Mathematics Year 12 Curriculum Overview

What is the Year 12 Mathematics curriculum aiming to achieve?

What do we want our Year 12 Mathematicians to be like?	How are we building on prior learning?	How can parents/carers support their child's learning?
• Skilled in using precise mathematical notation and structure in solutions • Proficient in manipulating algebra • Confident in recognising, plotting and interpreting a variety of graphs • Able to analyse a problem to determine the skills required to solve it • Proactive in routinely seeking advice	• Using induction tasks at the start of Year 12 to assess key Higher GCSE work • Planning sequences of lessons • Introducing linked concepts that build on prior learning and reviewing key skills • Checking retention using twice weekly homework tasks and fortnightly assessment tasks	• Ensure students are properly equipped with the correct textbook and calculator • Encourage students to complete homework to the best of their ability • Give support in organising their notes • Help students review and reflect on assessments and homework to identify areas for improvement

How are we organising the Year 12 Mathematics curriculum?

	Autumn Units	Spring Units	Summer Units
Threshold Concepts & Skills	<u>Teacher 1</u> **Quadratics**: solve quadratic equations; use of discriminant **Equations & Inequalities**: set notation; solve equations, inequalities, simultaneous equations; graphical inequalities **Coordinate Geometry**: Gradient, length & midpoint of a line; equation of lines; circle equation; circle theorems **Differentiation**: differentiate functions; find gradients; turning points; use of $\frac{d^2y}{dx^2}$; function notation **Integration**: Integrate; areas under curves <u>Teacher 2</u> **Surds & Indices**: rules for manipulating surds & indices **Binomial Expansion**: Binomial expansion of $(a + b)^n$ for $n > 0$; permutations & combinations **Trigonometry**: graphs; identities; equations; sine & cosine rules **Polynomials**: factor theorem; manipulating and sketching polynomials including division **Graphs & Transformations**: translate, stretch or reflect graphs	<u>Teacher 1</u> **Logs and Exponentials**: exponential functions; rules for logarithms, natural logarithms **Data Collection**: sampling methods **Data Processing**: use of statistical charts; use summary measures to analyse data <u>Teacher 2</u> **Problem Solving**: methods of proof; ⇒, ⇐ , ⇔ notation **Vectors**: vector notation and magnitude of vectors **Kinematics**: Use of vectors in kinematics; use graphs of position-time, velocity-time, distance-time and speed-time; constant acceleration formulae (suvat)	<u>Teacher 1</u> **Probability**: probability rules for mutually exclusive and independent events **Binomial Distribution**: model using the binomial distribution, use the formula for binomial probabilities; know that E(X) = np **Hypothesis Testing**: conduct a hypothesis test using the binomial distribution **Differentiation**: Concave upwards and downwards; points of inflection; product rule; quotient rule; chain rule; connected rates of change; differentiate inverse functions <u>Teacher 2</u> **Forces and Newton's Laws**: force diagrams; modelling; Newton's laws; connected objects **Variable acceleration**: Use of calculus with variable acceleration **Trigonometry**: use of radians in trigonometric equations; arc length and area of a sector formulae using radians; small angle approximations **Proof**: proof by direct argument, exhaustion & contradiction; counter-examples
Enrichment within the curriculum	Students continually have opportunities to develop and practise problem-solving skills in advanced contexts, including more challenging extension questions. Concepts and skills will link to real-world applications wherever possible. Students also study, discuss and analyse a large data set, which uses real-life data. Full access to the Integral Maths website allows students to engage with a wide variety of support and enrichment resources, including extension work.		
Cross curricular links	• The content learned will support all the mathematical skills needed for Biology, Chemistry and Physics • Statistical skills will also be useful in Psychology, Economics, Business Studies and Geography • Algebra skills will be useful in Computing, and the Sciences • Most of the work on Mechanics overlaps with the A Level Physics course		
Extra-curricular opportunities	Students have the opportunity to enrol in enrichment courses run by the Advanced Mathematics Support Programme, including regular problem-solving sessions and courses aimed at preparing students for university entrance examinations such as STEP, MAT and TMUA. Students will also have the opportunity to take part in the UKMT Senior Maths Challenge. Students are able to seek help from their teachers outside lessons at any time, and homework support is always available.		

What are the intended outcomes of the Year 12 Mathematics curriculum?

	Autumn	Spring	Summer
Opportunities to show progress (Assessments)	Two homework assignments per week One P10 assessment per fortnight Induction test – 1 hour (in class) Autumn 1 test – 1 hour (in class) Autumn 2 test – 1 hour (in class)	Two homework assignments per week One P10 assessment per fortnight Spring Mock – 1.5 hours (formal) Spring 2 test – 1 hour (in class)	Two homework assignments per week One P10 assessment per fortnight Summer Mock – 1.5 hours (formal) Mechanics & Statistics mock exams (classroom based approx. 40 min each)
Impact on personal development (SMSC)	Studying Mathematics helps students develop the skills of thinking logically, analytically, strategically and independently. Students are also able to communicate in a clear, precise way, and explain their reasoning for decisions. Mathematics students have excellent numeracy skills and can process and interpret information in a variety of formats. These will prove to be invaluable skills, both during education and in employment.		
Preparation for the next stage of education	Studying Mathematics at A Level will ensure that students are better prepared to make the transition to higher education. A Level Mathematics is a subject requirement for many university courses, which can involve mathematical skills and content far beyond GCSE. Students also gain valuable confidence in being able to approach difficult problems independently, which will help them succeed in a broad range of subjects.		