

YEAR 8: AUTUMN TERM**Teaching objectives for the oral and mental activities**

<ul style="list-style-type: none"> Order, add, subtract, multiply and divide integers. Multiply and divide decimals by 10, 100, 1000. Count on and back in steps of 0.4, 0.75, $\frac{3}{4}$... Round numbers, including to one or two decimal places. Know and use squares, positive and negative square roots, cubes of numbers 1 to 5 and corresponding roots. Convert between fractions, decimals and percentages. Find fractions and percentages of quantities. <ul style="list-style-type: none"> Know or derive complements of 0.1, 1, 10, 50, 100, 1000. Add and subtract several small numbers or several multiples of 10, e.g. $250 + 120 - 190$. Use jottings to support addition and subtraction of whole numbers and decimals. Calculate using knowledge of multiplication and division facts and place value, e.g. 432×0.01, $37 \div 0.01$. Recall multiplication and division facts to 10×10. Use factors to multiply and divide mentally, e.g. 22×0.02, $420 \div 15$. 	<ul style="list-style-type: none"> Multiply and divide a two-digit number by a one-digit number. Use partitioning to multiply, e.g. 13×1.4. Use approximations to estimate the answers to calculations, e.g. 39×2.8. <ul style="list-style-type: none"> Solve equations, e.g. $3a - 2 = 31$. <ul style="list-style-type: none"> Visualise, describe and sketch 2-D shapes. Estimate and order acute, obtuse and reflex angles. <ul style="list-style-type: none"> Use metric units (length, mass, capacity) and units of time for calculations. Use metric units for estimation (length, mass, capacity). Convert between m, cm and mm, km and m, kg and g, litres and ml, cm^2 and mm^2. <ul style="list-style-type: none"> Discuss and interpret graphs. <ul style="list-style-type: none"> Apply mental skills to solve simple problems.
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Teaching objectives for the main activities

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
Number/algebra 1 (6 hours) Integers, powers and roots (48–59)	<ul style="list-style-type: none"> Understand negative numbers as positions on a number line; order, add and subtract positive and negative integers in context. Use simple tests of divisibility. 	<ul style="list-style-type: none"> Add, subtract, multiply and divide integers. Recognise and use multiples, factors (divisors), common factor, highest common factor, lowest common multiple and primes; find the prime factor decomposition of a number (e.g. $8000 = 2^6 \times 5^3$). Use squares, positive and negative square roots, cubes and cube roots, and index notation for small positive integer powers. 	<ul style="list-style-type: none"> Use the prime factor decomposition of a number.
Sequences and functions (144–157)	<ul style="list-style-type: none"> Recognise the first few triangular numbers, squares of numbers to at least 12×12 and the corresponding roots. Generate terms of a simple sequence given a rule. Generate sequences from practical contexts and describe the general term in simple cases. 	<ul style="list-style-type: none"> Generate and describe integer sequences. Generate terms of a linear sequence using term-to-term and position-to-term definitions of the sequence, on paper and using a spreadsheet or graphical calculator. Begin to use linear expressions to describe the nth term of an arithmetic sequence, justifying its form by referring to the activity or practical context from which it was generated. 	<ul style="list-style-type: none"> Use ICT to estimate square roots and cube roots. Use index notation for integer powers and simple instances of the index laws.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Shape, space and measures 1 (6 hours) Geometrical reasoning: lines, angles and shapes (178–189)</p> <p>Construction (220–223)</p> <p>Solving problems (14–17)</p>	<ul style="list-style-type: none"> Use correctly the vocabulary, notation and labelling conventions for lines, angles and shapes. Identify parallel and perpendicular lines; know the sum of angles at a point, on a straight line and in a triangle, and recognise vertically opposite angles. Use angle measure; distinguish between and estimate the size of acute, obtuse and reflex angles. <ul style="list-style-type: none"> Use a ruler and protractor to: <ul style="list-style-type: none"> measure and draw lines to the nearest millimetre and angles, including reflex angles, to the nearest degree; construct a triangle given two sides and the included angle (SAS) or two angles and the included side (ASA). 	<ul style="list-style-type: none"> Identify alternate angles and corresponding angles; understand a proof that: <ul style="list-style-type: none"> the sum of the angles of a triangle is 180° and of a quadrilateral is 360°; the exterior angle of a triangle is equal to the sum of the two interior opposite angles. Solve geometrical problems using side and angle properties of equilateral, isosceles and right-angled triangles and special quadrilaterals, explaining reasoning with diagrams and text; classify quadrilaterals by their geometric properties. Use straight edge and compasses to construct: <ul style="list-style-type: none"> the mid-point and perpendicular bisector of a line segment; the bisector of an angle; the perpendicular from a point to a line; the perpendicular from a point on a line. Investigate in a range of contexts: shape and space. 	<ul style="list-style-type: none"> Explain how to find, calculate and use: <ul style="list-style-type: none"> the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons; the interior and exterior angles of regular polygons. Solve problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons. Know the definition of a circle and the names of its parts. Use straight edge and compasses to construct a triangle, given right angle, hypotenuse and side (RHS).
<p>Handling data 1 (6 hours) Probability (276--283)</p>	<ul style="list-style-type: none"> Understand and use the probability scale from 0 to 1; find and justify probabilities based on equally likely outcomes in simple contexts. Collect data from a simple experiment and record in a frequency table; estimate probabilities based on this data. 	<ul style="list-style-type: none"> Use the vocabulary of probability when interpreting the results of an experiment; appreciate that random processes are unpredictable. Know that if the probability of an event occurring is p, then the probability of it not occurring is $1 - p$; find and record all possible mutually exclusive outcomes for single events and two successive events in a systematic way, using diagrams and tables. Estimate probabilities from experimental data; understand that: <ul style="list-style-type: none"> if an experiment is repeated there may be, and usually will be, different outcomes; increasing the number of times an experiment is repeated generally leads to better estimates of probability. 	<ul style="list-style-type: none"> Identify all the mutually exclusive outcomes of an experiment; know that the sum of probabilities of all mutually exclusive outcomes is 1 and use this when solving problems. Compare experimental and theoretical probabilities in a range of contexts; appreciate the difference between mathematical explanation and experimental evidence.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Number 2 (6 hours) Fractions, decimals, percentages (60–77)</p> <p>Calculations (82–85, 88–101)</p>	<ul style="list-style-type: none"> Use fraction notation to express a smaller whole number as a fraction of a larger one; simplify fractions by cancelling all common factors and identify equivalent fractions; convert terminating decimals to fractions. Add and subtract fractions with common denominators; calculate fractions of quantities (whole-number answers); multiply a fraction by an integer. Understand percentage as the 'number of parts per 100'; calculate simple percentages. Consolidate the rapid recall of number facts, including positive integer complements to 100 and multiplication facts to 10×10, and quickly derive associated division facts. 	<ul style="list-style-type: none"> Know that a recurring decimal is a fraction; use division to convert a fraction to a decimal; order fractions by writing them with a common denominator or by converting them to decimals. 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. Interpret percentage as the operator 'so many hundredths of' and express one given number as a percentage of another; use the equivalence of fractions, decimals and percentages to compare proportions; calculate percentages and find the outcome of a given percentage increase or decrease. Understand addition and subtraction of fractions; use the laws of arithmetic and inverse operations. Recall known facts, including fraction to decimal conversions; use known facts to derive unknown facts, including products such as 0.7 and 6, and 0.03 and 8. Consolidate and extend mental methods of calculation, working with decimals, fractions and percentages; solve word problems mentally. 	<ul style="list-style-type: none"> Use efficient methods to add, subtract, multiply and divide fractions, interpreting division as a multiplicative inverse; cancel common factors before multiplying or dividing. Solve problems involving percentage changes. Use known facts to derive unknown facts. Extend mental methods of calculation, working with factors, powers and roots.
<p>Algebra 2 (6 hours) Equations and formulae (112–119, 138–143)</p>	<ul style="list-style-type: none"> Use letter symbols to represent unknown numbers or variables; know the meanings of the words <i>term</i>, <i>expression</i> and <i>equation</i>. Simplify linear algebraic expressions by collecting like terms. 	<ul style="list-style-type: none"> Begin to distinguish the different roles played by letter symbols in equations, formulae and functions; know the meanings of the words <i>formula</i> and <i>function</i>. Know that algebraic operations follow the same conventions and order as arithmetic operations; use index notation for small positive integer powers. Simplify or transform linear expressions by collecting like terms; multiply a single term over a bracket. Use formulae from mathematics and other subjects; substitute integers into simple formulae, and positive integers into expressions involving small powers (e.g. $3x^2 + 4$ or $2x^3$); derive simple formulae. 	<ul style="list-style-type: none"> Use index notation for integer powers and simple instances of the index laws. Simplify or transform algebraic expressions by taking out single term common factors.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Shape, space and measures 2 (6 hours) Measures and mensuration (228–231, 234–241)</p> <p>Solving problems (18–21)</p>	<ul style="list-style-type: none"> • Convert one metric unit to another (e.g. grams to kilograms); read and interpret scales on a range of measuring instruments. • Know and use the formula for the area of a rectangle; calculate the perimeter and area of shapes made from rectangles. • Calculate the surface area of cubes and cuboids. 	<ul style="list-style-type: none"> • Use units of measurement to estimate, calculate and solve problems in everyday contexts involving length, area, volume, capacity, mass, time and angle; know rough metric equivalents of imperial measures in daily use (feet, miles, pounds, pints, gallons). • Deduce and use formulae for the area of a triangle, parallelogram and trapezium; calculate areas of compound shapes made from rectangles and triangles. • Know and use the formula for the volume of a cuboid; calculate volumes and surface areas of cuboids and shapes made from cuboids. • Investigate in a range of contexts: measures. 	<ul style="list-style-type: none"> • Convert between area measures (mm^2 to cm^2, cm^2 to m^2, and vice versa) and between volume measures (mm^3 to cm^3, cm^3 to m^3, and vice versa). • Know and use the formulae for the circumference and area of a circle. • Calculate the surface area and volume of right prisms.

YEAR 8: SPRING TERM

Teaching objectives for the oral and mental activities

<ul style="list-style-type: none"> • Order, add, subtract, multiply and divide integers. • Round numbers, including to one or two decimal places. • Know and use squares, positive and negative square roots, cubes of numbers 1 to 5 and corresponding roots. • Know or derive quickly prime numbers less than 30. • Convert between improper fractions and mixed numbers. • Find the outcome of a given percentage increase or decrease. <ul style="list-style-type: none"> • Know complements of 0.1, 1, 10, 50, 100, 1000. • Add and subtract several small numbers or several multiples of 10, e.g. $250 + 120 - 190$. • Calculate using knowledge of multiplication and division facts and place value, e.g. 432×0.01, $37 \div 0.01$, 0.04×8, $0.03 \div 5$. • Recall multiplication and division facts to 10×10. • Use factors to multiply and divide mentally, e.g. 22×0.02, $420 \div 15$. • Multiply and divide a two-digit number by a one-digit number. • Multiply by near 10s, e.g. 75×29, 8×19. • Use partitioning to multiply, e.g. 13×1.4. 	<ul style="list-style-type: none"> • Use approximations to estimate the answers to calculations, e.g. 39×2.8. • Solve equations, e.g. $n(n - 1) = 56$. • Visualise, describe and sketch 2-D shapes, 3-D shapes and simple loci. • Estimate and order acute, obtuse and reflex angles. • Use metric units (length, area and volume) and units of time for calculations. • Use metric units for estimation (length, area and volume). • Recall and use the formula for perimeter of rectangles and calculate areas of rectangles and triangles. • Calculate volumes of cuboids. • Discuss and interpret graphs. • Apply mental skills to solve simple problems.
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Teaching objectives for the main activities

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
Algebra 3 (6 hours) Sequences, functions, graphs (160–177)	<ul style="list-style-type: none"> • Express simple functions in words. • Generate coordinate pairs that satisfy a simple linear rule; recognise straight-line graphs parallel to the x-axis or y-axis. 	<ul style="list-style-type: none"> • Express simple functions in symbols; represent mappings expressed algebraically. • Generate points in all four quadrants and plot the graphs of linear functions, where y is given explicitly in terms of x, on paper and using ICT; recognise that equations of the form $y = mx + c$ correspond to straight-line graphs. • Construct linear functions arising from real-life problems and plot their corresponding graphs; discuss and interpret graphs arising from real situations. 	<ul style="list-style-type: none"> • Find the inverse of a linear function. • Plot graphs of linear functions (y given implicitly in terms of x), e.g. $ay + bx = 0$, $y + bx + c = 0$, on paper and using ICT; given values for m and c, find the gradient of lines given by equations of the form $y = mx + c$. • Discuss and interpret distance–time graphs.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Number 3 (9 hours) Place value (36–47)</p> <p>Calculations (92–107, 110–111)</p> <p>Calculator methods (108–109)</p>	<ul style="list-style-type: none"> Understand and use decimal notation and place value; multiply and divide integers and decimals by 10, 100 and 1000, and explain the effect. Round positive whole numbers to the nearest 10, 100 or 1000 and decimals to the nearest whole number or one decimal place. Consolidate and extend mental methods of calculation to include decimals, fractions and percentages, accompanied where appropriate by suitable jottings. Multiply and divide three-digit by two-digit whole numbers; extend to multiplying and dividing decimals with one or two places by single-digit whole numbers. Carry out calculations with more than one step using brackets and the memory. 	<ul style="list-style-type: none"> Read and write positive integer powers of 10; multiply and divide integers and decimals by 0.1, 0.01. Order decimals. Round positive numbers to any given power of 10; round decimals to the nearest whole number or to one or two decimal places. Consolidate and extend mental methods of calculation, working with decimals, squares and square roots, cubes and cube roots; solve word problems mentally. Make and justify estimates and approximations of calculations. Consolidate standard column procedures for addition and subtraction of integers and decimals with up to two places. Use standard column procedures for multiplication and division of integers and decimals, including by decimals such as 0.6 or 0.06; understand where to position the decimal point by considering equivalent calculations. Check a result by considering whether it is of the right order of magnitude and by working the problem backwards Carry out more difficult calculations effectively and efficiently using the function keys of a calculator for sign change, powers, roots and fractions; use brackets and the memory. Enter numbers and interpret the display of a calculator in different contexts (negative numbers, fractions, decimals, percentages, money, metric measures, time). 	<ul style="list-style-type: none"> Extend knowledge of integer powers of 10; multiply and divide by any integer power of 10. Extend mental methods of calculation, working with decimals, fractions, percentages, factors, powers and roots. Use standard column procedures to add and subtract integers and decimals of any size, including a mixture of large and small numbers with differing numbers of decimal places. Multiply and divide by decimals, dividing by transforming to division by an integer. 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.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Shape, space and measures 3 (6 hours) Geometrical reasoning: lines, angles and shapes (190–191) Transformations (202–215)</p> <p>Ratio and proportion (78–81)</p>	<ul style="list-style-type: none"> Recognise and visualise the transformation and symmetry of a 2-D shape: <ul style="list-style-type: none"> reflection in given mirror lines, and line symmetry; rotation about a given point, and rotation symmetry; translation; explore these transformations and symmetries using ICT. Understand the relationship between ratio and proportion; solve simple problems about ratio and proportion using informal strategies. 	<ul style="list-style-type: none"> Know that if two 2-D shapes are congruent, corresponding sides and angles are equal. Transform 2-D shapes by simple combinations of rotations, reflections and translations, on paper and using ICT; identify all the symmetries of 2-D shapes. Understand and use the language and notation associated with enlargement; enlarge 2-D shapes, given a centre of enlargement and a positive whole-number scale factor; explore enlargement using ICT. Consolidate understanding of the relationship between ratio and proportion; reduce a ratio to its simplest form, including a ratio expressed in different units, recognising links with fraction notation. 	<ul style="list-style-type: none"> Know that translations, rotations and reflections preserve length and angle and map objects on to congruent images; identify reflection symmetry in 3-D shapes. Enlarge 2-D shapes, given a centre of enlargement and a negative whole-number scale factor, on paper; identify the scale factor of an enlargement as the ratio of the lengths of any two corresponding line segments; recognise that enlargements preserve angle but not length, and understand the implications of enlargement for perimeter. Use proportional reasoning to solve a problem; interpret and use ratio in a range of contexts.
<p>Algebra 4 (6 hours) Equations and formulae (112–113, 122–125, 138–143)</p>	<ul style="list-style-type: none"> Use letter symbols to represent unknown numbers or variables; know the meanings of the words <i>term</i>, <i>expression</i> and <i>equation</i>. Construct and solve simple linear equations with integer coefficients (unknown on one side only) using an appropriate method (e.g. inverse operations). 	<ul style="list-style-type: none"> Begin to distinguish the different roles played by letter symbols in equations, formulae and functions; know the meanings of the words <i>formula</i> and <i>function</i>. Construct and solve linear equations with integer coefficients (unknown on either or both sides, without and with brackets) using appropriate methods (e.g. inverse operations, transforming both sides in the same way). Use formulae from mathematics and other subjects; substitute integers into simple formulae, including examples that lead to an equation to solve; derive simple formulae. 	<ul style="list-style-type: none"> Construct and solve linear equations with integer coefficients (with and without brackets, negative signs anywhere in the equation, positive or negative solution), using an appropriate method. Use formulae from mathematics and other subjects; substitute numbers into expressions and formulae; derive a formula and, in simple cases, change its subject.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Handling data 2 (6 hours) Handling data (248–273)</p> <p>Solving problems (28–29)</p>	<ul style="list-style-type: none"> Given a problem that can be addressed by statistical methods, suggest possible answers. Design a data collection sheet or questionnaire to use in a simple survey; construct frequency tables for discrete data. Calculate statistics for small sets of discrete data: <ul style="list-style-type: none"> find the mode, median and range; calculate the mean, including from a simple frequency table, using a calculator for a larger number of items. Construct, on paper and using ICT, graphs and diagrams to represent data, including: <ul style="list-style-type: none"> bar-line graphs; use ICT to generate pie charts. Write a short report of a statistical enquiry and illustrate with appropriate diagrams, graphs and charts, using ICT as appropriate; justify choice of what is presented. 	<ul style="list-style-type: none"> Discuss a problem that can be addressed by statistical methods and identify related questions to explore. Decide which data to collect to answer a question, and the degree of accuracy needed; identify possible sources. Plan how to collect the data, including sample size; design and use two-way tables for discrete data. Collect data using a suitable method, such as observation, controlled experiment using ICT, or questionnaire. Calculate statistics, including with a calculator; recognise when it is appropriate to use the range, mean, median and mode; construct and use stem-and-leaf diagrams. Construct, on paper and using ICT: <ul style="list-style-type: none"> pie charts for categorical data; bar charts and frequency diagrams for discrete data; simple scatter graphs; identify which are most useful in the context of the problem. Interpret tables, graphs and diagrams for discrete data and draw inferences that relate to the problem being discussed; relate summarised data to the questions being explored. Communicate orally and on paper the results of a statistical enquiry and the methods used, using ICT as appropriate; justify the choice of what is presented. Solve more complex problems by breaking them into smaller steps or tasks, choosing and using resources, including ICT. 	<ul style="list-style-type: none"> Discuss how data relate to a problem; identify possible sources, including primary and secondary sources. Gather data from specified secondary sources, including printed tables and lists from ICT-based sources. Interpret graphs and diagrams and draw inferences to support or cast doubt on initial conjectures; have a basic understanding of correlation.

YEAR 8: SUMMER TERM

Teaching objectives for the oral and mental activities

<ul style="list-style-type: none"> • Order, add, subtract, multiply and divide integers. • Multiply and divide decimals by 10, 100, 1000, 0.1, 0.01. • Round numbers, including to one or two decimal places. • Know and use squares, cubes, roots and index notation. • Know or derive prime factorisation of numbers to 30. • Convert between fractions, decimals and percentages. • Find the outcome of a given percentage increase or decrease. 	<ul style="list-style-type: none"> • Use partitioning to multiply, e.g. 13×1.4. • Use approximations to estimate the answers to calculations, e.g. 39×2.8.
<ul style="list-style-type: none"> • Know complements of 0.1, 1, 10, 50, 100. • Add and subtract several small numbers or several multiples of 10, e.g. $250 + 120 - 190$. • Use jottings to support addition and subtraction of whole numbers and decimals. • Calculate using knowledge of multiplication and division facts and place value, e.g. 432×0.01, $37 \div 0.01$, 0.04×8, $0.03 \div 5$. • Recall multiplication and division facts to 10×10. • Use factors to multiply and divide mentally, e.g. 22×0.02, $420 \div 15$. • Multiply by near 10s, e.g. 75×29, 8×19. 	<ul style="list-style-type: none"> • Solve equations, e.g. $n(n - 1) = 56$, $\square + \square = 46$. • Visualise, describe and sketch 2-D shapes, 3-D shapes and simple loci. • Estimate and order acute, obtuse and reflex angles. • Use metric units (length, mass, capacity, area and volume) and units of time for calculations. • Use metric units for estimation (length, mass, capacity, area and volume). • Convert between m, cm and mm, km and m, kg and g, litres and ml, cm^2 and mm^2. • Discuss and interpret graphs. • Calculate a mean using an assumed mean. • Apply mental skills to solve simple problems.

Teaching objectives for the main activities

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Number 4 (6 hours) Calculations (82–87, 92–107, 110–111)</p> <p>Measures (228–231)</p>	<ul style="list-style-type: none"> • Consolidate and extend mental methods of calculation to include decimals, fractions and percentages, accompanied where appropriate by suitable jottings. • Multiply and divide three-digit by two-digit whole numbers; extend to multiplying and dividing decimals with one or two places by single-digit whole numbers. • Convert one metric unit to another (e.g. grams to kilograms). 	<ul style="list-style-type: none"> • Understand addition and subtraction of fractions and integers, and multiplication and division of integers; use the laws of arithmetic and inverse operations. • Use the order of operations, including brackets, with more complex calculations. • Consolidate and extend mental methods of calculation, working with decimals, fractions and percentages, squares and square roots, cubes and cube roots; solve word problems mentally. • Make and justify estimates and approximations of calculations. • Consolidate standard column procedures for addition and subtraction of integers and decimals with up to two places. • Use standard column procedures for multiplication and division of integers and decimals, including by decimals such as 0.6 or 0.06; understand where to position the decimal point by considering equivalent calculations. • Check a result by considering whether it is of the right order of magnitude and by working the problem backwards. • Use units of measurement to estimate, calculate and solve problems in everyday contexts. 	<ul style="list-style-type: none"> • Understand the effects of multiplying and dividing by numbers between 0 and 1. • Understand the order of precedence and effect of powers. • Extend mental methods of calculation, working with decimals, fractions, percentages, factors, powers and roots. • Use standard column procedures to add and subtract integers and decimals of any size. • Multiply and divide by decimals, dividing by transforming to division by an integer.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Algebra 5 (8 hours) Equations and formulae (116–137)</p> <p>Sequences, functions and graphs (164–177)</p> <p>Solving problems (6–13, 28–29)</p>	<ul style="list-style-type: none"> Simplify linear algebraic expressions by collecting like terms. Construct and solve simple linear equations with integer coefficients (unknown on one side only) using an appropriate method (e.g. inverse operations). Generate coordinate pairs that satisfy a simple linear rule; recognise straight-line graphs parallel to the x-axis or y-axis. Break a complex calculation into simpler steps, choosing and using appropriate and efficient operations, methods and resources, including ICT. 	<ul style="list-style-type: none"> Simplify or transform linear expressions by collecting like terms; multiply a single term over a bracket. Construct and solve linear equations with integer coefficients (unknown on either or both sides, without and with brackets) using appropriate methods (e.g. inverse operations, transforming both sides in the same way). Begin to use graphs and set up equations to solve simple problems involving direct proportion. Plot the graphs of linear functions, where y is given explicitly in terms of x, on paper and using ICT. Construct linear functions arising from real-life problems and plot their corresponding graphs; discuss and interpret graphs arising from real situations. Solve more demanding problems and investigate in a range of contexts: algebra. Solve more complex problems by breaking them into smaller steps or tasks, choosing and using efficient techniques for algebraic manipulation. 	<ul style="list-style-type: none"> Simplify or transform algebraic expressions by taking out single term common factors. Construct and solve linear equations with integer coefficients (with and without brackets, negative signs anywhere in the equation, positive or negative solution), using an appropriate method. Use systematic trial and improvement methods and ICT tools to find approximate solutions of equations such as $x^2 + x = 20$. Solve problems involving direct proportion using algebraic methods, relating algebraic solutions to graphical representations of the equations; use ICT as appropriate. Plot graphs of linear functions (y given implicitly in terms of x), e.g. $ay + bx = 0$, $y + bx + c = 0$, on paper and using ICT. Use trial and improvement methods where a more efficient method is not obvious.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Solving problems (6 hours) Solving problems (2–35)</p> <p>Ratio and proportion (78–81)</p>	<ul style="list-style-type: none"> Represent problems mathematically, making correct use of symbols, words, diagrams, tables and graphs. Break a complex calculation into simpler steps, choosing and using appropriate and efficient operations, methods and resources, including ICT. Understand the significance of a counter-example. Understand the relationship between ratio and proportion; solve simple problems about ratio and proportion using informal strategies. 	<ul style="list-style-type: none"> Solve more demanding problems and investigate in a range of contexts: number and measures. Identify the necessary information to solve a problem; represent problems and interpret solutions in algebraic or graphical form, using correct notation. Solve more complex problems by breaking them into smaller steps or tasks, choosing and using efficient techniques for calculation. Use logical argument to establish the truth of a statement; give solutions to an appropriate degree of accuracy in the context of the problem. Suggest extensions to problems, conjecture and generalise; identify exceptional cases or counter-examples. Consolidate understanding of the relationship between ratio and proportion; reduce a ratio to its simplest form, including a ratio expressed in different units, recognising links with fraction notation; divide a quantity into two or more parts in a given ratio; use the unitary method to solve simple word problems involving ratio and direct proportion. 	<ul style="list-style-type: none"> Solve increasingly demanding problems and evaluate solutions; explore connections in mathematics across a range of contexts. Present a concise, reasoned argument, using symbols, diagrams and graphs and related explanatory text. Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole; compare two ratios; interpret and use ratio in a range of contexts, including solving word problems.
<p>Shape, space and measures 4 (9 hours) Geometrical reasoning: lines, angles and shapes (198–201)</p> <p>Transformations (216–217) Coordinates (218–219)</p> <p>Construction and loci (220–227)</p> <p>Mensuration (232–233, 238–241)</p>	<ul style="list-style-type: none"> Use 2-D representations to visualise 3-D shapes and deduce some of their properties. Use ruler and protractor to construct simple nets of 3-D shapes, e.g. cuboid, regular tetrahedron, square-based pyramid, triangular prism. Use conventions and notation for 2-D coordinates in all four quadrants; find coordinates of points determined by geometric information. Use a ruler and protractor to: <ul style="list-style-type: none"> measure and draw lines to the nearest millimetre and angles, including reflex angles, to the nearest degree; construct a triangle given two sides and the included angle (SAS) or two angles and the included side (ASA); explore these constructions using ICT. Calculate the surface area of cubes and cuboids. 	<ul style="list-style-type: none"> Know and use geometric properties of cuboids and shapes made from cuboids; begin to use plans and elevations. Make simple scale drawings. Given the coordinates of points A and B, find the mid-point of the line segment AB. Use straight edge and compasses to construct: <ul style="list-style-type: none"> a triangle, given three sides (SSS); use ICT to explore this construction. Find simple loci, both by reasoning and by using ICT, to produce shapes and paths, e.g. an equilateral triangle. Use bearings to specify direction. Know and use the formula for the volume of a cuboid; calculate volumes and surface areas of cuboids and shapes made from cuboids. 	<ul style="list-style-type: none"> Visualise and use 2-D representations of 3-D objects; analyse 3-D shapes through 2-D projections, including plans and elevations. Use and interpret maps, scale drawings. Use straight edge and compasses to construct a triangle, given right angle, hypotenuse and side (RHS). Calculate the surface area and volume of right prisms.

	SUPPORT From the Y7 teaching programme	CORE From the Y8 teaching programme	EXTENSION From the Y9 teaching programme
<p>Handling data 3 (7 hours) Handling data (248–275)</p>	<ul style="list-style-type: none"> Given a problem that can be addressed by statistical methods, suggest possible answers. Design a data collection sheet or questionnaire to use in a simple survey; construct frequency tables for discrete data, grouped where appropriate in equal class intervals. Calculate statistics for small sets of discrete data: <ul style="list-style-type: none"> find the mode, median and range, and the modal class for grouped data; calculate the mean, including from a simple frequency table, using a calculator for a larger number of items. Construct, on paper and using ICT, graphs and diagrams to represent data, including: <ul style="list-style-type: none"> frequency diagrams for grouped discrete data; use ICT to generate pie charts. Write a short report of a statistical enquiry and illustrate with appropriate diagrams, graphs and charts, using ICT as appropriate; justify choice of what is presented. 	<ul style="list-style-type: none"> Discuss a problem that can be addressed by statistical methods and identify related questions to explore. Decide which data to collect to answer a question, and the degree of accuracy needed; identify possible sources. Plan how to collect the data, including sample size; construct frequency tables with given equal class intervals for sets of continuous data. Collect data using a suitable method, such as observation, controlled experiment, including data logging using ICT, or questionnaire. Calculate statistics, including with a calculator; calculate a mean using an assumed mean; know when it is appropriate to use the modal class for grouped data. Construct, on paper and using ICT: <ul style="list-style-type: none"> bar charts and frequency diagrams for continuous data; simple line graphs for time series; identify which are most useful in the context of the problem. Interpret tables, graphs and diagrams for continuous data and draw inferences that relate to the problem being discussed; relate summarised data to the questions being explored. Compare two distributions using the range and one or more of the mode, median and mean. Communicate orally and on paper the results of a statistical enquiry and the methods used, using ICT as appropriate; justify the choice of what is presented. Compare experimental and theoretical probabilities in different contexts. Solve more complex problems by breaking them into smaller steps or tasks, choosing and using graphical representation, and also resources, including ICT. 	<ul style="list-style-type: none"> Discuss how data relate to a problem; identify possible sources, including primary and secondary sources. Design a survey or experiment to capture the necessary data from one or more sources; determine the sample size and degree of accuracy needed; design, trial and if necessary refine data collection sheets; construct tables for large discrete and continuous sets of raw data, choosing suitable class intervals. Compare two or more distributions and make inferences, using the shape of the distributions, the range of data and appropriate statistics. Appreciate the difference between mathematical explanation and experimental evidence.
<p>Probability (284–285)</p> <p>Solving problems (28–29)</p>			