

# Mathematics

## Entry Requirements:

Grade 7 or above in GCSE Mathematics (Students who achieved a very high grade 6 may be considered on a case by case basis at the discretion of the Head of Maths).

## Course Content:

AS and A level mathematics builds from GCSE level mathematics and introduces calculus and its applications. It emphasises how mathematical ideas are interconnected, and how mathematics can be applied to model situations mathematically using algebra and other representations, to help make sense of data, to understand the physical world and to solve problems in a variety of contexts, including social sciences and business. It prepares students for further study and employment in a wide range of disciplines involving the use of mathematics.

A Level Mathematics consists of the following topics:

- Proof
- Algebra and functions
- Coordinate geometry in the (x,y) plane
- Sequences and series
- Trigonometry
- Exponentials and logarithms
- Differentiation
- Integration
- Numerical methods
- Vectors
- Statistical sampling
- Data presentation and interpretation
- Probability
- Statistical distributions
- Statistical hypothesis testing
- Quantities and units in mechanics
- Kinematics
- Forces and Newton's laws
- Moments

## Aims of the Course:

A level mathematics will encourage students to:

- Understand mathematics and mathematical processes in a way that promotes confidence, fosters enjoyment and provides a strong foundation for progress to further study
- Extend their range of mathematical skills and techniques
- Understand coherence and progression in mathematics and how different areas of mathematics are connected
- Apply mathematics in other fields of study and be aware of the relevance of mathematics to the world of work and to situations in society in general

- Use their mathematical knowledge to make logical and reasoned decisions in solving problems both within pure mathematics and in a variety of contexts, and communicate the mathematical rationale for these decisions clearly
- Reason logically and recognise incorrect reasoning
- Generalise mathematically
- Construct mathematical proofs
- Use their mathematical skills and techniques to solve challenging problems which require them to decide on the solution strategy
- Recognise when mathematics can be used to analyse and solve a problem in context
- Represent situations mathematically and understand the relationship between problems in context and mathematical models that may be applied to solve them
- Draw diagrams and sketch graphs to help explore mathematical situations and interpret solutions
- Make deductions and inferences and draw conclusions by using mathematical reasoning
- Interpret solutions and communicate their interpretation effectively in the context of the problem
- Read and comprehend mathematical arguments, including justifications of methods and formulae, and communicate their understanding
- Read and comprehend articles concerning applications of mathematics and communicate their understanding
- Use technology such as calculators and computers effectively and recognise when such use may be inappropriate
- Take increasing responsibility for their own learning and the evaluation of their own mathematical development

### **Teaching and Learning Methods:**

A variety of methods are employed, including group and pair work, independent study and note-taking. Students are expected to do a significant amount of independent consolidation of topics taught, although there will always be extra support available for those who need it.

### **Skills and Commitment:**

The ability to work independently is essential as students must consolidate topics learnt. Students must be prepared to attempt unfamiliar problems. A basic grounding of Higher tier GCSE Mathematics is important, and students who feel they need additional practice can always ask for extra worksheets and resources to help them with any areas of weakness before the commencement of the course.

**Cost:**

Students will be required to purchase two textbooks and a calculator. The textbooks are available to purchase from the school, the cost will be £20 at the start of the year, and when the books are returned in good condition, we will give the student £10 back. The calculators (Casio fx991-EX Classwiz) will need to be purchased separately and are quite expensive, but we do have some in school that we can lend to students until they have the funds to purchase their own.

**Progression:**

Mathematics is a highly valued qualification by all universities. It goes well with any combination of subjects, and may be of particular use to students considering reading medicine, sciences, computing, economics, social sciences, psychology and any other numerate subject at university.

**School Contact:**

For further information please contact Mr S Evans (Head of Mathematics) or Miss J Lear (Key Stage 5 Maths Coordinator)