



NOTTINGHAM GIRLS' ACADEMY

# **Mathematics Curriculum**

# Purpose of Study

Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

# Aims

The Nottingham Girls' Academy curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

Our expectation is that pupils will move through the programmes of study at a pace suited to their needs and capabilities. Decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged, through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

# Curriculum-at-a-Glance: Mathematics

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 7	Algebraic Thinking	Place Value and Proportion	Application of Number	Directed Number Fractional Thinking	Lines and Angles	Reasoning with Number
Year 8	Proportional Reasoning	Representations	Algebraic Techniques	Developing Number	Developing Geometry	Reasoning with Data
Year 9	Reasoning with Algebra	Constructing in 2 and 3 dimensions	Reasoning with Number	Reasoning with Geometry	Reasoning with Proportion	Representations
Year 10	Similarity	Developing Algebra	Geometry	Proportions and Proportional Change	Delving into Data	Using Number
Year 11	Graphs	Algebra	Reasoning	Revision and Communication	Revision	Examinations
Year 12	Reasoning with algebra and graphs	Calculus Trigonometry	Geometric Reasoning Exponentials and Logs	Statistical Analysis	Mechanics	Mock exams Large data set analysis
Year 13	Binomial, Sequences and Series Trigonometry and Circular Measures	Functions and Transformations Trigonometry Calculus	Mechanics	Statistical Distributions	Revision	Examinations

# Medium Term Plan: Mathematics

## Year 7 Mathematics

### Knowledge, Qualifications and Assessment

What pupils will study during Year 7, our ambition for the knowledge they retain and subject specific skill they will develop and how learning will be assessed formatively and summatively.

Unit Title	Periods	Learning Challenge What will pupils produce at the end of a unit to demonstrate their learning?	Learning Journey What knowledge and subject specific skills will pupils learn in order to complete the Learning Challenge?	Learning Consolidation What prior learning will pupils consolidate using spaced retrieval and spaced practice?
Sequences	4	Sequences Assessment test	<ul style="list-style-type: none"> <li>Describe and continue a sequence given diagrammatically</li> <li>Predict and check the next terms of a sequence</li> <li>Represent sequences in tabular form</li> <li>Recognise the difference between linear and non-linear sequences</li> <li>Continue numerical linear and non-linear sequences</li> <li>Explain the term-to-term rule of numerical sequences in words</li> <li><b>Find missing numbers within a sequence (H)</b></li> </ul>	Flashback starter  End of term test Q3 & 9
Understanding and using algebraic notation	12	Algebraic Notation Assessment test	<ul style="list-style-type: none"> <li>Given a numerical input find the output of a single function machine</li> <li>Use inverse operations to find the input given the output</li> <li>Use diagrams and letters with single function machines</li> <li>Find the function machine given a simple expression</li> <li>Substitute values into single operation expressions</li> <li>Find numerical inputs and outputs for a series of two function machines</li> <li>Find the function machine given a two-step expression</li> <li>Generate sequences given an algebraic rule</li> <li>Represent one and two step functions graphically</li> </ul>	Flashback starter  Revisit sequences from week 1 combined with substitution to create a sequence  Reinforce vocabulary of linear and non-linear through graphs of functions  End of term test Q4, 7 & 8
Equality and Equivalence	8	Equality and Equivalence Assessment test	<ul style="list-style-type: none"> <li>Understand the meaning of equality</li> <li>Understand and use fact families, numerically and algebraically</li> <li>Solve one-step linear equations involving <math>+</math> <math>-</math> <math>\times</math> <math>\div</math> using inverse operations</li> <li>Understand the meaning of like and unlike terms</li> <li>Understand the meaning of equivalence</li> </ul>	Flashback starter Revisit fact families with number bonds to then develop a link for algebraic fact families  End of term test Q11, 15 and 16

			<ul style="list-style-type: none"> <li>Simplify algebraic expressions by collecting like terms, using the <math>\equiv</math> symbol</li> </ul>	
<i>Place Value and ordering</i>	<b>12</b>	<i>Place Value Assessment test</i>	<ul style="list-style-type: none"> <li>Recognise the place value of any number in an integer up to one billion</li> <li>Understand and write integers up to one billion in words and figures</li> <li>Work out intervals on a number line</li> <li>Position integers on a number line</li> <li>Round integers to the nearest power of ten</li> <li>Compare two numbers using =, <math>\neq</math>, <math>\leq</math>, <math>\geq</math>, <math>&lt;</math>, <math>&gt;</math></li> <li>Order a list of integers</li> <li>Find the range of a set of numbers</li> <li>Understand place value for decimals</li> <li>Position decimals on a number line</li> <li>Compare and order any number up to one billion</li> <li>Round a number to one significant figure</li> <li><b>Write 10, 100, 1000 ... as a power of ten (H)</b></li> <li><b>Write positive integers in the form <math>A \times 10^n</math> (H)</b></li> <li><b>Investigate negative powers of ten (H)</b></li> <li><b>Write decimals in the form <math>A \times 10^n</math> (H)</b></li> </ul>	<p>Flashback starter</p> <p>Revise and extend knowledge of numbers up to ten million</p> <p><i>End of term test Q1, 5 &amp; 6</i></p>
<i>Fractional, decimal and percentage equivalence</i>	<b>12</b>	<i>FDP Assessment test</i>	<ul style="list-style-type: none"> <li>Represent tenths and hundredths as diagrams</li> <li>Represent tenths and hundredths on number lines</li> <li>Interchange between fractional and decimal number lines</li> <li>Convert between fractions and decimals – tenths and hundredths</li> <li>Convert between fractions and decimals – fifths and quarters</li> <li><b>Convert between fractions and decimals – eighths and thousandths (H)</b></li> <li>Understand the meaning of percentages using a hundred square</li> <li>Convert fluently between simple fractions, decimals and percentages</li> <li>Use and interpret pie charts</li> <li>Represent any fraction as a diagram</li> <li>Represent fractions on number lines</li> <li>Identify and use simple equivalent fractions</li> <li>Understand fractions as division</li> <li>Convert fluently being fractions, decimals and percentages</li> <li><b>Explore fractions above one, decimals and percentages (H)</b></li> </ul>	<p>Flashback starter</p> <p>Creating sequences using fractions, decimals and percentages</p> <p>Creating linear sequences using mixed number fractions and integers</p> <p><i>End of term test Q2,10, 13, 14 &amp; 17</i></p>
<i>Addition and subtraction</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Properties of addition and subtraction</li> <li>Mental strategies for addition and subtraction</li> <li>Use formal methods for addition of integers</li> <li>Use formal methods for addition of decimals</li> </ul>	<p>Flashback starter</p> <p>Addition and subtraction with decimals and fractions</p>

			<ul style="list-style-type: none"> <li>• Use formal methods for subtraction of integers</li> <li>• Use formal methods for subtraction of decimals</li> <li>• Choose the most appropriate method: mental strategies, formal written or calculator</li> <li>• Solve problems in the context of perimeter</li> <li>• Solve financial maths problems</li> <li>• Solve problems involving tables and timetables</li> <li>• Solve problems with frequency trees</li> <li>• Solve problems with bar charts and line charts</li> <li>• <b>Add and subtract numbers given in standard form (H)</b></li> </ul>	<p>Addition and subtraction through algebraic substitution</p> <p>Creating sequences through addition or subtraction with decimals</p> <p>Finding perimeter of shape using addition of decimals</p> <p>Forming and solving one-step equations simplifying and substituting into expressions</p> <p>Extracting information from graphs and charts</p>
<i>Multiplication and Division</i>	<b>16</b>		<ul style="list-style-type: none"> <li>• Properties of multiplication and division</li> <li>• Understand and use factors</li> <li>• Understand and use multiples</li> <li>• Multiply and divide integers and decimals by powers of 10</li> <li>• Multiply by 0.1 and 0.01</li> <li>• Convert metric units</li> <li>• Use formal methods to multiply integers</li> <li>• Use formal methods to multiply decimals</li> <li>• Use formal methods to divide integers</li> <li>• Use formal methods to divide decimals</li> <li>• Understand and use order of operations</li> <li>• Solve problems using the area of rectangles and parallelograms</li> <li>• Solve problems using the area of triangles</li> <li>• <b>Solve problems using the area of trapezia (H)</b></li> <li>• Solve problems using the mean</li> <li>• Solve problems involving fractions of amounts</li> <li>• Solve problems involving percentages of amounts</li> <li>• <b>Explore multiplication and division in algebraic expressions (H)</b></li> </ul>	<p>Flashback starter</p> <p>Solve equations using multiplication and division</p> <p>Generating a sequence using multiplication with a decimal</p> <p>Area of rectangles and triangles</p> <p><b>Multiplication and division with algebra (H)</b></p>
<i>Negative numbers</i>	<b>12</b>		<ul style="list-style-type: none"> <li>• Understand and use representations of directed numbers</li> <li>• Order directed numbers using lines and appropriate symbols</li> <li>• Perform calculations that cross zero</li> <li>• Adding directed numbers</li> <li>• Subtracting directed numbers</li> <li>• Multiplication of directed numbers</li> <li>• Multiplication and division of directed numbers</li> <li>• Using a calculator for directed number calculations</li> <li>• Evaluating algebraic expressions with directed number</li> </ul>	<p>Flashback starter</p> <p>Simplify algebraic expressions with negative terms by adding and subtracting</p> <p>Multiplying and dividing with negative terms to simplify an expression</p>

			<ul style="list-style-type: none"> <li>• Introduction to two-step equations</li> <li>• Solving two-step equations</li> <li>• Use order of operations with directed numbers</li> <li>• <b>Understand that positive numbers have more than one square root (H)</b></li> <li>• <b>Explore higher powers and roots (H)</b></li> </ul>	<p>Substitution into expressions with negative numbers using BIDMAS</p> <p>Function machines with squares and powers</p>
<i>Adding and Subtracting fractions</i>	<b>12</b>		<ul style="list-style-type: none"> <li>• Understand representations of fractions</li> <li>• Convert between mixed numbers and fractions</li> <li>• Add and subtract unit fractions with the same denominator</li> <li>• Add and subtract fractions with the same denominator</li> <li>• Add and subtract fractions from integers expressing the answer as a single fraction</li> <li>• Understand and use equivalent fractions</li> <li>• Add and subtract fractions where denominators share a simple common multiple</li> <li>• Add and subtract fractions with any denominator</li> <li>• Add and subtract improper fractions and mixed numbers</li> <li>• Use fractions in algebraic contexts</li> <li>• Using equivalence to add and subtract decimals and fractions</li> <li>• <b>Add and subtract simple algebraic fractions (H)</b></li> </ul>	<p>Flashback starter</p> <p>Creating linear sequences with mixed number fractions</p> <p>Investigating linear and geometric sequences with fractional parts</p> <p>Finding the perimeter of familiar shapes with fractional lengths</p> <p>Substitution into fractional expressions</p> <p>Using function machines with fractions</p> <p>Solve equations with fractional answers</p> <p>Fractional and decimal equivalence with addition and subtraction</p>
<i>Drawing, measuring and notation</i>	<b>12</b>		<ul style="list-style-type: none"> <li>• Understand and use letter and labelling conventions including those for geometric figures</li> <li>• Draw and measure line segments including geometric figures</li> <li>• Understand angles as a measure of turn</li> <li>• Classify angles</li> <li>• Measure and draw angles up to <math>180^\circ</math></li> <li>• Draw and measure angles between <math>180^\circ</math> and <math>360^\circ</math></li> <li>• Identify perpendicular and parallel lines</li> <li>• Recognise types of triangle and quadrilateral</li> <li>• Identify polygons up to a decagon</li> <li>• Construct triangles using SSS, SAS and ASA</li> <li>• Construct more complex polygons</li> <li>• Interpret simple pie charts using proportion</li> <li>• Interpret pie charts using a protractor</li> <li>• Draw pie charts</li> </ul>	<p>Flashback starter</p> <p>Perimeter problems to revisit solving equations and simplifying</p> <p>Forming and solving equations in a geometric setting</p> <p>Revisiting formal methods of addition and subtraction, including with decimals</p>



<i>Geometric Reasoning</i>	<b>12</b>		<ul style="list-style-type: none"> <li>• Understand and use the sum of angles at a point</li> <li>• Understand and use the sum of angles on a straight line</li> <li>• Understand and use the equality of vertically opposite angles</li> <li>• Know and apply the sum of angles in a triangle</li> <li>• Know and apply the sum of angles in a quadrilateral</li> <li>• Solve angle problems using properties of triangles and quadrilaterals</li> <li>• Solve complex angle problems</li> <li>• <b>Find and use the angle sum of any polygon (H)</b></li> <li>• <b>Investigate angles in parallel lines (H)</b></li> <li>• <b>Understand and use parallel line angle rules (H)</b></li> <li>• <b>Use known facts to obtain simple proofs (H)</b></li> </ul>	<p>Flashback starter</p> <p>Review of known angle facts – angles in a full turn</p> <p>Forming and solving equations using angle rules</p>
<i>Number Sense</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Know and use four rules strategies with integers</li> <li>• Know and use mental arithmetic strategies for decimals and fractions</li> <li>• Use factors to simplify calculations</li> <li>• Use estimation as a method for checking mental calculations</li> <li>• Use known number facts to derive other facts</li> <li>• Use known algebraic facts to derive other facts</li> <li>• Know when to use mental method, formal written strategies or a calculator</li> </ul>	<p>Flashback starter</p> <p>Generating sequences</p> <p>Order of operations</p> <p>Substitution into expressions</p>
<i>Sets and Probability</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Identify and represent sets</li> <li>• Interpret and create Venn diagrams</li> <li>• Understand and use the intersection of sets</li> <li>• Understand and use the union of sets</li> <li>• <b>Understand and use the complement of a set (H)</b></li> <li>• Know and use the vocabulary of probability</li> <li>• Generate sample space for single events</li> <li>• Calculate the probability of a single event</li> <li>• Know the sum of probabilities of all possible outcomes is 1</li> </ul>	<p>Flashback starter</p> <p>FDP equivalence</p> <p>Properties of number including factors and multiples</p> <p>Recall of triangle and quadrilateral facts</p> <p>Adding and subtracting fractions</p>
<i>Prime Numbers and Proof</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Find and use multiples</li> <li>• Identify factors of numbers and expressions</li> <li>• Recognise and identify prime numbers</li> <li>• Recognise square and triangular numbers</li> <li>• Find common factors of a set of numbers including the HCF</li> <li>• Find common multiples of a set of numbers including the LCM</li> <li>• Write a number as a product of its prime factors</li> <li>• <b>Use a Venn diagram to calculate the HCF and LCM (H)</b></li> <li>• Make and test conjectures</li> <li>• Use counterexamples to disprove a conjecture</li> </ul>	<p>Flashback starter</p> <p>Generating and describing sequences</p> <p>Properties of number including factors and multiples</p> <p>Use of Venn diagrams</p> <p>Fractional equivalence</p>

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**Qualities**  
 During Year 7, pupils will have opportunities to develop the following BUILD qualities:

<b>BUILD Quality</b>	<b>How the Year 7 mathematics curriculum contributes to developing this quality:</b>
Respect Kindness Tolerance	A culture of tolerance and respect is developed in all maths lessons through pupils discussing and listening to each other in a supportive and respectful manner.
Resilience	All units of work contain aspects of problem solving and challenge which helps students develop resilience.
Creativity	
Positivity	
Integrity	
Aspiration	
Empathy	

**Skills**  
 During Year 7, pupils will have opportunities to develop the following wider skills:

<b>Skill Area</b>	<b>How the Year 7 mathematics curriculum contributes to developing this skill area:</b>
Literacy & Numeracy	Pupils make notes for all units of work and are encouraged to explain their findings through both written and verbal methods.
Communication	Pupils regularly discuss and explain their ideas both to each other and to the class. Students are expected to communicate their mathematical findings through written explanations and diagrams.
Problem Solving	All units of work contain aspects of problem solving and challenge.
Leadership	Pupils work as a group taking on different roles.
Collaboration	Pupils work in both pairs and groups regularly in maths to develop a collaborative attitude to learning.
Metacognition	The maths curriculum contains regular interleaving activities. Manipulatives and multiple representations are used to develop understanding of a concept in both its pictorial, numerical and abstract form.
Physical, Practical and Technical	Constructions, Loci and nets.
Digital Literacy	Homework is set on line.





## Year 8 Mathematics

### **Knowledge, Qualifications and Assessment**

*What pupils will study during Year 8, our ambition for the knowledge they retain and subject specific skill they will develop and how learning will be assessed formatively and summatively.*

<b>Unit Title</b>	<b>Periods</b>	<b>Learning Challenge</b> <i>What will pupils produce at the end of a unit to demonstrate their learning?</i>	<b>Learning Journey</b> <i>What knowledge and subject specific skills will pupils learn in order to complete the Learning Challenge?</i>	<b>Learning Consolidation</b> <i>What prior learning will pupils consolidate using spaced retrieval and spaced practice?</i>
<i>Ratio and Scale</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Understand the meaning and representation of ratio</li> <li>• Understand and use ratio notation</li> <li>• Solve problems involving ratios of the form 1:n or n:1</li> <li>• Solve proportional problems involving the ratio m:n</li> <li>• Divide a value in a given ratio</li> <li>• Express ratios in their simplest integer form</li> <li>• <b>Express ratios in the form 1:n (H)</b></li> <li>• Compare ratios and related fractions</li> <li>• Understand <math>\pi</math> as the ratio between diameter and circumference</li> <li>• <b>Understand gradient of a line as a ratio (H)</b></li> </ul>	Flashback starter
<i>Multiplicative Change</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Solve problems involving direct proportion</li> <li>• Explore conversion graphs</li> <li>• Convert between currencies</li> <li>• <b>Explore direct proportion graphs (H)</b></li> <li>• Explore relationships between similar shapes</li> <li>• Understand scale factors as multiplicative representations</li> <li>• Draw and interpret scale diagrams</li> <li>• Interpret maps using scale factors and ratios</li> </ul>	Flashback starter
<i>Multiplying and Dividing Fractions</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Represent multiplication of fractions</li> <li>• Multiply a fraction by an integer</li> <li>• Find the product of a pair of unit fractions</li> <li>• Find the product of a pair of any fractions</li> <li>• Divide an integer by a fraction</li> <li>• Divide a fraction by a unit fraction</li> <li>• Understand and use the reciprocal</li> <li>• Divide any pair of fractions</li> </ul>	Flashback starter

<i>Working in the Cartesian Plane</i>	<b>12</b>		<ul style="list-style-type: none"> <li>Plot and Interpret straight line graphs</li> <li>Equations of lines parallel to the axis</li> <li>Model situations by translating them into expressions, formulae and graphs</li> <li><b>Finding the equation of a straight line (H)</b></li> <li><b>Finding the mid-point of a line segment (H)</b></li> <li><b>Drawing quadratic graphs (H)</b></li> </ul>	Flashback starter  Revisit negatives Link to solving linear equations
<i>Collecting and Representing Data</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Scatter graphs and Correlation</li> <li>Designing and using one and two way tables</li> <li>Listing outcomes</li> <li><b>Product Rule for Counting (H)</b></li> </ul>	Flashback starter  Revisiting Venn diagrams and set notation Links to representing data and using graphs in other areas of the curriculum.
<i>Tables</i>	<b>4</b>		<ul style="list-style-type: none"> <li>Using sample space diagrams</li> <li>Using tables</li> </ul>	Flashback starter
<i>Brackets, equations and Inequalities</i>	<b>16</b>		<ul style="list-style-type: none"> <li>Multiply out single brackets</li> <li>Forming and using expressions, formulae and identities</li> <li>Forming and solving equations and inequalities with and without brackets</li> <li><b>Factorising into a single bracket (H)</b></li> <li><b>Expanding Binomials (H)</b></li> <li><b>Solving equations with unknowns on both sides (H)</b></li> </ul>	Flashback starter  Equations set in the context of earlier units – shape, angles, probability, ratio etc
<i>Sequences</i>	<b>4</b>		<ul style="list-style-type: none"> <li>Using more complex rules – brackets and squared terms</li> <li><b>Find the rule for the nth term of a linear sequence (H)</b></li> </ul>	Flashback starter
<i>Indices</i>	<b>4</b>		<ul style="list-style-type: none"> <li>Writing expressions with powers</li> </ul>	Flashback starter
<i>Fractions and Percentages</i>	<b>12</b>		<ul style="list-style-type: none"> <li>Fraction, decimal and percentage equivalence</li> <li>On number as a percentage of another</li> <li><b>Finding the original given any percentage (H)</b></li> <li><b>Simple Surds (H)</b></li> </ul>	Flashback starter  Formal methods for calculation
<i>Standard Index Form</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Conversion between numbers in ordinary and standard form</li> <li>Comparing numbers in standard form</li> <li><b>Calculating with standard form (H)</b></li> <li><b>Negative and simple fractional indices (H)</b></li> <li></li> </ul>	Flashback starter
<i>Number Sense</i>	<b>4</b>		<ul style="list-style-type: none"> <li>Developing mental strategies</li> <li>Measures and units</li> <li>Estimation, including rounding to a given number of decimal places</li> <li>Revisit order of operations</li> </ul>	Flashback starter

			<ul style="list-style-type: none"> <li>• <b>Converting area units (H)</b></li> <li>• <b>Error interval notation (H)</b></li> </ul>	
<i>Angles in Parallel Lines and Polygons</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Review Year 7 angle rules</li> <li>• Parallel lines and angles</li> <li>• Revisit geometric notation</li> <li>• Angles in special quadrilaterals</li> <li>• Angles in a polygon</li> <li>• <b>Standard constructions including perpendiculars (H)</b></li> <li>• <b>Diagonal properties of quadrilaterals (H)</b></li> </ul>	Flashback starter  Fractions
<i>Area of Trapezia and Circles</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Review area of shapes covered in Year 7</li> <li>• Area of trapezium</li> <li>• Area of a circle and parts of a circle</li> <li>• Using significant figures</li> <li>• Area of compound shapes</li> </ul>	Flashback starter  Properties of shape
<i>Line Symmetry and Reflection</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Line symmetry in polygons and other shapes</li> <li>• Reflections of shapes in horizontal, vertical and diagonal lines.</li> </ul>	Flashback starter  Equations of lines
<i>The Data Handling Cycle</i>	<b>16</b>		<ul style="list-style-type: none"> <li>• Collecting data</li> <li>• Interpreting statistical diagrams</li> <li>• Dual bar charts</li> <li>• Constructing and interpreting pie charts</li> <li>• <b>Mean of grouped data (H)</b></li> <li>• <b>Finding unknown data values given the mean or changes in the mean (H)</b></li> </ul>	Flashback starter  Using algebraic substitution to form lists for average and the range Links to data collection in other areas of the curriculum

### **Qualities**

*During Year 8, pupils will have opportunities to develop the following BUILD qualities:*

<b>BUILD Quality</b>	<b>How the Year 8 mathematics curriculum contributes to developing this quality:</b>
<i>Respect</i>	A culture of tolerance and respect is developed in all maths lessons through pupils discussing and listening to each other in a supportive and respectful manner.
<i>Kindness</i>	
<i>Tolerance</i>	
<i>Resilience</i>	
<i>Creativity</i>	
<i>Positivity</i>	
<i>Integrity</i>	

Aspiration	
Empathy	

**Skills**  
*During Year 8, pupils will have opportunities to develop the following wider skills:*

<b>Skill Area</b>	<b>How the Year 8 mathematics curriculum contributes to developing this skill area:</b>
<i>Literacy &amp; Numeracy</i>	Pupils make notes for all units of work and are encouraged to explain their findings through both written and verbal methods.
<i>Communication</i>	Pupils regularly discuss and explain their ideas both to each other and to the class. Students are expected to communicate their mathematical findings through written explanations and diagrams.
<i>Problem Solving</i>	All units of work contain aspects of problem solving and challenge.
<i>Leadership</i>	Pupils work as a group taking on different roles.
<i>Collaboration</i>	Pupils work in both pairs and groups regularly in maths to develop a collaborative attitude to learning.
<i>Metacognition</i>	The maths curriculum contains regular interleaving activities. Manipulatives and multiple representations are used to develop understanding of a concept in both its pictorial, numerical and abstract form.
<i>Physical, Practical and Technical</i>	Constructions, Loci and nets.
<i>Digital Literacy</i>	Homework is set on line.



## Year 9 Mathematics

### **Knowledge, Qualifications and Assessment**

*What pupils will study during Year 9, our ambition for the knowledge they retain and subject specific skill they will develop and how learning will be assessed formatively and summatively.*

<b>Unit Title</b>	<b>Periods</b>	<b>Learning Challenge</b> <i>What will pupils produce at the end of a unit to demonstrate their learning?</i>	<b>Learning Journey</b> <i>What knowledge and subject specific skills will pupils learn in order to complete the Learning Challenge?</i>	<b>Learning Consolidation</b> <i>What prior learning will pupils consolidate using spaced retrieval and spaced practice?</i>
<i>Straight Line Graphs</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Interpreting straight line graphs</li> <li>Finding the equation of a straight line</li> <li>Compare to linear sequences and finding the rule for the nth term</li> <li><b>Solving simultaneous equations graphically (H)</b></li> </ul>	Flashback starter  Link equations of graphs to solving equations
<i>Forming and Solving Equations</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Forming and solving equations using contexts such as angles, probabilities and area</li> <li><b>Changing the subject of a formula (H)</b></li> </ul>	Flashback starter  Revisit key topics through equations Brackets Geometric properties and rules
<i>Testing Conjectures</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Conjectures about odd and even number, primes</li> <li>Is a given term in a sequence?</li> <li>Are these lines parallel?</li> <li>What would happen if ...?</li> </ul>	Flashback starter
<i>Three Dimensional Shapes</i>	<b>12</b>		<ul style="list-style-type: none"> <li>Faces, Edges and Vertices</li> <li>Names of prisms and non-prisms</li> <li>Identifying 2D shapes within 3D shapes</li> <li>Volume and surface area of cuboids and cylinders</li> <li><b>Converting between volume units (H)</b></li> <li><b>Surface area of any prism (H)</b></li> </ul>	Flashback starter  Estimation Rounding to nearest integer, decimal places and significant figures Unit Conversions

<i>Constructions and Congruency</i>	<b>12</b>		<ul style="list-style-type: none"> <li>• Nets</li> <li>• Scale drawing</li> <li>• Constructing perpendiculars and bisectors</li> <li>• Exploring congruency via construction</li> <li>• <b>Loci (H)</b></li> </ul>	Flashback starter
<i>Numbers</i>	<b>4</b>		<ul style="list-style-type: none"> <li>• Types of number</li> <li>• HCF and LCM</li> <li>• Revisit standard form</li> </ul>	Flashback starter Adding fractions
<i>Using Percentages</i>	<b>12</b>		<ul style="list-style-type: none"> <li>• Percentage increase and decrease</li> <li>• Percentages over 100%</li> <li>• Finding percentage change</li> <li>• Using multipliers</li> <li>• <b>Reverse percentages (H)</b></li> <li>• <b>Repeated percentage change (H)</b></li> </ul>	Flashback starter FDP equivalence Ratio
<i>Maths and Money</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Wages and taxes</li> <li>• Bills and bank statements</li> <li>• Interest</li> <li>• Unit pricing (best buys)</li> </ul>	Flashback starter
<i>Deduction</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Revisit angle rules including within special quadrilaterals and algebraic situations</li> <li>• <b>Angles proof (H)</b></li> </ul>	Flashback starter Identify 2D and 3D shapes Revisit constructions
<i>Rotation and Translation</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Identifying the order of rotational symmetry</li> <li>• Rotating shapes</li> <li>• Translating points and shapes</li> <li>• <b>Combined transformations (H)</b></li> </ul>	Flashback starter Fractions and directed number in the context of rotation Compare and contrast with lines of symmetry
<i>Enlargement and Similarity</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Identifying the hypotenuse of a right-angled triangle</li> <li>• Determining whether a triangle is right-angled</li> <li>• Calculating missing sides in right-angled triangles</li> <li>• <b>Exploring proofs of Pythagoras' theorem</b></li> <li>• <b>Using Pythagoras' theorem in 3D shapes</b></li> </ul>	Flashback starter Ratio notation Circumference
<i>Solving Ratio and Proportion Problems</i>	<b>12</b>		<ul style="list-style-type: none"> <li>• Enlarge shape by a positive scale factor, including from a given point</li> <li>• Calculate the lengths of missing sides in similar shapes</li> <li>• <b>Enlarge shapes by a negative scale factor (H)</b></li> <li>• <b>Similar triangles (H)</b></li> <li>• <b>Inverse proportion graphs (H)</b></li> </ul>	Flashback starter

			<ul style="list-style-type: none"> <li>• <b>Converting compound measures (H)</b></li> </ul>	
<i>Rates</i>	<b>4</b>		<ul style="list-style-type: none"> <li>• Speed, distance and time</li> <li>• Density</li> <li>• Working with compound units</li> </ul>	Flashback starter  Y =mx Unit pricing
<i>Solving Problems using Graphs, Tables and Algebra</i>	<b>24</b>		Revisit: <ul style="list-style-type: none"> <li>• data charts and graphs including bivariate data</li> <li>• Sequences</li> <li>• Frequency trees</li> <li>• Standard form</li> <li>• Tables and timetables</li> <li>• Inequalities on number lines, including error intervals</li> <li>• Misleading graphs</li> <li>• Representing word problems in a variety of forms (graphs, tables, expressions ....)</li> <li>• Probability</li> <li>• <b>Forming and solving linear simultaneous equations</b></li> </ul>	Flashback starter

### **Qualities**

*During Year 9, pupils will have opportunities to develop the following BUILD qualities:*

<b>BUILD Quality</b>	<b>How the Year 9 mathematics curriculum contributes to developing this quality:</b>
<i>Respect</i>	A culture of tolerance and respect is developed in all maths lessons through pupils discussing and listening to each other in a supportive and respectful manner.
<i>Kindness</i>	
<i>Tolerance</i>	
<i>Resilience</i>	
<i>Creativity</i>	
<i>Positivity</i>	
<i>Integrity</i>	
<i>Aspiration</i>	
<i>Empathy</i>	

### **Skills**

*During Year 9, pupils will have opportunities to develop the following wider skills:*

<b>Skill Area</b>	<b>How the Year 9 mathematics curriculum contributes to developing this skill area:</b>
<i>Literacy &amp; Numeracy</i>	Pupils make notes for all units of work and are encouraged to explain their findings through both written and verbal methods.
<i>Communication</i>	Pupils regularly discuss and explain their ideas both to each other and to the class. Students are expected to communicate their mathematical findings through written explanations and diagrams.
<i>Problem Solving</i>	All units of work contain aspects of problem solving and challenge.
<i>Leadership</i>	Pupils work as a group taking on different roles.
<i>Collaboration</i>	Pupils work in both pairs and groups regularly in maths to develop a collaborative attitude to learning.
<i>Metacognition</i>	The maths curriculum contains regular interleaving activities. Manipulatives and multiple representations are used to develop understanding of a concept in both its pictorial, numerical and abstract form.
<i>Physical, Practical and Technical</i>	Constructions, Loci and nets.
<i>Digital Literacy</i>	Homework is set on line.

## Year 10 Mathematics

### **Knowledge, Qualifications and Assessment**

*What pupils will study during Year 10, our ambition for the knowledge they retain and subject specific skill they will develop and how learning will be assessed formatively and summatively.*

<b>Unit Title</b>	<b>Periods</b>	<b>Learning Challenge</b> <i>What will pupils produce at the end of a unit to demonstrate their learning?</i>	<b>Learning Journey</b> <i>What knowledge and subject specific skills will pupils learn in order to complete the Learning Challenge?</i>	<b>Learning Consolidation</b> <i>What prior learning will pupils consolidate using spaced retrieval and spaced practice?</i>
Congruence, Similarity and Enlargement	<b>12</b>		<ul style="list-style-type: none"> <li>Understand the difference between congruence and similarity</li> <li>Enlarge a shape about a given point; understand and use similarity</li> <li>Find missing sides in similar shapes including pairs of similar triangles</li> <li><b>Formal proof of congruency of triangles</b></li> </ul>	Flashback starter  Angle rules including parallel line angles Equations, especially variants of $ax = b$
Trigonometry	<b>12</b>		<ul style="list-style-type: none"> <li><i>Find lengths and angles in right-angled triangles</i></li> <li><i>Know the exact values of key angles</i></li> <li><b>3D trigonometry</b></li> <li><b>Using the sine and cosine rule</b></li> <li><b>Using the formula <math>\frac{1}{2}ab\sin C</math> for the area of non-right angled triangles</b></li> </ul>	Flashback starter  Pythagoras' theorem

<i>Equations and Inequalities</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Forming and solving in a variety of contexts</li> <li><b>Using set notations for solutions (H)</b></li> </ul>	Flashback starter
<i>Representing Solutions</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Plotting and using linear graphs</li> <li>Using number lines</li> <li><b>Inequalities in two variables, identifying regions (H)</b></li> <li><b>Solving quadratic equations and inequalities by factorisation only (H)</b></li> </ul>	Flashback starter
<i>Simultaneous Equations</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Forming and solving linear simultaneous equations both graphically and algebraically</li> <li><b>Simultaneous equations with one linear and one quadratic (H)</b></li> </ul>	Flashback starter
<i>Angles and Bearings</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Review of KS3 angle rules</li> <li>Understanding and using bearings</li> </ul>	Flashback starter Trigonometry
<i>Working with Circles</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Reviewing area and circumference</li> <li>Parts of a circle – names and calculations</li> <li>Circle related areas and volumes – cylinder, sphere etc</li> <li><b>Using and proving circle theorems (H)</b></li> <li><b>Area and Volume ratios (H)</b></li> <li><b>Equations of a circle (H)</b></li> </ul>	Flashback starter Significant figures
<i>Vectors</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Understanding vector notation</li> <li>Vector arithmetic</li> <li>Vectors and translations</li> <li><b>Geometric proofs with vectors (H)</b></li> </ul>	Flashback starter
<i>Ratios and Fractions</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Using ratios, including with mixed units</li> <li>Fractions in ratios</li> <li>Fractions from ratios</li> </ul>	Flashback starter Formal methods of calculations Fraction arithmetic
<i>Percentages and Interest</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Converting fractions, decimals and percentages</li> <li>Finding percentages</li> <li>Finding as a percentage</li> <li>Simple and compound interest</li> <li>Depreciation</li> <li><b>Iteration (H)</b></li> </ul>	Flashback starter
<i>Probability</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Review of single event probability</li> <li>Independent events</li> <li>Tree diagrams</li> <li><b>Conditional probability (H)</b></li> </ul>	Flashback starter
<i>Collecting, Representing and Interpreting Data</i>	<b>24</b>		<ul style="list-style-type: none"> <li>Sampling</li> <li>Discussing limitations</li> <li>Tables and graphs for time series data</li> <li>Dealing with grouped data</li> </ul>	Flashback starter Use equations – solving problems about the mean

			<ul style="list-style-type: none"> <li>• Correlation</li> <li>• Lines of best fit, including dangers of extrapolation</li> <li>• Frequency polygons</li> <li>• Measures of location and dispersion</li> <li>• Comparing distributions</li> <li>• <b>Cumulative frequency and box-plots (H)</b></li> <li>• <b>Histograms (H)</b></li> </ul>	
<i>Non-Calculator methods</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Four operations with integers, decimals and fractions with and without context</li> <li>• Directed number arithmetic</li> <li>• Percentage calculations</li> <li>• <b>Limits of accuracy (H)</b></li> <li>• <b>Upper and lower bounds (H)</b></li> <li>• <b>Recurring decimals</b></li> </ul>	Flashback starter Exact trigonometry values Area and volume formulae without a calculator Exact answers in terms of $\pi$ Financial mathematics
<i>Types of Number and Sequences</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Factors, multiples, primes and prime factorisation</li> <li>• Arithmetic and geometric sequences</li> <li>• Other sequences</li> <li>• <b>Finding the rule for the nth term of a quadratic sequence</b></li> </ul>	Flashback starter
<i>Indices and Roots</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Working out powers and roots</li> <li>• Standard index form</li> <li>• Exact answers</li> <li>• <b>Fractional indices</b></li> <li>• <b>Rational and irrational numbers (H)</b></li> </ul>	Flashback starter

## Qualities

During Year 10, pupils will have opportunities to develop the following BUILD qualities:

<b>BUILD Quality</b>	<b>How the Year 10 mathematics curriculum contributes to developing this quality:</b>
<i>Respect</i>	A culture of tolerance and respect is developed in all maths lessons through pupils discussing and listening to each other in a supportive and respectful manner.
<i>Kindness</i>	
<i>Tolerance</i>	
<i>Resilience</i>	
<i>Creativity</i>	
<i>Positivity</i>	
<i>Integrity</i>	
<i>Aspiration</i>	

Empathy	
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**Skills**  
*During Year 10, pupils will have opportunities to develop the following wider skills:*

<b>Skill Area</b>	<b>How the Year 10 mathematics curriculum contributes to developing this skill area:</b>
<i>Literacy &amp; Numeracy</i>	Pupils make notes for all units of work and are encouraged to explain their findings through both written and verbal methods.
<i>Communication</i>	Pupils regularly discuss and explain their ideas both to each other and to the class. Students are expected to communicate their mathematical findings through written explanations and diagrams.
<i>Problem Solving</i>	All units of work contain aspects of problem solving and challenge.
<i>Leadership</i>	Pupils work as a group taking on different roles.
<i>Collaboration</i>	Pupils work in both pairs and groups regularly in maths to develop a collaborative attitude to learning.
<i>Metacognition</i>	The maths curriculum contains regular interleaving activities. Manipulatives and multiple representations are used to develop understanding of a concept in both its pictorial, numerical and abstract form.
<i>Physical, Practical and Technical</i>	Constructions, Loci and nets.
<i>Digital Literacy</i>	Homework is set on line.

## Year 11 Mathematics

**Knowledge, Qualifications and Assessment**  
*What pupils will study during Year 11, our ambition for the knowledge they retain and subject specific skill they will develop and how learning will be assessed formatively and summatively.*

<b>Unit Title</b>	<b>Periods</b>	<b>Learning Challenge</b> <i>What will pupils produce at the end of a unit to demonstrate their learning?</i>	<b>Learning Journey</b> <i>What knowledge and subject specific skills will pupils learn in order to complete the Learning Challenge?</i>	<b>Learning Consolidation</b> <i>What prior learning will pupils consolidate using spaced retrieval and spaced practice?</i>
Gradients and Lines	<b>8</b>		<ul style="list-style-type: none"> <li>Finding and using equations of lines</li> <li><b>Equations of perpendicular lines (H)</b></li> </ul>	Flashback starter Solving equations

<i>Non-linear Graphs</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Plotting quadratic curves</li> <li>Understanding roots</li> <li>Cubic and reciprocal graphs</li> <li>Real-life graphs</li> <li><b>Exponential graphs (H)</b></li> <li><b>Understanding roots (H)</b></li> <li><b>Equations of tangents to a curve (H)</b></li> <li><b>Area under a curve (H)</b></li> </ul>	Flashback starter Proportional reasoning
<i>Using Graphs</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Reflect in a line</li> <li>Speed, distance, time graphs</li> </ul>	Flashback starter
<i>Expanding and Factorising</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Expand a single bracket and binomials</li> <li>Factorising into a single bracket</li> <li>Factorising quadratics of the form <math>x^2 + bx + c</math></li> <li>Solving quadratic equations</li> </ul>	Flashback starter Directed number Graph
<i>Changing the Subject</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Review of solving linear equations</li> <li>Changing the subject of a formula where the subject appears once</li> <li><b>Changing the subject of the formula where the subject appears more than once (H)</b></li> <li><b>Composite and inverse functions (H)</b></li> </ul>	Flashback starter
<i>Functions</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Inputs and outputs</li> <li>Equations and identities</li> <li>Using kinematic equations</li> </ul>	Flashback starter
<i>Multiplicative Reasoning</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Review of scale factor and enlargement</li> <li>Review of direct and inverse proportion</li> <li>Review of pressure and density</li> </ul>	Flashback starter
<i>Geometric Reasoning</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Review of angle facts focussing on language and reasons</li> <li>Review of Pythagoras' theorem and trigonometry</li> </ul>	Flashback starter
<i>Algebraic Reasoning</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Complex indices</li> <li>Review of simplification of complex expressions and finding the nth term</li> <li>Justification – e.g. why a number is/isn't in a given sequence</li> <li><b>Variation with powers (H)</b></li> <li><b>Algebraic proof (H)</b></li> </ul>	Flashback starter
<i>Transformations and Construction</i>	<b>8</b>		<ul style="list-style-type: none"> <li>Revisit transformations</li> <li>Constructions using ruler and protractor</li> <li>Constructions using ruler and compasses</li> <li><b>Trigonometrical graphs (H)</b></li> <li><b>Graph transformations (H)</b></li> </ul>	Flashback starter



<i>Listing and Describing</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Listing and describing organised lists</li> <li>• Using Venn diagrams</li> <li>• Plans and elevations</li> </ul>	Flashback starter
<i>Show That ....</i>	<b>8</b>		<ul style="list-style-type: none"> <li>• Illustrating equivalence</li> <li>• Justifying answers</li> <li>• Language of angles rules</li> <li>• Conditions for congruent triangles</li> </ul>	Flashback starter

### **Qualities**

*During Year 11, pupils will have opportunities to develop the following BUILD qualities:*

<b>BUILD Quality</b>	<b>How the Year 11 mathematics curriculum contributes to developing this quality:</b>
<i>Respect</i>	A culture of tolerance and respect is developed in all maths lessons through pupils discussing and listening to each other in a supportive and respectful manner.
<i>Kindness</i>	
<i>Tolerance</i>	
<i>Resilience</i>	
<i>Creativity</i>	
<i>Positivity</i>	
<i>Integrity</i>	
<i>Aspiration</i>	
<i>Empathy</i>	

### **Skills**

*During Year 11, pupils will have opportunities to develop the following wider skills:*

<b>Skill Area</b>	<b>How the Year 11 mathematics curriculum contributes to developing this skill area:</b>
<i>Literacy &amp; Numeracy</i>	Pupils make notes for all units of work and are encouraged to explain their findings through both written and verbal methods.
<i>Communication</i>	Pupils regularly discuss and explain their ideas both to each other and to the class. Students are expected to communicate their mathematical findings through written explanations and diagrams.
<i>Problem Solving</i>	All units of work contain aspects of problem solving and challenge.
<i>Leadership</i>	Pupils work as a group taking on different roles.

<i>Collaboration</i>	Pupils work in both pairs and groups regularly in maths to develop a collaborative attitude to learning.
<i>Metacognition</i>	The maths curriculum contains regular interleaving activities. Manipulatives and multiple representations are used to develop understanding of a concept in both its pictorial, numerical and abstract form.
<i>Physical, Practical and Technical</i>	Constructions, Loci and nets.
<i>Digital Literacy</i>	Homework is set on line. All pupils are registered and use the PiXL maths app which is linked to their PLC's

## Year 12 Mathematics

### **Knowledge, Qualifications and Assessment**

*What pupils will study during Year 12, our ambition for the knowledge they retain and subject specific skill they will develop and how learning will be assessed formatively and summatively.*

<b>Unit Title</b>	<b>Periods</b>	<b>Learning Challenge</b> <i>What will pupils produce at the end of a unit to demonstrate their learning?</i>	<b>Learning Journey</b> <i>What knowledge and subject specific skills will pupils learn in order to complete the Learning Challenge?</i>	<b>Learning Consolidation</b> <i>What prior learning will pupils consolidate using spaced retrieval and spaced practice?</i>
<b>Algebraic Manipulation, Quadratic Equations &amp; Simultaneous Equations</b>	<b>8</b>		<ul style="list-style-type: none"> <li>• Argument and proof</li> <li>• Indices</li> <li>• Surds</li> <li>• Quadratic Functions</li> <li>• Simultaneous Equations</li> </ul>	
<b>Graphs, Linear &amp; Quadratic Inequalities</b>	<b>7</b>		<ul style="list-style-type: none"> <li>• Inequalities</li> </ul>	
<b>Straight Lines &amp; Circles</b>	<b>6</b>		<ul style="list-style-type: none"> <li>• Coordinate geometry</li> </ul>	
<b>Binomial Expansions</b>	<b>4</b>		<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>	
<b>Differentiation</b>	<b>15</b>		<ul style="list-style-type: none"> <li>• Differentiation from first principals</li> <li>• Differentiating <math>ax^n</math> and Leibniz notation</li> <li>• Rates of Change</li> <li>• Tangents and Normals</li> <li>• Turning Points</li> </ul>	
<b>Integration</b>	<b>10</b>		<ul style="list-style-type: none"> <li>• Integration</li> </ul>	

			<ul style="list-style-type: none"> <li>• Area under a curve</li> </ul>	
<b>Trigonometry</b>	<b>5</b>		<ul style="list-style-type: none"> <li>• Sine and Cosine</li> <li>• The sine and Cosine rules</li> </ul>	
<b>Vectors</b>	<b>10</b>		<ul style="list-style-type: none"> <li>• Definitions and properties</li> <li>• Component of a vector</li> </ul>	
<b>Proof</b>	<b>5</b>		<ul style="list-style-type: none"> <li>•</li> </ul>	
<b>Exponentials &amp; Logarithms</b>	<b>15</b>		<ul style="list-style-type: none"> <li>• <i>The laws of Logarithms</i></li> <li>• <i>Exponential Functions</i></li> <li>• <i>Exponential Process</i></li> <li>• <i>Curve Fitting</i></li> </ul>	
<b>Statistical Sampling, Data Presentation &amp; Interpretation</b>	<b>8</b>		<ul style="list-style-type: none"> <li>• Sampling</li> <li>• Central tendency and spread</li> <li>• Single-variable data</li> <li>• Bivariate data</li> </ul>	
<b>Probability &amp; Statistical Distributions</b>	<b>8</b>		<ul style="list-style-type: none"> <li>• Probability</li> <li>• Binomial distribution</li> </ul>	
<b>Statistical Hypothesis Testing</b>	<b>7</b>		<ul style="list-style-type: none"> <li>• Formulating a test</li> <li>• The critical region</li> </ul>	
<b>Kinematics in One Dimension</b>	<b>10</b>		<ul style="list-style-type: none"> <li>• Standard units and basic dimensions</li> <li>• Motion in a straight line – definitions and graphs</li> <li>• Equations of motion for constant acceleration</li> <li>• Motion with variable acceleration</li> </ul>	
<b>Forces and Newton's Law</b>	<b>10</b>		<ul style="list-style-type: none"> <li>• Forces</li> <li>• Dynamics</li> <li>• Motion under gravity</li> <li>• Systems of forces</li> </ul>	
<b>Statistical Distributions</b>	<b>4</b>		<ul style="list-style-type: none"> <li>•</li> </ul>	
<b>Analysis of Data using Statistical Packages</b>	<b>5</b>		<ul style="list-style-type: none"> <li>• Analyse and interrogate the large data set</li> </ul>	

### **Qualities**

*During Year 12, pupils will have opportunities to develop the following BUILD qualities:*

<b>BUILD Quality</b>	<b>How the Year 12 mathematics curriculum contributes to developing this quality:</b>
<i>Respect</i>	
<i>Kindness</i>	
<i>Tolerance</i>	
<i>Resilience</i>	
<i>Creativity</i>	
<i>Positivity</i>	
<i>Integrity</i>	
<i>Aspiration</i>	
<i>Empathy</i>	

### **Skills**

*During Year 12, pupils will have opportunities to develop the following wider skills:*

<b>Skill Area</b>	<b>How the Year 12 mathematics curriculum contributes to developing this skill area:</b>
<i>Literacy &amp; Numeracy</i>	Pupils make notes for all units of work and are encouraged to explain their findings through both written and verbal methods.

<i>Communication</i>	Pupils regularly discuss and explain their ideas both to each other and to the class. Students are expected to communicate their mathematical findings through written explanations and diagrams.
<i>Problem Solving</i>	All units of work contain aspects of problem solving and challenge.
<i>Leadership</i>	Pupils work as a group taking on different roles.
<i>Collaboration</i>	Pupils work in both pairs and groups regularly in maths to develop a collaborative attitude to learning.
<i>Metacognition</i>	The maths curriculum contains regular interleaving activities. Manipulatives and multiple representations are used to develop understanding of a concept in both its pictorial, numerical and abstract form.
<i>Physical, Practical and Technical</i>	
<i>Digital Literacy</i>	Graphic calculators are used in lessons and are available for all students in the exam. Graph packages are used such as DESMOS

## Year 13 Mathematics

### **Knowledge, Qualifications and Assessment**

*What pupils will study during Year 13, our ambition for the knowledge they retain and subject specific skill they will develop and how learning will be assessed formatively and summatively.*

<b>Unit Title</b>	<b>Periods</b>	<b>Learning Challenge</b> <i>What will pupils produce at the end of a unit to demonstrate their learning?</i>	<b>Learning Journey</b> <i>What knowledge and subject specific skills will pupils learn in order to complete the Learning Challenge?</i>	<b>Learning Consolidation</b> <i>What prior learning will pupils consolidate using spaced retrieval and spaced practice?</i>
<b>Sequences, Series and Binomial Theorem</b>	<b>8</b>	<i>Sequences and Series assessment test</i>	<ul style="list-style-type: none"> <li>• Types of sequences</li> <li>• Sigma notation</li> <li>• Arithmetic sequences and series</li> <li>• Geometric sequences and series</li> <li>• Binomial expansions</li> </ul>	<b>Homework of mixed topics from AS</b>
<b>Trigonometry and circular measures</b>	<b>12</b>		<ul style="list-style-type: none"> <li>• Radians</li> <li>• Trigonometric ratios</li> <li>• Sketching graphs using radians</li> <li>• Practical problems</li> <li>• Small angle approximations</li> <li>• Addition and subtraction formula</li> <li>• Expressions of the form <math>a\cos\theta + b\sin\theta</math></li> <li>• More trigonometric ratio</li> <li>• Inverse trigonometric functions</li> </ul>	

<b>Algebra and Functions</b>	<b>8</b>		<ul style="list-style-type: none"> <li>• Definition of a function</li> <li>• Composite Functions</li> <li>• Inverse Functions</li> <li>• The modulus of a function</li> <li>• Transformations involving the modulus function</li> <li>• Functions in modelling</li> </ul>	
<b>Probability</b>	<b>4</b>		<ul style="list-style-type: none"> <li>• Set notation</li> <li>• Conditional probability</li> <li>• Modelling real life problems with probability</li> </ul>	
<b>Differentiation</b>	<b>8</b>		<ul style="list-style-type: none"> <li>• Turning points</li> <li>• The chain rule</li> <li>• Differentiating <math>e^{kx}</math></li> <li>• Differentiating in <math>a^x</math></li> <li>• Differentiating <math>\sin x</math> and <math>\cos x</math> from first principles</li> </ul>	
<b>Further Differentiation</b>	<b>10</b>		<ul style="list-style-type: none"> <li>• The product rule</li> <li>• The quotient rule</li> <li>• Differentiating trigonometric functions</li> <li>• Differentiating parametric functions</li> <li>• Implicit equations</li> <li>• Constructing differential equations</li> </ul>	
<b>Integration</b>	<b>12</b>		<ul style="list-style-type: none"> <li>• Recognising integrals</li> <li>• Integration with trigonometric functions</li> <li>• Definite integrals</li> <li>• Integration by substitution</li> <li>• Integration by parts</li> <li>• Integrating algebraic fractions</li> <li>• Solving differential equations</li> </ul>	
<b>Numerical Methods</b>	<b>10</b>		<ul style="list-style-type: none"> <li>• Finding roots</li> <li>• How change of sign can fail</li> <li>• Iterative methods</li> <li>• The Newton-Raphson method</li> <li>• How iterative methods can vary</li> <li>• Numerical integration</li> <li>• Using numerical methods to solve problems</li> </ul>	
<b>Statistical Distributions</b>	<b>8</b>		<ul style="list-style-type: none"> <li>• The Normal distribution</li> <li>• Using the Normal distribution</li> <li>• Non standardised variables</li> <li>• Normal approximation to the Binomial</li> </ul>	

<b>Parametric Equations</b>	<b>4</b>		<ul style="list-style-type: none"> <li>• Parametric equations of curves</li> <li>• Converting between Cartesian and parametric forms</li> <li>• Problems involving parametric equations</li> </ul>	
<b>Statistical Hypothesis Testing</b>			<ul style="list-style-type: none"> <li>• Correlation coefficients</li> <li>• Hypothesis testing for mean of a Normal distribution</li> <li>• Non-linear regression</li> </ul>	
<b>Partial Fractions and Integration</b>			<ul style="list-style-type: none"> <li>• Simplifying algebraic fractions</li> <li>• Partial fractions without repeated terms</li> <li>• Partial fractions with repeated terms</li> <li>• Using partial fractions</li> </ul>	
<b>Kinematics</b>			<p>Equations of constant acceleration</p> <ul style="list-style-type: none"> <li>• Velocity vectors</li> <li>• Equations of constant acceleration using vectors</li> <li>• Vectors with calculus</li> <li>• Projectiles</li> </ul>	
<b>Forces</b>			<ul style="list-style-type: none"> <li>• Resolving Forces</li> <li>• Adding forces</li> <li>• Coefficient of friction</li> <li>• Connected particles</li> </ul>	
<b>Proof</b>			<ul style="list-style-type: none"> <li>• Proof by Contradiction</li> </ul>	
<b>Vectors</b>			<ul style="list-style-type: none"> <li>• Vectors in three dimensions</li> <li>• Vectors and shapes</li> </ul>	
<b>Moments</b>			<ul style="list-style-type: none"> <li>• Turning moments</li> <li>• Horizontal rods</li> <li>• 17.3 Equilibrium of rigid bodies</li> </ul>	

**Qualities**

*During Year 13, pupils will have opportunities to develop the following BUILD qualities:*

<b>BUILD Quality</b>	<b>How the Year 13 mathematics curriculum contributes to developing this quality:</b>
<i>Respect</i>	
<i>Kindness</i>	
<i>Tolerance</i>	
<i>Resilience</i>	
<i>Creativity</i>	
<i>Positivity</i>	
<i>Integrity</i>	
<i>Aspiration</i>	
<i>Empathy</i>	

**Skills**

*During Year 13, pupils will have opportunities to develop the following wider skills:*



<b><i>Skill Area</i></b>	<b><i>How the Year 13 mathematics curriculum contributes to developing this skill area:</i></b>
<i>Literacy &amp; Numeracy</i>	Pupils make notes for all units of work and are encouraged to explain their findings through both written and verbal methods.
<i>Communication</i>	Pupils regularly discuss and explain their ideas both to each other and to the class. Students are expected to communicate their mathematical findings through written explanations and diagrams.
<i>Problem Solving</i>	All units of work contain aspects of problem solving and challenge.
<i>Leadership</i>	Pupils work as a group taking on different roles.
<i>Collaboration</i>	Pupils work in both pairs and groups regularly in maths to develop a collaborative attitude to learning.
<i>Metacognition</i>	The maths curriculum contains regular interleaving activities. Manipulatives and multiple representations are used to develop understanding of a concept in both its pictorial, numerical and abstract form.
<i>Physical, Practical and Technical</i>	Constructions, Loci and nets.
<i>Digital Literacy</i>	Graphic calculators are used in lessons and are available for all students in the exam. Graph packages are used such as DESMOS

