

Subject: Further Mathematics

Level: A Level Exam Board: Edexcel



Course Outline

The course will prepare students to progress into further education to follow courses particularly in mathematics, STEM (Science, Technology, Engineering and Mathematics), finance, economics, and other related subjects. The entry requirement is a Grade 8 or 9 in GCSE Mathematics. Students will study for their Mathematics A level in Year 12. Further Mathematics A Level will then be studied in Year 13.

What will I learn on this course?

The Edexcel Further Mathematics course includes compulsory core topics including Proof, Complex Numbers, Matrices, Further Algebra and Functions, Further Calculus, and Further Vectors, along with a choice of optional units from Further Pure, Further Statistics, Further Mechanics, or Decision Mathematics. The course builds on A-Level Mathematics which is studied in Year 12, focusing on advanced reasoning, modelling skills, and deepens understanding of concepts like differential equations and polar coordinates, preparing students for mathematically intensive university courses.

Who would be a successful student of mathematics?

A successful A-Level Further Mathematics student typically has a strong enjoyment of mathematics, has excelled at GCSE, possesses excellent algebraic and problem-solving skills, and enjoys abstract thinking and applying concepts to new situations.

Students should be prepared for a demanding workload and have a desire to deepen their understanding of mathematics, which is particularly beneficial for those pursuing STEM degrees and careers. Further Mathematics is a challenging course that requires significant time and commitment to the subject.

Career Opportunities

A Level Further Mathematics provides a strong foundation for university degrees and careers in highly analytical and data-driven fields, including engineering, computer science, finance, data science, actuarial work, and scientific research. It is also a pathway to professional roles such as software engineer, data analyst, accountant, and actuary, and can lead to university courses in medicine, dentistry, and architecture.

Further Mathematics has specific university and career benefits for students:

- **University Advantage:** Further Mathematics is often a requirement or strong recommendation for university degrees with a high mathematical content.
- **Employers Advanced Skills:** Develops advanced algebraic, analytical, and critical thinking skills crucial for solving complex problems.
- **Career Demand:** The skills developed are highly sought after in a growing number of data-driven roles, providing opportunities for financially rewarding career choices.

Course Structure

The mandatory core pure Mathematics course covers topics including complex numbers, matrices, and sequences. There are also optional modules in Applied Mathematics including mechanics, statistics, or decision mathematics.

Pure Mathematics (50% of the course)

The mandatory pure component covers a broad range of new topics that go deeper or broader than A Level Mathematics. The core pure Mathematics course includes:

- **Complex Numbers:** The study of numbers involving the imaginary unit i .
- **Matrices:** Operations with matrices and their applications.
- **Sequences and Series:** More advanced concepts of sequences and series.
- **Polynomials and 3D space:** Further work on polynomial equations and vectors in three dimensions.
- **Proof:** Rigorous mathematical proof and developing the structure of mathematical argument.

Optional Modules (50% of the course)

The remaining 50% of the course is comprised of optional modules, from which students select two. They can choose from optional modules that add breadth and depth to their studies, building on the A Level Mathematics foundation of Year 12.

- **Further Mechanics:** Focuses on topics like momentum, impulse, work, energy, power, and projectiles.
- **Further Statistics:** Includes topics such as the Binomial and Poisson distributions, continuous random variables, and hypothesis testing.
- **Decision Mathematics:** Covers algorithms, graphs, critical path analysis, and linear programming.
- **Further Pure Mathematics:** Extends topics from core pure Mathematics with more advanced concepts in calculus, differential equations, and hyperbolic functions.

Exam Structure

Further Mathematics is a linear qualification assessed via four externally-examined papers:

- two core pure mathematics papers (Paper 1 & Paper 2)
- two optional application papers (Paper 3 & Paper 4)

Students choose a pair of options for Papers 3 and 4, such as two Option 1 papers, two Option 2 papers, or a matched Option 1 and Option 2 paper.

Each paper is a 1 hour 30-minute written exam, worth 25% of the total qualification.