

MATHEMATICS AND FURTHER MATHEMATICS

Entry	Grade 7 in the Higher tier GCSE paper. Students wishing to study Further		
Requirement:	All potential students will be required to sit a test based on the GCSE syllabus and the summer work in the September registration week. A satisfactory standard must be achieved on this test to embark on the course.		

GCE Advanced Mathematics

Examination Board: PEARSON EDEXCEL 9MA0

Course Content and Assessment

The course will be examined by three papers, each 2 hours long.

Papers 1 and 2 will be assessing the Pure Mathematics content and Paper 3 will assess the Statistics and Mechanics parts of the course. All students will follow the same course content.

Paper 1: Pure Mathematics 1	Paper 2: Pure Mathematics 2		
Proof	Proof		
• Algebra and functions – indices and surds, quadratics,	• Algebra and functions – algebraic division, composite		
simultaneous equations, inequalities, functions	and inverse functions, partial fractions		
• Coordinate geometry in the (x, y) plane – straight	• Coordinate geometry in the (x, y) plane – parametric		
lines, the circle	equations		
• Sequences and series – binomial expansion	• Sequences and series – binomial expansion, sigma		
• Trigonometry – simple identities and equations	notation, arithmetic and geometric series		
Exponentials and logarithms	• Trigonometry – radian measure, exact values,		
• Differentiation – first and second derivatives, tangents	reciprocal ratios, further identities and equations		
and normals	• Differentiation – trigonometric functions, product and		
• Integration – definite and indefinite integration	quotient rules, parametric differentiation		
Vectors	• Integration – area under a curve, substitution and		
	integration by parts, simple first order DE		
	• Numerical methods – roots of an equation, iterative		
	methods, trapezium rule		
	• Vectors (in two or three dimensions)		
Paper 3: Statistics and Mechanics			
Section A: Statistics	Section B: Mechanics		
Statistical sampling	Quantities and units in Mechanics		
 Data presentation and interpretation 	Kinematics		
Correlation & regression	 Forces and Newton's laws 		
Probability	• Moments		
Statistical distributions	Projectiles		
Statistical hypothesis testing			

Assessment

All examinations are taken at the end of Year 13. The three papers are of equal weighting, each marked out of 100. Students must answer all the questions. Calculators can be used in all papers but there will be questions in which appropriate working must be shown to gain marks.

GCE Advanced Further Mathematics

Examination Board: PEARSON EDEXCEL 9FM0

Students who choose to take Further Mathematics will study both A Level Mathematics and A Level Further Mathematics. The course is designed so that the A Level Mathematics content is studied in Year 12 and the A Level Further Mathematics course is studied in Year 13. To ensure sufficient lesson time, the course runs across two of the option blocks. Students can therefore choose two further subjects from the remaining two option blocks.

Students who choose to study Further Mathematics will complete the Mathematics course, as described above in addition to the following Further Mathematics content.

Paper 1: Further Pure Mathematics 1	Paper 2: Further Pure Mathematics 2
 Proof Complex numbers - modulus and argument, conjugates, Argand diagrams, simple loci Matrices - add, subtract and multiply, transformations, determinants, inverse matrices Further algebra and functions - roots of polynomials, series formulae Further calculus - volumes of revolution Further vectors - equation of a straight line and plane, scalar product 	 Complex numbers - de Moivre's theorem, exponential form, complex roots Further algebra and functions - method of differences, Maclaurin series Further calculus - improper integrals, mean value of a function, inverse trigonometric functions Polar coordinates Hyperbolic functions Differential equations - first and second order, simple harmonic motion, damped harmonic motion
Paper 3: Further Statistics	Paper 4: Further Mechanics
 Discrete distributions Continuous distributions Hypothesis testing Chi squared tests Quality of tests Probability generating functions 	 Momentum and impulse Work, energy and power Elastic strings and springs Elastic collisions in one dimension Elastic collisions in two dimensions

Assessment

All public examinations in both A Level Mathematics and A Level Further Mathematics will be taken at the end of Year 13. These will be comprised of:

- 2 Mathematics A Level: three 2 hour papers each worth 100 marks (see description above).
- ² Further Mathematics A Level: four 1.5 hour papers each worth 75 marks with 50% pure content and 50% applied.

Teaching and Learning Methods

Students are required to purchase textbooks (available in digital and hard copy format) for each of the courses and these are an integral part of the teaching process. Staff use a range of teaching styles, both traditional and involving the use of technology when appropriate. Students will require an advanced scientific calculator (for example Casio FX-991CW). There is no coursework involved in either course.

Homework

A homework task is set at the end of most lessons to be completed for the next lesson. On some occasions, a longer piece of work may be given but an extended time period would be allocated for this.

Regular assessment tests are given to further assess the students' progress.

Trips and Visits

All students studying Mathematics or Further Mathematics are invited to participate in the Individual Senior Mathematics Challenge and a team is selected for the Senior Team Challenge.

A Study Day is offered for Year 12 and 13 students in London, featuring talks from a variety of renowned mathematicians.

Why study Mathematics?

Some students may be attracted to Mathematics because of its intrinsic interest, others because they have a talent for the subject and wish to apply it to the physical sciences or to economics, management, etc.

GCE Advanced Mathematics is considered by many employers, universities and colleges as a vital subject. It is compatible with virtually any other GCE Advanced subject. If students intend to read Mathematics, Statistics, Computing Science, Physics, Engineering or Pure Science, GCE Advanced Mathematics is a likely pre-requisite. It is also an asset for any other Higher Education Course.

Careers

The logical thinking, problem-solving and decision-making skills students learn while studying a mathematics degree are highly valued by employers across many job sectors. Mathematicians are employed in accounting, banking, insurance and the various branches of engineering. Many work for British Rail, the Aircraft Industry, the Meteorological Office and other Government Departments and most industrial firms, e.g. those producing photographic and electrical equipment, oil products, glass and food, all employ mathematicians. Good teachers of Mathematics, Computing Science and Statistics are sought after. Since the subject is fundamental to technology, a good mathematician will always have positive career prospects.