A Level in Further Mathematics

Entry criteria – achieve a grade 8 or 9 in the GCSE in Mathematics.

A Level in Further Mathematics consists of four externally examined papers. Students must complete all assessment in May/June in any single year.

Although these are yet to be finalised as we will choose the route that is most appropriate for the students on a year-by-year basis:

Paper 1 – Further Pure Mathematics - 25%, 1 hour 30 minutes

Content overview

Proof, Complex numbers, Matrices, Further algebra and functions, Further calculus, Further vectors.

Paper 2 – Further Pure Mathematics 2 - 25%, 1 hour 30 minutes

Content overview

Complex numbers, Further algebra and functions, Further calculus, Polar coordinates, Hyperbolic functions, Differential equations

Paper 3 – One of the following options - 25%, 1 hour 30 minutes

Content overview

3A: Further Pure Mathematics 3 - Further calculus, Further differential equations, Coordinate systems, Further vectors, Further numerical methods, Inequalities

3B: Further Statistics 1 - Linear regression, Statistical distributions (discrete), Statistical distributions (continuous), Correlation, Hypothesis testing, Chi squared tests

3C: Further Mechanics 1 - Momentum and impulse, Collisions, Centres of mass, Work and energy, Elastic strings and springs

3D: Decision Mathematics 1 - Algorithms and graph theory, Algorithms on graphs, Algorithms on graphs II, Critical path analysis, Linear programming

Paper 4 – One of the following options - 25%, 1 hour 30 minutes

4A: Further Pure Mathematics 4 - Groups, Further calculus, Further matrix algebra, Further complex numbers, Number theory, Further sequences and series

4B: Further Statistics 1 - Linear regression, Statistical distributions (discrete), Statistical distributions (continuous), Correlation, Hypothesis testing, Chi squared tests

4C: Further Statistics 2 - Probability distributions, Combinations of random variables, Estimation, Confidence intervals and tests using a normal distribution, Other hypothesis tests and confidence intervals, Other hypothesis tests and confidence intervals, Probability generating functions, Quality of tests and estimators

4D: Further Mechanics 1 - Momentum and impulse, Collisions, Centres of mass, Work and energy, Elastic strings and springs

4E: Further Mechanics 2 - Further kinematics, Further dynamics, Motion in a circle, Statics of rigid bodies, Elastic collisions in two dimensions

4F: Decision Mathematics 1 - Algorithms and graph theory, Algorithms on graphs, Algorithms on graphs II, Critical path analysis, Linear programming

4G: Decision Mathematics 2 - Transportation problems, Allocation (assignment) problems, Flows in networks, Dynamic programming, Game theory, Recurrence relations, Decision analysis

More details can be found at:

https://qualifications.pearson.com/content/dam/pdf/A%20Level/Mathematics/2017/specification-and-sample-assesment/a-level-l3-further-mathematics-specification.pdf

Qualification aims and objectives

The aims and objectives of this qualification are to enable students to:

• understand mathematics and mathematical processes in ways that promote confidence, foster enjoyment and provide a strong foundation for progress to further study

• extend their range of mathematical skills and techniques

• understand coherence and progression in mathematics and how different areas of mathematics are connected

• apply mathematics in other fields of study and be aware of the relevance of mathematics to the world of work and to situations in society in general

• use their mathematical knowledge to make logical and reasoned decisions in solving problems both within pure mathematics and in a variety of contexts, and communicate the mathematical rationale for these decisions clearly

• reason logically and recognise incorrect reasoning

• generalise mathematically

• construct mathematical proofs

• use their mathematical skills and techniques to solve challenging problems which require them to decide on the solution strategy

• recognise when mathematics can be used to analyse and solve a problem in context

• represent situations mathematically and understand the relationship between problems in context and mathematical models that may be applied to solve them

• draw diagrams and sketch graphs to help explore mathematical situations and interpret solutions

• make deductions and inferences and draw conclusions by using mathematical reasoning

• interpret solutions and communicate their interpretation effectively in the context of the problem

• read and comprehend mathematical arguments, including justifications of methods and formulae, and communicate their understanding

• read and comprehend articles concerning applications of mathematics and communicate their understanding

• use technology such as calculators and computers effectively, and recognise when such use may be inappropriate

• take increasing responsibility for their own learning and the evaluation of their own mathematical development