NILE TUITION ACADEMY
Excellence in Mathematics Tuition
niletuitionacademy.co.uk

A-Level Mathematics

How to Answer Every Question - Exam Technique Guide

Edexcel Mathematics (9MA0) | 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.

Short 'work out / find' method questions · “Find / Work out / Calculate / Solve”

TESTS	Method (M) marks for correct process plus accuracy (A) marks for the right value · typically 2 to 5 marks
METHOD	**1.** Read the command and the required form: an exact answer (surd, π, fraction) or a decimal to a stated accuracy. **2.** Write the rule or formula you are using before substituting - the substitution itself is usually the M mark. **3.** Work line by line so each step is visible; never collapse three operations into one written line. **4.** Keep exact values (√, π, fractions) through the working and round only on the final line. **5.** State the final answer clearly, with units or the requested form, so the A mark is unambiguous.
STRUCTURE	Quote rule → substitute values (M) → simplify step by step → state exact or correctly rounded answer (A).
MODEL	*Find the gradient of* $y = 3x^2 - 5x$ *at* $x = 2$. $dy/dx = 6x - 5$ *(M, differentiating)* $= 6(2) - 5$ *(substituting)* $= 7$ *(A).*
PITFALLS	› Writing only the final number - with no working a wrong answer scores zero, since the M marks are gone. › Rounding part-way through, which corrupts the final A mark. › Ignoring the demanded form, e.g. giving a decimal when an exact surd was required.

'Show that' questions · “Show that”

TESTS	Mostly M marks for the route, with the final mark earned by reaching the printed result · 2 to 4 marks
METHOD	**1.** Note that the answer is given, so every mark is for the working that arrives at it convincingly. **2.** Start from the definitions or identities you are allowed to assume and write each manipulation in full. **3.** Do not jump to the printed line - show the step immediately before it so the link is explicit. **4.** Finish by stating the target expression and adding a short closing remark such as 'as required'.
STRUCTURE	State starting point → manipulate line by line (each line a small move) → arrive at the printed result and label it 'as required'.
MODEL	*Show that* $2\sin^2\theta + \cos\theta = 2 + \cos\theta - 2\cos^2\theta$. *LHS* $= 2(1 - \cos^2\theta) + \cos\theta$ *(using* $\sin^2\theta = 1 - \cos^2\theta$*)* $= 2 - 2\cos^2\theta + \cos\theta = 2 + \cos\theta - 2\cos^2\theta$ *= RHS, as required.*
PITFALLS	› Working backwards from the answer instead of deriving it - examiners want a forward argument. › Skipping the penultimate line, so the leap to the printed result is unjustified. › Treating it as 'find' and stopping one step short of the stated expression.

Proof questions (deduction, exhaustion, contradiction) · “Prove / Prove by contradiction / Prove that … is irrational”

TESTS	B and M marks for a rigorous logical chain with a clear conclusion · 3 to 6 marks
METHOD	**1.** Identify the proof type: direct deduction, proof by exhaustion of cases, or proof by contradiction. **2.** Define general terms algebraically - use 2n for even and 2n + 1 for odd, and keep n an integer. **3.** For contradiction, assume the opposite of the statement, then derive a logical impossibility. **4.** Argue each line as a consequence of the previous one, justifying every deduction. **5.** End with an explicit concluding sentence that states the result has been proved.
STRUCTURE	State assumption or general case → algebraic deduction line by line → reach a contradiction or general truth → write a clear conclusion.
MODEL	*Prove $\sqrt{2}$ is irrational. Assume $\sqrt{2} = a/b$ in lowest terms. Then $2 = a^2/b^2$, so $a^2 = 2b^2$, hence a is even, $a = 2k$. Then $4k^2 = 2b^2 \rightarrow b^2 = 2k^2$, so b is even too. This contradicts a/b being in lowest terms, so $\sqrt{2}$ is irrational.*
PITFALLS	› Using a single numerical example, which demonstrates but does not prove a general statement. › Forgetting to state the contradiction explicitly, leaving the argument unfinished. › Omitting the closing conclusion sentence that names the result as proved.

'Hence' and 'hence or otherwise' follow-ons · “Hence / Hence or otherwise”

TESTS	M and A marks that depend on linking to the previous part · 1 to 4 marks
METHOD	**1.** Read 'hence' as an instruction: you must use the result of the previous part to gain the method mark. **2.** Identify exactly which earlier expression, factorisation or value is meant to be reused. **3.** With 'or otherwise' a fresh method is allowed, but using the earlier result is almost always faster and safer. **4.** Quote the result you are carrying forward so the examiner sees the connection being made.
STRUCTURE	Recall the previous result → substitute or apply it to the new demand → complete the short calculation → state the answer.
MODEL	*Given $x^3 - 7x + 6 = (x - 1)(x^2 + x - 6)$, hence solve $x^3 - 7x + 6 = 0$. Using the factor form: $(x - 1)(x + 3)(x - 2) = 0$, hence $x = 1$, $x = -3$ or $x = 2$.*
PITFALLS	› Restarting from scratch on a plain 'hence', which forfeits the method mark tied to the earlier part. › Not quoting the previous result, so the link the examiner needs is missing. › On 'hence or otherwise', choosing a long fresh method and running out of time.

Multi-step problem-solving questions · “Solve / Determine / Show / Find (extended)”

TESTS	Several M marks across stages plus A marks for accuracy at the end · 5 to 9 marks
METHOD	**1.** Decode what is being asked and list the pieces of information given, including any diagram. **2.** Plan the route: name the techniques (e.g. simultaneous equations, then calculus) needed to connect start to finish. **3.** Work one stage at a time, labelling intermediate results so they can be carried forward cleanly. **4.** Keep exact values between stages and only convert to a decimal at the very end if asked. **5.** Return to the question and check you have answered exactly what was demanded, with correct units.
STRUCTURE	Extract data → plan and name methods → execute stage by stage (each scoring its own M) → combine results → final answer (A).
MODEL	*A curve meets $y = 2x + 1$ where $x^2 = 2x + 1$. So $x^2 - 2x - 1 = 0 \rightarrow x = 1 \pm \sqrt{2}$. Then $y = 2(1 \pm \sqrt{2}) + 1 = 3 \pm 2\sqrt{2}$, giving the two intersection points exactly.*
PITFALLS	› Diving in without a plan and losing the thread between stages. › Carrying a rounded decimal forward, which loses accuracy marks downstream. › Solving a sub-part correctly but never combining the stages to answer the actual question.

Modelling questions (interpret or criticise a model) · “Interpret / Criticise / Comment on / State a limitation”

TESTS	B marks for interpreting constants in context and for evaluating model validity · 1 to 3 marks
METHOD	**1.** Tie each symbol to its real-world meaning - a constant is often an initial value and a coefficient a rate. **2.** When asked to interpret, give the meaning in the words of the context, with correct units. **3.** When asked to criticise, name one specific assumption and explain why it may fail in reality. **4.** Suggest a sensible refinement only if the question invites an improvement to the model.
STRUCTURE	Read the model in context → interpret the requested constant or term with units → judge a limitation with a concrete reason.
MODEL	*For $P = 50e^{0.2t}$ modelling bacteria after t hours: the 50 is the initial population at $t = 0$, and 0.2 sets the growth rate. A limitation: unbounded exponential growth ignores limited food, so the model overestimates P for large t.*
PITFALLS	› Giving a number with no contextual meaning, e.g. '50' instead of 'the starting population'. › Offering a vague criticism such as 'it is not accurate' with no specific assumption named. › Forgetting units when interpreting a rate or quantity.

'Explain' and 'interpret' questions · “Explain / Interpret / State / Give a reason”

TESTS	B marks for a precise, complete statement in context · 1 to 3 marks
METHOD	**1.** Decide how many distinct points are needed - the mark total signals how many ideas to give. **2.** Use correct mathematical vocabulary, e.g. increasing, stationary, valid region, or a named distribution. **3.** Refer back to the specific values, variables or scenario in the question rather than answering generally. **4.** Write in full sentences so the reasoning is explicit and not left for the examiner to infer.
STRUCTURE	Identify the required number of points → state each precisely with the right term → anchor it to the question's values or context.
MODEL	*Explain why $x \geq 0$ in this model. Because x represents a length in metres, it cannot be negative, so only $x \geq 0$ gives physically meaningful values.*
PITFALLS	› Answering with one idea when the marks clearly call for two. › Using loose language instead of the precise term (e.g. 'goes up' rather than 'increasing'). › Giving a generic statement that never refers to the actual variables in the question.

Questions split into method (M) and accuracy (A) marks · "Find … (showing method) / Calculate … (give to a stated accuracy)"

TESTS	Explicit M marks for the process and A marks for the value, often with B marks for a stated fact · 3 to 6 marks
METHOD	**1.** Recognise the structure: M marks reward a correct method even if a later number is wrong (follow-through). **2.** Secure the M marks first by writing the formula and a clear, correct substitution. **3.** Protect the A marks by keeping exact values and rounding only at the end, to the accuracy demanded. **4.** Where a B mark is on offer, state the standalone fact plainly, such as the equation of an asymptote. **5.** Re-read the required degree of accuracy - '3 significant figures' and '2 decimal places' are not the same.
STRUCTURE	Method first (formula then substitution, scoring M) → exact simplification → round to the stated accuracy (scoring A) → state any B-mark fact explicitly.
MODEL	*Solve* $x^2 - 4x + 1 = 0$ *to 2 d.p.* $x = [4 \pm \sqrt{(16 - 4)}] / 2$ *(M, quadratic formula)* $= 2 \pm \sqrt{3}$ *(exact)* $= 3.73$ *or* 0.27 *to 2 d.p. (A).*
PITFALLS	› Skipping the substitution line, so the M mark is lost even when the final value is right. › Rounding too early, which makes a correct method produce an inaccurate A-mark answer. › Giving the wrong accuracy form (significant figures versus decimal places) and losing the final A mark.