MME.

A Level Maths Exam Tips

Mathematical Modelling

A mathematical model is a description of a real-life situation using maths. Generally, you are expected to reduce the situation to a set of equations that you then solve.

Models usually rely on assumptions. These are things that we have claimed to be true about a situation to make the maths easier. Common assumptions include things such as there being no air resistance in mechanics problems, or no limit on population growth – as these things are unlikely to affect the outcome of the model too substantially compared to real life.

Sometimes, you will be presented with a model and asked to IDENTIFY the assumptions that have been made.

Sometimes, you might be asked to criticise or improve a model. This will involve tweaking the model either to remove an assumption or to include new information.

Problem Solving

There are 5 steps to tackling a problem solving question.

1. Find out what the question is asking of you – this is particularly important for wordy questions, where the meaning could be made difficult to interpret by context-specific terms.
2. Gather information from the question – similarly, this will require some interpretation of the terms in the question.
3. Do the calculation(s) – Once you know your aim and have all of your information, you can do the maths to answer the question.
4. Interpret results – Put your results from the calculation(s) back into the context of the question.
5. Repeat (if needed) – Some problems have several steps, so you need to do this over and over again until the whole problem is solved.

Formula Booklet

You are given a formula booklet, so you don't need to memorise its contents. However, it is important to be familiar with its contents so that you know how to use it effectively.

Calculations

When doing calculations, make sure you give your answer in a sensible form – in particular, if your answer is a decimal you should make sure you give it to an appropriate number of decimal places. Sometimes the question will direct you on this, other times you must use your own initiative.

Don't round until the end of the question, however. To store really long decimals, you can use the store function on your calculator.

You can check your answer to a question by doing the calculations backwards and making sure you get back to the right numbers.

Do You Have the Right Calculator?

You MUST have a calculator that can perform iterative formulae (usually any calculator with an ANS button can) and compute summary statistics and probabilities from the binomial and normal distributions. You MUST NOT have a calculator that can manipulate algebra, do symbolic differentiation or integration, or have common formulas pre-stored in them (even if these formulas are in the formula booklet!). If you are not sure if your calculator is suitable, check with the exam board.

Once you have a suitable calculator, it is vital that you familiarise yourself with it before the exam, particularly how to do iterative formulae, summary statistics and probabilities from statistical distributions – these are relatively complicated tasks and every calculator will perform them in a different way.

Key Terms

Below is a list of terms that come up in questions over and over again.

Term	Meaning
Find / Calculate / Determine	These are general terms – just that you need to answer the question. Make sure to show your working.
Solve	Find the value(s) of the missing variable(s) in the equation.
State / Write down	No working – just write down what the question asks for.
Show that	You have been given the "answer" and you have to show that it is the answer.
Explain	This requires a little more words than just showing your working – you have to say why you do each step.
Prove	You need a logical argument for why something is true.
Sketch	Draw a diagram – not necessarily to scale but it should include all of the mathematical ideas the question concerns.
Plot	ACCURATELY mark points or ACCURATELY draw a line of best fit.
Verify	Show that the solution you are given is a solution – but not by working out the solution. Usually this means substituting the solution into an equation rather than solving the equation.
Hence	Use previous parts of the question to answer the question.
Hence, or otherwise	You could use previous parts of the question to answer the question – however another way to solve it exists, and both ways will get full marks.
Exact	This means do not round your answer. Often, this could involve presenting an answer as an expression that contains π, e, or a surd.

Exam Structure

The structure of exams varies depending on the exam board, but in all exam boards, there are three exams, each of which is worth 100 marks, lasts 2 hours, and makes up a third of the qualification.

AQA:

Paper 1 – Pure Mathematics
Covers: Proof, Algebra and Functions, Coordinate Geometry, Sequences and Series, Trigonometry, Exponentials and Logarithms, Differentiation, Integration, Numerical Methods

Paper 2 – Pure Mathematics and Mechanics
Covers: Proof, Algebra and Functions, Coordinate Geometry, Sequences and Series, Trigonometry, Exponentials and Logarithms, Differentiation, Integration, Numerical Methods, Vectors, Kinematics, Forces and Newton's Laws, Moments

Paper 3 – Pure Mathematics and Statistics
Covers: Proof, Algebra and Functions, Coordinate Geometry, Sequences and Series, Trigonometry, Exponentials and Logarithms, Differentiation, Integration, Numerical Methods, Data Presentation and Interpretation, Probability, Statistical Distributions, Hypothesis Testing, Correlation and Regression

OCR:

Paper 1 – Pure Mathematics
Covers: Proof, Algebra and Functions, Coordinate Geometry, Sequences and Series, Trigonometry, Exponentials and Logarithms, Differentiation, Integration, Numerical Methods, Vectors

Paper 2 – Pure Mathematics and Statistics
Covers: Proof, Algebra and Functions, Coordinate Geometry, Sequences and Series, Trigonometry, Exponentials and Logarithms, Differentiation, Integration, Numerical Methods, Vectors, Data Presentation and Interpretation, Probability, Statistical Distributions, Hypothesis Testing, Correlation and Regression

Paper 3 – Pure Mathematics and Mechanics
Covers: Proof, Algebra and Functions, Coordinate Geometry, Sequences and Series, Trigonometry, Exponentials and Logarithms, Differentiation, Integration, Numerical Methods, Vectors, Kinematics, Forces and Newton's Laws, Moments

Edexcel:

Paper 1 – Pure Mathematics 1
Covers: Proof, Algebra and Functions, Coordinate Geometry, Sequences and Series, Trigonometry, Exponentials and Logarithms, Differentiation, Integration, Numerical Methods, Vectors

Paper 2 – Pure Mathematics 2
Covers: Proof, Algebra and Functions, Coordinate Geometry, Sequences and Series, Trigonometry, Exponentials and Logarithms, Differentiation, Integration, Numerical Methods, Vectors

Paper 3 – Statistics and Mechanics
Covers: Data Presentation and Interpretation, Probability, Statistical Distributions, Hypothesis Testing, Correlation and Regression, Kinematics, Forces and Newton's Laws, Moments

Large Data Set

The large data set is a spreadsheet containing data tables pertaining to a specific topic. You should be introduced to this during the A-level course. By the exam, you should be familiar with the context and trends of the data set and be able to produce summary statistics and statistical diagrams based on the whole data set and samples of the data set.

The large data sets for each exam board pertain to:

AQA – Vehicular emissions
OCR – How people travel to work
Edexcel – Weather conditions

Time Management

The number of marks for a question tells you roughly how long to spend on a question. Each 2 hour paper contains 100 marks, so you want to spend 6 minutes on every 5 marks. For example, if a question is worth 10 marks, it should take you around 10 minutes.

You don't have to do the paper in order, so if a question is stumping you or you fear wasting time on it, come back to it once you have done other questions.

Finally, when doing indefinite integrals...

Don't forget $+c$