

A-Level Maths Curriculum Map

The A-Level Mathematics course has a focus on application of knowledge to problem solving in real-life contexts.

A-Level Maths has three overarching themes of Mathematical argument, language and proof, Mathematical problem solving and Mathematical modelling. Our scheme of learning aims to support students with these themes across the programme of study.

Our students currently sit the OCR Mathematics A qualification.



Moments
Students will consider the motion of a rotating object in situations where an object can be modelled as one or two-dimensional, and the axis of rotation is perpendicular to the plane in which the object lies.

Forces in Context
Students use their knowledge of resultant force from Year 12 to deal with more complex situations involving strings and planes in different orientations.



Final Exam Preparation

Rational Functions
Students will focus on applying algebraic techniques to change rational functions into forms that will allow more advanced manipulations later in the course.

General Binomial Expansion
Students will extend and deepen their knowledge binomial expansions to include functions with any rational power. They will again use their expansion to approximate.

Further Applications of Calculus
Students will use methods of differentiation and integration to solve problems. This will include; analysing the properties of curves, rates of change, parametric equations and more complex areas between curves and differential equations.

Numerical Methods
Students will learn methods for solving equations numerically to obtain approximate solutions to equations and to find approximate areas between the curve and the x-axis using the trapezium rule.

Further Vectors
Students will extend their knowledge of vectors to three dimensions. They will be required to use these vectors to describe displacement, velocity and acceleration.

Projectiles
Students will extend their knowledge of constant acceleration to look at projectiles moving in a two-dimensional plane. This will allow modelling of real-life situations.

Further Integration
Students will expand the range of functions they can integrate. They will learn how to use the reverse of standard derivatives, integration by substitution, integration by parts and integration of rational functions.

Rational Functions

General Binomial Expansion

Further Applications of Calculus

Numerical Solutions and Integration

Further Vectors

Further Transformations of Graphs

Proof
Students will review the methods of proof from Year 12 as well as learning proof by contradiction. They will also practise criticising proofs.

Sequences and Series
Students will learn about the different type of sequences, particularly arithmetic and geometric progressions. This will include solving problems involving terms and sums of series and using the associated formulae.

Further Differentiation
Students will extend their skills in differentiation and will be introduced to the standard derivatives of exponential and trigonometric functions. They will also learn to use the chain, product and quotient rules for differentiation as well as differentiating implicitly.

Further Transformations of Graphs
Students will use the transformations they met in Year 12 and combine them to produce a sequence of transformations of the original graph. They will also be introduced to the modulus function.

Objects in Contact
Students will meet the normal reaction force and use the tension/thrust force in a connecting string, cable or rod.

Conditional Probability
Students will visualise conditional probabilities in various ways and use them to solve problems. They will also deduce and use the conditional probability formulae.

The Normal Distribution
Students are introduced to the normal distribution for continuous random variables. They will explore a range of concepts in this area and will learn to use the associated calculator functions.

Further Hypothesis Testing
Students will extend their knowledge of hypothesis testing to include testing sample means and correlation co-efficients.

Radians
Students will be introduced to radian measures. They will extend their skills in solving trigonometric equations to include the use of radians.

Functions
Students will focus on developing the theory of functions. This will include; understanding mappings, types of functions, domain and range, composite functions and inverse functions.

Further Trigonometry
Students will learn how to simplify expressions involving some sums and products of trigonometric functions.

Force and Motion
Students will investigate the relationship between force and acceleration for forces in one and two dimensions. They will also look at the combined effect of several forces.

Motion with Constant Acceleration
Students derive and use equations for motion with constant acceleration. They will apply CA formulae to vertical motion under gravity.

Kinematics
In this section students will use the basic concepts in kinematics; displacement, distance, velocity, speed and acceleration and will use differentiation and integration to relate them and solve problems.

Exponentials and Logarithms
Students will discover the concept of logarithms and learn about the laws of logarithms and how to use them to solve problems involving exponential functions.

Integration
Students will reverse the process of differentiation and recognise this as integration. They will then use this method to find the equation of a curve and the area between the curve and the x-axis.

Working with Data
Students will review the construction and interpretation of statistical diagrams, as well as the calculation and use of summary statistics. It will be essential for students to learn how to use calculator functions to support them.

Force and Motion

Motion with Constant Acceleration

Vectors
Students will learn about the different ways to represent vectors and use them to solve geometrical problems.

Trigonometry
Students will extend and deepen their knowledge of trigonometric functions. They will study the basic properties and the graphs of the sine, cosine and tangent functions and will begin to solve equations involving them. This will include the use of transformed functions and simple trigonometric identities.

Differentiation
Students will study the process and rules of differentiation for simple functions. This will be extended to include the applications of differentiation including; finding a gradient at a given point, stationary points and optimisation.

Binomial Expansion
Students will learn how to expand binomial expressions for any positive integer. They will then use parts of their expansions to find approximations.

Using Graphs
Students will develop their knowledge of using graphs and the links to simultaneous equations and transforming graphs.

Probability
Students will review the independent and mutually exclusive events and use them to calculate more complicated probabilities. The binomial distribution will also be introduced.

Statistical Hypothesis Testing
Students will recap their knowledge of sampling and will be introduced to the process of hypothesis testing using the binomial distribution.

Co-ordinate Geometry
Students will look at using co-ordinates to represent lines and circles. They will use equations to represent those shapes and find their intersections.

Binomial Expansion

Co-ordinate Geometry

Polynomials
Students will extend their work on quadratics to include higher order terms. This will include algebraic division, the factor theorem and sketching polynomials.

Quadratic Functions
Students will recap methods for solving quadratics and inequalities. They will also be introduced to the discriminant and disguised quadratic equations.

Indices and Surds
Students will review algebraic rules for working with powers and roots and use them to simplify more complex expressions.

Proof
Proof is one of the key themes of the A-Level Mathematics qualification so forms a fundamental part of the course. In this topic students will study various methods of proof including; exhaustion, contradiction and deduction as well as a common notation they are expected to use.

Proof

GCSE MATHS

GCSE MATHS

YEAR 12

welcome