

Exam technique

How the exams work, technique for every type of question, and every command word

How the exams work

Pearson Edexcel A level Mathematics (9MA0) is assessed by three written papers, all sat at the end of the course and equally weighted. Each paper lasts 2 hours, is worth 100 marks and allows a calculator, and you are given the formulae booklet with statistical tables. Papers 1 and 2 can test any of the Pure content; Paper 3 has a Statistics section and a Mechanics section of 50 marks each.

Paper	Time	Marks	Calculator	What's on it
Paper 1: Pure Mathematics 1	2 h	100	Allowed	Any of the Pure content (topics 1 to 10, Year 1 and Year 2): proof, algebra and functions, coordinate geometry, sequences and series, trigonometry, exponentials and logarithms, differentiation, integration, numerical methods and vectors.
Paper 2: Pure Mathematics 2	2 h	100	Allowed	Any of the Pure content (topics 1 to 10), exactly as for Paper 1. Neither paper is limited to particular topics, so revise all of the Pure content for both.
Paper 3: Statistics and Mechanics	2 h	100	Allowed	Section A, Statistics (50 marks), topics 1 to 5: statistical sampling and the large data set, data presentation and interpretation, probability, statistical distributions (binomial and normal) and hypothesis testing. Section B, Mechanics (50 marks), topics 6 to 9: quantities and units, kinematics (including variable acceleration and projectiles), forces and Newton's laws (including friction) and moments. Pure skills such as algebra, calculus and vectors are used in both sections.

Exam technique

The weeks before the exams

- Revise all of Year 1 and Year 2. The papers test the whole course, and many long questions start from Year 1 skills such as quadratics, indices, straight lines and the binomial expansion.
- Move from topic-by-topic practice to timed, mixed practice. In the exam nothing tells you which topic a question is from, and Pure questions often combine two or three (trig with calculus, logs with a model, parametric equations with areas).
- Know what the formulae booklet (Mathematical Formulae and Statistical Tables) gives you and where to find it, but don't rely on it: learn by heart the results you use all the time, such as the laws of logarithms, the double angle formulae, the derivatives and integrals of

$\sin x$

,

$\cos x$

,

e^x

and

$\ln x$

, the chain and product rules, arc length

$r\theta$

and sector area

$\frac{1}{2}r^2\theta$

, and the equation of a circle.

- Get used to the statistical tables in the booklet: the binomial cumulative distribution function, the percentage points of the normal distribution and the critical values for the correlation coefficient. Know which one each type of question needs and how to read it.
- Study the large data set Pearson publishes for the course. Questions can assume you know its variables, their units, where and when the data was collected and how missing values are recorded, so a student who has used it can answer questions that others can't.
- Keep an error log: for every mark you drop, write the topic, what went wrong and the correct method. Re-read it every week; the same few mistakes usually cost most of the marks.
- Make flashcards for things you must recall instantly (identities, standard derivatives and integrals, the hypothesis-test layout, modelling assumptions) and review them little and often.
- In the last month, sit at least one full 2-hour paper each week under exam conditions, rotating Papers 1, 2 and 3, and mark it strictly.

The night before and the morning of the exam

- Pack black pens (more than one), an HB or B pencil for sketches and diagrams, a ruler, a rubber, a protractor, and your calculator with fresh or charged batteries.
- Check your calculator is allowed: Pearson does not allow calculators that can do symbolic algebra, symbolic differentiation or integration, or that have formulae or notes stored in them. Clear any stored programs or text.
- Don't use coloured pens or highlighters on the paper. Underline key words in pen or pencil instead.
- Do light revision only: your flashcards, your error log and the layout of the formulae booklet. Don't start a topic you haven't learnt.
- Before Paper 3, run through the hypothesis-test layout, the steps for finding an unknown mean or standard deviation in a normal distribution, and the standard modelling assumptions in mechanics.
- Get a proper night's sleep. Tiredness shows up as sign errors and misread questions, and one slip early in a 10-mark question can cost most of it.
- In the morning, eat, arrive early and do two or three quick warm-up questions (a differentiation, a quadratic, a trig equation) to get your brain into gear.

The first five minutes

- Fill in your details on the front, check you have the formulae booklet, and check how many questions there are so you know the paper is complete.
- Look at the angle mode on your calculator and know how to switch it. Calculus and small angle approximations need radians; many trig equations are set in degrees.
- Spend about a minute flicking through the whole paper: see where the long questions are and which topics come up, so nothing surprises you with ten minutes left.
- The marks for each part are shown in brackets. Use them to judge how much working each part needs.
- Start with question 1. The papers usually open with shorter, more routine questions, so bank those marks and build confidence. If a later question looks hard, note it and come back; don't let it unsettle you.
- On Paper 3, write down the time you will switch sections (60 minutes in). You can answer Section A or Section B first, as long as each gets its fair share of time.

Timing: about 1.2 minutes a mark

- 100 marks in 120 minutes is 1.2 minutes per mark: a 5-mark part is worth about 6 minutes and a 12-mark question about 14 to 15 minutes.
- Work a little faster than this on routine questions so you save time for the long questions near the end and for checking.
- Check your pace against the clock: roughly a quarter of the marks done every 30 minutes. If you are well behind at the one-hour mark, speed up on routine parts rather than rushing the hard ones.
- On Paper 3, give each section 60 minutes and stick to it. A statistics section that overruns takes marks away from mechanics, and the other way round.
- If a part has taken its time and you're not close, write down the method you would use, leave a gap and move on. A fresh look at the end often works.
- The later questions are longer and harder, but their first parts are often routine (differentiate, find a coordinate, write down a value). Never leave a whole long question blank.
- Don't over-write: a 1-mark 'write down' needs no working, and a 2-mark 'explain' needs one or two clear points, not a paragraph.

Reading the question

- Read the whole question, all parts, before you start. Later parts often show why an earlier part is there and which method is intended.

- Underline the command word and the form of the answer: 'exact', 'in the form

$$a + b\sqrt{3}$$

', 'in terms of

$$\pi$$

', 'to 3 significant figures', 'where

$$a$$

,

$$b$$

and

$$c$$

are integers'. An answer in the wrong form can lose the final mark.

- In trig questions, check the interval and the units:

$$0 \leq \theta < 360^\circ$$

means degrees,

$$0 \leq x < 2\pi$$

means radians. If the angle is

$$2\theta$$

or

$$\theta + 30^\circ$$

, change the interval to match before you solve.

- Look for a method instruction: 'use algebra', 'using calculus', 'use the substitution

$$u = \dots$$

', 'hence', or 'In this question you must show all stages of your working. Solutions relying entirely on calculator technology are not acceptable.' Another method may score nothing.

- In context questions, pin down what each variable means and its units (

$$t$$

in hours or years,

$$P$$

in thousands) before you use the model.

- Read the figure and its labels: which curve is which, which region is shaded, which coordinates are marked. Don't measure from diagrams; they are not always drawn to scale.

- Watch the small words: 'positive', 'integer', 'non-zero', 'for all', 'at least', 'more than', 'given that', 'the exact value'.

- When you finish a part, re-read the question and check you answered what was asked: coordinates rather than just

$$x$$

, the equation of the tangent rather than its gradient, the probability rather than the

$$z$$

value.

Showing working and how the marks are given

- There is no multiple choice on these papers. Every question is answered in the space in the question paper, and most marks are for the method as well as the answer.
- Edexcel mark schemes give M marks for a correct method, A marks for accurate answers (which depend on the method mark), and B marks for correct results that don't need a method. A dM mark needs the earlier M mark too.
- A correct answer with no working is risky: where a method is asked for it can score nothing, and a wrong answer with no working always scores nothing. A wrong answer after a correct method still earns the M marks.
- Write your method so an examiner can follow it: state the rule, substitute, then simplify. For example, write $\frac{dy}{dx} = 0$ before solving for a stationary point, and $X \sim B(20, 0.3)$ before a probability.
- Follow-through (ft) marks mean a wrong answer in part (a), used correctly in part (b), can still earn marks in (b). Always carry on.
- If you can't do a 'show that' part, use the printed answer in the next part. You can score every mark in the later part.
- Marks labelled cso (correct solution only) need a fully correct argument with no wrong lines. They often sit at the end of 'show that' and proof questions.
- Answers that round to the correct value are usually accepted, but only if you kept enough accuracy: write at least 4 significant figures in intermediate working and keep the full value in your calculator.

'Show that' and proof questions

- In a 'show that' question the answer is printed, so every mark is for the working. Show each step; don't jump from the start to the given result.
- Start from the expression or the information in the question, not from the answer. End with a line that exactly matches the printed result and a short statement such as 'as required'.
- To prove a trig identity, work on one side only (usually the more complicated one) until it becomes the other side. Don't treat it as an equation and do the same thing to both sides.
- Proof by deduction: represent general cases with algebra, e.g.

$$2n$$

for an even number,

$$2n + 1$$

for an odd number,

$$n$$

and

$$n + 1$$

for consecutive integers, then simplify to show the property.

- Proof by exhaustion: split into cases that cover every possibility (e.g.

$$n$$

even and

$$n$$

odd, or

$$n = 3k$$

,

$$3k + 1$$

,

$$3k + 2$$

) and prove each one.

- Disproof by counter-example: give one specific example, show the working that proves it fails, and state that the claim is therefore false.
- Proof by contradiction: start 'Assume that ...' (the opposite of what you want to prove), reason to something impossible, then conclude that the assumption is false. Know the standard proofs that

$$\sqrt{2}$$

is irrational and that there are infinitely many primes.

- Finish every proof with a sentence stating what you have proved. Without it the last mark is often lost.

Modelling and problem-solving questions

- Many questions are set in a context: population growth, cooling, a drug in the bloodstream, the shape of an arch, a car's journey, the volume of a container. The maths is standard; the skill is turning the words into equations.
- Write the model down and define any variable you introduce. Check the units: hours or minutes, metres or kilometres, thousands or single items.
- In an exponential model such as

$$P = Ae^{kt}$$

,

A

is the value when

$$t = 0$$

and the sign and size of

k

describe the growth or decay. Use logarithms to find

k

or a time.

- Translate rates into differential equations: 'the rate of decrease of

V

is proportional to

V

' means

$$\frac{dV}{dt} = -kV$$

with

$$k > 0$$

. Use the conditions given to find the constants.

- Give answers in context and with units, e.g. 'the population first exceeds 5000 in the 13th year', not just

$$t = 12.4$$

.

- Expect to criticise or refine the model. Give a specific limitation linked to the context (e.g. 'the model predicts the fish population grows without limit, but the lake can only support a limited number'), not 'it may not be accurate'.
- Unstructured problems give a goal but no steps. Write down what you know, what you need and what links them (an area needs an integral, a maximum needs a derivative, a length might need a vector's magnitude), then work step by step.
- Sense-check the answer: a negative length, a probability above 1 or a time before the start means something has gone wrong.

Sketches, graphs and diagrams

- A sketch shows the shape and the key features, not plotted points: where the graph meets the axes (with coordinates), turning points if asked for, and asymptotes with their equations.
- Transformations: follow one key point and each asymptote through every step.

$$y = f(x + a)$$

moves the graph left by

a

,

$$y = af(x)$$

stretches it vertically by factor

a

,

$$y = |f(x)|$$

reflects the parts below the

x

-axis, and

$$y = f(|x|)$$

reflects the part for

$$x \geq 0$$

in the

y

-axis.

- Staircase and cobweb diagrams: draw on the diagram given, start from

x_0

and label

x_1

and

x_2

on the

x

-axis.

- Statistics: draw box plots on the scale given and mark outliers with a cross. In a histogram, frequency density = frequency $\div$ class width, so the area of a bar, not its height, gives the frequency. Sketch the normal curve and shade the region before a normal probability.
- Mechanics: draw a force diagram in every forces question, even when it isn't asked for, and a velocity–time graph for a journey in stages. The gradient of a velocity–time graph is the acceleration and the area under it is the displacement.
- Use the diagram in the question: mark lengths, angles and coordinates on it as you find them.
- Draw graphs and diagrams in dark pencil (HB or B) and use a ruler for straight lines.

Paper 3 Section A: statistics

- Lay out every hypothesis test the same way: define the parameter, write

$$H_0$$

and

$$H_1$$

in terms of it (e.g.

$$H_0 : p = 0.3$$

,

$$H_1 : p < 0.3$$

), state the distribution under

$$H_0$$

, find the probability or the critical region, compare with the significance level, and conclude in context.

- A test gives evidence, not proof. Write 'there is sufficient evidence at the 5% level to suggest that the proportion of ... has decreased', never 'this proves'. A bare 'reject

$$H_0$$

' without context loses the final mark.

- Two-tailed tests: compare with half the significance level in each tail. For a critical region from the binomial tables, choose the region whose probability is as close as possible to the significance level (or half of it) without going over, unless the question tells you otherwise, and be ready to give the actual significance level.
- Know that the significance level is the probability of rejecting

$$H_0$$

when it is actually true.

- Correlation tests use

$$\rho$$

for the population:

$$H_0 : \rho = 0$$

, and you compare

$$r$$

with the critical value in the table for your sample size and significance level. Tests for the mean of a normal distribution use

$$\bar{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$$

.

- Binomial: when asked why the model suits, give the conditions in context (a fixed number of trials, two outcomes, independent trials, a constant probability of success). Use cumulative probabilities, e.g.

$$P(X \geq 5) = 1 - P(X \leq 4)$$

.

- Normal distribution: use your calculator for probabilities. To find an unknown

$$\mu$$

or

$$\sigma$$

, standardise with

$$z = \frac{x - \mu}{\sigma}$$

using a value from the percentage points table (e.g. 1.6449 for the top 5%). Quote table values in full.

- Data questions are about interpretation: compare distributions using a measure of location and a measure of spread, in context; explain the effect of outliers; interpret the gradient of a regression line; say whether a prediction is interpolation (more reliable) or extrapolation (unreliable).
- When a question says 'using your knowledge of the large data set', your answer must use something specific about it, such as a variable, a unit, a location or how the data was recorded.

- Probability: use Venn and tree diagrams, test independence with

$$P(A \cap B) = P(A) \times P(B)$$

, and use

$$P(A | B) = \frac{P(A \cap B)}{P(B)}$$

for conditional probability.

Paper 3 Section B: mechanics

- Draw a large, clear force diagram with every force labelled: weight

mg

, normal reaction

R

, tension

T

, friction

F

and any driving or resisting force. Show the direction of the acceleration.

- Say which direction you are resolving in (e.g. 'resolving parallel to the plane') and apply

$$F = ma$$

in the direction of motion. In equilibrium, resolve in two perpendicular directions and set each resultant to zero.

- Take

$$g = 9.8$$

m s^{-2} unless told otherwise and give answers that use

g

to 2 or 3 significant figures, as the front cover says. Using 9.81 or 10 loses accuracy marks.

- Use the suvat equations only when the acceleration is constant. When acceleration varies with time, use calculus:

$$v = \frac{ds}{dt}$$

,

$$a = \frac{dv}{dt}$$

,

$$s = \int v dt$$

, with constants found from the starting conditions.

- Projectiles: treat horizontal motion (constant velocity

$$u \cos \alpha$$

) and vertical motion (initial velocity

$$u \sin \alpha$$

, acceleration

g

downwards) separately; time links the two.

- Connected particles: write

$$F = ma$$

for each particle separately. A light inextensible string over a smooth pulley has the same tension on both sides, and both particles have the same magnitude of acceleration. When the string breaks or goes slack, start a new stage of the motion.

- Friction:

$$F \leq \mu R$$

, with

$$F = \mu R$$

when the object is moving or on the point of moving. Friction acts against the motion or the tendency to move. Find

R

first by resolving perpendicular to the surface.

- Moments: take moments about a point where an unknown force acts, to remove it from the equation. A uniform rod's weight acts at its midpoint. 'About to tilt' about one support means the reaction at the other support is zero.

- Vectors: work in

i

and

j

components. Speed is the magnitude of the velocity vector; give a direction as an angle measured from a stated reference, such as the vector

i

or north.

- Know what each modelling assumption means for the maths: particle (size and rotation ignored), light (mass ignored, so the tension is the same throughout), inextensible (connected objects have the same acceleration), smooth (no friction), uniform (weight acts at the centre), air resistance ignored.
- Give units with every answer: m, m s⁻¹, m s⁻², N, kg, s.

Exact answers, accuracy and units

- 'Exact' means no rounded decimals: leave the answer as a fraction, a surd, a multiple of π

, or in terms of

ln

and

e

(e.g.

$$x = \frac{1}{2} \ln 5$$

). A calculator decimal loses the mark.

- Unless the question or the front cover says otherwise, give inexact answers to 3 significant figures. Answers that use

$$g = 9.8$$

are given to 2 or 3 significant figures.

- Don't round in the middle of a calculation. Store values in your calculator's memory and write at least 4 significant figures in your working; an angle rounded early to

53°

can push the final answer out of the accepted range.

- Differentiating or integrating trig functions only works in radians. Give angles in the unit the question uses.
- Iteration and Newton–Raphson: give each iterate to the accuracy asked. To show a root is

a

correct to 3 decimal places, show a change of sign of

f(x)

over the interval from

$$a - 0.0005$$

to

$$a + 0.0005$$

, and say the function is continuous there.

- Round sensibly in context: you can't have 12.7 fish or 3.4 buses, so say whether the model gives 12 or 13, and why.
- Include units in the final answer of every context question, and keep them consistent (don't mix minutes with hours, or grams with kilograms).

Using your calculator

- Many calculators allowed in the exam have functions that save time: table mode, equation solvers, numerical integration and the binomial and normal distributions. Learn them on the model you will use in the exam, not on the day.
- Use the calculator to check your algebra, not to replace it. When a question says solutions relying entirely on calculator technology are not acceptable, write out every algebraic step; a calculator answer alone scores nothing there.
- Table mode: evaluate a function at many points for change-of-sign questions, trapezium rule values and checking the shape of a sketch.
- Iteration: enter
 x_0
, press =, then type the iteration formula using Ans and press = repeatedly to get
 x_1
,
 x_2
, and so on.
- Statistics: use the distribution functions for binomial and normal probabilities and the inverse normal, and statistics mode for the mean, standard deviation, regression line and
 r
. Always write the probability you are finding, e.g.
 $P(X \leq 3) = 0.3823$
for
 $X \sim B(10, 0.4)$
, not just the number.
- Check the angle mode at every trig question: radians for calculus, small angle approximations, arcs and sectors.
- Check definite integrals with numerical integration and check solutions by substituting them back into the original equation.

Checking, extra space and crossing out

- Check as you go: substitute solutions back into the equation, differentiate an integral to see if you get back to the start, test a sketch with a couple of values, and ask whether each answer is sensible.
- At the end, check every answer against the question: the form asked for, the accuracy, the units, all solutions in the interval, both coordinates.
- Where you can, check by a different route: a stationary point with table mode, a probability using the complement, a vector answer by drawing it.
- The answer space is not a guide to how much to write: there may be more space than you need, so judge by the marks.
- If you run out of space, continue on a spare page or additional paper, write the question number beside the continued work, and write 'continued on page ...' in the original space so the examiner finds it.
- To change an answer, cross it out with a single neat line and write the new answer and working below it. Don't leave two different answers standing: make it clear which one you want marked.
- Don't rub out or scribble over working that might be right. Even an unfinished method can earn M marks.

When you are stuck

- Write down what you know in maths form: the given information, a diagram, the formula that links the quantities. This often earns the first method mark and shows you the way forward.
- Look at the marks: a 2-mark part needs one or two steps. If you are filling half a page, you have probably missed a quicker route.
- Look back at the earlier parts. A 'show that' or 'hence' is a signpost to the method, and you can use a printed answer even if you couldn't prove it.
- Try the standard moves for the topic: in trig, use an identity to get a single trig function; in integration, try substitution, parts or partial fractions; in mechanics, resolve in a different direction or take moments about a different point.
- If you are still stuck after a couple of minutes, leave a gap and move on. Come back at the end with fresh eyes.
- Don't leave any part blank. A correct first step, such as differentiating or setting up an equation, can earn marks even if you can't finish.
- Stay calm: every paper has some parts designed to stretch the strongest students, and dropping one part won't decide your grade.

Learning from mocks

- Sit mocks as if they were real: the full 2 hours, only the formulae booklet, your exam calculator and no notes.
- Mark strictly against a mark scheme. Don't give yourself an A mark for an answer that is 'nearly right' or a method mark for a method you didn't write down.
- Sort every lost mark by cause: didn't know the content, chose the wrong method, careless slip, misread the question, or ran out of time. Each needs a different fix.
- Redo every question you dropped marks on within a few days, without looking at the solution, and again a week later.
- Track topics across several mocks. The topics that keep costing marks become next week's revision.
- Look at your timing: where you were at 30, 60 and 90 minutes, and which questions took too long.
- Compare your written answers with model solutions for layout and wording, especially hypothesis-test conclusions, proofs, 'show that' steps and comments on models.

Command words

Word	What it means	How to answer	Example
Find	Work out a value, an expression, a set of values or a point. Any correct method is allowed unless the question says otherwise.	Show the key steps so method marks can be given, then give the answer in the form asked for (coordinates, exact value, equation).	Find the coordinates of the turning point of $y = 2x^2 - 12x + 7$. $\frac{dy}{dx} = 4x - 12 = 0$, so $x = 3$ and $y = -11$: the turning point is $(3, -11)$.
Calculate	Work out a numerical answer, usually with a calculator.	Write the formula or expression with the numbers substituted, then the answer to a suitable accuracy with units.	Calculate the area of a sector of radius 6 cm and angle 1.2 radians. $\frac{1}{2} \times 6^2 \times 1.2 = 21.6 \text{ cm}^2$.
Determine	Find something and justify it.	Do the working, then state your	Determine the nature of the stationary point of $y = x^3 - 6x^2 + 9x$ at $x = 3$.

Word	What it means	How to answer	Example
	Often used when a decision is needed: 'determine whether' or 'determine the nature of'.	conclusion clearly with the reason that supports it.	$\frac{d^2y}{dx^2} = 6x - 12 = 6 > 0$ when $x = 3$, so it is a minimum.
Solve	Find every value that satisfies the equation or inequality, within any interval given.	Show the algebra, adjust the interval if the variable is transformed, and list all solutions in the right units.	Solve $\tan 2x = 1$ for $0 \leq x < \pi$. For $0 \leq 2x < 2\pi$, $2x = \frac{\pi}{4}$ or $\frac{5\pi}{4}$, so $x = \frac{\pi}{8}$ or $\frac{5\pi}{8}$.
Show that	The result is given; you must show clearly and logically how it follows. The marks are for the working.	Start from what you are given, show every step, and end on exactly the printed result. You may use the result in later parts even if you couldn't show it.	Show that $2\cos^2 x + 3\sin x = 3$ can be written as $2\sin^2 x - 3\sin x + 1 = 0$. Replace $\cos^2 x$ with $1 - \sin^2 x$: $2 - 2\sin^2 x + 3\sin x = 3$, so $2\sin^2 x - 3\sin x + 1 = 0$, as required.
Prove	Give a complete, rigorous argument that the statement is always true (or, with 'disprove', that it is not).	Use general algebra or cover every case, make each step follow from the last, and finish with a sentence stating what has been proved.	Prove that the sum of any three consecutive integers is a multiple of 3. $n + (n + 1) + (n + 2) = 3n + 3 = 3(n + 1)$, which is a multiple of 3 for every integer n .
Hence	You must use the result you have just found. Another method will usually score no marks.	Quote or use the previous answer directly and build on it.	(a) Given that $(x + 1)$ is a factor, factorise $x^3 - 7x - 6$ fully: $(x + 1)(x - 3)(x + 2)$. (b) Hence solve $x^3 - 7x - 6 = 0$: $x = -1, 3$ or -2 .
Hence or otherwise	Using the previous result is expected to be the quickest route, but any correct method earns full marks.	Use the earlier part if you can; if you choose another method, show it fully.	Given that $\cos 2x = 1 - 2\sin^2 x$, hence or otherwise find $\int \sin^2 x \, dx$. $\int \frac{1}{2}(1 - \cos 2x) \, dx = \frac{x}{2} - \frac{\sin 2x}{4} + c$.
Write down / State	Give the answer or fact without working. Usually worth 1 mark, and the answer should follow directly from what you know	Give a short, precise answer. If you find yourself doing a long calculation, you have probably missed something simpler.	Write down the centre and radius of the circle $(x - 2)^2 + (y + 5)^2 = 49$. Centre $(2, -5)$, radius 7.

Word	What it means	How to answer	Example												
	or from earlier work.														
Sketch	Draw the general shape of a graph with its key features shown. It doesn't need to be to scale or plotted.	Get the shape right and mark the intercepts with coordinates, asymptotes with equations, and turning points when asked.	Sketch $y = \frac{1}{x-2}$, showing the asymptotes $x = 2$ and $y = 0$ and the point where the curve meets the y -axis, $(0, -\frac{1}{2})$.												
Draw / Complete	Fill in a table, tree diagram or Venn diagram, or draw accurately on a given diagram (a box plot, a staircase diagram).	Fill every gap, use the accuracy asked for, and use a ruler and dark pencil for diagrams.	Complete the table of values of ($y = \sqrt{1 + x^2}$) for the trapezium rule, giving values to 4 decimal places. <table border="1"><tr><td>(x)</td><td>0</td><td>0.5</td><td>1</td><td>1.5</td><td>2</td></tr><tr><td>(y)</td><td>1</td><td>1.1180</td><td></td><td>1.8028</td><td></td></tr></table> At $(x = 1)$, $(y = \sqrt{2} = 1.4142)$; at $(x = 2)$, $(y = \sqrt{5} = 2.2361)$.	(x)	0	0.5	1	1.5	2	(y)	1	1.1180		1.8028	
(x)	0	0.5	1	1.5	2										
(y)	1	1.1180		1.8028											
Explain / Give a reason	Say why something is true, in words, linked to the maths or the context.	Make one clear point for each mark and connect it to the question, using 'because' or 'so'.	Explain why the trapezium rule gives an overestimate of $\int_0^1 e^x dx$. The curve is convex (it bends upwards), so the top of each trapezium lies above the curve.												
Interpret	Say what a value, parameter or result means in the real-life context.	Refer to the context and the units; don't just repeat the number.	The number of bacteria after t hours is modelled by $N = 200e^{0.03t}$. Interpret the value 200. It is the number of bacteria at the start, when $t = 0$.												
Evaluate	Either find the value of an expression (such as an integral or a sum), or, for a model, judge how well it fits the situation.	For a value, show the method and give the number. For a model, compare its predictions with the facts and give specific strengths or limitations.	Evaluate $\sum_{r=1}^{20} (3r + 2)$. An arithmetic series with first term 5 and last term 62: $\frac{20}{2} (5 + 62) = 670$.												
Estimate	Give an approximate value using a model, a graph, a regression line or an approximation method.	Show which method you used and comment on reliability if asked (interpolation or extrapolation, overestimate or underestimate).	Use the regression line $y = 4.2 + 0.85x$ to estimate y when $x = 30$. $4.2 + 0.85 \times 30 = 29.7$. If 30 lies within the range of the data, this is interpolation, so it is fairly reliable.												
Express / Write in the form	Rearrange into exactly the form given and find the constants.	Match your working to the given form and state each constant, meeting	Express $3 \cos \theta + 4 \sin \theta$ in the form $R \cos(\theta - \alpha)$, $R > 0$, $0 < \alpha < 90^\circ$. $R \cos \alpha = 3$, $R \sin \alpha = 4$, so $R = 5$ and $\tan \alpha = \frac{4}{3}$, giving $\alpha = 53.1^\circ$.												

Word	What it means	How to answer	Example
		any conditions (such as $R > 0$).	
Deduce	Use a result you have already found to reach a new one with little extra work.	Say which earlier result you are using and show the short step that follows from it.	The curve $y = f(x)$ has a minimum point at $(3, 2)$. Deduce the minimum point of $y = f(x + 1) - 4$. Move left 1 and down 4: $(2, -2)$.
Comment on / Describe	Make a relevant observation about data, a result or a model, backed by the numbers.	Say what the evidence shows in context. In statistics, use the correct words (positive or negative correlation, skew, location, spread).	The product moment correlation coefficient between daily hours of sunshine and daily maximum temperature is 0.62. Comment on this. There is positive correlation: days with more sunshine tended to be warmer.
Test	Carry out a full hypothesis test at the stated significance level.	Write the hypotheses in terms of the parameter, state the distribution under H_0 , find the probability or critical region, compare with the significance level, and conclude in context.	A spinner should land on red with probability 0.5. In 20 spins it lands on red 15 times. Test, at the 5% level of significance, whether the spinner is biased towards red. $H_0 : p = 0.5$, $H_1 : p > 0.5$, $X \sim B(20, 0.5)$, $P(X \geq 15) = 0.0207 < 0.05$, so reject H_0 : there is evidence that the spinner is biased towards red.
Use / Using (algebra, calculus, the substitution ...)	The question names the method you must use. Answers found another way, such as by calculator, trial and improvement or reading a graph, can score nothing.	Show the named method clearly, step by step, even if you check the answer another way.	Use algebra to solve $\frac{3}{x} = x - 2$. $x^2 - 2x - 3 = 0$, so $(x - 3)(x + 1) = 0$, giving $x = 3$ or $x = -1$.

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