mathematics

A Level

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What is this subject about?

A Level Mathematics builds on the skills and knowledge developed at GCSE level. It emphasises how mathematical ideas are interconnected and how mathematics can be applied to model situations mathematically using algebra, to help make sense of data, to understand the physical world and to solve problems in a variety of real life contexts. It prepares students for further study and employment in a wide range of disciplines involving the use of mathematics.

A major part of the course is Pure Maths, which is the study of mathematical ideas and methods for their own sake and to give a 'toolkit' for solving mathematical problems. All Pure Maths is expressed in terms of algebra. Students will also study both statistics and mechanics as part of their A Level.

Statistics involves learning how to draw conclusions from data. It is very different from Statistics at GCSE and the focus is on probability and hypothesis testing, looking at whether or not apparent patterns in certain types of situation could be the result merely of chance and random variation, or whether the pattern in the data is unlikely to have arisen in this way.

Studying mechanics allows us to understand the physical world and to work out how objects move when forces such as gravity act on them.

What will I study over the two years?

In the first year you will cover topics in Pure Maths, Statistics and Mechanics. In Pure Maths you will study a wide range of topics including differentiation, trigonometry and vectors. In Statistics you will learn about sampling and probability and hypothesis testing, and in Mechanics you will learn about kinematics (displacement, velocity and acceleration).

In the second year you will develop your mathematical problem solving skills and algebraic skills further and you will study the Pure Maths topics in greater depth. In Statistics you will learn about probability distributions and in Mechanics you will learn about moments and friction.

How is the course assessed?

Assessment is by three written exam papers, each 2 hours long. All 3 papers are calculator papers.

What skills will I develop in this course?

There is a strong emphasis on developing skills in logical reasoning and problem solving and you will be solving problems by reasoning clearly in a step-by- step, logical way using algebra. You will learn how to represent situations mathematically and then to find solutions to them. In Statistics you will spend time interpreting and investigating real data and drawing conclusions from it. In Mechanics you will study how objects move under the influence of gravity and you will learn about forces and Newton's laws.

What can the course lead to in terms of higher education and future careers?

A Level Mathematics is required for most university courses in Mathematics, Physics, Chemistry (straight Chemistry degrees), Engineering, Architecture (many courses but not all), Economics (the more mathematical courses), Management Science (some courses) and Computer Science (but not IT more broadly).

A Level Maths provides a helpful background for the mathematical parts of university courses in Biological and Environmental Sciences, Business Studies (at least on some of the more mathematical courses) and Psychology (because of its Statistics content). Students who have not taken Maths beyond GCSE often struggle with the mathematical parts of these courses.

What are the formal entry requirements for A Level Mathematics?

In addition to the College's general entry criteria, you will need to achieve a minimum of:

- Grade 6 in GCSE Maths

We would also ideally expect you to have averaged at least a grade 6 in your GCSEs overall. A Level Mathematics is a strongly theory based course that is assessed by exams and builds directly on GCSE work in the subject. You are most likely to succeed if you have an appropriate base of knowledge and a good track-record of success in exam based courses at GCSE overall.

Which aspects of GCSE Mathematics are important for the A Level Course?

Fluency in algebra is vital for success on this course. It is easy to underestimate this. Can you...

- Solve equations, including simultaneous and quadratic equations (factorising and the formula)?
- Rearrange formulae?
- Work with fractions and negative numbers without a calculator (absolutely essential)?
- Solve problems – for example using trigonometry?
- Draw graphs of functions from their equations without calculating values point by point?

What extra support/enrichment activities are on offer?

The department runs daily 'clinics' during lunchtimes. The purpose of these is to provide a place for students to discuss problems with homework and get some individual help. In the College's Wider Skills Week students explore cryptography (codes and codebreaking, with a visit to Bletchley Park). There is also the opportunity to learn to play Bridge.

Subject combination advice:

In order to enable progression to university courses with a high mathematical content, A Level Mathematics can be a particularly important complement to A Level Physics and Chemistry and also to A Levels in Economics and Biology. However Mathematics is an interesting, stimulating and valuable subject in its own right and there is no need to take any of these subjects alongside it.

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