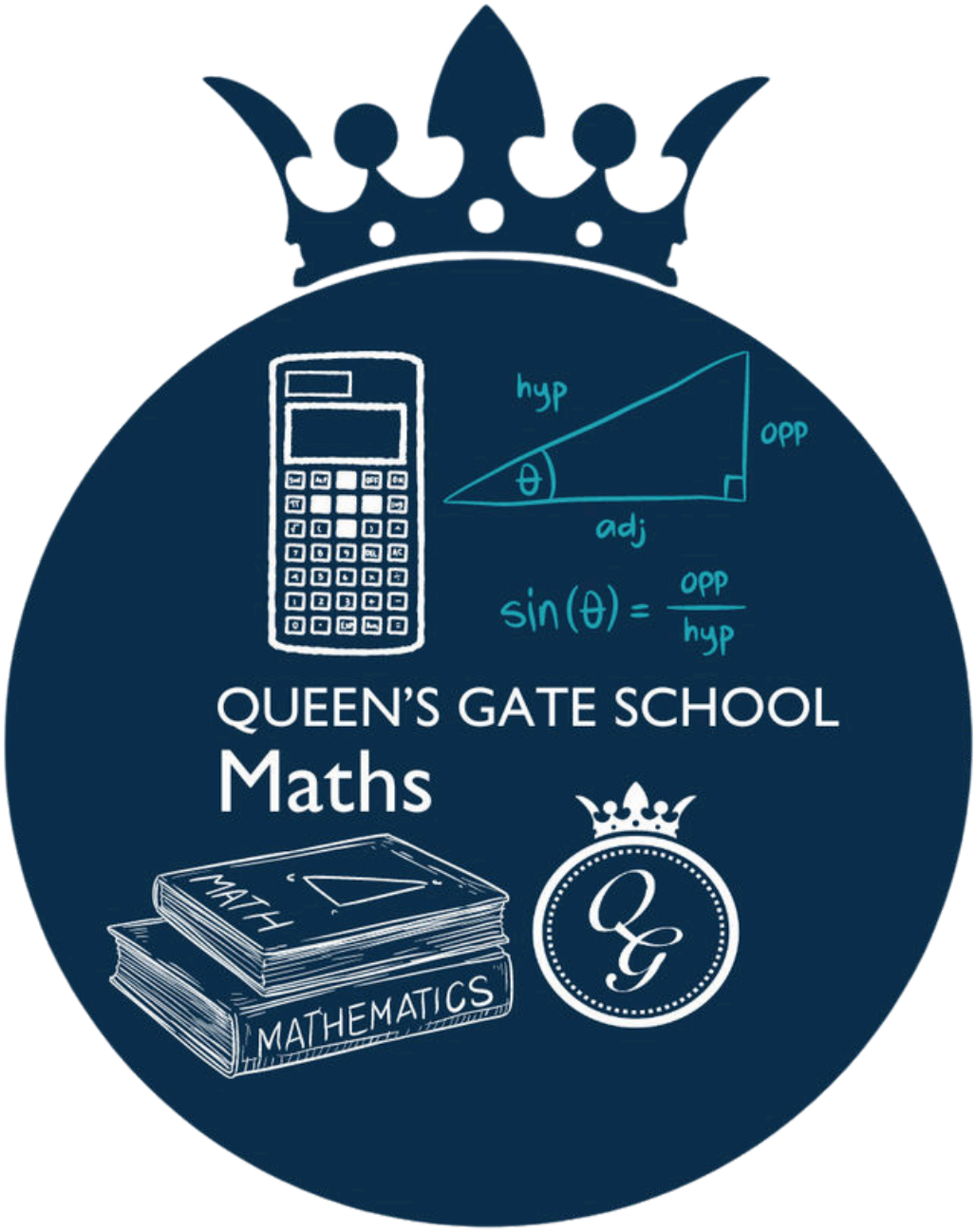
QUEEN'S GATE SCHOOL

MATHEMATICS

A-LEVEL GUIDE



WHY STUDY A LEVEL MATHEMATICS?

Mathematics is a gateway to a wide variety of university courses and careers, including economics and business management, computing, engineering, architecture, all scientific disciplines (especially Physics and Chemistry) and of course, higher studies in Mathematics. The logical skills developed may also be helpful for degrees such as Law, while the Statistics modules are relevant to subjects like sociology and psychology, or any other discipline where data is gathered and processed to support conclusions, for example pharmaceutics or medicine.

Mathematics is enjoyable for many students and may provide a welcome break from subjects which involve a lot of essay writing. It stimulates intellectual curiosity and underpins much of our modern understanding of the world around us, as well as being essential to the development of modern technology.

ENTRY REQUIREMENTS

We do not have specific entrance requirements for A Level Mathematics, but we would recommend that prospective students have achieved grade 6 or better at (I)GCSE. The following table is based on data shared by the examination board and shows typical grades achieved at A Level, given a student's grade at (I)GCSE.

Grade at (I)GCSE	Typical A level grade
High 9	A*
High 8 to Low 9	A
Low 8	C
7	D
6	E
High 5	U

Of course, we give our students all the support they need to fulfil their potential and achieve the highest possible grades. However, A Level Mathematics is a challenging course and prospective students should have realistic expectations and be prepared to work hard to achieve their goals.

KEY IDEAS AND SKILLS FOR A LEVEL MATHEMATICS

There are three main components of A Level Mathematics: Pure Mathematics, Statistics and Mechanics. The final assessment consists of three 2 hour papers, each worth 100 marks. Calculators are allowed in all papers. The first two papers assess Pure Mathematics and the third is split into two Sections: Statistics (50 marks) and Mechanics (50 marks). The topics studied in each component are as follows:

Papers 1 & 2
Pure Mathematics · Topic 1: Proof · Topic 2: Algebra and functions · Topic 3: Coordinate geometry in the (x,y) plane · Topic 4: Sequences and Series · Topic 5: Trigonometry · Topic 6: Exponentials and Logarithms · Topic 7: Differentiation · Topic 8: Integration · Topic 9: Numerical Methods · Topic 10: Vectors
Paper 3
Statistics · Topic 1: Statistical sampling · Topic 2: Data Presentation and interpretation · Topic 3: Probability · Topic 4: Statistical distributions · Topic 5: Statistical hypothesis testing
Mechanics · Topic 6: Quantities and units in Mechanics · Topic 7: Kinematics · Topic 8: Forces and Newton's Laws · Topic 9: Moments

You will already have met many of these topics in your IGCSE Mathematics and Physics IGCSE courses (don't worry if you didn't study Physics at IGCSE – all material in the Mechanics component will be covered again from the beginning). All of these topics will be introduced in LVI and most will then be studied to a greater depth in UVI.

Theme 1: Mathematical argument, language and proof
· Construct and present mathematical arguments through the use of diagrams, sketching, graphs, logical deduction, precise statements involving correct use of symbols and mathematical language · Understand and use mathematical language and symbols, including language and symbols associated with set theory · Understand and use the definition of a function, including domain and range · Comprehend and critique mathematical arguments and proof (for example, spot errors in a solution); Justify methods and formulae

Theme 2: Mathematical Problem Solving

· Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved (identify the most appropriate methods for a given problem
· Construct extended arguments to solve problems presented in an unstructured form (eg worded problems), including problems in context
· Interpret and communicate solutions in the context of the original problem
· Understand that many mathematical problems cannot be solved analytically, but numerical methods permit solution to a required level of accuracy
· Evaluate, including by making reasoned estimates, the accuracy or limitations of solutions, including those obtained by numerical methods
· Understand the concept of a mathematical problem-solving cycle, including specifying the problem, collecting information, processing and representing information and interpreting results, which may identify the need to repeat the cycle
· Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics

Theme 3: Mathematical Modelling

· Translate a situation in context into a mathematical model, making simplifying assumptions
· Use a mathematical model with suitable inputs to engage with and explore situations
· Interpret the outputs of a mathematical model in the context of the original situation
· Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate
· Understand and use modelling assumptions