

	Algebra	Numbers and the number system	Calculating
Level 8	<p>factorise quadratic expressions including the difference of two squares, e.g. $x^2 - 9 = (x + 3)(x - 3)$</p> <ul style="list-style-type: none"> <input type="checkbox"/> manipulate algebraic formulae, equations and expressions, finding common factors and multiplying two linear expressions <input type="checkbox"/> derive and use more complex formulae and change the subject of a formula <input type="checkbox"/> evaluate algebraic formulae, substituting fractions, decimals and negative numbers <input type="checkbox"/> solve inequalities in two variables and find the solution set <input type="checkbox"/> sketch, interpret and identify graphs of linear, quadratic, cubic and reciprocal functions, and graphs that model real situations <input type="checkbox"/> understand the effect on a graph of addition of (or multiplication by) a constant 	<ul style="list-style-type: none"> <input type="checkbox"/> understand the equivalence between recurring decimals and fractions 	<ul style="list-style-type: none"> <input type="checkbox"/> use fractions or percentages to solve problems involving repeated proportional changes or the calculation of the original quantity given the result of a proportional change <input type="checkbox"/> solve problems involving calculating with powers, roots and numbers expressed in standard form, checking for correct order of magnitude and using a calculator as appropriate <input type="checkbox"/>
Level 7	<ul style="list-style-type: none"> <input type="checkbox"/> square a linear expression, and expand and simplify the product of two linear expressions of the form $(x \pm n)$ and simplify the corresponding quadratic expression <input type="checkbox"/> use algebraic and graphical methods to solve simultaneous linear equations in two variables <input type="checkbox"/> solve inequalities in one variable and represent the solution set on a number line <input type="checkbox"/> use formulae from mathematics and other subjects; substitute numbers into expressions and formulae; derive a formula and, in simple cases, change its subject <input type="checkbox"/> find the next term and nth term of quadratic sequences and functions and explore their properties 	<ul style="list-style-type: none"> <input type="checkbox"/> understand and use proportionality 	<ul style="list-style-type: none"> <input type="checkbox"/> calculate the result of any proportional change using multiplicative methods <input type="checkbox"/> understand the effects of multiplying and dividing by numbers between 0 and 1 <input type="checkbox"/> add, subtract, multiply and divide fractions <input type="checkbox"/> make and justify estimates and approximations of calculations; estimate calculations by rounding numbers to one significant figure and multiplying and dividing mentally <input type="checkbox"/> use a calculator efficiently and appropriately to perform complex calculations with numbers of any size, knowing not to round during intermediate steps of a calculation
Level 6	<ul style="list-style-type: none"> <input type="checkbox"/> use systematic trial and improvement methods and ICT tools to find approximate solutions to equations such as $x^3 + x = 20$ <input type="checkbox"/> construct and solve linear equations with integer coefficients, using an appropriate method <input type="checkbox"/> generate terms of a sequence using term-to-term and position-to-term definitions of the sequence, on paper and using ICT; write an expression to describe the nth term of an arithmetic sequence. <input type="checkbox"/> plot the graphs of linear functions, where y is given explicitly in terms of x; recognise that equations of the form $y = mx + c$ correspond to straight-line graphs <input type="checkbox"/> construct functions arising from real-life problems and plot their corresponding graphs; 	<ul style="list-style-type: none"> <input type="checkbox"/> use the equivalence of fractions, decimals and percentages to compare proportions 	<ul style="list-style-type: none"> <input type="checkbox"/> calculate percentages and find the outcome of a given percentage increase or decrease <input type="checkbox"/> divide a quantity into two or more parts in a given ratio and solve problems involving ratio and direct proportion <input type="checkbox"/> use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole <input type="checkbox"/> add and subtract fractions by writing them with a common denominator, calculate fractions of quantities (fraction answers), multiply and divide an integer by a fraction
Level 5	<ul style="list-style-type: none"> <input type="checkbox"/> construct, express in symbolic form, and use simple formulae involving one or two operations <input type="checkbox"/> use and interpret coordinates in all four quadrants <input type="checkbox"/> argue mathematically to show expressions are equivalent <input type="checkbox"/> factorise algebraic expressions by taking out single-term common factors <input type="checkbox"/> construct and solve linear equations with integer coefficients (including brackets & negative signs in the equation) 	<ul style="list-style-type: none"> <input type="checkbox"/> use understanding of place value to multiply and divide whole numbers and decimals by 10, 100 and 1000 and explain the effect <input type="checkbox"/> round decimals to the nearest decimal place and order negative numbers in context <input type="checkbox"/> recognise and use number patterns and relationships <input type="checkbox"/> use equivalence between fractions and order fractions and decimals 	<ul style="list-style-type: none"> <input type="checkbox"/> use known facts, place value, knowledge of operations and brackets to calculate including using all four operations with decimals to two places <input type="checkbox"/> use a calculator where appropriate to calculate fractions/percentages of quantities/measurements <input type="checkbox"/> understand and use an appropriate non-calculator method for solving problems that involve multiplying and dividing any three digit number by any two-digit number <input type="checkbox"/> solve simple problems involving ordering, adding, subtracting negative numbers in context <input type="checkbox"/> solve simple problems involving ratio and direct proportion <input type="checkbox"/> apply inverse operations and approximate to check answers to problems are of the correct magnitude

		<ul style="list-style-type: none"> <input type="checkbox"/> reduce a fraction to its simplest form by cancelling common factors <input type="checkbox"/> understand simple ratio 	
Level 4	<ul style="list-style-type: none"> <input type="checkbox"/> begin to use simple formulae expressed in words <input type="checkbox"/> use and interpret coordinates in the first quadrant <input type="checkbox"/> simplify simple linear expressions by collecting like terms <input type="checkbox"/> use simple formulae expressed in words & then symbols <input type="checkbox"/> substitute numbers into word formulae <input type="checkbox"/> substitute positive integers into linear expressions 	<ul style="list-style-type: none"> <input type="checkbox"/> recognise and describe number patterns <input type="checkbox"/> recognise and describe number relationships including multiple, factor and square <input type="checkbox"/> use place value to multiply and divide whole numbers by 10 or 100 <input type="checkbox"/> recognise approximate proportions of a whole and use simple fractions and percentages to describe these <input type="checkbox"/> order decimals to three decimal places <input type="checkbox"/> begin to understand simple ratio 	<ul style="list-style-type: none"> <input type="checkbox"/> use a range of mental methods of computation with all operations <input type="checkbox"/> recall multiplication facts up to 10×10 and quickly derive corresponding division facts <input type="checkbox"/> use efficient written methods of addition and subtraction and of short multiplication and division <input type="checkbox"/> multiply a simple decimal by a single digit <input type="checkbox"/> solve problems with or without a calculator <input type="checkbox"/> check the reasonableness of results with reference to the context or size of numbers
Level 3	<ul style="list-style-type: none"> <input type="checkbox"/> recognise a wider range of sequences <input type="checkbox"/> begin to understand the role of '=' (the 'equals' sign) <input type="checkbox"/> understand the difference in expression, equation & formula <input type="checkbox"/> multiply together simple expressions <input type="checkbox"/> multiply a constant over a bracket 	<ul style="list-style-type: none"> <input type="checkbox"/> understand place value in numbers to 1000 <input type="checkbox"/> use place value to make approximations <input type="checkbox"/> recognise negative numbers in contexts such as temperature <input type="checkbox"/> use simple fractions that are several parts of a whole and recognise when two simple fractions are equivalent <input type="checkbox"/> begin to use decimal notation in contexts such as money 	<ul style="list-style-type: none"> <input type="checkbox"/> derive associated division facts from known multiplication facts <input type="checkbox"/> add and subtract two-digit numbers mentally <input type="checkbox"/> add and subtract three digit numbers using written method <input type="checkbox"/> multiply and divide two digit numbers by 2, 3, 4 or 5 as well as 10 with whole number answers and remainders <input type="checkbox"/> use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers <input type="checkbox"/> solve whole number problems including those involving multiplication or division that may give rise to remainders
Level 2	<ul style="list-style-type: none"> <input type="checkbox"/> recognise sequences of numbers, including odd and even numbers <input type="checkbox"/> use notation and symbols correctly <input type="checkbox"/> write an expression 	<ul style="list-style-type: none"> <input type="checkbox"/> count sets of objects reliably <input type="checkbox"/> begin to understand the place value of each digit; use this to order numbers up to 100 <input type="checkbox"/> begin to use halves and quarters and relate the concept of half of a small quantity to the concept of half of a shape 	<ul style="list-style-type: none"> <input type="checkbox"/> use the knowledge that subtraction is the inverse of addition and understand halving as a way of 'undoing' doubling and vice versa <input type="checkbox"/> use mental recall of addition and subtraction facts to 10 <input type="checkbox"/> use mental calculation strategies to solve number problems including those involving money and measures <input type="checkbox"/> record their work in writing <input type="checkbox"/> choose the appropriate operation when solving addition and subtraction problems
Level 1	<ul style="list-style-type: none"> <input type="checkbox"/> Begin to use letters and symbols to represent numbers <input type="checkbox"/> Write simple expressions 	<ul style="list-style-type: none"> <input type="checkbox"/> count up to 10 objects <input type="checkbox"/> read, write numbers to 10 <input type="checkbox"/> order numbers to 10 <input type="checkbox"/> begin to use the fraction, one 	<ul style="list-style-type: none"> <input type="checkbox"/> understand addition as finding the total of two or more sets of objects <input type="checkbox"/> understand subtraction as 'taking away' objects from a set and finding how many are left <input type="checkbox"/> add and subtract numbers of objects to 10 <input type="checkbox"/> begin to know some addition facts <input type="checkbox"/> solve addition/subtraction problems involving up to 10 objects

	Using and applying mathematics	Shape, space and measure	Handling data
Level 8	<ul style="list-style-type: none"> <input type="checkbox"/> develop and follow alternative methods and approaches <input type="checkbox"/> reflect on lines of enquiry when exploring mathematical tasks <input type="checkbox"/> select and combine known facts and problem solving strategies to solve problems of increasing complexity <input type="checkbox"/> convey mathematical meaning through precise and consistent use of symbols <input type="checkbox"/> examine generalisations or solutions reached in an activity, commenting constructively on the reasoning and logic or the process employed, or the results obtained <input type="checkbox"/> distinguish between practical demonstration and proof; know underlying assumptions, recognising their importance and limitations, and the effect of varying them 	<ul style="list-style-type: none"> <input type="checkbox"/> understand and use congruence and mathematical similarity <input type="checkbox"/> understand and use trigonometrical relationships in right-angled triangles, and use these to solve problems, including those involving bearings <input type="checkbox"/> understand the difference between formulae for perimeter, area and volume in simple contexts by considering dimensions 	<ul style="list-style-type: none"> <input type="checkbox"/> estimate and find the median, quartiles and interquartile range for large data sets, including using a cumulative frequency diagram <input type="checkbox"/> compare two or more distributions and make inferences, using the shape of the distributions and measures of average and spread including median and quartiles <input type="checkbox"/> know when to add or multiply two probabilities <input type="checkbox"/> use tree diagrams to calculate probabilities of combinations of independent events
Level 7	<ul style="list-style-type: none"> <input type="checkbox"/> solve increasingly demanding problems and evaluate solutions; explore connections in mathematics across a range of contexts: number, algebra, shape, space and measures, and handling data; refine or extend the mathematics used to generate fuller solutions <input type="checkbox"/> give reasons for choice of presentation, explaining selected features and showing insight into the problems structure <input type="checkbox"/> justify generalisations, arguments or solutions <input type="checkbox"/> appreciate the difference between mathematical explanation and experimental evidence 	<ul style="list-style-type: none"> <input type="checkbox"/> understand and apply Pythagoras' theorem when solving problems in 2-D <input type="checkbox"/> calculate lengths, areas and volumes in plane shapes and right prisms <input type="checkbox"/> enlarge 2-D shapes, given a centre of enlargement and a fractional scale factor, on paper and using ICT; recognise the similarity of the resulting shapes <input type="checkbox"/> find the locus of a point that moves according to a given rule, both by reasoning and using ICT <input type="checkbox"/> recognise that measurements given to the nearest whole unit may be inaccurate by up to one half of the unit in either direction <input type="checkbox"/> understand and use measures of speed (and other compound measures such as density or pressure) to solve problems 	<ul style="list-style-type: none"> <input type="checkbox"/> suggest a problem to explore using statistical methods, frame questions and raise conjectures; identify possible sources of bias and plan how to minimise it <input type="checkbox"/> select, construct and modify, on paper and using ICT suitable graphical representation to progress an enquiry including frequency polygons and lines of best fit on scatter graphs <input type="checkbox"/> estimate the mean, median and range of a set of grouped data and determine the modal class, selecting the statistic most appropriate to the line of enquiry <input type="checkbox"/> compare two or more distributions and make inferences, using the shape of the distributions and measures of average and range <input type="checkbox"/> understand relative frequency as an estimate of probability and use this to compare outcomes of an experiment <input type="checkbox"/> examine critically the results of a statistical enquiry, and justify the choice of statistical representation in written presentation
Level 6	<ul style="list-style-type: none"> <input type="checkbox"/> solve problems and carry through substantial tasks by breaking them into smaller, more manageable tasks, using a range of efficient techniques, methods and resources, including ICT; give solutions to an appropriate degree of accuracy <input type="checkbox"/> interpret, discuss and synthesise information presented in a variety of mathematical forms <input type="checkbox"/> present a concise, reasoned argument, using symbols, diagrams, graphs and related explanatory texts <input type="checkbox"/> use logical argument to establish the truth of a statement 	<ul style="list-style-type: none"> <input type="checkbox"/> classify quadrilaterals by their geometric properties <input type="checkbox"/> solve geometrical problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons <input type="checkbox"/> identify alternate and corresponding angles: understand a proof that the sum of the angles of a triangle is 180° and of a quadrilateral is 360° <input type="checkbox"/> devise instructions for a computer to generate and transform shapes and paths <input type="checkbox"/> visualise and use 2-D representations of 3-D objects <input type="checkbox"/> enlarge 2-D shapes, given a centre of enlargement and a positive whole-number scale factor <input type="checkbox"/> use straight edge and compasses to do standard constructions 	<ul style="list-style-type: none"> <input type="checkbox"/> design a survey or experiment to capture the necessary data from one or more sources; design, trial and, if necessary, refine data collection sheets; construct tables for large discrete and continuous sets of raw data, choosing suitable class intervals; design and use two-way tables <input type="checkbox"/> select, construct and modify, on paper and using ICT: <input type="checkbox"/> pie charts for categorical data <input type="checkbox"/> bar charts and frequency diagrams for discrete and continuous data <p>find and record all possible mutually exclusive outcomes for single events and two successive events in a systematic way</p> <ul style="list-style-type: none"> <input type="checkbox"/> know that the sum of probabilities of all mutually exclusive outcomes is 1 and use this when solving problems <input type="checkbox"/> communicate interpretations and results of a statistical survey using selected tables, graphs and diagrams in support

		<ul style="list-style-type: none"> <input type="checkbox"/> deduce and use formulae for the area of a triangle and parallelogram, and the volume of a cuboid; calculate volumes and surface areas of cuboids <input type="checkbox"/> know and use the formulae for the circumference and area of a circle 	
Level 5	<ul style="list-style-type: none"> <input type="checkbox"/> identify and obtain necessary information to carry through a task and solve mathematical problems <input type="checkbox"/> check results, considering whether these are reasonable <input type="checkbox"/> solve word problems and investigations from a range of contexts <input type="checkbox"/> show understanding of situations by describing them mathematically using symbols, words and diagrams <input type="checkbox"/> draw simple conclusions of their own and give an explanation of their reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> use a wider range of properties of 2-D and 3-D shapes and identify all the symmetries of 2-D shapes <input type="checkbox"/> use language associated with angle and know and use the angle sum of a triangle and that of angles at a point <input type="checkbox"/> reason about position and movement and transform shapes <input type="checkbox"/> measure and draw angles to the nearest degree, when constructing models and drawing or using shapes <input type="checkbox"/> read and interpret scales on a range of measuring instruments, explaining what each labelled division represents <input type="checkbox"/> solve problems involving the conversion of units and make sensible estimates of a range of measures in relation to everyday situations <input type="checkbox"/> understand and use the formula for the area of a rectangle and distinguish area from perimeter 	<ul style="list-style-type: none"> <input type="checkbox"/> ask questions, plan how to answer them and collect the data required <input type="checkbox"/> in probability, select methods based on equally likely outcomes and experimental evidence, as appropriate <input type="checkbox"/> understand and use the probability scale from 0 to 1 <input type="checkbox"/> understand and use the mean of discrete data and compare two simple distributions, using the range and one of mode, median or mean <input type="checkbox"/> understand that different outcomes may result from repeating an experiment <input type="checkbox"/> interpret graphs and diagrams, including pie charts, and draw conclusions <input type="checkbox"/> create and interpret line graphs where the intermediate values have meaning
Level 4	<ul style="list-style-type: none"> <input type="checkbox"/> develop own strategies for solving problems <input type="checkbox"/> use their own strategies within mathematics and in applying mathematics to practical contexts <input type="checkbox"/> present information and results in a clear and organised way <input type="checkbox"/> search for a solution by trying out ideas of their own 	<ul style="list-style-type: none"> <input type="checkbox"/> use the properties of 2-D and 3-D shapes <input type="checkbox"/> make 3-D models by linking given faces or edges and draw common 2-D shapes in different orientations on grids <input type="checkbox"/> reflect simple shapes in a mirror line, translate shapes horizontally or vertically and begin to rotate a simple shape or object about its centre or a vertex <input type="checkbox"/> choose and use appropriate units and instruments <input type="checkbox"/> interpret, with appropriate accuracy, numbers on a range of measuring <input type="checkbox"/> find perimeters of simple shapes and find areas by counting squares 	<ul style="list-style-type: none"> <input type="checkbox"/> collect and record discrete data <input type="checkbox"/> group data, where appropriate, in equal class intervals <input type="checkbox"/> continue to use Venn and Carroll diagrams to record their sorting and classifying of information <input type="checkbox"/> construct and interpret frequency diagrams and simple line graphs <input type="checkbox"/> understand and use the mode and range to describe sets of data
Level 3	<ul style="list-style-type: none"> <input type="checkbox"/> select the mathematics they use in a wider range of classroom activities <input type="checkbox"/> try different approaches and find ways of overcoming difficulties that arise when they are solving problems <input type="checkbox"/> begin to organise their work and check results <input type="checkbox"/> use and interpret mathematical symbols and diagrams <input type="checkbox"/> understand a general statement by finding particular examples that match it <input type="checkbox"/> review their work and reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes <input type="checkbox"/> begin to recognise nets of familiar 3-D shapes, e.g. cube, cuboid, triangular prism, square-based pyramid <input type="checkbox"/> recognise shapes in different orientations and reflect shapes, presented on a grid, in a vertical or horizontal mirror line <input type="checkbox"/> describe position and movement <input type="checkbox"/> use a wider range of measures including non-standard units and standard metric units of length, capacity and mass in a range of contexts <input type="checkbox"/> use standard units of time 	<ul style="list-style-type: none"> <input type="checkbox"/> gather information <input type="checkbox"/> construct bar charts and pictograms, where the symbol represents a group of units <input type="checkbox"/> use Venn and Carroll diagrams to record their sorting and classifying of information <input type="checkbox"/> extract and interpret information presented in simple tables, lists, bar charts and pictograms

Level 2	<ul style="list-style-type: none"> <input type="checkbox"/> select the mathematics they use in some classroom activities <input type="checkbox"/> discuss their work using mathematical language <input type="checkbox"/> begin to represent their work using symbols and simple diagrams <input type="checkbox"/> predict what comes next in a simple number, shape or spatial pattern or sequence and give reasons for their opinions <input type="checkbox"/> explain why an answer is correct 	<ul style="list-style-type: none"> <input type="checkbox"/> use mathematical names for common 3-D and 2-D shapes <input type="checkbox"/> describe their properties, including numbers of sides and corners <input type="checkbox"/> describe the position of objects, distinguish between straight and turning movements <input type="checkbox"/> recognise right angles in turns and understand angle as a measurement of turn <input type="checkbox"/> begin to use a wider range of measures including to use every day non-standard and standard units to measure length and mass <input type="checkbox"/> begin to understand that numbers can be used not only to count discrete objects but also to describe continuous measures 	<ul style="list-style-type: none"> <input type="checkbox"/> sort objects and classify them using more than one criterion <input type="checkbox"/> understand vocabulary relating to handling data <input type="checkbox"/> collect and sort data to test a simple hypothesis <input type="checkbox"/> record results in simple lists, tables, pictograms and block graphs <input type="checkbox"/> communicate their findings, using the simple lists, tables, pictograms and block graphs they have recorded
Level 1	<ul style="list-style-type: none"> <input type="checkbox"/> use mathematics as an integral part of classroom activities <input type="checkbox"/> represent their work with objects or pictures <input type="checkbox"/> discuss their work <input type="checkbox"/> draw simple conclusions from their work <input type="checkbox"/> recognise and use a simple pattern or relationship 	<ul style="list-style-type: none"> <input type="checkbox"/> use everyday language to describe properties of 2-D and 3-D shapes <input type="checkbox"/> use everyday language to describe positions of 2-D and 3-D shapes <input type="checkbox"/> measure and order objects using direct comparison or order of events 	<ul style="list-style-type: none"> <input type="checkbox"/> sort and classify objects <input type="checkbox"/> represent their work <input type="checkbox"/> demonstrate the criterion they have used