

MATHEMATICS

Pre-levels

	Experience stage	Responsive stage	Interactive stage	Engagement stage	Insight stage
Number	<ul style="list-style-type: none">• Can distinguish between individual objects or people e.g. follow different people with the eyes	<ul style="list-style-type: none">• Can tell the difference between one, a few and lots of objects.	<ul style="list-style-type: none">• Can count up to 10 on the fingers with help e.g. a counting rhyme	<ul style="list-style-type: none">• Can count to 10 without fingers and share out objects between 2 people	<ul style="list-style-type: none">• Can count to 20 and share out objects between 3 people
Measurement	<ul style="list-style-type: none">• Is aware of size e.g. focuses in on small objects, looks up to find the top of a tower	<ul style="list-style-type: none">• Can identify the bigger of two objects	<ul style="list-style-type: none">• Can put objects in order related to their size e.g. length, height	<ul style="list-style-type: none">• Can describe the scale of objects in a range of helpful terms e.g. tall, small, tiny; hot; warm; cool; cold	<ul style="list-style-type: none">• Can compare objects e.g. big, bigger, biggest; less/more
Geometry	<ul style="list-style-type: none">• Explores shape and size using touch and sight	<ul style="list-style-type: none">• Can match like objects e.g. place a square counter onto a square shape	<ul style="list-style-type: none">• Uses simple terms to describe direction and position e.g. up, down, across, in, through	<ul style="list-style-type: none">• Can name simple shapes e.g. triangle, circle, square, line	<ul style="list-style-type: none">• Can sort objects by shape and size e.g. big triangles, small circles

Key Stage 1

		Year 1	Year 2
Number	Number & place value	<ul style="list-style-type: none"> Can read, write and count numbers up to 100 from 0 or 1 Can count up to 100 in multiples of 2,5 and 10 Is confident with language of mathematical statements such as equal to, more than, less than, fewer, etc 	<ul style="list-style-type: none"> Can count in steps of 2,3,5 and 10 from any number, forward and backward Can order numbers up to 100 and use the < and > signs Understands place value in 2-digit numbers Uses place value and number facts to solve problems Understands zero as a place holder
	Addition & subtraction	<ul style="list-style-type: none"> Understands statements using +, - and = signs Understands number bonds and subtraction facts within 20 Can add and subtract one and two digit numbers to 20 Solve one-step missing number problems 	<ul style="list-style-type: none"> Recalls addition and subtraction facts easily up to 20, and be able to work out facts up to 100 Can add and subtract using two-digit numbers, and also add 3 one-digit numbers Understands the inverse relationship between addition and subtraction and use this to solve problems and check answers
	Multiplication & division	<ul style="list-style-type: none"> Can solve one-step multiplication and division problems using aids 	<ul style="list-style-type: none"> Knows the 2, 5 and 10 times tables Understand statements using x, [division sign] and = signs Uses a variety of strategies to solve multiplication and division problems including the use of pictorial aids, objects, mental methods, etc
	Fractions	<ul style="list-style-type: none"> Understands a half and a quarter 	<ul style="list-style-type: none"> Understands the fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ Can write simple fractions e.g. $\frac{1}{2}$ of 6 = 3 and explain what they mean Recognises simple equivalence such as $\frac{2}{4} = \frac{1}{2}$
Measurement		<ul style="list-style-type: none"> Can measure length, weight, volume, time, money and time Has a strong vocabulary for explaining relative measurements e.g. slower, later, taller, double Understands chronological order including days of week, hours and half-hours 	<ul style="list-style-type: none"> Can measure using the correct unit, abbreviations and equipment Can solve simple money problems such as calculating change Can tell and show the time to the nearest 5 minutes or quarter-hour
Geometry	Properties of shapes	<ul style="list-style-type: none"> Can name common 2D and 3D shapes 	<ul style="list-style-type: none"> Name, describe and sort common 2D and 3D shapes
	Position & direction	<ul style="list-style-type: none"> Can describe position, direction and movement including whole, half, quarter and three-quarter turns 	<ul style="list-style-type: none"> Arrange mathematical objects in patterns and sequences Understand rotation as a turn, clockwise or anticlockwise, and in terms of right angles for quarter, half and three-quarter turns.
Statistics		n/a	<ul style="list-style-type: none"> Construct and interpret simple pictograms, tally charts, etc

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Lower Key Stage 2

		Year 3	Year 4
Number	Number & place value	<ul style="list-style-type: none"> • Can count in multiples of 4,8,50 and 100 • Understands place value in 3-digit numbers • Can order numbers up to 1000 • Can solves problems using the above 	<ul style="list-style-type: none"> • Can count in multiples of 6, 7, 9, 25 and 1000 • Understands place value in 4 digit numbers • Can order numbers beyond 1000 • Can round numbers to the nearest 10,100 or 1000 • Can count backwards through zero, including negative numbers
	Addition & subtraction	<ul style="list-style-type: none"> • Can add and subtract number mentally including 3-digit numbers with ones, tens or hundreds • Can use formal method to add or subtract numbers of up to 3 digits • Can estimate answers and use inverse operations to check 	<ul style="list-style-type: none"> • Can use formal written methods to add and subtract numbers with 4 digits • Can solve addition and subtraction two-step problems in context, deciding which operations and methods to use and why
	Multiplication & division	<ul style="list-style-type: none"> • Knows the 3,4 and 8 times tables • Has begun to use formal written methods to multiply 2-digit numbers • Can solve multiplication & division problems including missing numbers, positive integer scaling and correspondence problems 	<ul style="list-style-type: none"> • Knows all times tables up to 12x12 • Can multiply and divide numbers mentally (including multiplying by 0 and 1, dividing by 1, and multiplying together 3 numbers) • Can use formal methods to multiply 2 or 3 digit numbers by a 1-digit number • Can solve multiplication and division problems (including use of the distributive law to multiply 2-digit numbers by 1-digit, integer scaling and harder correspondence problems)
	Fractions including decimals from Y4	<ul style="list-style-type: none"> • Can use and count up and down in tenths • Understands the idea of equivalent fractions • Can add and subtract fractions with a common denominator • Can compare & order simple fractions 	<ul style="list-style-type: none"> • Can solve problems involving simple fractions • Recognises and writse decimal equivalents of any number of tenths and hundredths, and also $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ • Can round decimals with one decimal place to nearest whole number • Can solve simple measure and money problems involving fractions and decimals to 2 decimal places
Measurement		<ul style="list-style-type: none"> • Can measure, compare, add and subtract length, mass and volume • Can measure the perimeter of simple 2D shapes • Can add and subtract amounts of money • Is fluent in telling the time – using 12 and 24 hr clocks, calculating and comparing duration, telling time to the minute, etc 	<ul style="list-style-type: none"> • Can convert between different units of measure e.g. pounds to pence, analogue to digital time • Can calculate the perimeter and the area of a rectilinear figure
	Properties of shapes	<ul style="list-style-type: none"> • Can draw 2D shapes and make 3D shapes, and recognise them in different orientations and describe them 	<ul style="list-style-type: none"> • Can compare and classify geometrical shapes, including quadrilaterals and triangles, based on their properties and size

Geometry		<ul style="list-style-type: none"> Recognises right angles and whether other angles are greater or lesser than them Can identify horizontal, vertical, parallel and perpendicular lines 	<ul style="list-style-type: none"> Can identify acute and obtuse angles and compare or order angles up to 2 right angles by size Can identify symmetry in a 2D shape and complete a symmetrical figure
	Position & direction	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Can describe positions on a 2D grid as co-ordinates in the first quadrant Can describe translations to left/right up/down Can plot specified points and draw sides to complete a given polygon
Statistics		<ul style="list-style-type: none"> Can interpret and present data using bar charts, pictograms and tables Can solve one and two step questions using the above 	<ul style="list-style-type: none"> Can present and interpret discrete and continuous data Can solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables or other graphs

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Upper Key Stage 2

		Year 5	Year 6
Number	Number & place value	<ul style="list-style-type: none"> Understands the place value of any digit in numbers up to a million Can count forward or backwards up to a million in powers of 10 Can round any number up to nearest 10, 100, 1000, 10,000, 100,000 or 1,000,000 Can interpret negative numbers in context, and count forwards and backwards through zero 	<ul style="list-style-type: none"> Can read, write and compare numbers up to 10m and determine the value of each digit Can round any whole number to a required degree of accuracy Can use negative numbers in context and calculate intervals across zero
	Addition & subtraction	<ul style="list-style-type: none"> Can use formal methods to add and subtract whole numbers of more than 4 digits Can add and subtract numbers mentally, and use rounding to check calculations Can solve multi-step problems 	<ul style="list-style-type: none"> Can use formal method to multiply or divide 4 digit number by 2 digit numbers Can manage remainders as whole numbers, fractions or by rounding as appropriate Can perform mental calculations including mixed operations and large numbers Can identify common factors, multiples and prime numbers Understands the order of operations and the use of brackets when carrying out operation involving all four operations
	Multiplication & division	<ul style="list-style-type: none"> Can identify multiples and factors Understands prime numbers, prime factors and composite numbers; identifies them up to 100; recalls them up to 19 Can use formal method to multiply 4-digit numbers by 1 or 2 digit numbers, and to divide them by 1-digit numbers Can multiply and divide numbers including decimals by 10, 100 & 1000 Understands and uses square and cube numbers Can solve problems that involve scaling by simple fractions and simple rates 	
	Fractions, decimals & percentages	<ul style="list-style-type: none"> Can add and subtract fractions with denominators that are the same or multiples of the same number Recognises mixed and improper fractions Can round numbers to nearest whole or first decimal place Can convert fractions into decimals Can solve problems involving numbers with up to 3 decimal places Understand percentage as parts of 100 Can solve problems that use percentages and decimals equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and fractions with a denominator of a multiple of 10 or 25. 	
			<ul style="list-style-type: none"> Can use common factors to simplify fractions; use common multiples to express fractions in the same denomination Can add and subtract fractions with different denominators and mixed numbers Can multiply simple pairs of proper fractions, writing the answer in its simplest form Can divide proper fractions by whole numbers Can calculate the decimal equivalent of a fraction, and recall simple equivalents between fractions, decimals and percentages Can multiply one-digit numbers with up to 2 decimal places by whole numbers

			<ul style="list-style-type: none"> Use formal method of division giving an answer with up to 2 decimal places
Measurement		<ul style="list-style-type: none"> Can convert between metric and imperial measures Can calculate the area of all rectangles and estimate the area of irregular shapes Can estimate volume and capacity 	<ul style="list-style-type: none"> Convert between units of measurement up to 3 decimal places including miles and kilometres Recognise that shapes with the same area can have different perimeters Calculate the area of parallelograms and triangles Calculate, estimate and compare the volume of cubes and cuboids
Geometry	Properties of shapes	<ul style="list-style-type: none"> Can identify 3D shapes from 2D representations Can draw and measure given angles Can identify 90, 180, 270 and 360 degrees Deduce related facts and missing lengths and angles of rectangles Can distinguish between regular and irregular polygons 	<ul style="list-style-type: none"> Draw or make 2D and 3D shapes using given dimensions and angles Find unknown angles in triangles, quadrilaterals and regular polygons Illustrate and name parts of a circle and know that diameter is twice radius
	Position & direction	<ul style="list-style-type: none"> Can identify, describe and represent the position of a shape following a reflection or translation and know that it has not changed shape 	<ul style="list-style-type: none"> Describe positions on the full co-ordinate grid (all 4 quadrants) Draw and translate simple shapes on the co-ordinate plane and reflect them in the axes
Statistics		<ul style="list-style-type: none"> Can solve problems using information represented in a line graph Can complete and interpret information in tables including timetables 	<ul style="list-style-type: none"> Interpret and construct pie charts and line graphs and use these to solve problems Calculate and interpret the mean as an average
Ratio & proportion <i>from Y6</i>	n/a		<ul style="list-style-type: none"> Solve problems involving the relative size of 2 quantities Solve problems involving the calculation of percentages Solve problems involving similar shapes where the scale factor can be worked out Solve problems involving unequal quantities using fractions and/or multiples
Algebra <i>from Y6</i>	n/a		<ul style="list-style-type: none"> Use simple formulae Generate & describe linear number sequences Express missing number problems algebraically Find pairs of numbers that satisfy an equation with 2 unknowns Enumerate the possible combinations of 2 variables

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Key Stage 3

		Year 7	Year 8	Year 9
Working mathematically	Develop fluency	<ul style="list-style-type: none"> Has command of number, times tables and place value including fractions, decimals, powers and roots. Can use language and properties precisely to analyse numbers, algebraic expressions, shapes, probability and statistics 	<ul style="list-style-type: none"> Can select and use appropriate calculation strategies to solve increasingly complex problems Moves freely between different numerical, algebraic, graphical and diagrammatic representations 	<ul style="list-style-type: none"> Can use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships Demonstrates a basic level of algebraic and graphical fluency, including linear and simple quadratic functions
	Reason mathematically	<ul style="list-style-type: none"> Understands the number system and makes connections between number relationships Shows awareness of what can and can't be inferred in statistical and probabilistic settings 	<ul style="list-style-type: none"> Has formal knowledge of ratio and proportion, and expresses proportional relations algebraically Has begun to reason deductively in geometry, number and algebra, including using geometric constructions 	<ul style="list-style-type: none"> Can identify variables and express relations between them algebraically and graphically Can make and test conjectures about patterns and relationships; look for proofs or counter-examples
	Solve problems	<ul style="list-style-type: none"> Can solve and evaluate the outcome of problems including multi-step problems 	<ul style="list-style-type: none"> Has begun to model situations and express results in a range of suitable formats 	<ul style="list-style-type: none"> Selects appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems
Number		<ul style="list-style-type: none"> Is secure in all Y5 and Y6 objectives Can use the 4 operations, including formal written methods, applied to integers, decimals, proper & improper fractions, and mixed numbers, all both positive and negative Works interchangeably with terminating decimals and their corresponding fractions Uses a calculator accurately 	<ul style="list-style-type: none"> Understands percentages and percentage changes as fractions or decimals; compare 2 quantities using percentages; work with percentages greater than 100% Uses conventional notation for the priority of operations, including brackets, powers, roots and reciprocals Can use approximation through rounding to estimate answers and calculate possible resulting error expressed using inequality notation 	<ul style="list-style-type: none"> Appreciates the infinite nature of the sets of integers, real and rational numbers Can interpret fractions and percentages as operators Can use integer powers and associated real roots (square, cube or higher) and distinguish between exact representations of roots and their decimal approximations

Algebra	<ul style="list-style-type: none"> Is secure in Y6 objectives Uses the vocabulary of expressions, equations, inequalities, terms and factors Can use and interpret algebraic notation Can use algebraic methods to solve linear equations in one variable 	<ul style="list-style-type: none"> Can simplify and manipulate algebraic expressions Can use standard mathematical formulae; rearrange formulae to change the subject Can model situations or procedures using algebra or graph Can use graphs of linear and quadratic functions of one variable 	<ul style="list-style-type: none"> Can reduce a linear equation in 2 variables to the standard form $y = mx + c$; work out gradients and intercept of their graphs Can use linear and quadratic graphs to estimate values of y for given values of x and vice versa; find approximate solutions of simultaneous linear equations Can recognise an arithmetic sequence and work out the nth term
Ratio, proportion & rates of change	<ul style="list-style-type: none"> Can use scale factors, scale diagrams and maps Can express one quantity as a fraction of another where the fraction is <1 and >1 Uses ratio notation, including reduction to simplest form Can divide a quantity into 2 parts in a given ratio, and express the division of a quantity into 2 parts as a ratio 	<ul style="list-style-type: none"> Understands that a multiplicative relationship between 2 quantities can be expressed as a ratio or fraction Can relate the calculation of ratios to the associated calculation of fractions and linear functions Can solve problems involving percentage change including simple interest 	<ul style="list-style-type: none"> Can solve problems involving direct and inverse proportion, including graphical and algebraic representations Can use compound units such as speed, unit pricing and density to solve problems
Geometry & measures	<ul style="list-style-type: none"> Uses standard conventions for labelling and describing the properties of 2D shapes Can derive and apply formulae to calculate perimeters, area and volume of the common 2D and 3D shapes Can use compass and ruler to bisect lines and angles, create perpendiculars and the shortest distance to a line Can identify properties of, and describe the results of, translations, rotations and reflections applied to given figures 	<ul style="list-style-type: none"> Can identify and construct congruent triangles, and construct similar shapes by enlargement, with and without co-ordinate grids Can apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles Understands and can use the relationship between parallel lines and alternate and corresponding angles 	<ul style="list-style-type: none"> Can derive the use and sum of angles in a triangle and thus the properties of regular polygons Can derive results about angles and sides in triangles and quadrilaterals, including Pythagoras' Theorem Can use Pythagoras' theorem and trigonometrical ratios to solve problems involving right-angled triangles Understands the properties of common 3D shapes and use this knowledge to solve problems about them
Probability	<ul style="list-style-type: none"> Understands that the probabilities of all possible outcomes add up to 1 Can record, describe and analyse the frequency of outcomes in simple probability experiments involving randomness, fairness, equally and unequally likely outcomes and the 0-1 probability scale 	<ul style="list-style-type: none"> Can enumerate set and unions/intersections of sets systematically using tables, grids and Venn diagrams 	<ul style="list-style-type: none"> Can generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities
Statistics	<ul style="list-style-type: none"> Uses appropriate representations for categorical data and for grouped and ungrouped numerical data 	<ul style="list-style-type: none"> Understands distributions of a single variable in various formats; mean, mode and median; spread (e.g. range, outliers) 	<ul style="list-style-type: none"> Can describe simple mathematical relationships between 2 variables (bivariate data) and illustrate using scatter graphs.

