



# Mathematics curriculum overview KS3

Topic	1- Algebraic Thinking	2- Place Value and Proportion	3- Application of number	4- Directed number/Fractional thinking	5- Lines and angles	6- Reasoning with number
Length of topic (in weeks)	6 weeks	7 weeks	6 weeks	6 weeks	6 weeks	7 weeks
Links to national curriculum	<p>Use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics</p> <p>Generate terms of a sequence from either a term-to-term or a position-to-term rule</p> <p>Consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots.</p>	<p>Consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots. use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics</p> <p>Order positive and negative integers, decimals and fractions; use the number line as a model for ordering of the real numbers; use the symbols =, ≠, &lt;, &gt;, ≤, ≥</p> <p>Define percentage as ‘number of parts per hundred’, interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively, express 1 quantity as a percentage of another, compare 2 quantities using percentages, and work with percentages greater than 100%</p> <p>Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors</p>	<p>Consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots.</p> <p>Select and use appropriate calculation strategies to solve increasingly complex problems. use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics</p> <p>interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning</p>	<p>Consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots</p> <p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics</p> <p>Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems</p> <p>Understand and use place value for decimals, measures and integers of any size</p>	<p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics</p> <p>Draw and measure line segments and angles in geometric figures, including interpreting scale drawings</p> <p>Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric</p> <p>Use the standard conventions for labelling the sides and angles of triangle ABC, and know and use the criteria for congruence of triangles</p>	<p>Use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation property</p> <p>use the 4 operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative</p> <p>use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals</p> <p>Recognise and use relationships between operations including inverse operations</p> <p>Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale</p> <p>Understand that the probabilities of all possible outcomes sum to 1</p> <p>Enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams</p>

Assessment Task(s)	End of block task	End of block task End of term assessment	End of block task	End of block task End of term assessment	End of block task	End of block task End of year assessment
Key Knowledge	Sequences. Understand and use algebraic notation. Equality and equivalence	Place value and ordering integers and decimals. Fraction, decimal and percentage equivalence	Solving problems with addition and subtraction. Solving problems with multiplication and division. Fractions and percentages of amounts	Operations and equations with directed number. Addition and subtraction of fractions.	Constructing, measuring and using geometric notation. Developing geometrical reasoning	Developing number sense. Sets and probability. Prime numbers and proof
Key Skills NUMBER ALGEBRA GEOMETRY RATIO PROBABILITY STATISTICS	Compare sequences. Review numerical graphs. Function machines Bar models Algebraic notation. Form and solve equations Collect like terms	Order and compare number Find range and mean. Interchange between fractions, decimal and percentages. Interpret pie charts.	Mental and formal calculations Money problems in context of perimeter HCF/LCM $X / 10, 100, 1000, 0.1, 0.01$ Find the mean of a set of numbers	Fraction, % of amount no calculator. Order number Two step equations Directed number. Add and subtract decimals and fractions	Geometric notation Classify angles Construction Pie charts Angles on lines and points. Calculating angles in triangles and quadrilaterals	Mental arithmetic Evaluate algebraic expressions estimation. Set notation Venn diagrams probability. Recognise prime, square, triangle numbers Powers and roots Products of primes

Topic	1-Proportional Reasoning	2- Representations	3- Algebraic Techniques	4- Developing Number	5-Developing Geometry	6- Reasoning with data
Length of topic (in weeks)	6 weeks	7 weeks	6 weeks	6 weeks	6 weeks	7 weeks
Links to national curriculum	<p>Use a calculator and other technologies to calculate results accurately and then interpret them appropriately. use scale factors, scale diagrams and maps.</p> <p>Use ratio notation, including reduction to simplest form.</p> <p>Divide a given quantity into 2 parts in a given part:part or part:whole ratio; express the division of a quantity into 2 parts as a ratio.</p>	<p>Use a calculator and other technologies to calculate results accurately and then interpret them appropriately</p> <p>Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities</p>	<p>Substitute values in expressions, rearrange and simplify expressions, and solve equations</p> <p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics</p> <p>Use and interpret algebraic notation, including: <math>ab</math> in place of <math>a \times b</math>, <math>3y</math> in place of <math>y + y + y</math> and <math>3 \times y</math>, <math>a^2</math> in place of <math>a \times a</math>, <math>a^3</math> in place of <math>a \times a \times a</math>; <math>a^2b</math> in place of <math>a \times a \times b</math>, <math>a/b</math> in place of <math>a \div b</math>, coefficients written as fractions rather than as decimals, brackets</p> <p>Substitute numerical values into formulae and expressions, including scientific formulae</p> <p>Simplify and manipulate algebraic expressions to maintain equivalence by: collecting like terms, multiplying a single term over a bracket, taking out common factors.</p> <p>Use algebraic methods to solve linear equations in 1 variable (including all forms that require rearrangement)</p> <p>Recognise geometric sequences and appreciate other sequences that arise</p>	<p>Use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations</p> <p>Interpret and compare numbers in standard form <math>A \times 10^n</math> <math>1 \leq A &lt; 10</math>, where <math>n</math> is a positive or negative integer or 0</p> <p>Use standard units of mass, length, time, money and other measures, including with decimal quantities</p> <p>Round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures]</p> <p>Change freely between related standard units [for example time, length, area, volume/capacity, mass]</p>	<p>Use a calculator and other technologies to calculate results accurately and then interpret them appropriately</p> <p>Work with coordinates in all 4 quadrants</p> <p>Calculate and solve problems involving: perimeters of 2-D shapes (including circles), areas of circles and composite shapes.</p> <p>Understand and use the relationship between parallel lines and alternate and corresponding angles.</p> <p>Derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons.</p>	<p>Explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally</p> <p>Use a calculator and other technologies to calculate results accurately and then interpret them appropriately.</p> <p>Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers).</p> <p>Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data.</p> <p>Describe simple mathematical relationships between 2 variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs</p>

Assessment Task(s)	End of block task	End of block task End of term assessment	End of block task	End of block task End of term assessment	End of block task	End of block task End of year assessment
Key Knowledge	Ratio and scale. Multiplicative change. Multiplying and dividing fractions	Working in the Cartesian plane. Representing data. Tables and probability	Brackets, equations and inequalities. Sequences. Indices.	Fractions and %. Standard index form. Number sense.	Angles in parallel lines and polygons. Area of Trapezia and circles. Lines of symmetry and reflection.	The data handling cycle. Measure of location.
Key Skills NUMBER ALGEBRA GEOMETRY RATIO PROBABILITY STATISTICS	Understand ratio Use ration Simplify ratio Circumference of a circleScale factors linking to ratio. Convert currencies Draw and interpret scale diagrams and mapsMultiply and divide by integers Multiply and divide by fractions. Understand and use reciprocals	Plot and interpret line graphs and parallel lines. Make links between direction proportion and straight lines in the form $y=kx$ . Draw and interpret scatter graphs. Understand grouped, ungrouped, discrete and continuous data. Design and use two-way tables.	Expand and factorise single brackets. Form and use expression, formulae and identities. Form and solve equations with and without brackets. Generate sequences with brackets and squared terms. Generate sequences with algebra. Form expressions using indices. Use addition and subtraction rules.	Develop and understand fraction, decimals and percentages. Evaluate percentage increase and decrease. Use decimals multipliers. Convert and compare between ordinary numbers and standard form. Convert between metric units. Use order of operations.	Understand and use parallel lines and angles. Find and use the sum of interior and exterior angles. Calculate area of trapezium. Calculate area of circles and know the parts of a circle. Use significant figures. Calculate compound area. Recognise lines of symmetry in polygons. Reflect in horizontal, vertical and diagonal lines.	Understand secondary and primary data. Collect data including questionnaires. Construct statistical diagrams. Compare distribution in charts. Calculate mean, median, mode and range including modal class. Compare averages.

Topic	1- Reasoning with Algebra	2- CONSTRUCTING IN 2 AND 3 DIMENSIONS	3- Reasoning with Number	4- Reasoning with Geometry	5- Reasoning with Proportion	6- Representations and recall
Length of topic (in weeks)	6 weeks	7 weeks	6 weeks	6 weeks	6 weeks	7 weeks
Links to national curriculum	<p>Move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs]</p> <p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics. Identify variables and express relations between variables algebraically and graphically.</p> <p>Make and test conjectures about patterns and relationships; look for proofs or counter-examples.</p> <p>Begin to reason deductively in geometry, number and algebra, including using geometrical constructions.</p> <p>Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics.</p> <p>Begin to model situations mathematically and express the results using a range of formal mathematical representations.</p> <p>Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.</p>	<p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics. Use a calculator and other technologies to calculate results accurately and then interpret them appropriately.</p> <p>Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D</p> <p>Interpret mathematical relationships both algebraically and geometrically</p>	<p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics.</p> <p>Work interchangeably with terminating decimals and their corresponding fractions.</p> <p>Use a calculator and other technologies to calculate results accurately and then interpret them appropriately.</p> <p>Appreciate the infinite nature of the sets of integers, real and rational numbers.</p>	<p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics.</p> <p>Use a calculator and other technologies to calculate results accurately and then interpret them appropriately.</p> <p>Derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume of cuboids (including cubes) and other prisms (including cylinders).</p> <p>Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); recognise and use the perpendicular distance from a point to a line as the shortest distance to the line.</p> <p>Derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies.</p>	<p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics.</p> <p>Extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically.</p> <p>Use a calculator and other technologies to calculate results accurately and then interpret them appropriately.</p> <p>Recognise arithmetic sequences and find the <math>n</math>th term.</p> <p>Express 1 quantity as a fraction of another, where the fraction is less than 1 and greater than 1.</p> <p>Understand that a multiplicative relationship between 2 quantities can be expressed as a ratio or a fraction.</p>	<p>Develop algebraic and graphical fluency, including understanding linear and simple quadratic functions.</p> <p>Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics. Use a calculator and other technologies to calculate results accurately and then interpret them appropriately.</p> <p>Recognise, sketch and produce graphs of linear and quadratic functions of 1 variable with appropriate scaling, using equations in <math>x</math> and <math>y</math> and the Cartesian plane.</p> <p>Interpret mathematical relationships both algebraically and graphically.</p> <p>Use linear and quadratic graphs to estimate values of <math>y</math> for given values of <math>x</math> and vice versa and to find approximate solutions of simultaneous linear equations.</p>

Links to national curriculum	<p>Use approximation through rounding to estimate answers and calculate possible resulting errors expressed using inequality notation <math>a &lt; x \leq b</math></p> <p>Use a calculator and other technologies to calculate results accurately and then interpret them appropriately.</p> <p>Expanding products of 2 or more binomials.</p> <p>Understand and use standard mathematical formulae; rearrange formulae to change the subject.</p> <p>Model situations or procedures by translating them into algebraic expressions or formulae and by using graphs.</p> <p>Reduce a given linear equation in 2 variables to the standard form <math>y = mx + c</math>; calculate and interpret gradients and intercepts of graphs of such linear equations numerically, graphically and algebraically.</p> <p>Solve problems involving direct and inverse proportion, including graphical and algebraic representations.</p> <p>Use compound units such as speed, unit pricing and density to solve problems.</p>		Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics.	Identify properties of, and describe the results of, translations, rotations and reflections applied to given figures. Use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles	Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions. Identify and construct congruent triangles, and construct similar shapes by enlargement, with and without coordinate grids. Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem, and use known results to obtain simple proofs.	Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential and reciprocal graphs
Assessment Task(s)	End of block task	End of block task End of term assessment	End of block task	End of block task End of term assessment	End of block task	End of block task End of year assessment
Key Knowledge	Straight line graphs. Form and solve equations. Testing conjectures	3 dimensional shapes. Construction and congruency	Number skills. Using percentages. Maths and money.	Deduction. Rotation and translation. Pythagoras theorem.	Enlargement and similarity. Solving ratio and proportion problems. Rates	Solving problems using graphs, tables and algebra
Key Skills NUMBER ALGEBRA GEOMETRY RATIO PROBABILITY STATISTICS	Interpret line graphs. Find and use the equation $y = mx + c$ Compare linear Sequences, find nth term rules. Revisit and extend equations and inequalities with unknowns on both sides, in a variety of context. Change subject of formula. Test conjectures in a wide range of contexts. Including number, shape, angles etc.	Identify 2d and 3d shapes. Calculate volume and surface area of a variety of shapes. Construct 3d shapes from nets. Use lines and bisectors for construction. Understand congruency.	Understand rational and real numbers. Extend knowledge of HCF/LCM. Revisit standard form Percentage Inc. /Dec. reverse percentage, percentage change. Use multipliers above 100% Explore bills, banking interest, best buy.	Review angle rules. Solve problems algebraically. Use chains of reasoning to solve angle problems. Understand rotational symmetry. Translate shapes by given vectors. Understand variance and context of transformations. Use Pythagoras theorem in variety of contexts.	Enlarge shapes by given scale factor. Find missing lengths. Direct proportion problems and graphs. Conversion graphs, solve ratio problems. Unit pricing problems. Work with speed distance time. Solve problems with density.	Revisit data charts and graphs. Revisit frequency trees. Solve inequalities. Represent word problems algebraically. Compare probabilities. Expand binomials.



# Mathematics curriculum overview KS4



Topic	1- Similarity	2- Developing Algebra	3- Geometry	4- Proportion and proportional change	5- Delving into data	6- Using Number
Length of topic (in weeks)	6 weeks	7 weeks	6 weeks	6 weeks	6 weeks	7 weeks
Links to specification	Geometry and measures – Use Pythagoras’ Theorem and trigonometric ratios in similar triangles to solve problems involving right angled triangles	Algebra – Work with coordinates in all four quadrants	Number -Recognise and use relationships between operations including inverse operations. Geometry and measures – Use Pythagoras’ Theorem and trigonometric ratios in similar triangles to solve problems involving right angled triangles	Probability – Understand that the probabilities of all possible outcomes sum to 1 Number -Recognise and use relationships between operations including inverse operations Ratio, proportion and rates of change – Express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1	Statistics – Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs.	Number -Recognise and use relationships between operations including inverse operations Algebra – Work with coordinates in all four quadrants
Assessment Task(s)	End of block task	End of block task GCSE Paper Assessment	End of block task	End of block task	End of block task	End of block task GCSE Paper Assessment
Key Knowledge	Congruency, similarity and enlargement, Trigonometry	Representing solutions of equations and inequalities. Simultaneous equations	Angles and bearings, Working with circles, Vectors	Ratio and fractions, Percentage and interest, Probability	Collecting, representing and interpreting data.	Non- calculator methods. Types of number and sequences, Indices and roots
Key Skills NUMBER ALGEBRA GEOMETRY RATIO PROBABILITY STATISTICS	Understand congruency and similarity. Enlarge shapes. Find missing lengths of similar shapes. Understand trigonometric ratios. Work out missing lengths and angles in right angled triangles.	Form and solve equations in a variety of contexts. Use number lines to solve and represent inequalities. Form and solve linear equations graphically. Form and solve linear equations algebraically. Understand some equations have multiple solutions.	Review KS3 angles. Understand bearings Review area and circumference. Calculate volume and surface area of cylinders and cones. Understand vector notation. Vector arithmetic add, subtract and multiply.	Use ratios in a variety of contexts. Combining ratio and fractions. Unit pricing. Convert fractions decimals and %. % change. Finding original values Review probability. Use tree diagrams... find probability from frequency tree and venn diagrams	Revisit all forms of statistical graphs and diagrams.	Use all four operations decimals, negatives and fractions. With and without context. Factors multiples and primes. Geometric and arithmetic sequences. Work out powers and roots. Use all index laws. Standard form.

Topic	1- Graphs	2- Algebra	3- Reasoning	4- Transformation	5- Revision and recall	Exams
Length of topic (in weeks)	6 weeks	7 weeks	6 weeks	6 weeks	6 weeks	7 weeks
Links to specification	Algebra – Work with coordinates in all four quadrants. Geometry and measures – Use Pythagoras’ Theorem and trigonometric ratios in similar triangles to solve problems involving right angled triangles	Geometry and measures – Use Pythagoras’ Theorem and trigonometric ratios in similar triangles to solve problems involving right angled triangles Number -Recognise and use relationships between operations including inverse operations Algebra – Work with coordinates in all four quadrants	Statistics – Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs. Number -Recognise and use relationships between operations including inverse operations	Algebra – Work with coordinates in all four quadrants Geometry and measures – Use Pythagoras’ Theorem and trigonometric ratios in similar triangles to solve problems involving right angled triangles	All curriculum strands to be reviewed. Curriculum recovery from covid.	Exam timetable, individual student timetables. Examinations
Assessment Task(s)	End of block task	End of block task GCSE Paper Assessment	End of block task	End of block task GCSE Paper Assessment	Strength and weakness assessments	GCSE EXAMINATIONS
Key Knowledge	Gradients and lines. Non- linear graphs. Using graphs. Non- linear graphs	Expanding and factorising. Change the subject. Functions	Multiplicative reasoning. Geometric reasoning. Algebraic reasoning	Transformation and construction. Listing and describing. Show that.....	GCSE preparation and recall	Examinations
Key Skills NUMBER ALGEBRA GEOMETRY RATIO PROBABILITY STATISTICS	Find and use equations of straight lines. Plot and read quadratic curves. Plot cubic and reciprocals. Real life graphs. Speed, distance time graphs.	Factorise single and binomial. Expand single and quadratics. Solve quadratics. Review change the subject of a formula. Volume of a pyramid. Find inputs and outputs. Solve algebraic expressions	Scale enlargement. Direct and inverse proportion Pressure and density. Angles, Pythagoras Trigonometry Complex indices, Nth terms	Transform Construction Loci. Sample space Venn diagrams Plans and elevations. Proof both algebraically and numerically	Number work Equations Probability Ratio Shape statistics	Number work Equations Probability Ratio Shape statistics