Further Mathematics A-Level

Welcome to the further mathematics A-level course. We follow the AQA specification (7367). The course in Year 12 will be taught by Mr Gerrard and Mrs Grigg.

What is further mathematics?

Further mathematics is an additional A-level qualification taken alongside an A-level mathematics course. It is designed to stretch and challenge the most able mathematicians and prepare them for university courses in mathematics and related quantitative and scientific subjects.

Further mathematics A-level is very difficult and we highly recommend taking a fourth subject in case you find it too difficult.

What is covered in A-level further mathematics?

- pure mathematics content, making up at least 50% of the qualification

The remainder of the content is made up of options which include:

- additional pure mathematics
- additional mechanics
- discrete / decision mathematics

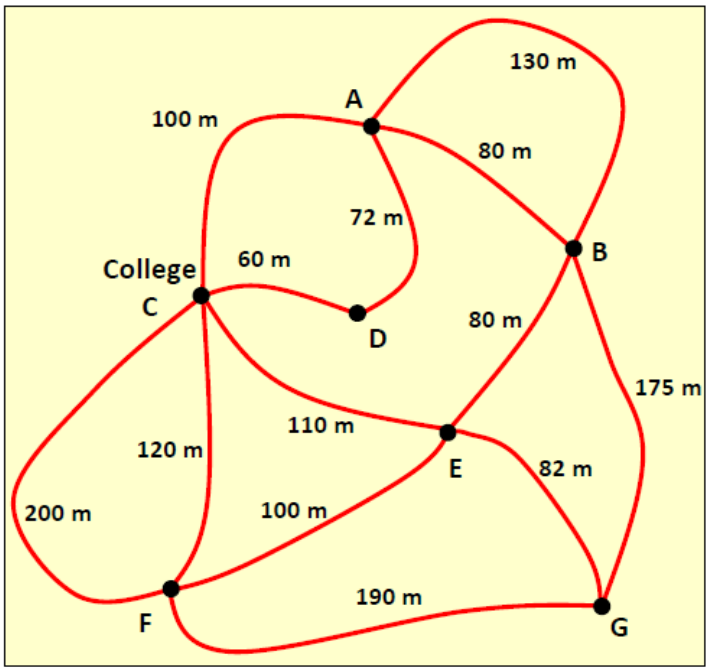
Two examples of important further pure topics are complex numbers and matrices.

Matrices are arrays of numbers such as $\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$.

They can be used to solve sets of simultaneous equations and to represent transformations. Complex numbers are based on the 'imaginary' number $\sqrt{-1}$. They lead to the study of lots of new areas of mathematics.

One area of discrete mathematics is graph theory, which includes solving problems such as:

What would be the most efficient route for delivering post around a network of streets? This topic uses algorithms which are vital in computer science.



You will need to purchase textbooks for Year 12 and Year 13. You will be able to buy these from the school for about £20 per book. There will be four textbooks to buy that cover the two years. Two pure maths books, one mechanics and one discrete/decision book.

The calculator you buy for use in the mathematics A-level is suitable for further mathematics as well.

Please be aware that if you are eligible for a post 16 bursary then the cost of resources may be covered depending on family circumstances – please ask in the sixth form office for an application/claim form.

At the end of the course you will sit three papers.

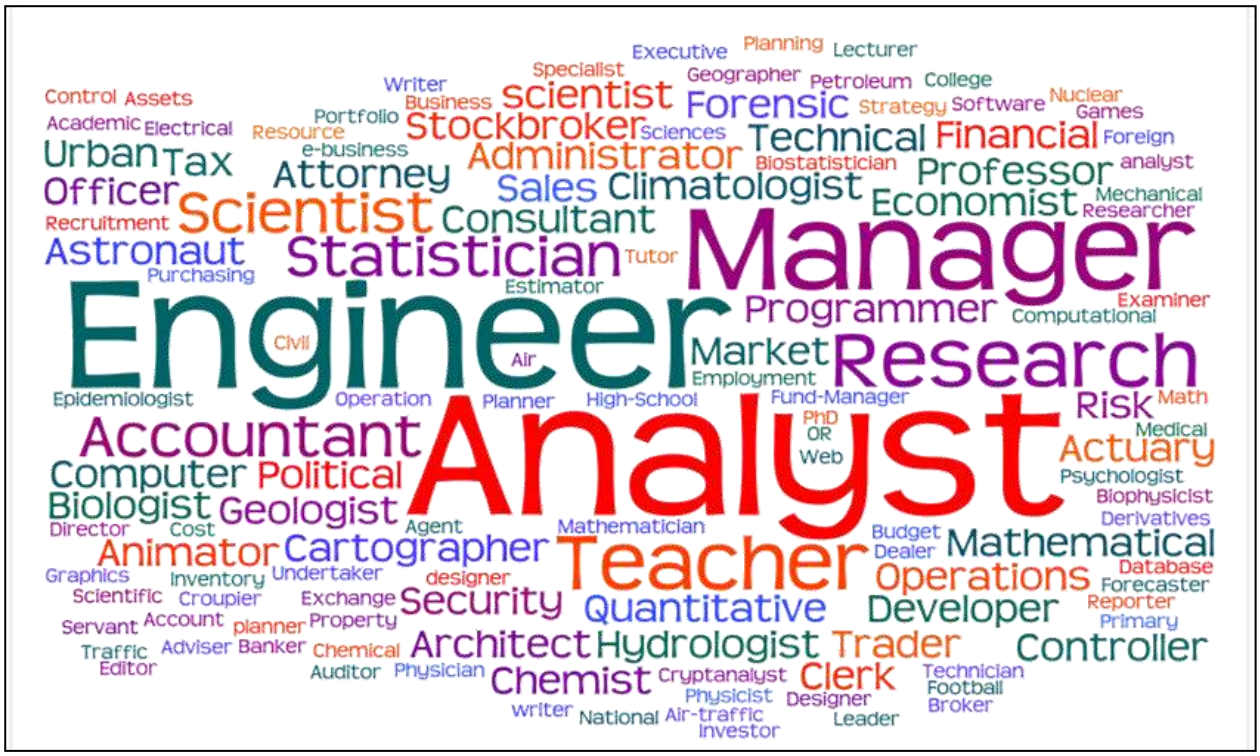
Why study further mathematics?

Studying mathematics and further mathematics will:

- provide a stimulating and challenging course
- develop key employability skills such as problem-solving, logical reasoning, communication and resilience
- increase knowledge and understanding of mathematical techniques and their applications
- support the study of other A-level subjects
- provide excellent preparation for a wide range of university courses
- lead to a versatile qualification that is well-respected by employers and higher education

If you are considering a career in mathematics or a maths based subject like engineering, you should seriously consider further mathematics.

What are the career opportunities?



How can I be successful in A-level further mathematics?

- be actively involved in managing the learning process, the mathematics and your study time
- take responsibility for studying, recognising what you do and don't know and ask for help with what you don't know
- **attend every lesson and make complete notes**. Test questions are based on material and examples covered in class as well as those in your textbooks. If you miss a lesson you will be expected to catch up with the work missed before the next lesson, if possible.
- **be an active participant in the classroom**. Get ahead in the book; try to work some of the problems before they are covered in class. Anticipate what the teacher's next step will be.
- **ask questions in class!** There are usually other students wanting to know the answers to the same questions you have.
- **ask questions outside the class**. Your teacher will be pleased to see that you are interested and you will be actively helping yourself.
- **take responsibility for keeping up with the homework**. Make sure you find out how to do it.
- **you will need to spend more time studying per week** – you do more of the learning outside of class than in. Good study habits throughout each term make it easier to revise for tests.

Studying mathematics is different from studying other subjects. Mathematics is learned by *doing* problems. Attempt each homework set. The problems help you learn the formulas and techniques you do need to know, as well as improve your problem-solving prowess.

A word of warning

Each lesson builds upon the previous ones throughout the course. You must keep up with the work set. Attend lessons, read the examples given in your textbooks and do all homework. Falling a day behind puts you at a disadvantage. Falling a week behind puts you in deep trouble!

A word of encouragement

You are always reviewing previous work as you cover new material. Studying further mathematics will help your understanding of A-level mathematics as you will be using the methods learnt there for further work. Many of the ideas link together. Identifying and learning the key concepts means you do not have to memorise as much.

Mathematics at Key Stage 5 is different from mathematics at Key Stage 4

Mathematics classes at Key Stage 5 meet more frequently than those at Key Stage 4. Material is covered at a faster rate and you are expected to absorb new material much more quickly. Tests will be more frequent and more specific. Take responsibility for keeping up with the homework. Make sure *you* find out how to do it. You will need to spend *more* time studying per week – you do more of the learning *outside* of class than in. Tests may seem harder because they cover material in more depth.

Summer task

You are expected to read and complete the booklet of further mathematics problems. This should be handed into Dr Stangoe in G1 on your first day in September. You should be able to complete all the questions in the booklet for the A-level mathematics course.