Year 12 Maths Curriculum Map

Overview	The A Level course begins with recap of key GCSE topics which underpin the AS syllabus as well as introducing new applied areas of study in mechanics and statistics. This develops through the year to encompass the key fundamental building blocks of A level Maths – calculus, functions, trigonometry, logarithms and exponentials. Further applied units are also explored. Student progress is assisted through the Integral online learning platform.		
Year 12	Autumn 1 & 2	Spring 1 & 2	Summer 1 & 2
Topic	Surds & indices Quadratic functions Data collection Kinematics Vectors Equations & Identities Data processing Polynomials Probability Trigonometry Problem solving	Graphs & transformations Coordinate geometry Forces & Newton's laws Differentiation Integration The binomial expansion The binomial distribution Hypothesis testing Exponentials & logarithms	Integration Exponentials & logs Variable acceleration A2 – Trigonometry A2 – Forces & motion A2 – Sequences & series
Knowledge	Using and manipulating surds, including rationalising the denominator. Working with negative and fractional indices. Understanding and solving quadratic graphs and equations Completing the square. Using the quadratic formula and the discriminant. Specifying the problem, data collection, cleaning data. Sampling and bias. Defining key kinematics terms – the language of motion. Speed, velocity & acceleration – interpreting and drawing graphs. Using areas to find distance & displacement.	Understanding curve shapes. Using transformations to sketch curves – stretches, translations, reflections. Finding the equation of a transformed curve. Transforming trig curves. Gradient, parallel and perpendicular lines, midpoints, lengths of lines. The equation of a line. Intersecting lines. The equation of a circle. Force diagrams. Newton's first law. Different force types and Newton's second law (F=ma). Connected particles (pulley systems).	Dealing with areas below the x axis. Harder integration and more challenging questions. Logarithms and log laws. The exponential function. The natural log function ln. Modelling with curves - linearising exponential functions using logs. Differentiating position to obtain velocity, and velocity to obtain acceleration. Using integration to obtain displacement from velocity, and velocity from acceleration. Revisiting the suvat equations with calculus. **A2 knowledge:** Working in radians .

	Constant acceleration problems. Vector terminology and magnitude/direction to component form equivalents. Position vectors and vector arithmetic and unit vectors. Vector geometry. Simultaneous equations. Linear and quadratic inequalities. Data vocabulary and presenting different data types. Ranking data – stem and leaf, median, quartiles. Grouping discrete & continuous data. Bivariate data. Standard deviation. Expanding polynomials and plotting curves using roots. Polynomial division. Using the factor theorem. The language of probability and probability distributions. Understanding sin, cos, tan and using exact values. CAST, trig identities, understand trig graph properties. Solving equations using graphs and identities. Sine and cosine rule. Formula for triangle area. Exploring the modelling cycle. Writing maths – necessary, sufficient, converse of a theorem. Proof by deduction, exhaustion, disproof.	Applying F=ma along a line with single objects. Applying F=ma along a line with connected objects. The gradient function of a curve. Simple differentiation. Finding equations of tangents and normal. Increasing/decreasing functions and turning points. Sketching graphs with TPs and sketching the gradient function. Harder differentiation and more challenging curves. The second derivative. Applications of differentiation to maximisation/minimisation problems. Differentiating from first principles. Reversing differentiation – finding the function from the gradient function. Finding definite and indefinite integrals – the area under a curve. Finding coefficients and Pascal's triangle. Permutations and Combinations. The binomial probability distribution. Using the binomial distribution - Expectation of B(n,p). Defining hypothesis testing terms – establishing hypotheses and choosing significance level. Extending hypothesis testing – critical values and regions and 1 and 2 tail tests. Understanding the exponential function.	Arc length, sector area. Small angle approximations. Reciprocal trig functions (cot, cosec, sec) and their identities. Solving and proving equations and identities with trig. Equations in radians. Defining terminology, types of sequence. Arithmetic sequences and series. Geometric sequences and series and modelling with sequences. Using force triangles in 2D. Resolving forces in 2D. Applying F=ma in 2D.
Skills	Through the course our students will develop the ability to construct and clearly present mathematical and logical arguments using the correct mathematical terminology and notation. They will develop the ability to deal with highly abstract concepts and continue to build advanced numeracy skills. They will use their topic understanding to turn real world problems into mathematical ones, using appropriate modelling with mathematical functions. They will build their communication and interpersonal skills, as well as independent study skills. The challenging nature of the subject fosters commitment, resilience and determination.		