Maths Curriculum Overview - Year 12

	Unit	Details
Autumn One	**Pure**:Exponential and Logarithms, Indices & Surds, Quadratic Functions **Mechanics:** Modelling and kinematic graphs, Constant acceleration formulae	We start the A level course with one of the more difficult topics, and one which has not been encountered at GCSE. Pupils will build on their knowledge of indices and inverse functions, manipulating expressions and equations using logarithms and modelling exponential growth and decay. We continue the theme with a focus on laws of indices and manipulation of surds, before consolidating knowledge of quadratic functions and the discriminant. In mechanics, pupils will begin by learning how to make assumptions which allow a situation to be modelled. They will then develop knowledge of real life graphs from GCSE to solving problems using displacement and velocity time graphs, extending this to equations of motion for constant acceleration.
Autumn Two	**Pure:** Equations & Inequalities, Sketching and transforming graphs, Coordinate Geometry **Mechanics:** Forces and Newton's Law, Connected particles	Pupils will begin this half term by learning to solve linear and quadratic equations and inequalities and to use set notation. They will then develop their understanding of graphs from GCSE and quadratics in the previous topic to transform graphs of functions and solve geometric problems involving lines and circles, including the use of the discriminant to find intersections. In mechanics, 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.
Spring One	**Pure:** Factor Theorem, Proof, Binomial Expansion **Statistics:** Sampling, Descriptive Statistics, Statistical graphs	We will begin this term by using prior knowledge of polynomials to apply the factor theorem, then bring this together with concepts from functions to sketch curves and transform graphs. The theme of proof, which runs throughout A level is then studied, with pupils learning the conventions of formal proof by deduction and exhaustion and disproof by counterexample. We will then learn techniques to form an expansion of a binomial, which will be encountered again in statistics. In statistics, pupils will learn the methods for sampling, Summarise data using measures of location and spread, and represent data with statistical diagrams.They will be expected to interpret situations and assess which diagram is best to use for a particular set of data.
Spring Two	**Pure**:Trigonometry: geometry and graphs, Solving trigonometric equations and identities, Vectors **Statistics:** Correlation, Probability, Statistical distributions	Pupils will first consolidate their knowledge of trigonometry from Year 11 by finding lengths and angles in right angled and non-right angled triangles. They will find the area of a triangle using trigonometry and will solve equations for angles over 180 degrees. In vectors pupils will develop an understanding of magnitude, unit vectors and the ability to solve problems involving ratios and collinearity. In Statistics they will make predictions using regression lines, identify outliers and comment on the strength of correlation. They will then calculate probabilities using mutually exclusive and independent events, before applying these concepts to individual and cumulative probabilities from the binomial distribution.
Summer One	**Pure:** Differentiation from first principles, Differentiation in context, Integration **Statistics:** Hypothesis Testing	Pupils begin the theme of calculus by tackling differentiation from first principles and generalising to find derivatives of polynomials. They will then use these skills when integrating polynomials and applying this to finding the area under a curve. In statistics, pupils will learn to understand the language of statistical hypothesis testing and conduct a statistical hypothesis test for the proportion in a binomial distribution and interpret the results in a context. They will understand the limitations of sampling methods in making this inference and appreciate that the significance level is the probability of incorrectly rejecting the null hypothesis.
Summer Two	**Pure:** Partial Fractions **Mechanics:** Non-constant acceleration	If time allows we will aim to move beyond the AS course and begin Year 13 topics. Pupils will learn how to split an algebraic expression into partial fractions, which will be encountered again when developing integration skills in Year 13. Having now covered differentiation and integration in Pure maths pupils will use calculus in kinematics for motion in a straight line.