Mathematics @ KS5

Students doing AS and A2 Mathematics do two different courses: Pure Mathematics and Applied. The Pure syllabus builds on their algebraic understanding from iGCSE whilst the Applied syllabus applies students' mathematical understanding into physical situations (**Mechanics**) and statistical understanding (**Statistics**).

Exact curriculum timings might change due to school trips, calendar dates and other off-timetable days.

Application of 5Cs in Mathematics:
Mathematics provides a rich context for teaching and cultivating values such as **community, compassion, creativity, confidence, and challenge**. In a maths classroom, students can engage in collaborative problem-solving activities, fostering a sense of **community** as they work together, share ideas, and learn from one another. The exploration of mathematical concepts and real-world applications encourages students to develop **compassion** by understanding how maths can be used to address societal issues and make a positive impact. Mathematics also nurtures creativity by encouraging students to think critically, explore different problem-solving strategies, and discover innovative solutions. As students tackle **challenging** mathematical problems, they develop **confidence** in their abilities to analyse, reason, and persevere. The inherent nature of mathematics, with its logical structures and puzzles, presents a continuous **challenge** that pushes students to think deeply, expand their skills, and embrace new mathematical frontiers. Through the study of mathematics, students not only gain mathematical knowledge but also acquire valuable life skills and attitudes that contribute to their personal growth and success.

Current Program of study

Please note that the current year 12 and current year 13 are learning the applied mathematics modules in a slightly different order:
Year 12 (2023-24) : Pure 1 and Statistics 1
Year 13 (2024-25): Mechanics 1 and Pure 2 and 3
Year 12 (2022-23): Pure 1 and Mechanics 1
Year 13 (2023 - 24): Statistics1 and Pure 2 and 3

Term 1			
Topic and Content	**Chapter 1**: Quadratics **Chapter 2**: Functions	**Chapter 1:** Representation of Data **Chapter 2:** Measures of Central Tendency **Chapter 3:** Measures of Variation **Chapter 4:** Probability	**Chapter 2:** Logarithms **Chapter 3:** Trigonometry **Chapter 11**: Complex Numbers **Chapter 4:** Differentiation
Skills	**Ch1**: completing the square, graphing quadratics, solving quadratic equations and inequalities, solving simultaneous equations **Ch2**: function notation, finding range/domain, finding inverses, transforming functions	**Ch1:** types of data, stem-and-leaf diagrams, histograms, cumulative frequency graphs, comparing different data representations **Ch2:** finding measures of the centre in a range of different contexts, including lists, tables and graphs: the mode and modal class, the mean and the median, combined means, coded mean **Ch3:** finding measures of spread in a range of different contexts: range, interquartile range and percentiles, variation and standard deviation, combined standard deviation, coded standard deviation **Ch4:** experiments, events and outcomes, mutually exclusive events, independent events	**Ch2:** recognise and use exponentials and ln, use the log/exponential laws, solve exponential equations, solve logarithmic equations **Ch3:** use and recognise the 6 ratios, use complex trigonometric identities, use the Rcosa form, prove trigonometric identities, solve complex trigonometric equations **Ch11:** understand what complex numbers are, do complex arithmetic, find non-real roots of polynomials, change complex forms, represent complex numbers geometrically **Ch4:** differentiate products and quotients, derive special functions, use the chain rule

Assessments	Induction Test P1 Assessment Homework (exam qs), Independent Practice	S1 Assessment Homework (exam qs), Independent Practice	Induction Test P3 Assessment Homework (exam qs), Independent Practice
Term 2			
Topic and Content	**Chapter 3:** Coordinate Geometry **Chapter 4**: Circular Measure **Chapter 5**: Trigonometry	**Chapter 4:** Probability **Chapter 5:** Permutations and Combinations	**Chapter 4:** Differentiation **Chapter 5:** Integration
Skills	**Ch3:** equations of straight line, equations of a circle, finding intersection of lines and curves **Ch4**: understanding and using radians, finding arc length, finding sector area, solving problems **Ch5**: sketching trigonometric graphs, finding angles using inverse ratios, using basic identities, solving equations and problems ***Review and Revision:*** *for the mocks, including use of past paper questions and in-class mini-assessments.*	**Ch4:** experiments, events and outcomes, mutually exclusive events, independent events, conditional probability, dependent events and conditional probability **Ch5:** the factorial function, permutations, combinations, problem solving with permutations and combinations ***Review and Revision:*** *for the mocks, including use of past paper questions and in-class mini-assessments.*	**Ch4:** differentiate products and quotients, derive special functions, use the chain rule, differentiate and use parametric equations **Ch5:** use 'reverse differentiation' to integrate special functions, use trigonometric identities to integrate ***Review and Revision:*** *for the mocks, including use of past paper questions and in-class mini-assessments.*
Methods of Assessment	P1 Assessment (cumulative) Homework (exam qs), Independent Practice	S1 Assessment (cumulative) Homework (exam qs), Independent Practice	P3 Assessment (cumulative) Homework (exam qs), Independent Practice
Term 3			
Topic and Content	**Chapter 6:** Series **Chapter 7:** Differentiation **Chapter 8:** Further Differentiation **Chapter 9:** Integration	**Chapter 6:** Probability Distributions **Chapter 7:** Binomial & Geometric Distributions **Chapter 8:** Normal Distribution	**Chapter 8:** Further Calculus **Chapter 6:** Numerical Methods **Chapter 7:** Further Algebra **Chapter 10:** Differentiation Equations

			Taught in S1 lessons: ***Chapter 9:*** *Vectors*
Skills	**Ch6:** expand binomial brackets, recognise arithmetic and geometric sequences, use the formula for arithmetic terms and sums, use the formula for geometric terms and sums **Ch7:** find first and second derivatives, differentiate any polynomial, find gradients and tangents/normals of curves **Ch8:** understand and define increasing/decreasing functions, find stationary points, determining natures of points **Ch9:** integrate polynomials, calculate definite integrals, find areas under curves and areas enclosed between curves, find volumes of revolution	**Ch6:** discrete random variables, understanding and completing probability distributions, expectation and variance of a random variable **Ch7:** understanding and using binomial distribution (uses, probabilities, expectation and variation), understanding and using the geometric distribution (uses, probabilities, expectation and variation) **Ch8:** continuous random variables, understanding the shape of a normal distribution, finding probabilities, solving problems with normal distributions, modelling with the normal distribution, approximating	**Ch8:** use derivatives of inverse tan, integrate rational functions, integrate by inspection, integrate using partial fractions, integrate by parts **Ch6:** find approximate roots of equations, derive and use iterative formulae **Ch7:** use partial fractions to express rational functions, know and use the binomial expansion formula (where *n* is not an integer) **Ch10:** derive differential equations, solve differential equations generally and explicitly **Ch9:** use vector notation, do vector arithmetic, calculate the magnitude and direction of vectors, find vector equations of lines, determine whether two line are parallel, intersect or skew, find and use the scalar product of vectors
Methods of Assessment	Mocks P1 Assessment (cumulative) Homework (exam qs), Independent Practice	Mocks M1 Assessment (cumulative) Homework (exam qs), Independent Practice	Mocks P3 Assessment (cumulative) Homework (exam qs), Independent Practice
Term 4: Exam Season			
Content	**Revision**	**Revision**	**Revision**
Skills	*see above* *Past paper packs and in-class mini-assessments.*	*see above* *Past paper packs and in-class mini-assessments.*	*see above* *Past paper packs and in-class mini-assessments.*

Methods of Assessment	Homework (exam qs), Independent Practice	Homework (exam qs), Independent Practice	Homework (exam qs), Independent Practice