Year 12 Curriculum Overview

Rationale: The Year 12 curriculum is designed to extend student's knowledge from Key Stage 4, introducing new concepts in algebra, calculus, coordinate geometry, trigonometry, vectors, statistics, and mechanics. Over time students will see the links between the various concepts and topics and be able to answer multi-step problems covering a range of new learning. This year will provide a solid foundation for future progress in Key Stage 5 and their problem solving skills.

Term/Length of Time	Outline	Assessment/Teacher Feedback Opportunities	Homework and Literacy resources
Autumn 4 lessons	**Lessons taught by 3x Teacher** 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. **STATISTICS** **1. <u>Statistical Sampling</u>** Students will cover the language of sampling together with applying and criticising sampling methods.	*Over the course of year 12, pupils sit three baseline tests to establish what topics they may need to catch up on from GCSE. Additional work is set based on performance in these baselines. 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.* Baseline test – Statistics	**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 students 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. The Year 11 to 12 bridging unit, found on the Digital Learning Hub, provides specific short tests to assess how A-level ready you are. **<u>Links to aid revision</u>** Statistical sampling Maths Genie Sampling Qns Maths Genie Sampling Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.

4 lessons	**2. Probability** Students will build on probability covered in GCSE, covering calculating probability from tables, trees, and Venn diagrams, as well as conditional probability.		**Links to aid revision** Probability Maths Genie Probability Qns Maths Genie Probability Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.
4 lessons	**3. Statistical Measures** Students will consolidate and build on calculations with data covered in GCSE, including linear interpolation, linear coding, standard deviation, and variance.		**Links to aid revision** Statistical Measures Maths Genie Standard Deviation Qns Maths Genie Standard Deviation Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.
4 lessons	**4. Statistical Distributions** Students will cover the idea of a distribution, focussing on discrete distributions, including the Binomial distribution. This will be built on in year 13 when the Normal distribution is covered.		**Links to aid revision** Statistical Distributions Maths Genie Discrete Random Variables Qns Maths Genie Discrete Random Variables Solutions 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** The Beauty of Numbers in Nature – Ian Stewart The Weather Machine – Andrew Blum

Autumn 3 lessons per week for 2 weeks 3 lessons per week for 1-2 weeks 3 lessons per week for 2 weeks	**PURE** In Pure mathematics, there is 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. **1. <u>Coordinate Geometry</u>** Students will consolidate and build on GCSE knowledge on equations of lines and circles, tangents, and normals to a circle. **2. <u>Sequences</u>** Students will cover expanding binomials to any natural power, as well as summations of arithmetic and geometric progressions, which builds on their work on linear and quadratic nth term from GCSE. **3. <u>Further Algebra</u>** Students will build on the topics covered in the Algebra, Functions and Proof unit (covered with the other teacher), which will lead to them being able to solve cubic	Assessment 1a – Statistical Sampling and Coordinate Geometry – feedback and checklist given Assessment 2a – Probability and Further Algebra	**<u>Links to aid revision</u>** Coordinate Geometry Maths Genie Coordinate Geometry Qns Maths Genie Coordinate Geometry Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook. **<u>Links to aid revision</u>** Binomial Maths Genie Binomial Qns Maths Genie Binomial Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook. **<u>Links to aid revision</u>** Further Algebra Maths Genie Further Algebra Qns Maths Genie Further Algebra Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.

	equations, using algebraic long division and the Factor Theorem to aid in this. They will also cover various methods of mathematical proof, building on the ideas of proof they have covered at GCSE.		
Autumn 2 lessons per week for 4 weeks 2 lessons per week for 5 weeks	**Lessons Taught by 2x Teacher PURE** **1. <u>Algebra, Functions and Proof</u>** Students will consolidate and build on GCSE learning on quadratic equations and inequalities, simultaneous equations, sketching graphs, transformations of graphs, the discriminant of a quadratic expression, and set notation. **2. <u>Differentiation</u>** Students will cover differentiation of polynomials, as well as applications to tangents, normals, and stationary points. This builds on the content covered by the other teacher in the Coordinate Geometry unit, as well as GCSE work with equations and formulae.	Baseline test – algebra Assessment 1b – Algebra, Functions, and Proof Assessment 2b – Differentiation Baseline test – trigonometry and vectors	**For Autumn Term Pure and Mechanics** **<u>Links to aid revision</u>** Functions Maths Genie Proof Qns Maths Genie Proof Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook. **<u>Links to aid revision</u>** Differentiation Maths Genie Differentiation Qns Maths Genie Differentiation Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.

2 lessons per week for 4 weeks	Differentiation from first principles will be covered as well as modelling with differentiation to solve problems such as the max-box problem. 3. **Integration** Students will cover how to integrate a polynomial using both definite and indefinite integration, and how to apply this to find areas of regions bounded by lines and/or curves, building on their work on finding area under a curve from GCSE.		**Links to aid revision** Integration Maths Genie Integration Qns Maths Genie Integration Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.
Spring 3 lessons per week for 2 weeks 3 lessons per week for 2 weeks	**Lessons taught by 3x Teacher STATISTICS** **1. Hypothesis Testing** Students will cover one tailed and two tailed hypothesis testing for the Binomial distribution. **2. Statistical Graphs** Students will consolidate and build on GCSE knowledge of drawing and interpreting histograms, box and whisker diagrams, and scatter graphs.		**For Spring Term Pure and Statistics** **Links to aid revision** Hypothesis Testing Maths Genie Hypothesis Testing Qns Maths Genie Hypothesis Testing Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Links to aid revision** Statistical Graphs Maths Genie Histograms Qns Maths Genie Histograms Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.

Spring 2 lessons 3 lessons per week for 2-3 weeks	**Lessons Taught by 3x Teacher PURE** **1. <u>Modelling with Linear and Quadratic Functions</u>** Students will apply their knowledge of linear, simultaneous and quadratic equations from GCSE, setting up a linear or quadratic model for a given situation, as well as using contextual information to critique a model. **2. <u>Exponentials and Logarithms</u>** Building on their knowledge of indices and exponential graphs from GCSE, as well as their work on differentiation, students will cover the exponential function and the gradient of this, calculating logarithms, and applying the laws of logarithms to simplify an expression. They will also cover solving equations involving exponentials or logarithms, and using a linear graph to model an exponential function.	Year 12 mock exam, covering major aspects of all pure content to date.	**For Spring Term Core and Mechanics** **<u>Links to aid revision</u>** Modelling – see modelling section Students are expected to fully complete every question from the Chapter Exercises in the textbook. **<u>Links to aid revision</u>** Exponentials and Logarithms Maths Genie Logarithms Qns Maths Genie Logarithms Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.
Spring	**Lessons Taught by 2x Teacher MECHANICS**		**For Spring Term Pure and Mechanics**

2 lessons per week for 2-3 weeks	There is a lot of emphasis on use of modelling to solve real world problems, with clear links to Physics. **1. <u>Introduction to Mechanics and Kinematics</u>** Students will cover modelling assumptions and force diagrams together with appropriate SI units and vector quantities. Students will also cover how to derive and apply the suvat formulae for problems involving constant acceleration, linking this with knowledge of displacement time graphs and velocity time graphs covered at GCSE.		One piece of home learning lasting roughly an hour per lesson covering chapters 8 and 9 of the Applied textbook. **<u>Links to aid revision</u>** Introduction Maths Genie SUVAT Qns Maths Genie SUVAT Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.
Spring 2 lessons a week for 2-3 weeks	**Lessons Taught by 2x Teacher PURE** **1. <u>Vectors</u>** Students will consolidate and build on GCSE knowledge on vectors. New material covered includes use of i and j notation for unit vectors, calculating the magnitude and direction of a vector, and 2D proofs with vectors.	Year 12 mock exam, covering major aspects of all pure content to date	**For Spring Term Pure and Mechanics** One piece of home learning lasting roughly an hour per lesson covering chapter 11 of the Pure textbook. **<u>Links to aid revision</u>** Vectors Maths Genie Vectors Qns Maths Genie Vectors Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.

Summer 3 lessons a week for 1-2 weeks	**Lessons Taught by 3x Teacher PURE** **1. <u>Differentiation</u>** Students will build on earlier knowledge of differentiation, using the chain rule, product rule, and quotient rule to differentiate more advanced functions, and learning how to differentiate trigonometric and exponential functions. Revision and consolidation of content covered through the year, based on prior performance in each of the AS units covered to date.	Year 12 progression exam, covering major aspects of all AS level material to date.	**For Summer Term Pure and Statistics** One piece of home learning lasting roughly an hour per lesson covering the first section of chapter 9 of the Pure textbook. **<u>Links to aid revision</u>** Differentiation Maths Genie Differentiation Qns Maths Genie Differentiation Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.
Summer 2 lessons a week for 3 weeks	**Lessons Taught by 2x Teacher PURE** **1. <u>Trigonometry</u>** Students will build on knowledge covered at GCSE, focussing on trigonometric graphs, equations, and identities, as well as covering A level content on radians (a		**For Summer Term Pure and Mechanics** One piece of home learning lasting roughly an hour per lesson covering chapters 9 and 10 of the Pure textbook. **<u>Links to aid revision</u>** Trigonometry Maths Genie Trigonometry Qns Maths Genie Trigonometry Solutions

	different way to measure an angle), arc length, and sector area.		Students are expected to fully complete every question from the Chapter Exercises in the textbook.
Summer	**Lessons Taught by 2x Teacher** **MECHANICS** **1. Newton's Laws of Motion** Building on their knowledge of force diagrams and suvat from earlier, students cover Newton's 3 laws of motion, applying them to problems involving connected particles and pulleys. **2. Variable Acceleration** Building on their work on differentiation and integration, students cover use of calculus to solve kinematic problems where acceleration is not constant.		**For Summer Term Pure and Mechanics** **Links to aid revision** Laws of Motion Maths Genie Laws of Motion Qns Maths Genie Laws of Motion Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook. **Links to aid revision** Variable Acceleration Maths Genie Discrete Variable Acceleration Qns Maths Genie Discrete Variable Acceleration Solutions Students are expected to fully complete every question from the Chapter Exercises in the textbook.
Summer 3-5 lessons per week for 4-6 weeks	**General Revision (both teachers)** Revision and consolidation of content covered through the year, based on prior performance in each of the AS units covered to date.	Year12 progression exam, covering major aspects of all AS level material to date.	**For Summer Term** Regular exam practice using past papers set both in class and at home. **Links to aid revision:** Past paper Questions Additional materials are available on the Digital Learning Hub