Further Mathematics Year 13 Curriculum Overview

What is the Year 13 Further Mathematics curriculum aiming to achieve?		
What do we want our Year 13 Further Mathematicians to be like?	How are we building on prior learning?	How can parents/carers support their child's learning?
• Confident in working independently • Able to efficiently identify appropriate techniques to solve a problem • Enthusiastic about learning interesting and complex concepts • Excited about solving difficult problems • Prepared to be patient and persistent when challenged	• Sequences of lessons are planned to ensure pre-requisite knowledge from Maths is covered in advance • Concepts that build on prior learning have time allocated to review key skills • Checking retention using weekly homework tasks and half-termly assessments	• Ensure students are properly equipped with the correct textbooks • Encourage students to complete homework to the best of their ability • Give support in organising their time • Help students review and reflect on assessments and homework to identify areas for improvement

How are we organising the Year 13 Further Mathematics curriculum?			
	Autumn Units	Spring Units	Summer Units
Threshold Concepts & Skills	**Kinematics**: constant & variable acceleration **Forces & Motion**: Newton's laws of motion; equilibrium **Friction**: model with friction; F = μR **Moments**: calculate with moments; levers; couple; situations involving sliding or toppling **Work, Energy, Power:** work, energy and power; GPE; work-energy principle **Impulse & Momentum**: impulse; momentum; impulse-momentum equations; Newton's law of impact **Centres of Mass**: centre of mass of system of particles or composite body **Dimensional Analysis:** find dimension of a quantity; change units; use dimensional analysis **Calculus**: improper integrals; differentiate inverse trig functions; use trig substitutions	**Polar Coordinates:** sketch polar curves & find areas enclosed by polar curves **Maclaurin Series**: find Maclaurin series of a function; use standard results **Hyperbolic Functions**: differentiate & integrate hyperbolic functions; inverse hyperbolic functions **Integration**: volumes of solids; mean value of a function; recognise and use standard integration results **Differential Equations 1**: solve first-order differential equations; use integrating factors **Complex Numbers**: de Moivre's theorem; nth roots of a complex number; exponential form of a complex number **Differential Equations 2**: auxiliary equation method for second order differential equations; particular integrals; complementary functions; harmonic motion; damped oscillations; simultaneous differential equations	Exam preparation & external examinations
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, with the applied unit on Mechanics being especially appropriate for this. 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	• A good proportion of the content will be very useful in supporting and reinforcing the A Level Mathematics course • The content learned will support all the mathematical skills needed for Biology, Chemistry and Physics • 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 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 13 Further Mathematics curriculum?			
	Autumn	Spring	Summer
Opportunities to show progress (Assessments)	Weekly homework tasks One P10 assessment per fortnight Autumn 1 test – 1 hour (in class) Autumn 2 Mock – 2 hours (formal)	Weekly homework tasks One P10 assessment per fortnight Spring Mock exam – 2.5 hours (formal)	Weekly homework tasks One P10 assessment per fortnight
Impact on personal development (SMSC)	Studying Further 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. Complex problems are not daunting to Further Mathematics students, who usually thrive on challenge. These will prove to be invaluable skills, both during education and in employment.		
Preparation for the next stage of education	Studying Further Mathematics will ensure that students are better prepared to make the transition to higher education and will certainly have a positive effect on their performance in A Level Mathematics due to the development of techniques and additional practice. A Level Further Mathematics is a preferred option for some university courses and studying it can make a university application stand out. Students also gain valuable confidence in being able to approach difficult problems independently, which will help them succeed in a broad range of subjects.		