

Further Maths Curriculum Overview - Year 12

	Unit	Details
Autumn One	Pure: Complex numbers, Exponential and Logarithms, Indices & Surds, Quadratic Functions, Equations & Inequalities, Sketching and transforming graphs, Coordinate Geometry, Factor Theorem Mechanics: Modelling and kinematic graphs, Constant acceleration formulae, Forces and Newton's Law, Connected particles Statistics: Sampling, Descriptive Statistics	<p>We start with a further maths topic to introduce the students to complex numbers, conjugates and the Argand diagram. We then look at exponentials and logarithms and build on the algebra at GCSE and then apply this in a geometrical context.</p> <p>In mechanics, pupils will begin by learning how to make assumptions which allow a situation to be modelled, develop knowledge of real-life graphs from GCSE by solving problems involving velocity, distance and acceleration. Pupils will develop their understanding of forces, learning to resolve, find resultants and use Newton's second law. They will then apply this to connected particles such as pulleys.</p> <p>In statistics students will start by understanding and critiquing sampling methods and using descriptive statistics in data sets.</p>
Autumn Two	Pure: Proof, Binomial Expansion, Trigonometry: geometry and graphs, Solving trigonometric equations and identities, Vectors, Differentiation from first principles, Differentiation in context, Integration, Statistics: Data presentation and interpretation, Correlation and regression, Probability, Statistical distributions, Hypothesis Testing Mechanics: Non-constant acceleration	<p>Pupils will begin this half term by developing the theme of proof which runs throughout the A level. They will learn techniques to expand binomials and then expand their understanding of trigonometry to look at solutions over 180 degrees, before learning to differentiate and integrate polynomials, including in context.</p> <p>In statistics students will extend GCSE probability, use the binomial distribution, and culminate in making hypotheses and testing them.</p> <p>Once they have covered calculus in Pure they will apply calculus to non-constant acceleration in mechanics.</p>
Spring One	Further Core: Complex Numbers, Matrices <i>Students pick two of the following options:</i> Further Pure: t substitution, Conics Further Mechanics: Impulse and Momentum Further Statistics: DRV, Distributions	<p>Students begin the further core course by recapping the complex numbers and extending the ideas into loci. They will then spend time using matrices to describe transformations and solve systems of linear equations.</p> <p>In further pure, they will develop methods to use half angle formulae to solve equations and prove identities before studying parabolas and rectangular hyperbolae.</p> <p>In further mechanics pupils will study impulse and momentum to solve problems.</p> <p>In further statistics we will extend the ideas of discrete random variables to include expectation, variance and coding before using the Poisson distribution to find probabilities and to approximate the Binomial distribution.</p>
Spring Two	Further Core: Algebra and functions, Calculus Further Pure: Vectors, Numerical Methods Further Mechanics: Work, Energy, Power Further Statistics: Hypothesis tests	<p>We start this half term by extending the ideas of sums and products of polynomials and in finding polynomials with a transformation of roots, before extending calculus to look at volumes of revolution.</p> <p>In further pure we will extend concepts encountered in the autumn term to find the vector product, scalar triple product and applications to lines and planes.</p> <p>In further mechanics pupils will use the work energy power formula to solve problems on horizontal and inclined planes.</p> <p>In further statistics pupils will extend hypothesis testing to include the Poisson distribution.</p>
Summer One	Further Core: Further Vectors Further Pure: Inequalities Further Mechanics: Collisions Further Statistics: Goodness of fit	<p>We continue developing knowledge of vectors by looking at the equation of a straight line, the scalar product, equation of a plane and finding distances.</p> <p>In further pure students extend their understanding of inequalities by knowing how to handle quotients in inequalities.</p> <p>In further mechanics we will look at conservation of momentum and the coefficient of restitution in direct collisions.</p> <p>In further statistics we will use a goodness of fit test to consider the accuracy of modelling for Binomial, Poisson, discrete uniform, ratio and contingency tables.</p>
Summer Two	Further Core: Proof Pure: Partial fractions	<p>Further core will finish with the important concept of proof by induction, including divisibility, matrices and series questions.</p> <p>If time allows students will start the Year 13 pure syllabus, looking at the algebraic technique of partial fractions which will be encountered again in Year 13 integration.</p>