



THE BROMFORDS SCHOOL
ACHIEVE ENRICH PREPARE

The Bromfords School Maths Department. Intent of Curriculum



The Bromfords School

Maths Department.

The intent of Mathematics to prepare the students for life after Bromfords. In doing so, students will develop numeracy and problem-solving skills. Students will learn to communicate mathematically with confidence and to apply what they have learnt to real life situations.

Achieve:

Students will develop conceptual and procedural knowledge through the application of mathematical processes, solving specific problems and investigating mathematical ideas. Students will be given the opportunity to engage in a variety of projects designed to mirror the real world. As students' progress they will develop an understanding and comprehension of mathematical operations, and relations - know what mathematical symbols, diagrams, and procedures mean.

They will further develop their computation skills through carrying out mathematical operations, such as adding, subtracting, multiplying, and dividing numbers flexibly, accurately, efficiently, and appropriately.

Enrich:

Students will leave school having developed an appreciation of how mathematics has shaped the world. They will be equipped to manage and deal with real life scenarios and the ability to apply independent thinking. They will be able to formulate problems using mathematical models and devise strategies for solving them using concepts and procedures appropriately. They will be able to use mathematical reasoning and demonstrate logic to explain and justify a solution.

Prepare:

Studying mathematics will ensure our students develop a good number sense and be able to apply the essential skills required for everyday life, such as money management, an appreciation of inflation verses deflation and mathematical modelling of the real world. Through the curriculum students will be made aware of the role mathematics plays within various professions and the different strands of mathematics. Our students will foster an enthusiasm for Mathematics by being positive role models and promoting a love of the subject.

Entry KS2	Year 7	Year 8	Year 9	Year 10	Year 11	Post-16
<p><u>Knowledge:</u></p> <ul style="list-style-type: none"> • Times tables • Written and mental calculations • Introduce to geometry • Time • Introduction to fractions, decimals and percentages <p><u>Skills:</u> Fluent in the fundamentals of mathematics. Developing reasoning skills and begin to understand mathematical relationships.</p>	<p><u>Knowledge:</u></p> <ul style="list-style-type: none"> • Place Value • Four operations • Positive and negative numbers • Order of operations • Perimeter, area and units • Angles and 2D shapes • Fractions • Fractions, decimals and percentages • Introduction to algebra • Co-ordinates and graphs • Ratio and proportion • Working with data <p><u>Skills:</u> Consolidate their numerical and mathematical capability from KS2 and extend their understanding of the number system and place value. Make connections between number relationships and their algebraic and graphical representation.</p>	<p><u>Knowledge:</u></p> <ul style="list-style-type: none"> • Number properties • Rounding and estimation • Length and area • 3D shapes • Compound measures • Calculating with fractions • Probability • Algebraic manipulation • Solving equations • Angles • Transformations • Statistics <p><u>Skills:</u> To use language and properties precisely to analysis numbers, algebraic expressions, 2D and 3D Shapes, probability and statistics.</p>	<p><u>Knowledge:</u> <u>Set 1 and 2</u></p> <ul style="list-style-type: none"> • Number involving standard form, surds and indices • Algebra involving factorising and expanding complex expressions and sequences • Interpretating and representing data • Fractions, ratios and percentages • Angles and trigonometry • Graphs involving linear and non-linear graphs <p><u>Set 3 and 4</u></p> <ul style="list-style-type: none"> • Number involving factors, multiples indices and standard form • Graphs, tables and charts • Fractions and percentages • Angles including angles in parallel lines and polygons • Averages and ranges <p><u>Skills:</u> To be able to develop their mathematical knowledge in part through solving problems and evaluating the outcomes, including multi-step problems.</p>	<p><u>Knowledge:</u> <u>Higher</u></p> <ul style="list-style-type: none"> • Probability involving tree diagrams and venn diagrams • Graphs involving cubic, reciprocal, exponential and equation of a circle • Equations and inequalities • Area and volume of complex 2D and 3D shapes • Solving equations graphically • Transformations and constructions • Multiplicative reasoning • Similarity and congruency • Further statistics <p><u>Foundation</u></p> <ul style="list-style-type: none"> • Probability involving tree diagrams and venn diagrams • Perimeter area and volume • Manipulating algebra • Graphs involving real-life graphs • Transformations of shapes on a four-quadrant axis • Percentages 	<p><u>Knowledge:</u> <u>Higher</u></p> <ul style="list-style-type: none"> • Vectors and geometric problem • Circles • Algebraic fraction • Functions and proofs • Proportion involving direct and inverse • Advanced trigonometry • Graph function <p><u>Foundation</u></p> <ul style="list-style-type: none"> • Vectors, similarity and congruency • Plans and constructions • Quadratic equations • Area and volume involving complex 2D and 3D shapes • Fractions, indices and standard form • Non-linear graphs <p><u>Skills:</u> To be able to select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; and to interpret their solution in the context of the given problem. To assess the validity of an argument and the</p>	<p><u>Knowledge:</u></p> <p><u>Skills:</u></p>

				<ul style="list-style-type: none"> Pythagoras and trigonometry <p><u>Skills:</u> Make and use connections between different parts of mathematics to solve problems. To select and use appropriate strategies to solve increasingly complex problems.</p>	accuracy of a given way of presenting. To use mathematical language and properties precisely.	
Enrichment, Careers, Real-world Experience.		Careers & Real-World: Mathematics develops students' confidence in identifying and solving problems and providing clear processes to support a statement. It allows students to interpret, evaluate and present data in a variety of ways. These transferrable skills support a variety of careers, including Medicine, engineering, astronomy, IT, game and film design, media and accountancy.				

Year 7 – Intent:

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of work: Number Place value and the four operations</p> <p>Learning intent: <u>Place Value:</u> To extend students' knowledge of place value and rounding values to a given degree of accuracy.</p> <p><u>The four operations:</u> To strengthen students' knowledge of the four operations, focusing upon decimal values. To introduce students to new concepts of HCF and LCM and build students confidence with a scientific calculator.</p>	<p>Scheme of work: Number Positive and negative numbers and order of operations</p> <p>Learning intent: <u>Positive and negative numbers:</u> To develop students' knowledge of positive and negative numbers and apply them into new contexts such as substituting and BIDMAS.</p> <p><u>Order of operations:</u> To be able to use order of operations, focusing on using indices. To reason and justify by applying the order of operations.</p>	<p>Scheme of work: Geometry Perimeter, area and units and angles and 2D shapes</p> <p>Learning intent: <u>Perimeter, area and units:</u> To derive for formulae for the area of 2D shapes and apply this to find the area, missing lengths and solve problems. To convert between metric units and apply this to the perimeter and area of 2D shapes.</p> <p><u>Angles and 2D shapes:</u> To introduce how to use a protractor to measure and draw angles. To extend knowledge of standard angle facts and apply these to solve angle problems. To develop students' knowledge of 2D shape properties and correctly use geometrical terms and notation.</p>	<p>Scheme of work: Number Fractions, decimals and percentages</p> <p>Learning intent: <u>Fractions:</u> To develop students' knowledge of fractions with adding and subtracting and solve problems involving these.</p> <p><u>Fractions, decimals and percentages:</u> To find equivalent fractions, decimals and percentages and compare them. To find the fraction and percentage of a quantity and use these to solve problems.</p>	<p>Scheme of work: Algebra Introduction to algebra and coordinates and graphs</p> <p>Learning intent: <u>Introduction to algebra:</u> To introduce students to algebra by simplifying algebraic expressions, substituting values into expressions and investigate linear sequences.</p> <p><u>Coordinates and graphs:</u> To read coordinates and graphs and learn how to plot linear functions on a four-quadrant axis. To be able to interpret real-life graphs.</p>	<p>Scheme of work: Proportion and statistics Ratio and proportion and working with data</p> <p>Learning intent: <u>Ratio and proportion:</u> To introduce ratio to students by sharing amounts into a given ratio and identify the relationship between fractions and ratio. To solve simple direct proportion problems.</p> <p><u>Working with data:</u> To introduce averages and range and calculate these from a set of data. To construct stem and leaf diagrams, bar charts and interpret these.</p>
<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests Homework</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests Homework</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>

Year 8 – Intent:

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of work: Number Number properties and rounding and estimation</p> <p>Learning intent: <u>Number properties:</u> To extend students' knowledge of number properties by identifying the difference between factors, multiples and primes and use this knowledge to write a number as a product of its prime factors.</p> <p><u>Rounding and estimation:</u> To strengthen students' knowledge of rounding integers and decimal places and introduce significant figures. To provide real life application of rounding and estimating.</p>	<p>Scheme of work: Geometry Length and area and 3D shapes</p> <p>Learning intent: <u>Length and area:</u> To develop students' knowledge of 2D shapes and finding the area and perimeter and to apply these skills to solve problems. To develop students' understanding of circles and how to find the perimeter and area.</p> <p><u>3D shapes:</u> To extend students' knowledge of 3D shapes, their properties and nets. To create plans and elevations of these shapes. To extend students understanding of surface area and volume and use these skills to solve geometrical problems showing reasoning.</p>	<p>Scheme of work: Number and proportion Compound measures and calculating with fractions</p> <p>Learning intent: <u>Compound measures:</u> To introduce compound measures to students and rearrange formulae in compound measures. To be able to construct and interpret speed-time graphs and distance-time graphs.</p> <p><u>Calculating with fractions:</u> To extend and formalise their knowledge of fractions and working with the four operations and strengthen their knowledge by applying these skills to solve problems.</p>	<p>Scheme of work: Probability and statistics Probability and algebraic manipulation</p> <p>Learning intent: <u>Probability:</u> To understand the language of probability and what it represents and be able to calculate the probability of an event happening. To be able to represent data in tables, charts and diagrams and calculate probabilities from these.</p> <p><u>Algebraic manipulation:</u> To extend and formalise students' knowledge of expressions, equations, formula and identities and strengthen their knowledge by applying these skills to solve algebraic problems.</p>	<p>Scheme of work: Algebra and geometry Solving equations and angles</p> <p>Learning intent: <u>Solving equations:</u> To develop students' knowledge of function machines and use this to solve questions and check their work by substituting. To extend students knowledge on inequalities, representing these on number lines and find solutions to inequalities.</p> <p><u>Angles:</u> To apply understanding of geometric properties of shapes and find interior and exterior angles. To extend knowledge of angle theorems and use these to solve problems in parallel lines.</p>	<p>Scheme of work: Geometry and statistics Transformations and statistics</p> <p>Learning intent: <u>Transformations:</u> To be able to develop students' knowledge of rotating and reflection of 2D shapes on a coordinate grid. To introduce students to the transformations enlargement and translation. To be able to describe transformations using full sentences.</p> <p><u>Statistics:</u> To construct and interpret appropriate tables, charts and diagrams, including frequency tables, pie charts, stem-and-leaf diagrams. To find averages and ranges from these tables, charts and diagrams. To be able to interpret and construct scatter diagrams.</p>
<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests Homework</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests Homework</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>

Year 9 Set 1 and 2 – Intent:

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of work: Number</p> <p>Learning intent: To extend students' knowledge of standard form by completing calculations involving it. To introduce surds and negative/fractional indices.</p>	<p>Scheme of work: Algebra</p> <p>Learning intent: To develop students understanding of algebra by expanding and factorising more complex expressions and introducing other sequences alongside developing linear sequences knowledge.</p>	<p>Scheme of work: Interpreting and representing data</p> <p>Learning intent: To deepen and formalise students' knowledge of averages and representing data and focusing on comparing data by writing mathematical sentences. Students can identify an appropriate average to analysis data and a diagram to represent a given set of data.</p>	<p>Scheme of work: Fractions, ratio and percentage</p> <p>Learning intent: To further develop students' knowledge of fractions, decimals and percentages and students are confident in performing calculations involving these with and without a scientific calculator. Students will begin to solve challenging ratio and proportion problems.</p>	<p>Scheme of work: Angles and trigonometry</p> <p>Learning intent: To introduce students to Pythagoras Theorem by deriving the formula themselves and applying it to find a missing side in a right-angled triangle. Also, introduce students to trigonometry and use this to find a missing side or angle in a right-angled triangle.</p>	<p>Scheme of work: Graphs</p> <p>Learning intent: To enhance students' knowledge of linear graphs and extending it to finding the perpendicular line of a give line. To introduce students to non-linear graphs and being able to plot and interpret these graphs.</p>
<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests Homework</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests Homework</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>

Year 9 Set 3 and 4 – Intent:

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Schemes of work: Number Algebra</p> <p>Learning intent: To extend Year 8 knowledge of place value, factors and multiples and indices (standard form). To further develop students' understanding of algebra including expanding brackets, factorising, simplifying and writing expressions.</p>	<p>Schemes of work: Graphs, tables and charts Fractions and percentages</p> <p>Learning intent: To develop students' understanding of tables, graphs and diagrams (including scatter diagrams and stem and leaf diagrams) To further develop student's understanding of fractions, decimals and percentages.</p>	<p>Schemes of work: Equations, inequalities and sequences</p> <p>Learning intent: To extend and formalise students' knowledge of solving equations and equalities including those with brackets. To generate sequences and find the nth term of a sequence. To develop student's knowledge of properties of shapes and angle rules.</p>	<p>Scheme of work: Angles</p> <p>Learning intent: To further develop student's knowledge of angle rules including interior, exterior and angles in polygons.</p>	<p>Scheme of work: Averages and Ranges</p> <p>Leaning intent: To extend Year 8 knowledge of types of averages and the range. Selecting the best average to use for different scenarios.</p>	<p><u>Revision</u></p>
<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests Homework</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests Homework</i></p>	<p><i>Measuring Impact through: Diagnostic assessments and end of topic tests. Homework Core Assessments</i></p>

Year 10 Higher – Intent: To further enhance and develop mathematical skills learnt at KS3. Students will build on their basic concepts and principles in number, algebra, geometry, proportion and statistics, helping them to secure an understanding of contextual problem-solving questions.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of Work: Probability Graphs</p> <p>Learning Intent: To revise the areas and develop students' understanding of: Simple probability Theoretical and experimental probability Venn diagrams Tree diagrams Linear graphs Real-life graphs Quadratic graphs Cubic and reciprocal graphs</p>	<p>Scheme of Work: Equations Inequalities</p> <p>Learning Intent: To develop students understanding of: Quadratic equations Simultaneous equations Inequalities</p>	<p>Scheme of Work: Area and Volume Equations and graphs</p> <p>Learning Intent: To revise areas and develop students understanding of: Perimeter and area of shapes including compound shapes Conversion of measures Upper and lower bounds Volume and surface area of shapes Circle theorems Solving a variety of equations graphically</p>	<p>Scheme of Work: Transformations and constructions Multiplicative reasoning</p> <p>Learning Intent: To revise the areas and develop students' understanding of: Transforming shapes Construction and loci Bearings Percentage change Growth and decay Compound measures Direct and indirect proportion</p>	<p>Scheme of Work: Similarity and congruence Further statistics</p> <p>Learning Intent: To revise and develop student's understanding of: Congruence Similarity 3D shapes Scale factors Contextual problems Sampling Data comparison Cumulative frequency Box plots Histograms</p>	<p>Scheme of Work: Exam revision</p> <p>Learning Intent:</p>
<p><i>Measuring Impact through: End of topic tests and homework</i></p>	<p><i>Measuring Impact through: End of topic assessments, homework and core assessments</i></p>	<p><i>Measuring Impact through: End of topic assessments and homework</i></p>	<p><i>Measuring Impact through: End of topic assessments, homework and core assessments</i></p>	<p><i>Measuring Impact through: End of topic assessments, homework and core assessments</i></p>	<p><i>Measuring Impact through: End of topic assessments and homework</i></p>

Year 10 Foundation – Intent: To further enhance and develop mathematical skills learnt at KS3. Students will build on their basic concepts and principles in number, algebra, geometry, proportion and statistics, helping them to secure an understanding of contextual problem-solving questions.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of Work: Probability Perimeter, Area and Volume</p> <p>Learning Intent: To revise the areas and develop students' understanding of: Simple probability Theoretical and experimental probability Venn diagrams Tree diagrams Perimeter Area Volume Surface area</p>	<p>Scheme of Work: Algebra Graphs</p> <p>Learning Intent: To revise the areas and develop students' understanding of: Manipulating algebra Expanding Factorising substitution Equations Straight line graphs Real life graphs</p>	<p>Scheme of Work: Transformations Ratio and proportion</p> <p>Learning Intent: To revise the areas and develop students' understanding of: Ratios and fractions Context problems Transforming shapes</p>	<p>Scheme of Work: Percentages Pythagoras and Trigonometry</p> <p>Learning Intent: To revise the areas and develop students' understanding of: Right-angled triangles Percentages Context problems</p>	<p>Scheme of Work: Exam preparation</p> <p>Learning Intent: To revise in preparation for the end of year progress exam</p>	<p>Scheme of Work:</p> <p>Learning Intent:</p>
<i>Measuring Impact through: End of topic tests and homework</i>	<i>Measuring Impact through: End of topic assessments, homework and core assessments</i>	<i>Measuring Impact through: End of topic assessments and homework</i>	<i>Measuring Impact through: End of topic assessments, homework and core assessments</i>	<i>Measuring Impact through: End of topic assessments, homework and core assessments</i>	<i>Measuring Impact through: End of topic assessments and homework</i>

Year 11 Higher – Intent: To further enhance and develop mathematical skills learnt at KS3. Students will build on their basic concepts and principles in number, algebra, geometry, proportion and statistics, helping them to secure an understanding of contextual problem-solving questions.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of Work: Vectors and geometric problems Further statistic</p> <p>Learning Intent: To develop and deepen students understanding: Vector notation Vector geometry Sampling Data comparison Cumulative frequency Box plots Histograms To master the skills based in KS3 and year 10. To be confident to answer exam style questions of a higher order for all abilities.</p>	<p>Scheme of Work: Circles Algebraic fractions</p> <p>Learning Intent: To develop and deepen students’ understanding: Circles, including circle theorems Algebraic fractions including quadratic fractions Surds Algebraic proofs To master the skills based in KS3 and year 10. To be confident to answer exam style questions of a higher order for all abilities.</p>	<p>Scheme of Work: Functions and proofs Proportion</p> <p>Learning Intent: To develop and deepen students’ understanding: Direct and inverse proportion Exponential functions Non-linear graphs To master the skills based in KS3 and year 10. To be confident to answer exam style questions of a higher order for all abilities.</p>	<p>Scheme of Work: Advanced Trig Graph functions</p> <p>Learning Intent: To develop and deepen students’ understanding: Area of non-right angles triangle Cosine rule 3D problem solving Exact trig function Sine, cosine and tangent graph function Graph transformations To master the skills based in KS3 and year 10. To be confident to answer exam style questions of a higher order for all abilities.</p>	<p>Scheme of Work: Revision</p> <p>Learning Intent: Exam Preparation</p>	<p>Scheme of Work: Revision</p> <p>Learning Intent: Exam Preparation</p>
<i>Measuring Impact through: End of topic tests and homework</i>	<i>Measuring Impact through: End of topic assessments, homework and core assessments</i>	<i>Measuring Impact through: End of topic assessments and homework</i>	<i>Measuring Impact through: End of topic assessments, homework and core assessments</i>	<i>Measuring Impact through: GCSE Exams</i>	<i>Measuring impact through: GCSE exams</i>

Year 11 Foundation – Intent: To further enhance and develop mathematical skills learnt at KS3. Students will build on their basic concepts and principles in number, algebra, geometry, proportion and statistics, helping them to secure an understanding of contextual problem-solving questions.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of Work: Vectors, similarity and congruence Pythagoras and trigonometry</p> <p>Learning Intent: To develop and deepen students' understanding of: Vectors Similarity Congruence Pythagoras Trigonometry To master the skills based in KS3 and year 10. To be confident to answer exam style questions of a higher order for all abilities.</p>	<p>Scheme of Work: Plans and construction Quadratic equations</p> <p>Learning Intent: To develop and deepen understanding: Plans Construction Quadratic equations (expanding, factorising and solving) Plotting quadratic graphs To master the skills based in KS3 and year 10. To be confident to answer exam style questions of a higher order for all abilities.</p>	<p>Scheme of Work: Area and Volume Fractions, indices and standard form</p> <p>Learning Intent: To develop and deepen understanding: Circles Area of composite shapes and cylinders Pyramids, cones and spheres Fractions Indices Standard form To master the skills based in KS3 and year 10. To be confident to answer exam style questions of a higher order for all abilities.</p>	<p>Scheme of Work: Graphs</p> <p>Learning Intent: To develop and deepen understanding: Cubic and reciprocal graphs Non-Linear graphs Simultaneous equations Rearranging formulae Proof To master the skills based in KS3 and year 10. To be confident to answer exam style questions of a higher order for all abilities.</p>	<p>Scheme of Work: Revision</p> <p>Learning Intent: Exam Preparation</p>	<p>Scheme of Work: Revision</p> <p>Learning Intent: Exam Preparation</p>
<p><i>Measuring Impact through: End of topic tests and homework</i></p>	<p><i>Measuring Impact through: End of topic assessments, homework and core assessments</i></p>	<p><i>Measuring Impact through: End of topic assessments and homework</i></p>	<p><i>Measuring Impact through: End of topic assessments, homework and core assessments</i></p>	<p><i>Measuring Impact through: GCSE Exams</i></p>	<p><i>Measuring impact through: GCSE exams</i></p>

Year 12– Intent: To secure an understanding in a problem-solving context question involving the context used.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of Work: Pure: Quadratics Equations and inequalities Graphs and transformations Straight line graphs Circles Trigonometric ratios</p> <p>Learning Intent: - Expand the product of two or three expressions - Factorise linear, quadratic and simple cubic expressions - Know and use the laws of indices - Simplify and use the rules of surds - Rationalise denominators - Solve quadratic equations using factorising, the quadratic formula and completing the square - Read and use the $f(x)$ notation when working with functions - Sketch the graph and find the turning point of a quadratic function - Find and interpret the discriminant of a quadratic - Use and apply models that involve quadratic functions - Solve linear simultaneous equations using elimination: one linear and one quadratic - Interpret algebraic solutions of equations graphically - Solve linear inequalities - Solve quadratic inequalities</p>	<p>Scheme of Work: Pure: Circles Algebraic methods Trigonometric ratios Trigonometric identities and equations Vectors Statistics: Probability Statistical distribution</p> <p>Learning Intent: Know how to find the equation of a circle - Solve geometric problems involving straight lines and circles - Use circle properties to solve problems on coordinates grids - Find the angle in a semi-circle and solve other problems involving circles and triangles Cancel factors in algebraic fractions - Divide a polynomial by a linear expression - Use the factor theorem to factorise a cubic expression - Construct mathematical proofs using algebra - Use proof by exhaustion and disproof by counter-example - To understand and interpret trigonometric identities and equations - To solve trigonometric equations that produce quadratics</p>	<p>Scheme of Work: Pure: Vectors Mechanics: Modelling in mechanics Constant acceleration Statistics: Data collection</p> <p>Learning Intent: - Use vectors in two dimensions - Use column vectors and carry out arithmetic operations - Calculate the magnitude and direction of a vector - Understand and use the position vectors - Use vectors to solve problems in context - Understand and use fundamental quantities and units in the S.I. system: length, time, and mass. Understand and use derived quantities and units: velocity, acceleration, force, weight. Understand and use the language of kinematics. Understand, use and interpret graphs in kinematics for motion in a straight line. Understand, use and derive the formulae for constant acceleration for motion in a straight line - To understand the terminology used within data collection and understanding the advantages and disadvantages of sampling</p>	<p>Scheme of Work: Pure: Differentiation Mechanics: Forces and Motion Statistics: Measures of location and spread Representation of data</p> <p>Learning Intent: - To understand and apply differentiation - Model real life situations with differentiation - Understand the Use and concept of: <ul style="list-style-type: none"> • Newton’s first law. • Newton’s second law (restricted to forces in two perpendicular directions or simple cases of forces given as 2-D vectors). Newton’s third law; equilibrium of forces on a particle and motion in a straight line and connected particles - To understand the measures of spread and locations. To understand the use of coding - To represent and interpret data by using box plots, histograms and cumulative frequency graphs.</p>	<p>Scheme of Work: Pure: Differentiation Integration Exponentials and logarithms Statistics: Representation of data Correlation Hypothesis testing</p> <p>Learning Intent: - To understand and apply differentiation - Model real life situations with differentiation - To understand and apply integration - To evaluate a definite integral - Find the area bounded by curves, x axis and straight lines - To understand exponentials and interpret models that use exponential functions - Recognise the relationship between exponents and logarithms - Use logarithms to estimate the values of constraints in nonlinear models. - To represent and interpret data by using box plots, histograms and cumulative frequency graphs. - To be able to draw and interpret scatter graphs - To be able to identify the regression line and to use this to make predications - To understand the language and concept of hypothesis testing</p>	<p>Scheme of Work: Pure: Integration Exponentials and logarithms Mechanics: Variable acceleration</p> <p>Learning Intent: - To understand and apply integration - To evaluate a definite integral - Find the area bounded by curves, x axis and straight lines - To understand exponentials and interpret models that use exponential functions - Recognise the relationship between exponents and logarithms - Use logarithms to estimate the values of constraints in nonlinear models. - Use calculus to solve kinematics problems</p>

<ul style="list-style-type: none"> - Interpret inequalities graphically - Represent linear and quadratic inequalities graphically - Sketch cubic graphs - Sketch quartic graphs - Sketch reciprocal graphs of the form $y = \frac{a}{x}$ and $y = \frac{a}{x^2}$ - Use intersection points of graphs to solve equations - Translate graphs - Sketch graphs - Transform graphs of unfamiliar functions - Calculate the gradient of a line joining a pair of points - Understand the link between the equation of a line and its gradient and intercept - Find the equation of a line given the gradient and one point on the line or two points on the line - Find the point of intersection for a pair of straight lines - Know and use the rules for parallel and perpendicular gradients - Solve length and area problems on coordinate grids - Use straight line graphs to construct mathematical methods - Find the midpoint of a line segment - Find the equation of the perpendicular bisector to a line segment - Know how to find the equation of a circle - Solve geometric problems involving straight lines and circles 	<ul style="list-style-type: none"> - Use vectors in two dimensions - Use column vectors and carry out arithmetic operations - Calculate the magnitude and direction of a vector - Understand and use the position vectors - Use vectors to solve problems in context - To understand the terminology used in probability - To describe and interpret probability diagrams - To describe and interpret statistical distributions - To understand and use binomial distribution 				
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<ul style="list-style-type: none"> - Use circle properties to solve problems on coordinates grids - Find the angle in a semi-circle and solve other problems involving circles and triangles Use the cosine and sine rule to find a missing side or angle - Find the area of a triangle using an appropriate formula - Sketch problems involving triangles - Sketch the graphs of the sine cosine and tangent functions and sketch the transformations. 					
<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments Progress exams</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments Progress exams</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments Progress exams</i>

Year 12 Further – Intent: To secure an understanding in a problem-solving context question involving the context used

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Scheme of Work: Decision: Algorithms Graphs and networks Algorithms on graphs Core pure: Complex numbers Argand diagrams Series</p> <p>Learning Intent: Students will: -Use and understand algorithms, Flow charts, bubble sorts, quick sorts and bin-packing algorithms -Understand modelling with graphs, graph theory, special types of graphs -Be able to represent graphs and networks using matrices - understand and use Kruskal's, Prim's and Floyd's algorithms - Understand and use complex numbers to solve problems involving quadratic, cubic and quartic equations -To be able to represent a complex number on a argand diagram</p>	<p>Scheme of Work: Decision: Algorithms on graphs Route inspections Linear programming Critical Path analysis Core pure: Proof by induction Vectors Statistics: Discrete random variables</p> <p>Learning Intent:</p>	<p>Scheme of Work: Core Pure: Roots of polynomials Statistics: Poisson distribution Hypothesis testing Decision: Critical Path analysis</p> <p>Learning Intent:</p>	<p>Scheme of Work: Core Pure: Matrices Linear transformations Statistics: Chi-squared tests Geometric and negative binomial distribution</p> <p>Learning Intent:</p>	<p>Scheme of Work: Core Pure: Linear transformations Volumes of revolution Statistics: Geometric and negative binomial distribution Central Limit Theorem Probability generating functions Decision: The travelling salesman problem</p> <p>Learning Intent:</p>	<p>Scheme of Work: Decision: The simplex algorithm Statistics: Quality of tests</p> <p>Learning Intent:</p>

-to calculate the modulus and argument of a complex number and to find loci and regions on an argand diagram -To be able to find the sum of natural numbers, squares and cubes					
<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments Progress exams</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments Progress exams</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments</i>	<i>Measuring Impact through: Homework based on Exam questions End of chapter assessments Progress exams</i>

Year 13– Intent: To secure an understanding in a problem-solving context question involving the context used

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Scheme of Work: Pure: Algebraic methods Sequences and series Statistics: Normal distribution Mechanics: Moments Forces and frictions Projectiles Learning Intent:	Scheme of Work: Pure: Functions and graphs Sequences and series Binomial expansion Differentiation Statistics: Regression, correlation and hypothesis testing Conditional probability Learning Intent:	Scheme of Work: Pure: Functions and graphs Radians Trigonometric functions Differentiation Numerical methods Learning Intent: Students will: - use the modulus of a linear function - understand and use	Scheme of Work: Pure: Trigonometric functions Numerical methods Integration Trigonometry and modelling Learning Intent: Students will: - be able to prove and use the addition formulae	Scheme of Work: Pure: Integration Parametric equations Vectors Mechanics: Application of forces Learning Intent: Students will: - be able to integrate standard mathematical functions.	Scheme of Work: Mechanics: Further Kinematics Learning Intent: Students will: - extend the constant acceleration formulae of motion to 2 dimensions using vectors.

<p>Students will:</p> <ul style="list-style-type: none"> - understand and use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion; use methods of proof, including proof by deduction. Proof by contradiction (including proof of the irrationality of $\sqrt{2}$ and the infinity of primes, and application to unfamiliar proofs - use the modulus of a linear function - understand and use composite functions; inverse functions and their graphs - understand the effect of simple transformations on the graph of $y = f(x)$ including sketching associated graphs; and combinations of these transformations. - use of functions in modelling, including consideration of limitations and refinements of the models. - understand and use the Normal distribution as a model; find probabilities using the Normal Distribution. - able to link to histograms, mean, standard deviation, points of inflection and the binomial distribution. - be able to select an appropriate probability distribution for a context, with appropriate reasoning. - be able to conduct a hypothesis test for the mean of the Normal distribution. 	<p>Students will:</p> <ul style="list-style-type: none"> - be able to simplify rational expressions including by factorising and cancelling, and algebraic division (by linear expressions only - decompose rational functions into simple partial fractions with no more than 3 terms. - use the modulus of a linear function - understand and use composite functions; inverse functions and their graphs - understand the effect of simple transformations on the graph of $y = f(x)$ including sketching associated graphs; and combinations of these transformations. - use of functions in modelling, including consideration of limitations and refinements of the models. - be able to understand and use a binomial expansion and how it can be used to find polynomial approximations. - further develop the skills required to work with sequences and an appreciation of the differences in increasing, decreasing and periodic sequences. - differentiate from first principles for $\sin x$ and $\cos x$ - understand and use the second derivative as the rate of change of gradient; connection to convex and concave sections of curves and points of inflection - differentiate using the product rule, the quotient rule and the chain rule, including problems involving connected 	<p>composite functions; inverse functions and their graphs</p> <ul style="list-style-type: none"> - understand the effect of simple transformations on the graph of $y = f(x)$ including sketching associated graphs; and combinations of these transformations. - use of functions in modelling, including consideration of limitations and refinements of the models. - understand the definition of a radian and be able to convert between radians and degrees; - know and be able to use exact values of \sin, \cos and \tan; - be able to derive and use the formulae for arc length and area of sector - understand and use the definitions of sine, cosine and tangent for all arguments. - be taught the skills to work confidently with radians and their applications. - understand and use the definitions of secant, cosecant and cotangent and of \arcsin, \arccos and \arctan; their relationships to sine, cosine and tangent. - differentiate from first principles for $\sin x$ and $\cos x$ - understand and use the second derivative as the rate of change of gradient; connection to convex and concave sections of curves and points of inflection - differentiate using the product rule, the quotient rule and the chain rule, including problems involving connected rates of change and inverse functions. - differentiate simple functions and relations defined implicitly or parametrically. 	<ul style="list-style-type: none"> - understand and use the double angle formulae - solve trigonometric equations - write expressions of the form $a\cos\theta \pm a\sin\theta$ in the forms $R \cos(x \pm \alpha)$ or $R \sin(x \pm \alpha)$ - be able to construct proofs involving trigonometric functions and previously learnt identities. - be able to integrate standard mathematical functions. - use trigonometric identities in integration - use the reverse chain rule to integrate more complex functions. - use integration to find the area under a curve. - model real life situations with differential equations. - be able to locate roots of $f(x) = 0$ by considering changes of sign of $f(x)$ in an interval of x. - solve equations approximately using simple iterative methods; be able to draw associated cobweb and staircase diagrams. - solve equations using the Newton-Raphson method and other recurrence relations. - use numerical methods to solve problems in context 	<ul style="list-style-type: none"> - use trigonometric identities in integration - use the reverse chain rule to integrate more complex functions. - use integration to find the area under a curve. - model real life situations with differential equations. - be able to understand and use the parametric equations of curves and conversion between Cartesian and parametric forms - Use parametric equations in modelling in a variety of contexts. - be able to understand Cartesian coordinates - use vectors in three dimensions. - use vectors to solve geometric problems - model 3D - be able to find an unknown force when a system is in equilibrium. - solve statics problems involving weight, tension and pulleys. - understand and solve problems limiting equilibrium. - solve problems involving motion on an inclined plane. - solve problems involving connected particles that require the resolution of forces. 	<ul style="list-style-type: none"> - use calculus in kinematics for (variable acceleration) motion in a straight line. Extend to 2 dimensions using vectors.
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<ul style="list-style-type: none"> - be introduced to moments in simple static contexts, understanding that the moment of a force, is a measure of its turning effect on a body. - develop ideas of modelling real life situations: uniform and non-uniform mass. Introducing and developing the ideas of resolving and equilibrium (vertically only). - be able to resolve forces in 2 dimensions. - solve problems involving inclined planes - understand and use the $F \leq \mu R$ model for friction; motion of a body on a rough surface; limiting friction and limiting equilibrium. - be able to model motion under gravity in a vertical plane using vectors. . - solve problems involving particles projected at an angle. 	<ul style="list-style-type: none"> rates of change and inverse functions. - differentiate simple functions and relations defined implicitly or parametrically. - construct simple differential equations in pure mathematics and in context. - be able to understand exponential models in bivariate data. - Understand and apply the language of statistical hypothesis testing, extend to correlation coefficients as measures of how close data points lie to a straight line and be able to interpret a given correlation coefficient using a given p-value or critical value (calculation of correlation coefficients are excluded) - understand and use mutually exclusive and independent events when calculating probabilities - be able to link to discrete and continuous distributions. - understand and use conditional probability, including the use of tree diagrams, Venn diagrams, two-way tables. 	<ul style="list-style-type: none"> - construct simple differential equations in pure mathematics and in context - be able to locate roots of $f(x) = 0$ by considering changes of sign of $f(x)$ in an interval of x. - solve equations approximately using simple iterative methods; be able to draw associated cobweb and staircase diagrams. - solve equations using the Newton-Raphson method and other recurrence relations. - use numerical methods to solve problems in context 			
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