

## Curriculum Intent Overview

At the Ripley Academy the Maths department aim to make maths inspiring and engaging in order to get our students independently thinking and learning, guiding them to become accurate and fluent in solving increasingly complex mathematical problems over time.

At key stage 3 the focus is knowledge from the national curriculum that will allow our students to start solving problems in a variety of contexts. We aim to consolidate and deepen understanding of the mathematical concepts learnt at key stage 2, creating a fluid transition from primary to secondary education.

At key stage 4 the focus is success at GCSE; following the national curriculum strands of algebra, geometry & measure, number, probability, ratio proportion & rates of change and statistics. By building on the problem solving methods and mathematical reasoning developed at key stage 3 we aim to prepare students to be mathematically equipped for the future.

At key stage 5 the focus is success at A Level delivered through well sequenced teaching and assessment. Our aim is to broaden the post-18 choices for our students through access to higher education and a greater breadth of career options.

## Year 7

Unit Title	Unit Overview	Prior Knowledge / skills	New Learning
Unit 1	The Four Operations	<ul style="list-style-type: none"><li>Addition, Subtraction, Multiplication and Division</li></ul>	<ul style="list-style-type: none"><li>Writing a number as a product of its prime factors.</li><li>Using prime factors to find the HCF and LCM.</li></ul>
Unit 2	Place Value	<ul style="list-style-type: none"><li>Understanding place value</li><li>Multiplying and dividing by powers of 10.</li></ul>	<ul style="list-style-type: none"><li>Rounding to decimal places</li><li>Standard Form</li></ul>
Unit 3	Perimeter, Area and Units	<ul style="list-style-type: none"><li>Find the perimeter of a shape.</li></ul>	<ul style="list-style-type: none"><li>Find the area of several 2D shapes.</li><li>Compare and order measures of length with different units.</li></ul>

		<ul style="list-style-type: none"> <li>Find the area of a shape by counting squares</li> </ul>	
Unit 4	Angles and 2D Shapes	<ul style="list-style-type: none"> <li>Recognise types of angles.</li> <li>Measure and estimate the size of an angle.</li> </ul>	<ul style="list-style-type: none"> <li>Find missing angles using key facts</li> <li>Deduce the interior angles of a regular polygon</li> </ul>
Unit 5	Fractions	<ul style="list-style-type: none"> <li>Find fractions of shapes.</li> <li>Find simple equivalent fractions.</li> </ul>	<ul style="list-style-type: none"> <li>Calculating with fractions.</li> <li>Problem solving with mixed numbers</li> </ul>
Unit 6	Fractions, Decimals and Percentages	<ul style="list-style-type: none"> <li>Finding simple percentages.</li> <li>Find simple equivalent fractions.</li> </ul>	<ul style="list-style-type: none"> <li>Using a calculator to find a percentage of an amount.</li> <li>Order fractions, decimals and percentages</li> </ul>
Unit 7	Introduction to Algebra	<ul style="list-style-type: none"> <li>Continuing a sequence given its rule.</li> <li>Writing using algebra</li> </ul>	<ul style="list-style-type: none"> <li>Find the position-to-term rule for a linear sequence</li> <li>Substitution involving decimals.</li> </ul>
Unit 8	Coordinates and Graphs	<ul style="list-style-type: none"> <li>Plot coordinates in the first quadrant</li> <li>Understand coordinate notation</li> </ul>	<ul style="list-style-type: none"> <li>Plotting linear graphs.</li> <li>Read and interpret real life graphs</li> </ul>
Unit 9	Order of Operations	<ul style="list-style-type: none"> <li>Understand the order in which calculations are decided</li> </ul>	<ul style="list-style-type: none"> <li>Justify by applying the order of operations</li> </ul>
Unit 10	Ratio	<ul style="list-style-type: none"> <li>Read and write ratios</li> <li>Working out simple proportions such as recipes.</li> </ul>	<ul style="list-style-type: none"> <li>Find equivalent ratios</li> <li>Sharing a total in a ratio</li> </ul>
Unit 11	Working with Data	<ul style="list-style-type: none"> <li>Collect data in a frequency table.</li> </ul>	<ul style="list-style-type: none"> <li>Comparing two or more sets of data.</li> <li>Draw a scatter graph.</li> </ul>

- Find the mode from a set of data

## Year 8

Unit Title	Unit Overview	Prior Knowledge / skills	New Learning
Unit 1	Number Properties	<ul style="list-style-type: none"> <li>List the multiples of a number</li> <li>Identify a prime number</li> </ul>	<ul style="list-style-type: none"> <li>Solving worded LCM and HCF problems.</li> <li>Use index laws</li> </ul>
Unit 2	Directed Numbers	<ul style="list-style-type: none"> <li>Represent numbers on a number line</li> <li>Interpret negative values in a context</li> </ul>	<ul style="list-style-type: none"> <li>Calculate with negative numbers</li> <li>Substitute negative numbers into expressions</li> </ul>
Unit 3	Rounding and Estimation	<ul style="list-style-type: none"> <li>Rounding to significant figures.</li> <li>Round to a certain decimal place.</li> </ul>	<ul style="list-style-type: none"> <li>Estimate the answer to a calculation.</li> <li>Find the upper and lower bounds to rounded values</li> </ul>
Unit 4	Length and Area	<ul style="list-style-type: none"> <li>Find the area of certain 2D shapes</li> <li>Convert between metric units</li> </ul>	<ul style="list-style-type: none"> <li>Find the area and circumference of a circle</li> <li>Apply Pythagoras' Theorem</li> </ul>
Unit 5	3D Shapes	<ul style="list-style-type: none"> <li>Name 3D shapes</li> <li>Find the volume by counting cubes</li> </ul>	<ul style="list-style-type: none"> <li>Find the volume of a prism</li> <li>Find the surface area of a prism</li> </ul>
Unit 6	Compound Measures	<ul style="list-style-type: none"> <li>Read real life graphs</li> <li>Have an understanding of what speed is</li> </ul>	<ul style="list-style-type: none"> <li>Calculate speed, distance or time</li> <li>Read speed-time graphs</li> </ul>

Unit 7	Probability	<ul style="list-style-type: none"> <li>Understand chance and the likelihood of something happening.</li> <li>Calculate probabilities of equally likely outcomes.</li> </ul>	<ul style="list-style-type: none"> <li>Use the probability of an event happening to find out the probability that it doesn't happen.</li> <li>Work out probabilities from sample space diagrams.</li> </ul>
Unit 8	Algebraic Manipulation	<ul style="list-style-type: none"> <li>Forming algebraic expressions and equations.</li> <li>Simplify expressions</li> </ul>	<ul style="list-style-type: none"> <li>Expand and simplify expressions.</li> <li>Factorise expressions</li> </ul>
Unit 9	Solving Equations	<ul style="list-style-type: none"> <li>Solve linear equations.</li> <li>Understand inequality notation</li> </ul>	<ul style="list-style-type: none"> <li>Solve equations where the unknown is on both sides</li> <li>Represent inequalities on a number line</li> </ul>
Unit 10	Angles	<ul style="list-style-type: none"> <li>Find missing angles using key facts.</li> <li>Measure and draw angles</li> </ul>	<ul style="list-style-type: none"> <li>Find angles around parallel lines</li> <li>Problem solve with angles in polygons</li> </ul>
Unit 11	Transformations	<ul style="list-style-type: none"> <li>Reflect and rotate a shape.</li> <li>Enlarge a shape.</li> </ul>	<ul style="list-style-type: none"> <li>Translate a shape by a vector.</li> <li>Enlarge a shape with a given centre of enlargement.</li> </ul>
Unit 12	Statistics	<ul style="list-style-type: none"> <li>Complete two-way tables</li> <li>Find the mean from a set of data</li> </ul>	<ul style="list-style-type: none"> <li>Construct a pie chart given a protractor.</li> <li>Interpret a pie chart with more complex fractions.</li> </ul>
Unit 13	Constructions, loci and bearings	<ul style="list-style-type: none"> <li>Know basic properties of quadrilaterals.</li> <li>Draw and measure angles.</li> </ul>	<ul style="list-style-type: none"> <li>Construct a perpendicular bisector.</li> <li>Construct different types of triangles.</li> </ul>

## Year 9

In mathematics, we carry out a three-year scheme of work, meaning that students will begin their GCSE course in Year 9. The topics covered in year 9 aim to solidify and embed the knowledge gained in years 7 and 8 whilst transitioning to applying this to GCSE style questions.

Unit Title	Unit Overview	Prior Knowledge / skills	New Learning
Unit 1	1.1 The Number System 1.2 Rounding, Approximating and Estimations 1.3 Number Properties 1.4 Fractions and Fraction Arithmetic 1.5 Percentages and working with percentages	<ul style="list-style-type: none"> <li>Add, subtract, multiply and divide positive and negative numbers.</li> <li>Estimate the answer to a question by rounding.</li> <li>Find the HCF and LCM of two numbers.</li> <li>Find the fraction or percentage of a quantity.</li> </ul>	<ul style="list-style-type: none"> <li>Apply the order of operations to calculate with a mixture of negative numbers, decimals and fractions.</li> <li>Determine the error interval of a number that has been rounded.</li> <li>Answer worded GCSE problems involving the HCF and LCM of two numbers.</li> <li>Find the original amount after a fraction or a percentage has been deducted.</li> </ul>
Unit 2	2.1 Algebra Notation and Rules for Indices 2.2 Manipulating Expressions 2.3 Solving Linear Equations 2.4 Reasons and Proof 2.5 Sequences	<ul style="list-style-type: none"> <li>Understand what powers of a number mean.</li> <li>Simplify expressions by 'collecting like terms'.</li> <li>Solve equations where the unknown appears on both sides of the equation.</li> <li>Show examples using numbers to justify an answer.</li> <li>Find the position to term rule of a linear sequence.</li> </ul>	<ul style="list-style-type: none"> <li>Apply index laws to calculations.</li> <li>Simplify expressions which contain terms with different powers.</li> <li>Solve equations involving fractions.</li> <li>Prove that a statement is true or false algebraically.</li> <li>Find the position to term rule of a quadratic sequence.</li> </ul>



Unit 3	3.1 Collecting Data 3.2 Statistical Measures 3.3 Probability and Outcomes 3.4 Presenting Data 1	<ul style="list-style-type: none"> <li>• Collect data in an ungrouped frequency table.</li> <li>• Find the averages from a list of data.</li> <li>• Calculate probabilities from a sample space diagram.</li> <li>• Present data using a variety of graphs and charts.</li> </ul>	<ul style="list-style-type: none"> <li>• Collect data in a grouped frequency table.</li> <li>• Find the averages of a set of data from a frequency table.</li> <li>• List possible outcomes using a tree diagram.</li> <li>• Compare sets of data from different types of graphs and charts.</li> </ul>
Unit 4	4.1 Measures 4.2 Perimeter, Area and Volume 4.3 2D Shapes and their Properties	<ul style="list-style-type: none"> <li>• Converting between different metric units.</li> <li>• Using proportion to work out problems involving speed, distance and time.</li> <li>• Finding the volume and surface area of any prism.</li> <li>• Identifying the names of quadrilaterals.</li> </ul>	<ul style="list-style-type: none"> <li>• Converting between squared and cubed metric units.</li> <li>• Using the formulae for speed, density and pressure.</li> <li>• Finding the volume and surface area of a cylinder.</li> </ul>

## KS4 Courses Overview

The GCSE scheme of work continues in years 10 and 11 and begins to look at the more advanced topics that the mathematics curriculum has to offer. All of the skills worked on in year 7 – 9 will be interlinked within the units covered KS4.

## Year 10

Unit Title	Unit Overview	Prior Knowledge / skills	New Learning
Unit 5	5.1 Angles and Angle Properties of Lines and Shapes 5.2 Ratios 5.3 Formulae and Substitution	<ul style="list-style-type: none"> <li>Calculate the interior angle of any polygon.</li> <li>Calculate the exterior angle of any polygon.</li> <li>Divide a quantity in a given total.</li> <li>Substitution involving decimals.</li> </ul>	<ul style="list-style-type: none"> <li>Prove the rules for interior angles in polygons.</li> <li>Use the unitary method for solving problems including value for money.</li> <li>Interpret ratios with more than two parts.</li> <li>Substitute values into formulae which involve powers and roots.</li> </ul>
Unit 6	6.1 Co-ordinates and Graphs 6.2 Graphs for Real Situations 6.3 Presenting Data – Pie Charts	<ul style="list-style-type: none"> <li>Draw and interpret graphs of real-life situations.</li> <li>Find the equation of a straight line.</li> <li>Read values off a conversion graph.</li> <li>Construct a pie chart given a protractor.</li> <li>Interpret a pie chart with more complex fractions.</li> </ul>	<ul style="list-style-type: none"> <li>Find the equations of parallel and perpendicular lines.</li> <li>Find the equation of a straight line that joins up two co-ordinates.</li> <li>Interpret a velocity/time graph.</li> <li>discuss and interpret non-linear graphs that model real situations.</li> <li>Solve harder problems by using information from a pie chart such as fractions of quantities, probabilities and averages.</li> </ul>

Unit 7	<p>7.1 Proportions and Proportional Change</p> <p>7.2 Solving Inequalities</p> <p>7.3 Scatter Diagrams and Correlation</p> <p>7.4 Trial and Improvement and Iteration</p>	<ul style="list-style-type: none"> <li>Find the original amount after a fraction or a percentage has been deducted.</li> <li>Working out simple proportions such as recipes.</li> <li>Recognise and use the symbols for inequalities.</li> <li>Solve basic equations.</li> <li>Draw a scatter graph.</li> <li>Find information from a scatter graph.</li> </ul>	<ul style="list-style-type: none"> <li>Find the value after a repeated percentage change.</li> <li>Solve problems involving direct and inverse proportion.</li> <li>Solve inequalities and represent the solutions on a number line.</li> <li>Understand the relationship between two variables and correlation.</li> <li>Know how data from a scatter graph has limitations.</li> <li>Use a method of trial and improvement to solve a complex equation.</li> </ul>
Unit 8	<p>8.1 Transformations</p> <p>8.2 Quadratic Graphs</p> <p>8.3 Manipulating and Solving Quadratic Equations</p>	<ul style="list-style-type: none"> <li>Translate a shape by a vector.</li> <li>Enlarge a shape with a given centre of enlargement.</li> <li>Plot a straight-line graph.</li> <li>Factorise expressions.</li> </ul>	<ul style="list-style-type: none"> <li>Enlarge a shape with a negative scale factor.</li> <li>Combine transformations.</li> <li>Plot non-linear graphs.</li> <li>Use a quadratic graph to solve an equation.</li> <li>Factorise and solve quadratic equations.</li> </ul>
Unit 9	<p>9.1 Cumulative Frequency (Higher tier only)</p> <p>9.2 Pythagoras' Theorem and 2D Problems</p> <p>9.3 The Circle</p>	<ul style="list-style-type: none"> <li>Collect data in a grouped frequency table.</li> <li>Find the square and square root of a number.</li> <li>Find the area and circumference of a circle.</li> </ul>	<ul style="list-style-type: none"> <li>Use data from a frequency table to plot a cumulative frequency graph.</li> <li>Draw and interpret box plots.</li> <li>Find the longest side of a right-angled triangle using Pythagoras' Theorem.</li> <li>Find the shorter sides of a right-angled triangle using Pythagoras' Theorem.</li> <li>Find the area and perimeter of a sector.</li> </ul>



## Year 11

Unit Title	Unit Overview	Prior Knowledge / skills	New Learning
Unit 10	10.1 Nets, Isometric Drawing and Views of 3D Shapes 10.2 Constructing Triangles and other 2D Shapes 10.3 Constructions and Loci 10.4 Compass Directions and Bearings	<ul style="list-style-type: none"> <li>Identify 2D and 3D shapes.</li> <li>Construct a perpendicular bisector.</li> <li>Construct different types of triangles.</li> <li>Draw and measure angles.</li> </ul>	<ul style="list-style-type: none"> <li>Sketch the plan, front and side elevations of a 3D shape.</li> <li>Identify a shape from its views.</li> <li>Solve loci problems, such as identifying points or regions.</li> <li>Understand that bearings are taken from north.</li> <li>Solve bearings problems involving parallel lines.</li> </ul>
Unit 11	11.1 More Rules of Indices 11.2 Standard Index Form 11.3 Changing the Subject of a Formula 11.4 Trigonometry in 2D Problems using Right-Angled Triangles 11.5 Trigonometry and Pythagoras' Theorem for Solving 3D Problems (Higher tier only)	<ul style="list-style-type: none"> <li>Index laws for multiplying and dividing with the same base.</li> <li>Multiplying and Dividing by powers of 10.</li> <li>Finding missing side lengths using Pythagoras' Theorem.</li> <li>Understanding the order of operations for calculations.</li> </ul>	<ul style="list-style-type: none"> <li>More complex index laws including fractions and negatives.</li> <li>Reading and writing numbers in standard index form.</li> <li>Calculations in standard form.</li> <li>Finding missing sides using trigonometry.</li> <li>Finding missing angles using trigonometry.</li> <li>Rearranging formulae to change the subject.</li> </ul>
Unit 12	12.1 Surds and Manipulating Expressions containing Surds (Higher tier only)	<ul style="list-style-type: none"> <li>Calculate the square root of a number.</li> </ul>	<ul style="list-style-type: none"> <li>Manipulate surds.</li> </ul>

	<p>12.2 Histograms and Frequency Density (Higher tier only)</p> <p>12.3 Probability Tree Diagrams</p> <p>12.4 Solving Quadratics Equations using the Formula and by Completing the Square (Higher tier only)</p>	<ul style="list-style-type: none"> <li>List possible outcomes using a tree diagram.</li> <li>Draw a grouped frequency table.</li> <li>Solve quadratic equations by factorising.</li> <li>Solve quadratic equations graphically.</li> </ul>	<ul style="list-style-type: none"> <li>Find the probability of two or more events happening using a tree diagram.</li> <li>Construct histograms.</li> <li>Interpret histograms</li> <li>Use the quadratic formula to solve equations that cannot be factorised.</li> <li>Find the turning point by completing the square.</li> </ul>
Unit 13	<p>13.1 Solving Simultaneous Equations</p> <p>13.2 Circle Theorems (Higher tier only)</p> <p>13.3 Similarity and Enlargement</p> <p>13.4 Volume of Spheres, Cones, Pyramids and Compound Shapes</p> <p>13.5 Graphs for Non-Linear Functions</p>	<ul style="list-style-type: none"> <li>Solve linear equations where there is one unknown.</li> <li>Name parts of the circle.</li> <li>Use scale factors and centre of enlargement.</li> <li>Calculate the volume of prisms.</li> <li>Recognise non-linear graphs and their properties.</li> </ul>	<ul style="list-style-type: none"> <li>Solve linear simultaneous equations where there is more than one unknown.</li> <li>Understand the circle theorem facts.</li> <li>Understand what is meant by similar shapes and congruency.</li> <li>Calculate the volume of all 3D shapes.</li> <li>Recognise the graphs of trigonometric functions.</li> </ul>
Unit 14	<p>14.1 Trigonometry for Non-Right-Angled Triangles (Higher tier only)</p> <p>14.2 Transformations of Functions and their Graphs</p> <p>14.3 Vector Notation and Vector Geometry</p>	<ul style="list-style-type: none"> <li>Find missing sides and angles for right-angled triangles.</li> <li>Translating a shape by a given vector</li> </ul>	<ul style="list-style-type: none"> <li>Find the missing sides and angles for non-right-angled triangles.</li> <li>Transform graphs by a scale factor in either direction.</li> <li>Add and subtract two or more vectors.</li> </ul>

## KS5 Courses Overview

### Year 12

Unit Title	Unit Overview	Prior Knowledge / skills	New Learning
Algebra 1	<ul style="list-style-type: none"> <li>Argument and Proof</li> <li>Index Laws</li> <li>Surds</li> <li>Quadratic Functions</li> <li>Simultaneous Equations</li> <li>Lines and Circles</li> <li>Inequalities</li> </ul>	<ul style="list-style-type: none"> <li>Understand and use algebraic notation</li> <li>Simplify and manipulate algebraic expressions</li> <li>Rearrange formulae</li> <li>Solve linear equations</li> </ul>	<ul style="list-style-type: none"> <li>Use direct proof by exhaustion and counter examples</li> <li>To use and manipulate index laws</li> <li>To manipulate surds and rationalise the denominator</li> <li>Solve and sketch quadratics</li> <li>To understand and use co-ordinate geometry</li> <li>To understand and solve simultaneous equations</li> <li>To understand and solve inequalities</li> </ul>
Polynomials	<ul style="list-style-type: none"> <li>Expanding and Factorising</li> <li>The binomial Theorem</li> <li>Algebraic Division</li> <li>Curve Sketching</li> </ul>	<ul style="list-style-type: none"> <li>To simplify and manipulate algebraic expressions including collecting like terms and the use of brackets.</li> </ul>	<ul style="list-style-type: none"> <li>To manipulate and simplify polynomials.</li> <li>To understand the binomial theorem</li> <li>To divide polynomials by algebraic expressions</li> <li>To understand and use the factor theorem</li> <li>To analyse a function and sketch its graph</li> </ul>

Trigonometry	<ul style="list-style-type: none"> <li>Sine, Cosine and Tangent</li> <li>The sine and cosine rules</li> </ul>	<ul style="list-style-type: none"> <li>Apply and derive Pythagoras' theorem</li> <li>Recognise graphs of trigonometric functions.</li> <li>Apply some properties of angles and sides of a triangle</li> </ul>	<ul style="list-style-type: none"> <li>To calculate the values of sine, cosine and tangent for any angle</li> <li>To use trigonometric identities and recognise the equation of a circle.</li> <li>To sketch and describe trigonometric functions</li> <li>To solve trigonometric equations</li> </ul>
Differentiation and Integration	<ul style="list-style-type: none"> <li>Differentiation from first principles</li> <li>Leibniz notation</li> <li>Rates of change</li> <li>Tangents and normal</li> <li>Turning points</li> <li>Integration</li> <li>Area under a curve</li> </ul>	<ul style="list-style-type: none"> <li>The equation of a straight line where <math>m</math> is the gradient</li> <li>When two lines are perpendicular, their gradients multiply to give <math>-1</math></li> <li>Binomial expansion formula.</li> <li>Curve sketching</li> </ul>	<ul style="list-style-type: none"> <li>To differentiate from first principles</li> <li>To differentiate terms in the form <math>ax^n</math></li> <li>To calculate rates of change</li> <li>To work out and interpret equations, tangents, normal, turning points and second derivatives</li> <li>To work out the integral of a function and the area under a curve</li> </ul>
Exponentials and Logarithms	<ul style="list-style-type: none"> <li>Laws of logarithms</li> <li>Exponential functions</li> <li>Curve fitting</li> </ul>	<ul style="list-style-type: none"> <li>Recognise, sketch and interpret graphs of exponential functions</li> <li>Graph transformations</li> <li>Proportionality</li> </ul>	<ul style="list-style-type: none"> <li>To convert between powers and logarithms</li> <li>To manipulate and solve equations involving powers and logs</li> <li>To use exponential functions and their graphs</li> </ul>
Mechanics	<ul style="list-style-type: none"> <li>Vectors</li> <li>Kinematics</li> <li>Forces</li> </ul>	<ul style="list-style-type: none"> <li>Scalar and vector components</li> <li>To change freely between standard units and compound units</li> <li>Velocity time graphs</li> </ul>	<ul style="list-style-type: none"> <li>Use calculus to solve problems involving variable acceleration</li> <li>To find the magnitude and direction of a vector</li> <li>To calculate the magnitude and direction of a resultant force</li> <li>To resolve for particles with constant acceleration</li> </ul>

Statistics	<ul style="list-style-type: none"> <li>Collecting and interpreting data</li> <li>Probability</li> <li>Hypothesis testing</li> </ul>	<ul style="list-style-type: none"> <li>Apply statistics to describe a population</li> <li>Recognise appropriate measures of central tendency</li> <li>Understand and draw probability tree diagrams</li> </ul>	<ul style="list-style-type: none"> <li>To distinguish a population and its parameters from a sample and its statistics</li> <li>To identify and name sampling methods and highlight sources of bias</li> <li>To solve problems involving mutually exclusive events and independent events</li> <li>To recognise and solve problems related to the binomial distribution</li> </ul>
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## Year 13

Unit Title	Unit Overview	Prior Knowledge / skills	New Learning
Algebra 2	<ul style="list-style-type: none"> <li>Further mathematical proof</li> <li>Functions</li> <li>Parametric equations</li> <li>Algebraic fractions</li> <li>Partial fractions</li> </ul>	<ul style="list-style-type: none"> <li>Direct proof, proof by exhaustion and counter examples.</li> <li>Algebraic division.</li> <li>The factor theorem.</li> <li>Graph transformations.</li> <li>Sine, cosine and tangent</li> </ul>	<ul style="list-style-type: none"> <li>To make logical deductions and prove statements directly.</li> <li>To understand and use functions, parametric equations and algebraic fractions.</li> <li>To decompose partial fractions.</li> </ul>
Sequences	<ul style="list-style-type: none"> <li>The binomial series</li> <li>Introduction to sequences</li> <li>Arithmetic sequences</li> <li>Geometric sequences</li> </ul>	<ul style="list-style-type: none"> <li>The expansion of <math>(1 + x)^n</math></li> <li><math>{}^nC_r</math> notation.</li> <li>Algebraic Fractions</li> <li>Partial Fractions</li> </ul>	<ul style="list-style-type: none"> <li>To use the binomial expansion and recognise the range of validity.</li> <li>To understand if a sequence is increasing or decreasing.</li> <li>To find the order of a periodic sequence.</li> </ul>

			<ul style="list-style-type: none"> <li>To find the <math>n</math>th term and the sum of an arithmetic and a geometric sequence.</li> <li>To evaluate a series given in sigma notation.</li> </ul>
Trigonometric Identities	<ul style="list-style-type: none"> <li>Radians</li> <li>Reciprocal and inverse trigonometric functions</li> <li>Compound angles</li> </ul>	<ul style="list-style-type: none"> <li>Sine, cosine and tangent.</li> <li>The sine and cosine rules.</li> <li>Transformations of functions.</li> <li>Inverse functions.</li> </ul>	<ul style="list-style-type: none"> <li>To convert between degrees and radians.</li> <li>To use reciprocal and inverse trigonometric functions.</li> <li>To use trigonometric formulae for compound angles, double angles and half angles.</li> <li>To simplify and solve equations using trigonometric formulae.</li> </ul>
Differentiation 2	<ul style="list-style-type: none"> <li>The shapes of functions</li> <li>The chain rule</li> <li>The product and quotient rules</li> <li>Inverse functions</li> <li>Implicit differentiation</li> <li>Parametric functions</li> </ul>	<ul style="list-style-type: none"> <li>Introduction to differentiation.</li> <li>Turning points and the second derivative.</li> <li>Laws of logs.</li> <li>The natural logarithm.</li> <li>Parametric equations.</li> <li>Small angle approximations.</li> </ul>	<ul style="list-style-type: none"> <li>To find points of inflection and determine whether a curve is concave or convex.</li> <li>To understand and use limits.</li> <li>To differentiate <math>\sin x</math>, <math>\cos x</math>, <math>e^x</math>, <math>a^x</math> and <math>\ln x</math></li> <li>To use the chain, product and quotient rules.</li> <li>To find the derivative of an inverse function.</li> </ul>
Integration and differential equations	<ul style="list-style-type: none"> <li>Standard integrals</li> <li>Integration by substitution</li> <li>Integration by parts</li> <li>Integrating rational functions</li> <li>Differential equations</li> </ul>	<ul style="list-style-type: none"> <li>Introduction to integration</li> <li>Area under a curve.</li> <li>Partial fractions.</li> <li>The product rule.</li> </ul>	<ul style="list-style-type: none"> <li>To integrate a set of standard functions, <math>f(x)</math> and the related functions, <math>f(ax + b)</math>.</li> <li>To find the area between curves.</li> <li>To integrate by substitution, by parts or by using partial fractions.</li> </ul>

			<ul style="list-style-type: none"> <li>To understand the expression 'differential equation'.</li> </ul>
Numerical Methods	<ul style="list-style-type: none"> <li>Simple root finding</li> <li>Iterative root finding</li> <li>Newton-Raphson root finding</li> <li>Numerical integration</li> </ul>	<ul style="list-style-type: none"> <li>Finding the roots of an equation.</li> <li>Area under a curve.</li> <li>Increasing, decreasing or periodic sequences.</li> <li>Differentiation of trigonometric functions.</li> </ul>	<ul style="list-style-type: none"> <li>To use the change of sign method to find and estimate the roots of an equation.</li> <li>To use an iterative formula to estimate the root of an equation.</li> <li>To recognise the conditions that cause an iterative sequence to converge.</li> <li>To use the Newton-Raphson method to estimate the root of an equation.</li> <li>To use the trapezium rule to find the area under a curve.</li> </ul>
Mechanics 2	<ul style="list-style-type: none"> <li>Motion in two dimensions</li> <li>3D vectors</li> <li>Forces 2</li> </ul>	<ul style="list-style-type: none"> <li>Resolving vectors into components.</li> <li>Motion with variable acceleration.</li> <li>The constant acceleration formulae.</li> <li>Newton's Laws of Motion.</li> </ul>	<ul style="list-style-type: none"> <li>To use the constant acceleration equations for motion in two dimensions.</li> <li>To use calculus to solve two-dimensional motion with variable acceleration problems.</li> <li>To solve problems involving projectiles.</li> <li>To take moments about points and resolve to find unknown forces.</li> </ul>
Statistics 2	<ul style="list-style-type: none"> <li>Probability and continuous random variables</li> <li>Normal distribution</li> <li>Hypothesis testing</li> </ul>	<ul style="list-style-type: none"> <li>Variance and standard deviation</li> <li>Binomial distribution</li> <li>Correlation and causation.</li> <li>Significance and p-value.</li> <li>Introduction to the normal distribution.</li> </ul>	<ul style="list-style-type: none"> <li>To calculate conditional probabilities from data given in different forms.</li> <li>To apply binomial and Normal probability models in different circumstances.</li> <li>To use data to assess the validity of probability models.</li> </ul>



			<ul style="list-style-type: none"><li>• To state the null and alternative hypothesis.</li><li>• To compare a PMCC to its critical value.</li></ul>
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