



MATHEMATICS CURRICULUM MAP

Intent:

All students make progress in maths which is brought about by quality first teaching in the classroom where all students can experience success.

At Key Stage 3, our focus is on providing a robust pre-GCSE curriculum that ensures students master the fundamentals of mathematics. We emphasize deep conceptual understanding over rote memorisation, adopting a mastery approach. This involves exposing students to various representations that illustrate the structure of mathematical concepts before transitioning to more abstract methods to build fluency. We firmly believe that all students can excel in mathematics, so our tasks are designed to foster resilience, curiosity, and problem-solving skills, preparing them to confidently progress in their learning journey.

At Key Stage 4, during the two years of studying the GCSE syllabus, students will deepen and consolidate their understanding by exploring and investigating key mathematical ideas. Through carefully selected tasks, students will delve into all major areas of mathematics, pushing each student to their potential. Decisions about progression are based on students' readiness to move on to the next stage. Pupils are being stretched through depth rather than breadth, by providing them with rich and sophisticated problems before any acceleration through new content in preparation for the next stage of their education. Students who are not sufficiently fluent will have the opportunity to strengthen their understanding through additional practice, reteaching, and access to a maths clinic before progressing to a different topic.

Key stage 4: GCSE

YEAR 10						
Key Knowledge	<ul style="list-style-type: none"> • Surds • Functions • Quadratic equations 	<ul style="list-style-type: none"> • Graphs • Circle theorems • Trigonometry 	<ul style="list-style-type: none"> • Linear inequalities • Quadratic inequalities • Linear simultaneous equations 	<ul style="list-style-type: none"> • Equation of a circle • Non-linear simultaneous equations • Sequences • Iterative processes 	<ul style="list-style-type: none"> • Indices • Congruence and similarity • MOCK EXAM 	<ul style="list-style-type: none"> • Statistics • Probability
Key Subject Skills	<p>This term, students will broaden their understanding of numbers to include the simplification and manipulation of surds, which will later be applied in calculations involving shapes and angles. They will also enhance their algebraic skills, with a particular emphasis on quadratic equations and functions. Students will explore three methods of solving quadratic equations:</p>	<p>Students will revisit linear graphs and explore non-linear graphs and their equations. They will practice matching equations to their corresponding graphs and identify important features such as roots and turning points, which they have previously determined through algebraic methods. Additionally, they will use circle theorems and their prior knowledge of angle rules to find missing</p>	<p>Students will expand their knowledge of solving quadratic equations to include inequalities. They will learn to plot inequalities on number lines and identify regions on a graph bounded by multiple inequalities. Additionally, students will develop the skills to solve equations involving more than one unknown, modelling real-life situations where there are two</p>	<p>This term, students will learn how equations can represent circles in the Cartesian plane. They will revisit their Term 1 knowledge of solving quadratic equations and extend these skills to non-linear simultaneous equations. Additionally, students will explore various patterns that define different types of sequences (linear, Fibonacci, geometric, quadratic) and use algebraic notation to</p>	<p>The laws of indices empower students to manipulate expressions involving powers more efficiently than fully expanding them. These laws encompass negative and fractional powers introduced in earlier stages (KS3). Understanding congruence and similarity enables students to determine missing angles and sides by comparing shapes. Moreover, students</p>	<p>Statistics empower students to critically analyse the data they encounter in everyday life. They will engage with the statistical cycle, a method used for conducting investigations. Exploring various types of diagrams such as pie charts, time series, frequency polygons, cumulative frequency, and histograms, students will learn effective ways to present their</p>

	<p>factorising, using the quadratic formula, and completing the square. Additionally, they will cover the use of inverse functions and composite functions.</p>	<p>angles without a protractor. Building on their previous study of trigonometry in right-angled triangles, students will now learn to apply trigonometric rules to any type of triangle.</p>	<p>unknown quantities and at least two pieces of information.</p>	<p>formulate the rules for these sequences.</p>	<p>will enhance their ability to construct formal proofs within geometric contexts, which prepares them to effectively communicate mathematical ideas with others.</p>	<p>findings. Additionally, students will deepen their comprehension of probability, gaining insights into chance and variability in real-life scenarios. While statistics addresses uncertainty, probability offers a precise mathematical framework for its study.</p>
<p>Personal development:</p> <ul style="list-style-type: none"> • RSE • Online safety • Enrichment 	<p>Maths lessons support the broader goals of RSE by helping students develop not only mathematical skills essential for functioning in society but also important life skills related to relationships, respect, and ethical decision-making. In math lessons, students will engage in respectful discussions, listen to others' viewpoints, and provide constructive feedback. They will be encouraged to present their mathematical findings to the class, fostering clear and respectful communication. Teachers will actively work on building students' confidence in their mathematical abilities, positively impacting their overall self-esteem and personal relationships. Additionally, when appropriate, questions will involve real-life scenarios related to relationships and personal finance, such as budgeting for a family and understanding loans and interest rates. Finally, lessons will encourage collaborative problem-solving and group work to promote teamwork and communication skills.</p> <p>Enrichment opportunities:</p> <p>Pupils are offered the opportunity to take part in the Intermediate Mathematics Challenge run by UKMT and may qualify for subsequent rounds.</p> <p>Pupils are offered the chance to take part in courses run by the University of Kent or AMSP to look at further applications of Mathematics in the real world.</p> <p>Students participate in a competition to complete the most independent work on Sparx in order to address their areas of improvement after each assessment. The highest achievers will be rewarded with a trip to an escape room to further enhance their analytical and problem-solving skills.</p> <p>We run a chess club every lunch time and students have the opportunity to take part in chess competitions.</p> <p>Students in the top set will be taking an additional GCSE, the AQA Level 2 Further Maths, to deepen their understanding of mathematics and bridge the gap between GCSE and A Level.</p> <p>Disneyland Maths Live Conference</p>					

Connections with careers

Physics: Physicists use quadratic equations to describe the motion of objects under gravity, wave functions, and other phenomena. Surds can appear in solutions to equations involving square roots.

Computer Science: Computer scientists and software developers use functions and quadratic equations in algorithms, coding, and data analysis. Surds can be part of algorithmic design and cryptography.

Finance: Financial analysts and actuaries use functions and quadratic equations to model economic behaviours, calculate compound interest, and assess risks.

Surveying and Cartography: Surveyors and cartographers use graphs and trigonometry to map terrain, measure distances, and plot geographical data accurately. Circle theorems can be relevant in surveying land boundaries and angles.

Physics and Astronomy: Physicists and astronomers use graphs to represent data from experiments and observations. Circle theorems are applied in celestial mechanics and optics. Trigonometry is crucial for calculating distances, angles, and positions of celestial objects.

Engineering: Engineers frequently encounter linear and quadratic inequalities when designing systems and optimising processes. Linear simultaneous equations are used to solve for multiple variables in complex systems, ensuring efficiency and stability in engineering solutions.

Economics and Finance: Economists and financial analysts use inequalities and simultaneous equations to model economic behaviours, analyse markets, and optimise resource allocation. These tools are essential for understanding constraints and making informed decisions in economic forecasting and financial planning.

Biomedical Engineering: Biomedical engineers apply the equation of a circle in medical imaging and signal processing. Non-linear simultaneous equations are used in modelling physiological systems and analysing biological processes. Sequences and iterative processes are used in modelling biological systems and optimizing treatment plans.

Computer Graphics and Animation: Professionals in computer graphics and animation use the equation of a circle for drawing curves and shapes. Non-linear simultaneous equations are applied in modelling complex animations and simulations.

Robotics and Automation: Engineers and researchers in robotics use indices in control systems and algorithm development. Congruence and similarity are used in robot vision and spatial recognition tasks to navigate environments and manipulate objects accurately.

Medical Imaging: Professionals in medical imaging use indices in image processing algorithms and data analysis. Congruence and similarity are applied in anatomical measurements and comparison of medical images for diagnosis and treatment planning.

Data Science and Analytics: Data scientists and analysts use statistics and probability to extract insights from large datasets. They apply statistical methods to analyse trends, predict outcomes, and make data-driven decisions in various industries such as healthcare, finance, and marketing.

Market Research: Market researchers use statistics and probability to gather and analyse data on consumer preferences, market trends, and economic indicators. They use statistical methods to interpret survey results and forecast market conditions.

Home support	<p>Following each assessment, students will receive a feedback sheet that identifies their strengths and areas for improvement. It is important to encourage your child to utilise this feedback effectively and promptly address any gaps in their understanding. Students have access to the following online platforms for support:</p> <p>Sparx – independent learning Maths genie - https://mathsgenie.co.uk/ Corbettmaths- https://corbettmaths.com/ On Maths - https://www.onmaths.com/</p> <p>These platforms offer a range of resources and tools to help students revise and reinforce their understanding of mathematics at different levels of complexity. Students have been demonstrated in class how to use these tools effectively.</p>
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YEAR 11						
Key Knowledge	<i>Content for all students</i>					
	<ul style="list-style-type: none"> • Volume and surface area • Direct and inverse proportion • Bounds • Ratio <p style="color: red; font-size: small;">*subject to change, depending on how students are progressing</p>	<ul style="list-style-type: none"> • Algebraic fractions • Proof • Transformations of functions • MOCK EXAM 	<ul style="list-style-type: none"> • Gradients of curves • Area under curves • Vectors • Review and consolidation 	<ul style="list-style-type: none"> • Review and consolidation 	<ul style="list-style-type: none"> • Review and consolidation 	<ul style="list-style-type: none"> • Review and consolidation
	<i>The following topics are to be taught when studying the Further Maths Level 2 qualification (set 1). Students will be moving through the content at an accelerated pace.</i>					

		<ul style="list-style-type: none"> • Differentiation • Matrices 	<ul style="list-style-type: none"> • Binomial expansion • Product rule for counting • Domain and range of a function • Piecewise functions 	<ul style="list-style-type: none"> • The factor theorem • Limiting value of a sequence • Simultaneous equations in three unknowns • Dividing a line in a given ratio • Geometry 1 • Geometry 2 	<ul style="list-style-type: none"> • Review and consolidation 	<ul style="list-style-type: none"> • Review and consolidation
Key Subject Skills	<p>While revisiting the volume and surface area of right prisms, which were covered in Year 9, the primary focus will now shift to Pyramids, Cones (including frustums), and Spheres. This shift will allow students to apply their Pythagorean and trigonometry skills in new contexts. In the area of direct and inverse proportion, the emphasis will be on solving problems algebraically. Calculations involving bounds will be integrated with</p>	<p>Students will have the opportunity to revise their understanding of algebraic manipulation, including solving quadratics, using the difference of two squares, and performing operations with fractions in algebraic contexts. They will learn to argue mathematically to demonstrate the equivalence of algebraic expressions and construct proofs. Additionally, students will review functions and explore graph</p>	<p>A cross-curricular topic that has been covered in science, specifically the gradient of curves and the area under curves, will now be examined from a mathematical perspective. Students will study column vectors, including drawing them, multiplying by a scalar, and combining them, before progressing to constructing proofs with vectors. The required proofs include demonstrating that two lines are parallel</p>	<p>Teachers will focus on addressing any gaps identified in the mock (except set 1).</p>	<p>Teachers will focus on addressing any gaps identified in the mocks.</p>	<p>Teachers will focus on addressing any gaps identified in the mocks.</p>

	<p>volume and surface area problems, as well as compound measures such as speed, density, and pressure. Students will also begin studying ratios, including problems that involve combining and subdividing ratios that were not previously encountered.</p>	<p>transformations using function notation. All content covered up to this point will be assessed in the mock exams. After the mock exams, set 1 students will start the Further Maths Level 2 content.</p>	<p>and proving that a line is straight. Following this, teachers will focus on addressing any gaps identified in the mock exams.</p>			
<p>Personal development:</p> <ul style="list-style-type: none"> • RSE • Online safety • Enrichment 	<p>Maths lessons support the broader goals of RSE by helping students develop not only mathematical skills essential for functioning in society but also important life skills related to relationships, respect, and ethical decision-making. In math lessons, students will engage in respectful discussions, listen to others' viewpoints, and provide constructive feedback. They will be encouraged to present their mathematical findings to the class, fostering clear and respectful communication. Teachers will actively work on building students' confidence in their mathematical abilities, positively impacting their overall self-esteem and personal relationships. Additionally, when appropriate, questions will involve real-life scenarios related to relationships and personal finance, such as budgeting for a family and understanding loans and interest rates. Finally, lessons will encourage collaborative problem-solving and group work to promote teamwork and communication skills.</p> <p>Enrichment opportunities:</p> <p>Pupils are offered the opportunity to take part in the Intermediate Mathematics Challenge run by UKMT and may qualify for subsequent rounds.</p> <p>Pupils are offered the chance to take part in courses run by the University of Kent or AMSP to look at further applications of Mathematics in the real world.</p> <p>We run a chess club every lunch time and students have the opportunity to take part in chess competitions.</p> <p>Students in the top set will be taking an additional GCSE, the AQA Level 2 Further Maths, to deepen their understanding of mathematics and bridge the gap between GCSE and A Level.</p>					

<p>Connections with careers</p>	<p>Architect: Designs buildings and structures, needing to calculate the volume and surface area of spaces.</p> <p>Civil Engineer: Works on infrastructure projects, requiring calculations of volumes for materials and surface areas for construction elements.</p> <p>Nutritionist/Dietitian: Calculates and advises on the ratio of nutrients in diets.</p> <p>Surveyor: Measures land and ensures calculations fall within legal and practical bounds.</p>	<p>Economist: Uses algebraic fractions to model and solve economic problems involving ratios and rates.</p> <p>Computer Scientist: Implements algorithms that may involve algebraic fractions, especially in fields like cryptography and data analysis.</p> <p>Actuary: Uses transformations of functions to model financial risks and insurance calculations.</p>	<p>Meteorologist: Studies weather patterns and changes in atmospheric conditions using gradients.</p> <p>Pharmacokineticist: Studies the concentration of drugs in the body over time, using area under curves to determine exposure levels.</p> <p>Robotician: Programs and designs robots, using vectors to describe movements and orientations.</p>
<p>Home support</p>	<p>Following each assessment, students will receive a feedback sheet that identifies their strengths and areas for improvement. It is important to encourage your child to utilise this feedback effectively and promptly address any gaps in their understanding. Students have access to the following online platforms for support:</p> <p>Sparx – independent learning Mathsgenie - https://mathsgenie.co.uk/ Corbettmaths- https://corbettmaths.com/ On Maths - https://www.onmaths.com/</p> <p>These platforms offer a range of resources and tools to help students revise and reinforce their understanding of mathematics at different levels of complexity. Students have been demonstrated in class how to use these tools effectively.</p>		

Key Stage 5: A levels (Mathematics)

YEAR 12 Mathematics AS	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Key Knowledge	PURE: <ul style="list-style-type: none"> Algebraic Expressions. Quadratics. Equations and Inequalities. Graphs and Transformations. 	PURE: <ul style="list-style-type: none"> Straight line graphs. Circles. Algebraic Methods. 	PURE: <ul style="list-style-type: none"> The Binomial expansion. Trigonometric ratios. Trigonometric identities and equations. 	PURE: <ul style="list-style-type: none"> Differentiation. 	PURE: <ul style="list-style-type: none"> Integration. 	PURE: <ul style="list-style-type: none"> Exponentials and logarithms. Vectors. PURE Yr 13: <ul style="list-style-type: none"> Algebraic Methods. Partial Fractions.
	APPLIED: <ul style="list-style-type: none"> Introduction to LDS Statistical sampling. Measures of location and Spread 	APPLIED: <ul style="list-style-type: none"> Representing data. Correlation Probability 	APPLIED: <ul style="list-style-type: none"> Probability Statistical Distributions. Hypothesis Testing 	APPLIED: <ul style="list-style-type: none"> Modelling in Mechanics Constant Acceleration (SUVAT) 	APPLIED: <ul style="list-style-type: none"> Constant Acceleration (SUVAT) Forces and Newtons Law 	APPLIED: <ul style="list-style-type: none"> Variable Acceleration
Key subjects Skills	PURE: Build on topics introduced at GCSE working with Quadratics, Inequalities and graphical representation. APPLIED: Introduction to dealing with data, starting by learning	PURE: Develop an understanding of coordinate geometry. Investigate the properties of straight-line graphs and their equations. Similarly looking at the links between the graphs of circular functions and their equations.	PURE: Expanding brackets for any power, making use of Pascals Triangle to start. Investigating the properties of Sine, Cosine and Tangent. Using their properties to form identities and solve equations	PURE: Introduction to calculus from first principals to form the gradient function or derivative. Apply the derivative to finding stationary points (Min, Max, Inflection) Using second derivative to classify stationary point, and	PURE: Recognise integration as the reverse process of differentiation. To understand that integration is used to find the area beneath a given curve given boundary values. APPLIED:	PURE: Use the properties of exponentials and logarithms to model situations involving growth and decay. Including areas such as interest payments, population growth, and radioactive decay. APPLIED:

	<p>the methods for collecting data and analysing using statistical measures. Investigating the advantages and disadvantages of each method. Allowing pupils to understand statistical measures used throughout everyday life.</p>	<p>APPLIED: Pupils look at different representations of data as seen throughout everyday life. They can critically analyse these representations to draw conclusions from the data. Pupils will investigate the idea of correlation versus causation. The idea of linear regression and the appropriate use of a line of best fit.</p>	<p>involving those ratios. APPLIED: Investigating the use of probability to model real life situations. Introduction to the Binomial distribution and the use of Hypothesis testing to justify statistical claims.</p>	<p>applying this knowledge to real life models to identify optimal solution to a given problem. APPLIED: Understanding the motion of objects in 1- and 2-dimensional space. The use of Mathematics to model real life situations involving a constant rate of acceleration.</p>	<p>Investigating the effect of Forces on the actions of objects in the real world.</p>	<p>Using the skills of Differentiation and Integration to work with situations involving variable acceleration (a variable rate of change.</p>
<p>Personal development:</p> <ul style="list-style-type: none"> • RSE • Online safety • Enrichment 	<p>Mathematics is a creative and highly interconnected discipline that has been developed over the centuries, providing the solution to some of history’s most intriguing problems. Giving us a greater understanding of the world, we live in, helping us to understand how the world works and to model future possibilities. Studying mathematics allows pupils to explore our world from a different perspective, to see its structure for all its complexities in a mathematical form.</p> <p>Enrichment: Pupils are offered the opportunity to take part in the Senior Mathematics Challenge run by UKMT and may qualify for subsequent rounds. Pupils are encouraged to assist with the year 11 intervention programme, attending after school sessions in paper club. Pupils are offered the chance to take part in courses run by the University of Kent to look at further applications of Mathematics in the real world. Opportunities are provided for pupils who are taking university entrance exams (STEP) to attend AMSP courses to help them prepare. Maths Fest Trip Maths Society</p>					
<p>Connections with careers</p>	<p>The logical thinking, problem-solving and decision-making skills you learn while studying mathematics are a prized asset for any future career. With a growing importance placed on technology, large amounts of data and economic efficiency by all kinds of organisations, an</p>					

	understanding of the mathematical world opens the door to many opportunities. From careers in business, economics and banking. As well as computing, engineering, the sciences and academic research.
Home support	Pupils will have access to the appropriate textbook for reference. All pupils will be given a login to Integral maths, our online platform with learning and assessment resources. All pupils are directed to revision/video sites via links in Teams to aid with study outside of school, but they are also encouraged to attend Maths Clinic in school if extra assistance is required.

YEAR 12 Further Mathematics AS	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Key Knowledge	CORE: <ul style="list-style-type: none"> Complex Numbers Argand Diagrams Series Matrices 	CORE: <ul style="list-style-type: none"> Matrix Transformations Vectors Roots of Polynomials Volumes of Revolution Proof by Induction 	APPLIED: <ul style="list-style-type: none"> Momentum and Impulse Discrete Random Variables Poisson Distribution 	APPLIED: <ul style="list-style-type: none"> Hypothesis Testing Work, Energy and Power Elastic Collisions in one dimension Chi Squared Tests 	Revision and Exams <ul style="list-style-type: none"> Pupils sit AS Further Maths 	CORE: <ul style="list-style-type: none"> Method of differences Maclaurin Series De Moivre's Theorem Methods of Calculus
Key subjects Skills	CORE: Understand what complex numbers are and how to do operations involving these types of numbers. Understand the concept of a complex conjugate and how this can be	CORE: Be able to represent linear transformations using matrices, including rotations, reflections, stretches, enlargements. Be able to find invariant points and invariant	CORE: Understand the principle of the conservation of momentum and the impulse-momentum principle. To be able to apply these principles to solve problems (this does	APPLIED: To be able to use hypothesis testing to test for lambda in the Poisson distribution. This includes finding critical regions for Poisson distributions. Be able to calculate	To be able to solve a dynamic range of problems involving content from all topics covered in Edexcel Core 1 and selected content from Further	CORE: Understand how the method of differences can be applied to find the sum of a finite series. Introduction to the key concepts of A2 Differentiation which will be essential to

	<p>used in calculations. To be able to find the roots of quadratic, cubic and quartic equations where the roots include complex roots. To be able to write the modulus argument form of a complex number and visually represent complex numbers on an Argand diagram. This includes describing loci with complex numbers. Evaluating and simplifying series of terms. Understanding the concept of a matrix and how to do calculations with them for 2x2 and 3x3 matrices. Understand how to find determinants and inverses of matrices and apply this to solve systems of equations. To be able to geometrically interpret the solutions to 3 dimensional</p>	<p>lines under matrix transformations. This includes successive transformations and reverse linear transformations in both 2 and 3 dimensions. Work with vectors of lines and planes in different forms including cartesian and vector. Use scalar product to find the angle between 2 vectors, 2 lines, 2 planes and a line and a plane. Form the equation of planes. Find the perpendicular distance between 2 lines and between a point and either a line or plane. Solve problems using the relationship between roots of quadratic, cubic and quartic equations. Find the equation of polynomials whose roots are a linear transformation of the roots of a given</p>	<p>not include vectors problems at this stage.) To be able to find the expected values of X and X^2 for discrete random variables and use this to find the variance. This should be applied to solving problems involving random variables. Understand how the Poisson distribution can be used to model real world problems. The mean and variance for both the Poisson and the Binomial distributions should be understood, including using the Poisson distribution as an approximation to the Binomial.</p>	<p>work done by a force, kinetic and potential energy of a particle. This should be applied to problem solving involving the conservation of mechanical energy principle and work-energy principle. This includes problems involving power developed by engines. Understand Newton's law of restitution and be able to apply these to calculate change in energy due to an impact or the application of an impulse for single or successive direct impacts. An understanding about how to form hypotheses about how well a distribution fits as a model for an observed frequency distribution. This includes measuring goodness of fit of a model to observed</p>	<p>Mechanics1 and Further Statistics 1.</p>	<p>access the elements of the further maths course, including product rule and differentiating trig functions and logarithms. Investigating how to express functions as an infinite series in ascending powers using the Maclaurin series. Apply this knowledge to find series expansions of compound functions. Recognise how to use complex numbers in exponential form. Understand de Moivre's theorem and how to apply this derive trig identities, find the sum of series. Use complex roots of unity to solve geometric problems. Understand how to evaluate improper integrals, evaluate the mean value of a function. Investigate integration using trig substitutions and partial fractions.</p>
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	simultaneous equations.	polynomial. Apply the principles of proof by induction for proofs of sums, matrices and divisibility.		data. Understand degrees of freedom and be able to use chi-squared family of distributions. This should be able to be applied to goodness-of-fit tests for discrete data. Contingency tables will be used in these processes.		
Personal development: <ul style="list-style-type: none"> • RSE • Online safety • Enrichment 	<p>Mathematics is a creative and highly interconnected discipline that has been developed over the centuries, providing the solution to some of history's most intriguing problems. Giving us a greater understanding of the world, we live in, helping us to understand how the world works and to model future possibilities. Studying mathematics allows pupils to explore our world from a different perspective, to see its structure for all its complexities in a mathematical form.</p> <p>Enrichment: Pupils are offered the opportunity to take part in the Senior Mathematics Challenge run by UKMT and may qualify for subsequent rounds. Pupils are encouraged to assist with the year 11 intervention programme, attending after school sessions in paper club. Pupils are offered the chance to take part in courses run by the University of Kent to look at further applications of Mathematics in the real world. Opportunities are provided for pupils who are taking university entrance exams (STEP) to attend AMSP courses to help them prepare.</p>					
Connections with careers	<p>The logical thinking, problem-solving and decision-making skills you learn while studying mathematics are a prized asset for any future career. With a growing importance placed on technology, large amounts of data and economic efficiency by all kinds of organisations, an understanding of the mathematical world opens the door to many opportunities. From careers in business, economics and banking. As well as computing, engineering, the sciences and academic research.</p>					
Home support	<p>Pupils will have access to the appropriate textbook for reference. All pupils will be given a login to Integral maths, our online platform with learning and assessment resources. All pupils are directed to revision/video sites via links in Teams to aid with study outside of school, but they are also encouraged to attend Maths Clinic in school if extra assistance is required.</p>					

Key Stage 5: Core Maths

YEAR 12 (CORE)	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Key Knowledge	<ul style="list-style-type: none"> Algebra, Graphs and Gradients Percentages 1 Percentages 3 Modelling Shape, Measure and Ratio 	<ul style="list-style-type: none"> Exchanging Currency Standard Form Exponentials and Logarithmic Scales Estimation Risk Probability and Frequency Trees 	<ul style="list-style-type: none"> Statistics 1 Statistics 2 Normal Distributions Sampling and Experiment Design 	<ul style="list-style-type: none"> Correlation and Regression The Problem-Solving Cycle Measures of Location and Spread The Normal Distribution P2 	<ul style="list-style-type: none"> Hypothesis Tests and Correlation Chi-Squared Hypothesis Test 	
Key subjects Skills	<p>Algebra, Graphs and Gradients Plotting and interpreting graphs. Gradients and tangents. Motion graphs. Direct and inverse proportion.</p> <p>Percentages 1 Percentage of amount. Percentage increase/decrease.</p>	<p>Exchanging Currency Using sell at and by at tables.</p> <p>Standard Form Converting in and out of standard form. Standard form on a calculator.</p> <p>Exponentials and Logarithmic Scales Exponential growth and decay. Using a spreadsheet for exponential growth.</p>	<p>Statistics 1 and Statistics 2 The statistical problem-solving cycle. Using averages to summarise data. Types of data (discrete/continuous /numerical/categorical). Grouping discrete data. Interpreting bar charts and pie charts.</p>	<p>Correlation and Regression Differences between correlation and association. Calculating Spearman's rank correlation coefficient. Conduct Spearman's rank correlation hypothesis test.</p>	<p>Hypothesis Tests and Correlation Defining a null and alternative hypothesis for chi-squared test. Understanding differences between 1-tail and 2-tail test. Calculating test statistic for chi-squared hypothesis test.</p>	

	<p>Inflation and index numbers. Annual percentage growth. Reverse percentages. Percentages 3 Compound interest. AER and APR. Costing with spreadsheets. Demand curves. Modelling Fitting mathematical models to data and interpreting their effectiveness. Shape, measures and ratio Calculating area and volume of similar shapes. Converting between different units. Scale drawings and Maps. Health and safety regulations. Plans and elevations.</p>	<p>Using trial and improvement to solve exponential equations. Logarithmic scales. Estimation Rounding and estimating a calculation. Lower and upper bounds. Writing tolerances. Using an appropriate degree of accuracy. Risk Using risk-impact diagrams to assess risk. Writing risk in form 1 to n and as a percentage. Probability and frequency trees Calculating probabilities. Relative frequency. Dependent/independent events. Frequency trees. Screening.</p>	<p>Histograms Cumulative frequency graphs. Box and whisker plots. Normal Distributions Properties of normal distribution (shape, symmetry and skewness). Standard deviation Using z-scores. Normal probability plots. Sampling and Experiment Design Data collection and bias. Different sampling methods and their advantages/disadvantages. Cleaning data.</p>	<p>Using Excel and a calculator to find PMCC. The Problem-Solving Cycle Problem analysis. Using summary statistics (measures of location and spread) to interpret data. Reporting on findings. The Normal Distribution P2/Measures of Location and Spread Standardising a normal distribution and an understanding of Z-values. Using statistical tables to find probabilities. Using experimental probability to check appropriateness of normal model.</p>	<p>Using statistical tables for chi-squared hypothesis test.</p>	
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<p>Personal development:</p> <ul style="list-style-type: none"> • RSE • Online safety • Enrichment 	<p>Mathematics is a creative and highly interconnected discipline that has been developed over the centuries, providing the solution to some of history's most intriguing problems. Giving us a greater understanding of the world, we live in, helping us to understand how the world works and to model future possibilities. Studying mathematics allows pupils to explore our world from a different perspective, to see its structure for all its complexities in a mathematical form.</p> <p>Enrichment:</p> <p>Pupils are offered the opportunity to take part in the Senior Mathematics Challenge run by UKMT and may qualify for subsequent rounds. Pupils are encouraged to assist with the year 11 intervention programme, attending after school sessions in paper club. Pupils are offered the chance to take part in courses run by the University of Kent to look at further applications of Mathematics in the real world. Opportunities are provided for pupils who are taking university entrance exams (STEP) to attend AMSP courses to help them prepare.</p>
<p>Connections with careers</p>	<p>The logical thinking, problem-solving and decision-making skills you learn while studying mathematics are a prized asset for any future career. With a growing importance placed on technology, large amounts of data and economic efficiency by all kinds of organisations, an understanding of the mathematical world opens the door to many opportunities. From careers in business, economics and banking. As well as computing, engineering, the sciences and academic research.</p>
<p>Home support</p>	<p>Pupils will have access to the appropriate textbook for reference.</p> <p>All pupils will be given a login to Integral maths, our online platform with learning and assessment resources.</p> <p>All pupils are directed to revision/video sites via links in Teams to aid with study outside of school, but they are also encouraged to attend Maths Clinic in school if extra assistance is required.</p>

YEAR 13 Mathematics A2	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1
Key Knowledge	<p>PURE:</p> <ul style="list-style-type: none"> • Functions and Graphs. • Sequences and Series <p>APPLIED:</p> <ul style="list-style-type: none"> • Regression, correlation and hypothesis testing. • The normal distribution. 	<p>PURE:</p> <ul style="list-style-type: none"> • Radians • Trigonometric functions • Trigonometry & modelling <p>APPLIED:</p> <ul style="list-style-type: none"> • The normal distribution. • Moments 	<p>PURE:</p> <ul style="list-style-type: none"> • Parametric equations. • Differentiation <p>APPLIED:</p> <ul style="list-style-type: none"> • Forces and Friction • Projectiles 	<p>PURE:</p> <ul style="list-style-type: none"> • Numerical methods • Integration <p>APPLIED:</p> <ul style="list-style-type: none"> • Applications of forces 	<p>PURE:</p> <ul style="list-style-type: none"> • Vectors • Revision <p>APPLIED:</p> <ul style="list-style-type: none"> • Further Kinematics • Revision.
Key subjects Skills	<p>PURE: Introduction to the modulus function and its effect on other functions. Forming and using both composite functions and inverse functions, gaining an understanding of function notation including domain and range.</p> <p>APPLIED: Pupils will learn about correlation, how it is measured and interpreted. They will be asked to interpret a possible line of best fit, linking skills from pure to a real-world interpretation for the</p>	<p>PURE: Making use of the Radian as a measure of angle, and applying skills learnt in year 12 to review and extend understanding of trigonometric functions and their use in modelling real life situations.</p> <p>APPLIED: Pupils continue to work with the normal distribution, applying their knowledge to real life applications in industry. Calculating the probability of various events and carrying out Hypothesis tests to validate statistical conclusions.</p>	<p>PURE: Introduction to equations given in parametric form (in terms of a 3rd variable). Linking the equations together to form a cartesian equation. Extending and deepening understanding of differentiation techniques learned in year 12.</p> <p>APPLIED: In Mechanics pupils will return to forces of motion, building on and refining their understanding further with the introduction of friction into their models. Pupils will learn how a frictional force is calculated and be</p>	<p>PURE: Pupils investigate a numerical approach rather than formulaic approach to solving equations. Identifying the intervals where a solution for an equation may lay, and then employing an iterative approach to further narrow down a potential solution. The focus then returns to integration, looking at how different functions, or forms of function can be integrated. Building on previous learning in year 12.</p> <p>APPLIED:</p>	<p>PURE: Building on and extending their knowledge of vectors from GCSE. Pupils are introduced to i, and j notation. Pupils solve geometric problems using vectors in 2D and 3D situations.</p> <p>APPLIED: As we reach the end of the mechanics course, we return to previous topics but this time working with quantities given in vector form. These topics include constant acceleration problems using SUVAT, Projectiles, and Variable acceleration</p>

	<p>gradient and intercept. They will then carry out hypothesis tests to see if it is appropriate to accept the given correlation as true.</p> <p>Pupils are then introduced to a second probability distribution, used to calculate probabilities based on continuous data.</p>	<p>Pupils will then return to the study of Mechanics. They will begin by moving away from forces of motion on a particle, to studying forces of rotation on a rigid body. Investigating the properties of Moments.</p>	<p>apply this to various situation including horizontal motion, and motion along an inclined slope.</p> <p>Pupils will then move onto the study of projectiles. Building on previous work with the SUVAT equations, pupils will develop equations for projectile motion and velocity. These will be applied in various real-life contexts.</p>	<p>In mechanics we return to static particles, rigid bodies (moments) and connected particles. Building on previous work we now begin to incorporate the concept of friction into our models.</p>	<p>problems involving calculus.</p>
<p>Personal development:</p> <ul style="list-style-type: none"> • RSE • Online safety • Enrichment 	<p>Mathematics is a creative and highly interconnected discipline that has been developed over the centuries, providing the solution to some of history's most intriguing problems. Giving us a greater understanding of the world, we live in, helping us to understand how the world works and to model future possibilities. Studying mathematics allows pupils to explore our world from a different perspective, to see its structure for all its complexities in a mathematical form.</p> <p>Enrichment:</p> <p>Pupils are offered the opportunity to take part in the Senior Mathematics Challenge run by UKMT and may qualify for subsequent rounds. Pupils are offered the chance to take part in courses run by the University of Kent to look at further applications of Mathematics in the real world.</p> <p>Opportunities are provided for pupils who are taking university entrance exams (STEP) to attend AMSP courses to help them prepare.</p>				
<p>Connections with careers</p>	<p>The logical thinking, problem-solving and decision-making skills you learn while studying mathematics are a prized asset for any future career. With a growing importance placed on technology, large amounts of data and economic efficiency by all kinds of organisations, an understanding of the mathematical world opens the door to many opportunities. From careers in business, economics and banking. As well as computing, engineering, the sciences and academic research.</p>				
<p>Home support</p>	<p>Pupils will have access to the appropriate textbook for reference.</p> <p>All pupils will be given a login to Integral maths, our online platform with learning and assessment resources.</p>				

YEAR 13 Further Mathematics A2	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1
Key Knowledge	CORE: <ul style="list-style-type: none"> • Polar Coordinates • Methods of differential equations • Volumes of revolution • Methods of Calculus (cont.) 	CORE: <ul style="list-style-type: none"> • Methods of Differential equations (cont.) • Modelling with differential equations • Hyperbolic Functions • Geometric and Negative Binomial Distributions 	APPLIED: <ul style="list-style-type: none"> • Elastic Strings and springs • Hypothesis Testing • Central Limit Theorem • Chi-Squared Tests 	APPLIED: <ul style="list-style-type: none"> • Elastic collisions in 2 dimensions • Momentum as a vector • Probability Generating Functions • Quality of Tests 	Revision and Exams Pupils sit Further Maths ALevels
Key subjects Skills	CORE: Introduction to how to use polar coordinates including how to convert between polar and cartesian forms. Explore how to sketch curves and how to find areas enclosed by polar curves. Understand how to find tangents to polar curves that are both parallel and perpendicular to the initial line. Introduction to solving first order differential equations using an integrating factor. An complete understanding of solving second order differential	CORE: Full exploration and practice of the key subject skills from Autumn 1 on Methods of differential equations. Investigate how to use first and second order differential equations to model real life situations including: simple harmonic motion, damped and forced oscillations. This modelling should include problems involving coupled first order differential equations. Introduction to the definitions and graphs of hyperbolic functions and	APPLIED: Introduction to using Hooke's Law to solve equilibrium and dynamic problems involving elastic strings and springs. Understand how to find energy stored in string and springs and how this can be used with the conservation of mechanical energy principle and the work-energy principle to solve problems. To be able to use hypothesis testing to test the parameter p in a geometric distribution. This includes finding critical regions for	APPLIED: Build upon existing understanding of collisions in one dimension to be able to solve problems involving the oblique impact of a smooth sphere with a fixed surface or with another sphere. This includes problems involving successive impacts of a sphere with smooth plane surfaces. Extend existing understanding of the impulse-momentum principle and the principle of the conservation of momentum to include problems including vectors. Understand and use probability generating functions for standard distributions. This includes their use to find the	To be able to solve a dynamic range of problems involving content from all topics covered in Edexcel Core 1, Edexcel Core 2, Further Mechanics 1 and Further Statistics 1.

	<p>equations using auxiliary equations, complimentary functions and particular integrals. This includes problems involving boundary conditions. Understand how to evaluate improper integrals, evaluate the mean value of a function. Investigate integration using trig substitutions and partial fractions.</p>	<p>inverse functions. Exploration of hw to prove identities and solve equations involving hyperbolics. Building on this differentiation and integration of hyperbolic functions to be explored. Understand how to calculate the mean and variance of the geometric and the negative binomial distributions.</p>	<p>geometric distributions. Explore and apply the central limit theorem to approximate the sample mean of random variables and apply this to other distributions. Understand how to apply goodness-of-fit tests to geometric distributions.</p>	<p>mean and variance of a distribution. Know the probability generating function of the sum of independent random variables. Explore Type I and Type II errors, and how to find these for the normal distribution. Calculate the size and power of a test and explore how to graph the power function for a test.</p>	
<p>Personal development:</p> <ul style="list-style-type: none"> • RSE • Online safety • Enrichment 	<p>Mathematics is a creative and highly interconnected discipline that has been developed over the centuries, providing the solution to some of history's most intriguing problems. Giving us a greater understanding of the world, we live in, helping us to understand how the world works and to model future possibilities. Studying mathematics allows pupils to explore our world from a different perspective, to see its structure for all its complexities in a mathematical form.</p> <p>Enrichment: Pupils are offered the opportunity to take part in the Senior Mathematics Challenge run by UKMT and may qualify for subsequent rounds. Pupils are offered the chance to take part in courses run by the University of Kent to look at further applications of Mathematics in the real world. Opportunities are provided for pupils who are taking university entrance exams (STEP) to attend AMSP courses to help them prepare.</p>				
<p>Connections with careers</p>	<p>The logical thinking, problem-solving and decision-making skills you learn while studying mathematics are a prized asset for any future career. With a growing importance placed on technology, large amounts of data and economic efficiency by all kinds of organisations, an understanding of the mathematical world opens the door to many opportunities. From careers in business, economics and banking. As well as computing, engineering, the sciences and academic research.</p>				
<p>Home support</p>	<p>Pupils will have access to the appropriate textbook for reference. All pupils will be given a login to Integral maths, our online platform with learning and assessment resources.</p>				