

MATHEMATICS

Exam board: Edexcel

Assessment Method: 100% examination (three papers at AS level and three papers at A2 level).

AS: C1, C2 and an applied module

A2: C3, C4 and another applied module.

Length of exams: All papers are 1½ hours.

Breakdown of units:

C1: Half of this module contains transition material between GCSEs and AS level: basic algebra, surds, indices, simple factorisations, quadratics, completing the square, inequalities and graph sketching, graph transformations and straight lines. The second half of C1 contains sequences and arithmetic progressions. All in all C1 is a relatively gentle module, but it does require that students know their algebra and arithmetic inside out as it is a non-calculator paper.

C2: This module starts by introducing students to polynomials, their division and the factor and remainder theorems. Binomial expansion is then introduced, this is basically a way to expand brackets of high powers relatively quickly, computers and calculators exploit ideas from this topic to speed up their calculations. Logarithms come next, these are unnatural things that students are unjustifiably afraid of, they are in fact quite cuddly. Geometric progressions are also introduced these can be thought of as the 'multiplication version' of arithmetic progressions. There follows a short introduction to the geometry of circles and triangles which lead into trigonometry, a very important topic with many real-world applications. The differentiation and integration from C1 is further developed and used to solve problems related to the real world.

C3: This is the first A2 module, most of the material further develops ideas and techniques from C1, C2 calculus and trigonometry: many trig identities are introduced, special functions (exp and natural log) and more differentiation methods (product, quotient and chain rules). There are a handful of standalone topics: numerical methods and functions are the two main ones. There is also a tiny bit on algebraic fractions (rational functions).

C4: This module is difficult. It requires that students know the material from all previous core modules like the back of their hands, many questions rely on techniques which were introduced earlier. The majority of this paper handles integration with its many methods and techniques (integration by parts, substitution, parametric integration, volumes of revolution, differential equations etc.). Parametric and implicit differentiation are also introduced. The non-calculus topics include partial fractions, the binomial theorem for rational exponents and vectors.

S1: This is an applied module, the first of four statistics modules. S1 introduces the basics of data types, measures of location (averages), measures of spread (variance, range) and spread. Probability is also introduced and goes up to include conditional probability (if I know something has happened what are the chances of something else happening?). More on data analysis in the form of regressions lines (sort of lines of best fit) and the product moment correlation coefficient. Discrete random variables make an appearance as does the normal distribution. The normal distribution is one that many students find a tad tricky, and is possibly the most conceptually challenging topics in the module.

M1: This is an applied module, the first of five mechanics modules. Mechanics is a branch of physics and concerns physical bodies and their behaviour under forces. In M1 students are introduced to the SUVAT equations, these describe one-dimensional motion under constant acceleration. Forces and Newton's laws of motion are revised and expanded with topics including momentum and the coefficient of friction. Other topics include moments (these describe the tendency to rotate) and solving problems with vectors.

D1: This is an applied module, the first of two. D stands for decision maths, this deals with finding optimal solutions to discrete real-world problems. Algorithms are taught, followed by many examples: various sorting and packing algorithms, Prim's and Dijkstra's algorithms are just a few. Graphs play a large part in this module, these are not x-axis, y-axis graphs, rather, they are combinatorial graphs. Critical path analysis and linear programming are also introduced. Critical path analysis is a method to schedule projects and activities in the most efficient and effective way. Linear programming seeks to solve simple equations subject to constraints (e.g. I want to make one quantity as large as possible whilst not exceeding A or falling below B etc.).

Combinations of modules: The four core modules are mandatory but a choice can be had with the two applied modules. We strongly recommend that student choose S1 and M1, this combination has been tried and tested over the years and fares better than options like M1, M2 or S1, S2 or anything involving decision maths. We do offer higher applied modules but normally only under special circumstances.

Other considerations: Edexcel is not the only Maths board we offer, should a student already have modules from another board then we can teach it for the difference in the syllabuses are superficial.

Further Maths: Every year we have students taking further maths and STEP papers, one has to be rather good at maths to attempt it though.

Overlap with other subjects: Having a firm grasp at maths will serve many subjects at A-level or degree level well: Physics, Chemistry, Biology, Economics, Accounting etc.



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