

# Further Mathematics

## A Level Further Mathematics in Year 12/13

### Course Description:

The AQA A Level Further Mathematics courses enable you to deepen your mathematical understanding, particularly through the further pure mathematics. The course also widens your mathematical understanding by studying in greater depth the applied mathematics. Although challenging, students taking further mathematics find it to be an enjoyable, rewarding, stimulating and empowering experience.

The course consists of three areas of mathematics, Further, Pure and two applied options of Statistics and Mechanics.

At its highest A Level Further Mathematics presents a substantial quantity of mathematics that is taught in the first year of a university course.

### Qualifications Required:

As well as the minimum two year course requirements students must have achieved a Grade 8 or better (ideally at least 75 per cent). You must also continue to study your two other A Level/BTEC courses to gain four level 3 qualifications overall at the end of Year 13. The AQA specification recommends that students have the skills and knowledge associated with the Level 2 Certificate in Further Mathematics or equivalent although many students starting the A Level at Mark Rutherford do not have this qualification. However, you should have a real enjoyment of the subject and a clear aptitude for mathematics. In particular, you need to be very confident with the problem solving aspect and the algebra content of the GCSE course.

### Aims of the Course:

- To develop your understanding of mathematics and mathematical processes
- To develop your ability to reason logically, to generalise, to construct mathematical proofs and produce clear and concise solutions to questions
- To extend your range of mathematical skills and techniques and use them in more difficult, unstructured problems
- To develop an understanding of coherence and progression in mathematics and of how different areas of mathematics can be connected
- To recognise how a situation may be represented mathematically and understand the relationship between 'real world' problems and standard and other mathematical models and how these can be refined and improved
- To read and comprehend written mathematics and use mathematics as an effective means of communication
- To show perseverance in answering challenging problems which may require several visitations before a solution is found
- To develop an awareness of the relevance of mathematics to other fields of study, to the world of work and to society in general

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### Future Prospects:

You can progress on to: Mathematics degree courses, degrees with significant mathematical content such as Physics, Engineering, Economics and a wide range of careers which require a numerate background.

### Student Feedback:

'I find this subject fascinating as it gives me the opportunity to explore mathematical concepts in greater depth. Your abilities are stretched, but it is more than worth it.'

### Features of the Course:

- Plan and interpret information from different sources
- Carry out multi-stage calculations and be able to form extended lines of reasoning
- Present findings, explain results and justify choice of methods
- Spiritual, moral, ethical social and cultural issues relating to mathematics

#### AS Content

##### Further Pure

Complex Numbers, Four operations, Roots of Polynomials, Argand diagrams, Loci, Matrices and Transformations, Determinants and Inverses in 2D, Invariant points and lines, Functions and Algebra, Calculus with Volumes of Revolution, Vectors, Scalar and Vector Product, Polar Coordinates, Hyperbolic Function Definitions

The two taught applied options.

##### Statistics

Introduction to Discrete and Continuous Random Variables and Expectation, Poisson Distribution, Type I and Type II Errors, Chi tests for Association

##### Mechanics

Introduction to Dimensional Analysis, Momentum and Collisions, Work, Energy and Power, Circular motion

#### A Level Content

##### Further Pure

Proof by Induction, Complex Numbers, Matrices and Transformations, Solutions of Linear Equations, Determinants and Inverses in 3D, Eigenvalues and Eigenvectors, Maclaurin Series, Calculus, Polar Coordinates, Hyperbolic Functions, Differential Equations, Trigonometry, Coordinate Geometry, Numerical Methods

The two taught applied options.

##### Statistics

Discrete and Continuous Random Variables and Expectation, Poisson Distribution, Type I and Type II Errors, Chi tests for Association, Exponential Distribution, Inference

##### Mechanics

Momentum and Collisions, Work, Energy and Power, Circular motion, Centre of Mass and Moments

### Methods of Assessment:

A2 Course: There are three papers overall, two papers consisting of Further Pure, and the third paper consisting of two applied options. These areas are each assessed by a 2 hour written paper at the end of the course.