the current falls.*
PITFALLS	› Describing what happens instead of explaining why - a description with no causal links scores AO1 only. › Breaking the chain by leaving out a step, so the conclusion no longer follows from the start.

Graph and data analysis · "Plot, Determine the gradient, Use the graph"

TESTS	AO2/AO3 handling linear graphs, gradients, intercepts and error bars · 3 to 6 marks
METHOD	**1.** Choose scales that fill at least half the grid and plot points to within half a small square. **2.** Draw a single best-fit line balancing points either side; add error bars where uncertainties are given. **3.** For the gradient, draw a large triangle (over half the line) and compute $\Delta y / \Delta x$ with units from the axes. **4.** Read the intercept only where $x = 0$ truly lies; if the axis is offset, calculate it from $y = m x + c$. **5.** Link the gradient and intercept back to the physics by comparing the data with the rearranged equation.
STRUCTURE	Sensible scales → best-fit line with error bars → large-triangle gradient with units → intercept → map m and c onto the equation.
MODEL	*For a stretched spring, plotting F against x gives a straight line; gradient = $\Delta F / \Delta x = (4.8 - 0.0) / (0.12 - 0.0) = 40\ N\ m^{-1}$, which is the spring constant k.*
PITFALLS	› Using a tiny gradient triangle, which magnifies reading error and loses accuracy marks. › Quoting the gradient with no unit, or reading the intercept off an offset axis instead of calculating it.

Practical and method evaluation · "Describe the method, Evaluate, Suggest an improvement"

TESTS	AO3 planning, measurement and uncertainty (CPAC-linked) · 3 to 6 marks
METHOD	**1.** Name the apparatus and the exact quantity each instrument measures, with its resolution. **2.** Identify the independent, dependent and control variables, and a fair way to vary and measure them. **3.** Reduce uncertainty: repeat and mean, take readings over large intervals, and use methods such as fiducial markers or timing many oscillations. **4.** Identify the dominant source of uncertainty and evaluate its effect, then suggest a targeted improvement. **5.** Combine percentage uncertainties when asked, adding them for quantities multiplied or divided.
STRUCTURE	Apparatus and resolution → variables and control → uncertainty-reduction technique → dominant error → justified improvement.
MODEL	*Time 20 oscillations and divide by 20 to cut the percentage uncertainty in the period; using a fiducial marker at the centre of the swing makes the timing of each pass consistent.*
PITFALLS	› Vague 'be accurate' or 'use better equipment' with no named technique gains nothing. › Naming a random error reducer (repeats) to cure a systematic error such as a zero offset, which repeats cannot remove.

Six-mark extended response · "Explain fully, Discuss, Evaluate (6 marks)"

TESTS	AO1/AO2/AO3 sustained, well-linked argument marked by levels · 6 marks
METHOD	**1.** Plan three or four distinct physics points before writing so the answer has a logical line of reasoning. **2.** Develop each point as a chain - statement, the physics that causes it, then its consequence - not a bare list. **3.** Use correct terminology and, where useful, a supporting equation or named relationship. **4.** For 'evaluate', weigh both sides and reach a justified judgement rather than stopping at the points. **5.** Keep the whole answer coherent and on-question; level 3 needs sustained, connected reasoning throughout.
STRUCTURE	Brief plan → three or four developed chains in a logical order → balanced weighing if evaluative → coherent concluding judgement.
MODEL	*In a transformer, the alternating primary current produces a changing magnetic flux in the core; by Faraday's law this changing flux links the secondary and induces an e.m.f., so a laminated core matters because it reduces eddy-current heating and keeps efficiency high.*
PITFALLS	› Writing a list of disconnected facts - level 3 requires sustained, linked reasoning, not bullet points in prose. › Running out of time or omitting the judgement on an 'evaluate', which caps the level reached.