Year 13 Curriculum Overview

Rationale: The Year 13 curriculum is designed to continue to develop students' knowledge at KS5, introducing new concepts in trigonometry, coordinate geometry, algebra, calculus, vectors, statistics, and mechanics. Students are exposed to a wide range of exam style questions and further refinements of their learning as the year progresses to successfully prepare them for their A Levels and any further education.

Term/Length of Time	Outline	Assessment/Teacher Feedback Opportunities	Homework and Literacy resources
Autumn 2 lessons a week for 2-3 weeks	**Lessons taught by 2x teacher** Pure mathematics has a lot of problem solving throughout the course, which will often link knowledge of several topics together. Students also need to consider applications of their learning, often through use and criticism of a mathematical model. This process clearly makes links to other STEM subjects. **PURE** **Sequences and Series** Students build on material covered in Year 12 on arithmetic and geometric series, considering	Assessments are 1 hour papers, worth around 50 marks. Most questions in an assessment will be on the topic(s) given in the title, but prior learning is also tested to help to assess whether a topic may need additional consolidation.	**Minimum homework expectation - to be set on G4S** One piece of home learning lasting roughly an hour per lesson. These are self-marked, but teachers will check that they have been completed and that pupils do understand the content, and know how to correct any errors. FAR (Feedback, Action, Response) tasks are set roughly once per unit (twice for longer units) covering key concepts. These contain 20-30 marks worth of exam style questions on the topics, including a question which requires pupils to explain or critique a problem solving process. These are marked by teachers, with time given in a later lesson for pupils to refine their work and act on feedback. For Statistics, the Large Data Set is a set of data from a number of weather stations both in the UK and internationally. Exam questions are set on this to assess pupil's ability to apply their statistical knowledge in context. There are many terms specific to this that pupils need to be aware of which are outlined on a summary page for them. Additionally all material taught is linked at some point to the Large Data Set. A copy of the Large Data Set can be found on the Digital Learning Hub. **Links to aid revision** **Sequences and Series** Maths Genie Arithmetic Sequences Qns Maths Genie Arithmetic Sequences Solns Maths Genie Geometric Series Qns Maths Genie Geometric Series Solns

2 lessons a week for 3 weeks	the sum to infinity of a series as well as periodic sequences and recurrence relations. **<u>Trigonometric Functions</u>** Students apply the knowledge of trigonometric equations, graphs, and identities they have covered in year 12 to the new functions sec, cosec, and cot, as well as considering the functions arcsin, arccos, and arctan.	Assessment 1a – Sequences and Series. Feedback and checklist given.	Students are expected to fully complete every question from the Chapter Exercises in the textbook. **<u>Links to aid revision</u>** **<u>Trigonometric Functions</u>** <u>Maths Genie sec cosec cot Qns</u> <u>Maths Genie sec cosec cot Solns</u> <u>Maths Genie Trigonometric Identities Qns</u> <u>Maths Genie Trigonometric Identities Solns</u> Students are expected to fully complete every question from the Chapter Exercises in the textbook. **<u>Literacy resources</u>** Bob's Blunders - short activities incorporated into lessons which require pupils to critique poorly written solutions which show insufficient literacy skills. **<u>Optional Additional reading</u>** The Beauty of Numbers in Nature – Ian Stewart
Autumn	**Lessons taught by 2 x teacher** **Statistics** There is a focus throughout the unit on applying knowledge in context, linking to the Large Data Set, and considering how the maths links to real world scenarios. Statistics in general has clear links to data collection in		

	Psychology and Sociology which can be bought out for pupils studying this. There are also links that can be made to pure content on binomial expansion and integration.		
2 lessons a week for 1-2 weeks	**Regression, Correlation and Hypothesis Testing** Students apply their knowledge on linear laws from the exponentials and logarithms units in year 12 to scatter graphs. Students also build on their knowledge of hypothesis testing for a Binomial distribution, looking at testing for correlation between 2 variables.		**Links to aid revision** **Regression Correlation and Hypothesis Testing** Maths Genie Correlation Hyp testing Qns Maths Genie Correlation Hyp Testing Solns Maths Genie Non-linear Regression Qns Maths Genie Non-linear Regression Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook.
2 lessons a week for 4-5 weeks	**The Normal Distribution** Students covered the Binomial distribution in year 12, and this is now extended to cover the Normal distribution. They will cover how to calculate probabilities and complete hypothesis tests as well as considering sample means and standard error.		**Links to aid revision** **Normal Distribution** Maths Genie Normal Distribution Qns Maths Genie Normal Distribution Solns Maths Genie Normal to Approx Binoimial Qns Maths Genie Normal to Approx Binomial Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook.

		Full statistics exam paper covering all areas of the course once statistics content has all been delivered.	**Literacy resources** Bob's Blunders - short activities incorporated into lessons which require pupils to critique poorly written solutions which show insufficient literacy skills. **Optional Additional reading** The Weather Machine – Andrew Blum
Autumn 3 lessons a week for 2 weeks	**Lessons taught by 3x teacher Pure** **Algebraic Methods** Students build on their work on proof from year 12, covering proof by contradiction and manipulation of algebraic fractions, including partial fractions.	Assessment 1b – Algebraic Methods. Feedback and checklist given.	**Links to aid revision** **Algebraic Methods** Maths Genie Partial Fractions Qns Maths Genie Partial Fractions Solns Maths Genie Proof by Contradiction Qns Maths Genie Proof by Contradiction Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook.

3 lessons a week for 1-2 weeks	**Radians** Students recap radians, arc length and sector area from year 12, as well as solving trigonometric equations and problems involving the small angle approximations.		**Links to aid revision** **Radians** Maths Genie Small Angle Approximations Qns Maths Genie Small Angle Approximations Solns Maths Genie Radians Qns Maths Genie Radians Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook.
3 lessons a week for 2 weeks	**Functions** Students build on knowledge of composite and inverse functions from GCSE, by considering the domain and range of a function as well as equations and graphs of the modulus function under given transformations. There are a lot of links in this unit with use of graphs to solve equations, particularly in trigonometry.		**Links to aid revision** **Functions and Graphs** Maths Genie Functions Qns Maths Genie Functions Solns Maths Genie Transforming Graphs Qns Maths Genie Transforming Graphs Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook.
3 lessons a week for 1-2 weeks	**Vectors** Students build on their knowledge of vectors in year 12, linking it to Newton's second law of motion and considering 3D vectors.		**Links to aid revision** **Vectors** Maths Genie 3D Vectors Qns Maths Genie 3D Vectors Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Links to aid revision**

3 lessons a week for 2 weeks	**Trigonometry and Modelling** Students cover the compound angle formulae, leading to the double and triple angle formulae. This is applied to graphs, equations, and identities, and modelling with harmonic form.		**Trigonometry and Modelling** Maths Genie Double Angle Formulae Qns Maths Genie Double Angle Formulae Solns Maths Genie Harmonic Form Qns Maths Genie Harmonic Form Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Literacy resources** Bob's Blunders - short activities incorporated into lessons which require pupils to critique poorly written solutions which show insufficient literacy skills. **Useful websites** The following websites will greatly benefit students learning and understanding of the course: • https://www.desmos.com/calculator ○ Graphing software package **Optional Additional reading** The Code Book – Simon Singh
Autumn	**Lessons taught by 3x teacher Mechanics** There is a lot of emphasis on use of modelling to solve real world problems, with clear links to Physics.		**For Autumn Term Pure and Mechanics** One piece of home learning lasting roughly an hour per lesson covering chapters 5 and 7 of the Applied textbook. FAR tasks covering key concepts in each of the units.

3 lessons a week for 2 weeks	**Forces and Friction** Students build on work on resolving forces from year 12. Friction is now formally calculated rather than given as a resistive force, and where objects are on a slope instead of a horizontal plane.		**Links to aid revision** **Forces and Friction** Maths Genie Forces and Friction Qns Maths Genie Forces and Friction Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook.
3 lessons	**Application of Forces** Students combine knowledge of forces and friction with the ideas of connected particles and moments covered in previous units. This is a culmination of all work in Mechanics on forces.		**Links to aid revision** **Application of Forces** Maths Genie Connected Particles Qns Maths Genie Connected Particles Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Literacy resources** Bob's Blunders - short activities incorporated into lessons which require pupils to critique poorly written solutions which show insufficient literacy skills. **Optional Additional reading** A Brief History of Mathematics - Marcus du Sautoy (BBC audio)

1-2 week window	**Lessons taught by both teachers** Autumn Mock	Year 13 Autumn mock covering all pure content taught to date. Feedback and analysis given.	**Links to aid revision:** Past paper Questions Additional materials are available on the Digital Learning Hub.
Spring 2 lessons a week for 3-4 weeks 2 lessons a week for 2-3 weeks 2 lessons a week for 2 weeks	**Lessons taught by 2x teacher Pure** **Parametric Functions** This unit builds on knowledge of graphs and equation solving. Students cover how to convert between Cartesian and parametric functions, as well as sketching graphs and modelling with parametric functions. Students also cover parametric differentiation. **Numerical Methods** Students cover numerical methods of equation solving and integration, including the Newton-Raphson Method and the Trapezium rule. **Binomial Expansion** Students build on the binomial expansion covered in Year 12,		**Links to aid revision** **Parametric Functions** Maths Genie Parametric Equations Qns Maths Genie Parametric Equations Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Links to aid revision** **Numerical Methods** Maths Genie Iteration Qns Maths Genie Iteration Solns Maths Genie Newton-Raphson Qns Maths Genie Newton-Raphson Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Links to aid revision** **Binomial Expansion** Maths Genie Binomial Expansion Qns Maths Genie Binomial Expansion Solns

2 lessons a week for 2-3 weeks	looking at expansions taken to negative and fractional powers, as well as using knowledge of partial fractions to expand more complex functions. **Integration B** Students build on the content covered in Integration A, with a particular focus on differential equations. Student will learn how to solve differential equations using the integration techniques they have learnt, and apply this knowledge to contextual models.		Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Links to aid revision** **Integration B** Maths Genie Differential Equations Qns Maths Genie Differential Equations Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Literacy resources** Bob's Blunders - short activities incorporated into lessons which require pupils to critique poorly written solutions which show insufficient literacy skills. **Useful websites** The following websites will greatly benefit students learning and understanding of the course: • https://www.drfrostmaths.com/sow.php?year=A%20Level%202017&term=Pure%202 ○ Complete set of powerpoints on the whole of Pure Mathematics 2 • https://www.desmos.com/calculator

			○ Graphing software package **Optional Additional reading** The Tiger that Isn't: Seeing Through a World of Numbers: Andrew Dilnot and Michael Blastland
Spring 1 lesson plus home learning	**Lessons taught by 2x teacher Statistics** **Review of Probability** This time is used to ensure that pupils are confident with the material covered on probability in year 12.		**Links to aid revision** **Probability** Maths Genie Probability Qns Maths Genie Probability Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Literacy resources** Bob's Blunders - short activities incorporated into lessons which require pupils to critique poorly written solutions which show insufficient literacy skills.
Spring 3 lessons a week for 3-4 weeks	**Lessons taught by 3x teacher Pure** **Differentiation** Students build on their knowledge of differentiation in year 12. They cover differentiation of trigonometric		**Links to aid revision** **Differentiation** Maths Genie Trigonometric Differentiation Qns Maths Genie Trigonometric Differentiation Solns Maths Genie Implicit Differentiation Qns Maths Genie Implicit Differentiation Solns

3 lessons a week for 3 weeks	and exponential functions as well as logarithms. Students also cover implicit differentiation and the idea of convex and concave functions.
	
	Integration A
	
	Students consolidate and build on the work in year 12, looking at use of standard integrals and trigonometric identities. Students also cover integration by substitution and parts, and use of partial fractions in integration.
			Students are expected to fully complete every question from the Chapter Exercises in the textbook.
			
			Links to aid revision
			
			Integration
			Maths Genie Integration by Substitution Qns
			Maths Genie Integration by Substitution Solns
			Maths Genie Trigonometric Integration Qns
			Maths Genie Trigonometric Integration Solns
			
			Students are expected to fully complete every question from the Chapter Exercises in the textbook.
			
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			• https://www.desmos.com/calculator
			  ○ Graphing software package
			
			Optional Additional reading
			
			The Calculus Story: A Mathematical Adventure – David Acheson

Spring 3 lessons a week for 1-2 weeks	**Lessons taught by 3x teacher Mechanics** **Projectiles** Students apply their knowledge of suvat to problems with projectiles which have both horizontal and vertical components to their motion.		**Links to aid revision** **Projectiles** Maths Genie Projectiles Qns Maths Genie Projectiles Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook.
3 lessons a week for 1-2 weeks	**Kinematics** Students cover use of vectors to set up problems both with constant acceleration and non-constant acceleration.		**Links to aid revision** **Kinematics** Maths Genie Kinematics with Vectors Qns Maths Genie Kinematics with Vectors Solns Maths Genie Kinematics with Calculus Qns Maths Genie Kinematics with Calculus Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook.
4 lessons	**Moments** Students cover calculation of moments with applications to problems with hinges and ladders.	Full Mechanics exam paper covering all Mechanics content. Feedback and analysis given.	**Links to aid revision** **Moments** Maths Genie Moments Qns Maths Genie Moments Solns Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Literacy resources** Bob's Blunders - short activities incorporated into lessons which require pupils to critique poorly written solutions which show insufficient literacy skills.

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			  ○ Complete set of powerpoints on the whole of Mechanics 2
			• https://www.desmos.com/calculator
			  ○ Graphing software package
			
			Optional Additional reading
			
			Humble Pi: A Comedy of Maths Errors – Matt Parker

Summer 5 lessons a week from when all material in the course has been delivered.	**General Revision (both teachers)** Revision and consolidation of content covered through the year, based on prior performance on all content within the course.		**For Summer Term** **Links to aid revision:** Past paper Questions Additional materials are available on the Digital Learning Hub.