MATHEMATICS

At the Grange we offer the following Sixth Form mathematics options:

Mathematics – single option choice leading to A level Mathematics

Further Mathematics – double option choice leading to A level Mathematics and A level Further Mathematics

Before deciding which the right choice is for you, make sure you read all three sections in this booklet.

MATHEMATICS

Course content

Whilst the A Level Mathematics course builds on the knowledge gained when studying GCSE, the emphasis is different. Algebra still has a central place, as this is the language in which the subject is expressed, but more importance than before is attached to being able to produce clearly reasoned arguments. You will build up a toolkit of mathematical methods, and you will learn how to become an effective problem-solver. You will make much greater use of technology to explore concepts, to exploit links between graphs and the underlying algebra, and to process data. There will be a greater focus on doing mathematics in the context of real-world problems.

In common with all A Level syllabuses, two thirds of the Edexcel specification is pure mathematics and the remainder applied.

Pure mathematics is the study of mathematical methods for their own sake, and you will gain a grounding in topics such as algebra, calculus (the study of gradients and areas under curves), numerical methods, trigonometry, vector geometry and differential equations. In applied mathematics, you put the techniques you have learnt to use in modelling real life situations: in mechanics you study forces and motion, and in statistics how to use mathematical rules to simplify complex probability calculations and how to analyse sets of data and draw reliable conclusions. The course is linear, leading to examinations at the end of the U6.

Assessment

Assessment is by three equally weighted written components:

Paper 1:	(2 hrs)	Pure Mathematics 1
Paper 2:	(2 hrs)	Pure Mathematics 2
Paper 3:	(2 hrs)	Section A: Statistics Section B: Mechanics

Why study Mathematics?

Above all, we hope that you will choose to do mathematics in the sixth form because you enjoy it. Mathematics fits well with almost any other combination of subjects. It is a useful back up to the sciences, and adds breadth to arts subjects. Many of skills you need are surprisingly similar to those used in, for example, learning a language or analysing a philosophical argument. An A Level qualification in mathematics is highly regarded by universities and employers as it gives evidence that you are at home with numbers and are a logical thinker.

A Level Mathematics is an essential requirement not just for further study in mathematics but for most degree courses in physics and engineering, and for some economics, architecture and computing courses.

Is A Level Mathematics right for me?

As with all A Level subjects at The Grange, our entrance requirement is a minimum of Grade 7 in IGCSE or GCSE Mathematics. It goes without saying that we will do everything we can to help you to achieve the best A Level grade of which you are capable, but it is important to be aware that a student without a Grade 8 or above is likely to find the course very challenging. We would therefore strongly encourage you to do everything you can to achieve as high an IGCSE/GCSE mark as possible.

Your IGCSE/GCSE grade in itself is not a guarantee of A Level success, you also need to seek the advice of your current teacher; they are in the best position to judge whether continuing beyond GCSE is a sensible choice for you and to give you guidance on your likely A Level prospects.

FURTHER MATHEMATICS

Course content

Further Mathematics A Level is offered in conjunction with Mathematics. This combination forms two of your four option choices.

What the Further Mathematics course is not, is simply more mathematics at a similar level to the single subject A Level. Having gained a working knowledge of the essentials, you go on to study pure mathematics in much greater depth. You will learn advanced techniques in areas such as integration and matrix theory which are fundamental to physics and engineering at degree level and beyond.

You will look at a wide variety of mathematical applications, from how to model the behaviour of elastic strings and springs to the theory behind linear regression. More time will be spent in proving results and you will learn to think creatively and to look for elegance. The interconnectedness of seemingly unrelated topics, which is one of the things that gives mathematics its beauty, will start to become much more apparent.

Assessment

At The Grange, throughout the two years you are taught completely separately from single subject mathematicians. You will work towards the equivalent of a full A Level in Mathematics in the L6, before tackling the Further Mathematics course in the U6. The Further Mathematics course is 50% Pure, 25% Mechanics and 25% Statistics.

At the end of U6, in addition to your A Level Mathematics papers, you will sit four equally weighted papers of 1 hour 30 minutes. Two of the papers will examine the pure content, one mechanics and one statistics.

Why study Further Mathematics?

Many students take Further Mathematics simply because they enjoy mathematics for its own sake and thrive on intellectual challenge. It is quite usual for Further Mathematicians to complete full A levels in all four of their subjects, so choosing it need not restrict the breadth of your Sixth Form studies in any way. It is also possible to drop one of your two non-maths options at the beginning of the U6.

You will want to take Further Mathematics if you are considering a degree course in mathematics or a closely related subject. Not only will some universities expect you to have taken it given that it is offered at The Grange, but, unlike single subject Mathematics, it will give you a realistic flavour of what mathematics at university entails.

If you hope to read physics or the physical branches of engineering at universities such as Oxford, Cambridge and Imperial College, studying Further Mathematics will improve your chances of gaining a place. Further Mathematics (as one of four A Levels) is also either essential or strongly preferred for some of the most competitive economics courses, such as that at LSE. If you have a particular direction in mind at this stage, check the specific course requirements.

Is Further Mathematics the right choice?

The pace in the Further Mathematics set is fast and you will need to reach A Level standard by the end of the L6. In addition to the requirements for single subject Mathematics, you must be capable of picking up ideas quickly and of thinking on your feet. Discussing your suitability with your current teacher is therefore crucial.

You do not need to have studied any additional mathematics qualifications beyond IGCSE/ GCSE Mathematics.
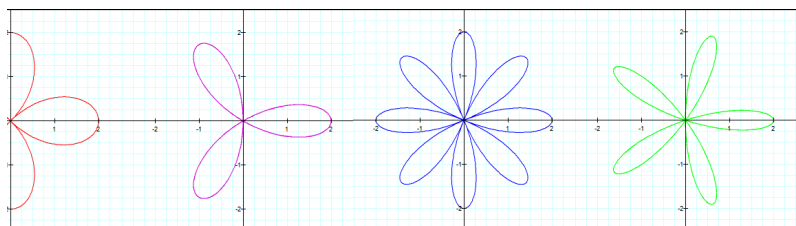
Mathematics - a student view

What's doing Sixth Form Maths at The Grange really like? The best way to find out is to talk to our sixth formers yourself – but here's what they had to say when we asked them.

The best thing about studying A Level Maths is...

- Rewarding when you finally get the right answer after lots of working
- Get shown lots about how things work not just what they are
- Learning about the principles which relate maths to the outside world in Mechanics and Statistics
- Problem-solving
- Good lessons with a relaxed feel. I like the small class sizes so the teacher can go through the work with you in more detail.
- Teachers explain things well and give help if you need it
- Quality of the lessons
- Finish the course with time to spare and have lots of really structured past paper practice
- Work is well structured so it is easy to look back and revise
- Gives you a head start in A Level Physics and Chemistry
- Not having to write much and no essays!
- The calculators are better than my phone

One thing I wish I'd known before I started the course...

- GCSE and A level are a whole different ball game so it requires a lot of work from the start of the L6
- I was aware that there was a jump, but didn't expect it to be this big a step up
- Make sure you ask questions if you don't understand.
- The amount of homework

And what the Further Mathematicians wish they'd known:

- Half my day is maths (Not sure why that one was a surprise as two options out of four equals half of your lesson time...)
- How quickly the syllabus has to be covered
- How many frees I'd have (the answer is 8)
- You need to be very organised as you don't have many frees to do homework
- Everyone doing normal maths is going to ask you to help with homework!

Extension Opportunities

Being a Sixth Form mathematician is not solely about examination preparation: you will also have opportunities to take part in competitions, go on study visits, and work with younger pupils.

We run weekly "Preparation for University Maths" sessions for anyone taking university admissions tests in Mathematics, or simply wishing to challenge themselves well beyond A Level.

And so to University...

Our Sixth Form mathematicians regularly go on to read Mathematics and related disciplines at top universities, including Cambridge, Oxford, Warwick, Imperial College, Manchester, Bath and Durham. Two former students have recently completed DPhil degrees in Mathematics at Oxford.