Key Stage 3 Maths

Pupils will use mental and written methods, as well as calculators and ICT, such as spreadsheets. They will work on problems linked to other subjects, and also to everyday life.

The focus is on developing mathematical fluency, mathematical reasoning and problem-solving.

The curriculum includes:

- Key Stage 3 Number
- Algebra, ratio, proportion and rates of change
- Geometry and measures
- Probability
- Statistics

| Year 7 | Sequences

Understand & use algebraic notation | Place value & ordering integers & decimals

Fraction, decimal & percentage | Solving problems with addition & subtraction

Solving problems with | Fractions & percentages of amounts

Operations & | Constructing, measuring & using geometric notation

Developing | Sets & probability

Prime numbers & proof |

	Equality & equivalence	equivalence	multiplication & division	equations with directed number Addition & subtraction of fractions	geometric reasoning Developing number sense	
Pupils should be able to do...	Sequences: ● Describe and continue sequences ● Predict and check next term(s) ● Sequences in a table and graphically ● Linear and non-linear sequences ● Continue linear sequences ● Continue non-linear sequences ● Explain the term-to-term rule ● Find missing terms (H)	Place value & ordering integers & decimals: ● Recognise the place value of any number in an integer up to one billion ● Understand and write integers up to one billion in words and figures ● Work out intervals on a number line ● Position integers on a number line Round integers to the nearest power of ten Compare two numbers using =, ≠, <, >, ≤, ≥ Order a list of integers Find the range of a set of numbers	Solving problems with addition & subtraction: ● Properties of addition and subtraction ● Mental strategies for addition and subtraction ● Use formal methods for addition of integers ● Use formal methods for addition/subtraction of decimals ● Use formal methods for subtraction/addition of integers	Fractions & percentages of amounts: ● Find a fraction of a given amount ● Use a given fraction to find the whole and/or other fractions ● Find a percentage of a given amount using mental methods ● Find a percentage of a given amount using a calculator ● Solve problems with fractions greater than 1 and percentages	Constructing, measuring & using geometric notation: ● Understand and use letter and labelling conventions including those for geometric figures ● Draw and measure line segments including geometric figures ● Understand angles as a measure of turn ● Classify angles ● Measure and draw angles up to 180°	Sets & probability: ● Identify and represent sets ● Interpret and create Venn diagrams ● Understand and use the intersection of sets ● Understand and use the union of sets ● Understand and use the complement of a set (H) ● Know and use the vocabulary of probability ● Generate sample spaces for single events

	Understand & use algebraic notation: ● Given a numerical input, find the output of a single function machine ● Use inverse operations to find the input given the output ● Use diagrams and letters to generalise number operations ● Use diagrams and letters with single function machines ● Find the function machine given a simple expression ● Substitute values into single operation expressions ● Find numerical inputs and outputs for a series of two	Find the median of a set of numbers Understand place value for decimals Position decimals on a number line Compare and order any number up to one billion Fraction, decimal & percentage equivalence: ● Represent tenths and hundredths as diagrams ● Represent tenths and hundredths on number line ● Interchange between fractional and decimal number lines ● Convert between fractions and decimals - tenths and hundredths ● Convert between fractions and decimals - fifths and quarters	● Solve problems in the context of perimeter ● Solve problems involving tables and timetables ● Solve problems with frequency trees ● Solve problems with frequency trees ● Solve problems with bar charts and line charts Solving problems with multiplication & division: ● Properties of multiplication & division ● Understand and use factors/multiples ● Multiply and divide integers and decimals by powers of 10 ● Multiply by 0.1 and 0.01 (H)	greater than 100%(H) Operations & equations with directed number: ● Understand and use representations of directed numbers ● Order directed numbers using lines and appropriate symbols ● Perform calculations that cross zero ● Add directed numbers ● Subtract directed numbers ● Multiplication of directed numbers ● Multiplication and division of directed numbers ● Use a calculator for directed number calculations ● Evaluate	● Draw and measure angles between 180° and 360° ● Identify perpendicular and parallel lines ● Recognise types of triangles and quadrilaterals ● Interpret simple pie charts using proportion ● Draw pie charts Developing geometric reasoning: ● Understand and use the sum of angles at a point ● Understand and use the sum of angles on a straight line ● Understand and use the equality of vertically opposite angles ● Know and apply the sum of angles in a triangle	● Calculate the probability of a single event ● Understand and use the probability scale ● Know that the sum of probabilities for all possible outcomes is 1 Prime numbers & proof: ● Find and use multiples ● Identify factors of numbers and expressions ● Recognise and identify prime numbers ● Recognise square and triangular numbers ● Find common factors of a set of numbers including the HCF ● Find common multiples of a set

	function machines • Use diagrams and letters with a series of two function machines • Find the function machines given a two-step expression • Substitute values into two-step expressions • Generate sequences given an algebraic rule • Represent one- and two-step functions graphically Equality & equivalence: • Understand the meaning of equality • Understand and use fact families, numerically and algebraically • Solve one-step linear equations	• Convert between fractions and decimals - eighths and thousandths (H) • Understand the meaning of percentage using a hundred square • Convert fluently between simple fractions, decimals and percentages • Use and interpret pie charts • Represent any fraction as a diagram • Represent fractions on number lines • Identify and use simple equivalent fractions • Understand fractions as division • Convert fluently between fractions, decimals and percentages • Explore fractions above one, decimals and percentages (H)	• Convert metric units • Use formal methods to multiply integers/Decimals • Use formal methods to multiply decimals/integers • Use formal methods to divide integers/decimals • Understand and use order of operations (BIDMAS) • Solve problems using the area of rectangles and parallelograms • Solve problems using the area of triangles • Solve problems using the area of trapezia (H)	algebraic expressions with directed number • Introduction to two-step equations Addition & subtraction of fractions: • Understand representations of fractions • Convert between mixed numbers and fractions • Add and subtract unit fractions with the same denominator • Add and subtract fractions with the same denominator • Add and subtract fractions from integers expressing the answer as a single fraction • Understand and use equivalent fractions	• Know and apply the sum of angles in a quadrilateral • Solve angle problems using properties of triangles and quadrilaterals • Solve complex angle problems • Find and use the angle sum of any polygon (H) • Investigate angles in parallel lines (H) • Understand and use parallel line angles rules (H) • Use known facts to obtain simple proofs (H) Developing number sense: • Know and use mental addition and subtraction strategies for integers • Known and use mental	of numbers including the LCM • Write a number as a product of its prime factors • Use a Venn diagram to calculate the HCF and LCM (H) • Make and test conjectures • Use counter examples to disprove a conjecture

	involving +/- using inverse operations • Solve one-step linear equations involving x/÷ using inverse operations • Understand the meaning of like and unlike terms • Understand the meaning of equivalence • Simplify algebraic expressions by collecting like terms, using the ≡ symbol			• Add and subtract fractions where denominators share a simple common multiple • Add and subtract fractions with any denominator • Add and subtract improper fractions and mixed numbers • Use fractions in algebraic contexts • Use equivalence to add and subtract decimals and fractions • Add and subtract simple algebraic fractions (H)	multiplication and division strategies for integers • Know and use mental arithmetic strategies for decimals • Know and use mental arithmetic strategies for fractions • Use factors to simplify calculations • Use estimation as a method for checking mental calculations • Use known number facts to derive other facts • Use known algebraic facts to derive other facts • Know when to use a mental strategy, formal written method or a calculator	

Key Terminology	Sequence, Term, Position, Rule, term to term, Table, Graph, Axes, Linear, Non linear, Difference, ascending, descending, geometric, fibonacci	Place value, Digit, Billion, Placeholder, Integer, Equal division, Interval, Scale, Approximate, Convention, Round, Equal, Compare, Ascending, Descending, Range, Median, Average, Decimal point, Hundredth, Tenth, Decimal, Significant figure, Scientific notation, Standard form, Fraction, Denominator, Numerator, Part, Operator, Percentage, Improper, Mixed number, Rational.	Total, Sum, Difference, Inverse, Commutative, Associative, Bridging, Compensation, Number bond, Partition, Exchange, Column method, Carrying, Estimating, Equivalence, Polygon, Perimeter, Balance.	Fraction, Equivalent, Numerator, Denominator, Whole,Percent, Percentage, Convert, Reflection, Symmetric, Ascending, Descending, Decrease, Increase, Square root, Square, Power. Indices, Common denominator.	Universal, Inclusive, Element, Member, Set, Venn diagram, Union, Mutually exclusive, Intersection, Element, Complement, Impossible, Likely, Fair chance, Random Unlikely, Sample, Outcome, Possibilities, Bias.	Multiples, Integer, Positive, Zero, Factor, Divisor, Remainder, Term, Factorise, Prime number, Square number, Investigate, Common factor, Highest common factor, Highest common multiple
Year 8	Ratio & scale

Working in the | Multiplying and dividing fractions | Brackets, equations & inequalities | Fractions & percentages | Angles in parallel lines & polygons

Area of trapezia & | The data handling cycle |

	Representing data Multiplicative change	Cartesian plane	Sequences Indices	Standard index form Standard index form Number sense	circles Line symmetry & reflection	Measures of location Revision and end of year tests
Pupils should be able to do…	Ratio & scale: ● Understand the meaning and representation of ratio ● Understand and use ratio notation ● Solve problems involving ratios of the form 1 : n (or n : 1) ● Solve proportional problems involving the ratio m : n ● Divide a value into a given ratio ● Express ratios in their simplest integer form	Multiplying and dividing fractions: ● Represent multiplication of fractions ● Multiply a fraction by an integer ● Find the product of a pair of unit fractions ● Find the product of a pair of any fractions ● Divide an integer by a fraction ● Divide a fraction by a unit fraction ● Understand and use the reciprocal ● Divide any pair of fractions	Brackets, equations & inequalities: ● Form algebraic expressions ● Use directed number with algebra ● Multiply out a single bracket ● Factorise into a single bracket ● Expand multiple single brackets and simplify ● Solve equations, including with brackets ● Form and solve equations with brackets	Fractions & percentages: ● Convert fluently between key fractions, decimals and percentages ● Calculate key fractions, decimals and percentages of an amount without a calculator ● Calculate fractions, decimals and percentages of an amount using calculator methods	Angles in parallel lines & polygons: ● Understand and use basic angles rules and notation ● Investigate angles between parallel lines and the transversal ● Identify and calculate with alternate and corresponding angles ● Identify and calculate with co-interior, alternate and corresponding angles	The data handling cycle: ● Set up a statistical enquiry ● Design and criticise questionnaires ● Draw and interpret pictograms, bar charts and vertical line charts ● Draw and interpret multiple bar charts ● Draw and interpret pie charts

	● Express ratios in the form $1 : n$ ● Compare ratios and related fractions ● Understand π as the ratio between diameter and circumference ● Understand gradient of a line as a ratio Representing data: ● Draw and interpret scatter graphs ● Understand and describe linear correlation ● Draw and use line of best fit ● Identify non-linear relationships ● Identify different types of data ● Read and interpret ungrouped frequency tables	Working in the Cartesian plane: ● Work with coordinates in all four quadrants ● Identify and draw lines that are parallel to the axes ● Recognise and use the line $y = x$ ● Recognise and use lines of the form $y = kx$ ● Link $y = kx$ to direct proportion problems ● Recognise and use lines of the form $y = x + a$ ● Explore graphs with negative gradient $(y = -kx, y = a - x, x + y = a)$ ● Plot graphs of the form $y = mx + c$	● Understand and solve simple inequalities ● Form and solve inequalities ● Identify and use formulae, expressions, identities and equations Sequences: ● Generate sequences given a rule in words ● Generate sequences given a simple algebraic rule ● Generate sequences given a complex algebraic rule ● Find the rule for the nth term of a linear sequence (H) Indices:	● Convert between decimals and percentages greater than 100% ● Percentage decrease with a multiplier ● Calculate percentage increase and decrease using a multiplier ● Express one number as a fraction or a percentage of another without a calculator ● Express one number as a fraction or a percentage of another using calculator methods ● Work with percentage change ● Choose appropriate methods to solve percentage problems	● Solve complex problems with parallel line angles ● Construct triangles and special quadrilaterals ● Investigate the properties of special quadrilaterals ● Identify and calculate with sides and angles in special quadrilaterals ● Understand and use the properties of diagonals of quadrilaterals (H) ● Understand and use the sum of exterior angles of any polygon ● Calculate and use the sum of the interior angles in any polygon ● Calculate missing interior angles in regular polygons	● Draw and interpret line graphs ● Choose the most appropriate diagram for given set of data ● Represent and interpret grouped quantitative data ● Find and interpret the range ● Compare distributions using charts ● Identify misleading graphs Measures of location: ● Understand and use the mean, median and mode ● Choose the most appropriate average ● Find the mean from an ungrouped frequency table (H)

	● Read and interpret grouped frequency tables ● Represent grouped discrete data ● Represent continuous data grouped into equal classes ● Represent data in two-way tables Multiplicative change: ● Solve problems involving direct proportion ● Explore conversion graphs ● Convert between currencies ● Explore direct proportion graphs(H) ● Explore relationships between similar shapes ● Understand scale factors as		● Adding and subtracting expressions with indices ● Simplifying algebraic expressions by multiplying indices ● Simplifying algebraic expressions by dividing indices ● Using the addition law for indices ● Using the addition and subtraction law for indices ● Exploring powers of powers (H)	● Find the original amount given the percentage less than 100% (H) ● Find the original amount given the percentage greater than 100% (H) ● Choose appropriate methods to solve complex percentage problems (H) Standard index form: ● Investigate positive powers of 10 ● Work with numbers greater than 1 in standard form Investigate negative powers of 10 Work with numbers between 0 and 1 in standard form	● Prove simple geometric facts (H) ● Construct an angle bisector (H) ● Construct a perpendicular bisector of a line segment (H) Area of trapezia & circles: ● Calculate the area of triangles, rectangles and parallelograms ● Calculate the area of a trapezium ● Calculate the perimeter and area of compound shapes (1) ● Investigate the area of a circle ● Calculate the area of a circle and parts of a	● Find the mean from an grouped frequency table (H) ● Identify outliers ● Compare distributions using averages and the range

	multiplicative representations ● Draw and interpret scale diagrams ● Interpret maps using scale factors and ratios			● Compare and order numbers in standard form ● Mentally calculate with numbers in standard form ● Add and subtract numbers in standard form ● Multiply and divide numbers in standard form ● Use a calculator to work with numbers in standard form Number sense: ● Round numbers to powers of 10, and 1 significant figure ● Round numbers to a given number of decimal places ● Estimate the answer to a calculation ● Understand and use error interval notation	circle without a calculator ● Calculate the area of a circle and parts of a circle with a calculator ● Calculate the perimeter and area of compound shapes (2) Line symmetry & reflection: ● Recognise line symmetry ● Reflect a shape in a horizontal or vertical line 1 (shapes touching the line) ● Reflect a shape in a horizontal or vertical line 2 (shapes not touching the line) ● Reflect a shape in a diagonal line 1 (shapes touching the line)	

				• Calculate using the order of operations • Calculate with money • Convert metric measures of length • Convert metric units of weight and capacity	• Reflect a shape in a diagonal line 2 (shapes not touching the line)	
Key Terminology	direct proportion recurring decimal terminating decimal unit fraction unitary method continuous data log discrete distance–time graph distribution interrogate line graph population pyramid primary source sample scatter graph secondary source stem-and-leaf	conclude, conclusion counter-example deduce exceptional case justify prove, proof Addition, Subtraction, Multiplication, Division, Sum, Product, Total, Compound, Estimate, Truncate, Round, Accuracy, Whole, Unit, Tenth, Hundredth, Thousandth, Decimal, Inverse, Commutative, Significant figure, Limit, Bound, Metric, Imperial,	Powers, Indices, Roots, Square, Cube, Standard form, Ordinary number, Radical, Reciprocal Expression, Equation, Formula, Identity, Variable, Solve, Solution, Term, Inequality, Greater than, Less than, Equal to, Solve, Solution, Variable, Simplify, Expand, Factorise, Linear, Binomial, Polynomial, Variable	Fraction, decimal, part, whole, numerator, denominator, percent, percentage, increase, decrease, growth, decay, decimal, multiplier, equivalent ascending, descending billion index power cube, cube number cube root (e.g. $3\sqrt{8}$) cubed (e.g. 23)	alternate angles bisect, bisector complementary angles congruent, congruence corresponding angles elevation equidistant exterior angle heptagon interior angle isometric mid-point plan view prove, proof supplementary angles tessellate, tessellation triangular prism view	continuous data log discrete distance–time graph distribution interrogate line graph population pyramid primary source sample scatter graph secondary source stem-and-leaf diagram two-way table bearing, three-figure bearing displacement foot, yard hectare tonne

	diagram two-way table	Metre, Litre, Gram, Pint, Gallon, Ounce, Pound, Stone, Ton, Tonne, Inch, Yard, Foot Coordinate, origin, axis, parallel, perpendicular, gradient, horizontal, vertical, diagonal, linear, positive, negative, generate		prime factor decomposition to the power of n (e.g. 64)		volume: cubic millimetre, cubic centimetre, cubic metre
Year 9	Straight line graphs Forming & solving equations Testing conjectures	Three dimensional shapes Constructions & congruency	Numbers Using percentages Maths & money	Deduction Rotation & translation Pythagoras' theorem	Enlargement & similarity Solving ratio & proportion problems Rates	Probability Algebraic Representation Revision and end of year tests
Pupils should be able to do...	Straight line graphs: ● Lines parallel to the axes, $y = x$ and $y = -x$ ● Using tables of values	Three dimensional shapes: ● Know names of 2-D and 3-D shapes ● Recognise prisms	Numbers: ● Integers, real and rational numbers ● Understand and use surds (H)	Deduction: ● Angles in parallel lines ● Solving angles problems (using	Enlargement & similarity: ● Recognise enlargement and similarity	Probability: ● Single event probability ● Relative frequency –

• Compare gradients • Compare intercepts • Understand and use $y = mx + c$ • Write an equation in the form $y = mx + c$ • Find the equation of a line from a graph • Interpret gradient and intercepts of real-life graphs • Model real-life graphs involving inverse proportion (H) • Explore perpendicular lines (H) Forming & solving equations: • Solve one- and two-step equations and inequalities • Solve one- and two-step	• Accurate nets of cuboids and other 3-D shapes • Sketch and recognise nets of cuboids and other 3-D shapes • Plans and elevations • Find area of 2-D shapes • Surface area of cubes and cuboids • Surface area of triangular prisms • Surface area of a cylinder • Volume of cubes and cuboids • Volume of other 3-D shapes – prisms and cylinders • Explore volumes of cones, pyramids and spheres (H) Constructions & congruency: • Draw and measure angles	• Work with directed number • Solve problems with integers • Solve problems with decimals • Find and use the HCF and LCM • Adding and subtracting fractions • Multiplying and dividing fractions • Solving problems with fractions • Numbers in standard form Using percentages: • Use the equivalence of fractions, decimals and percentages • Calculate percentage increase and decrease • Express a change as a percentage	chains of reasoning) • Angles problems with algebra • Conjectures with angles • Conjectures with shapes • Link constructions and geometrical reasoning (H) Rotation & translation: • Identify the order of rotational symmetry of a shape • Compare and contrast rotational symmetry with line symmetry • Rotate a shape about a point on a shape • Rotate a shape about a point not on a shape • Translate points and shapes by a given vector	• Enlarge a shape by a positive integer scale factor • Enlarge a shape by a positive integer scale factor from a point • Enlarge a shape by a positive fractional scale factor • Enlarge a shape by a negative scale factor (H) • Work out missing sides and angles in a pair of given similar shapes • Solve problems with similar triangles (H) • Explore ratios in right-angled triangles (H) Solving ratio & proportion problems: • Solve problems with direct proportion	include convergence • Expected outcomes • Independent events • Use tree diagrams (H) • Use tree diagrams to solve 'without replacement' problems (H) • Use diagrams to work out probabilities Algebraic Representation: • Draw and interpret quadratic graphs • Interpret graphs, including reciprocal and piece-wise • Investigate graphs of simultaneous equations • Represent inequalities

	equations and inequalities with brackets ● Inequalities with negative numbers ● Solve equations with unknowns on both sides ● Solve inequalities with unknowns on both sides ● Solving equations and inequalities in context ● Substituting into formulae and equations ● Rearrange formulae (one-step) ● Rearrange formulae (two-step) ● Rearrange complex formulae including brackets and squares (H) Testing conjectures:	● Construct and interpret scale drawings ● Locus of distance from a point ● Locus of distance from a straight line/shape ● Locus equidistant from two points ● Construct a perpendicular bisector ● Construct a perpendicular from a point ● Construct a perpendicular to a point ● Locus of distance from two lines ● Construct an angle bisector ● Construct triangles from given information ● Identify congruent figures ● Explore congruent triangles ● Identify congruent triangles	● Solve 'reverse' percentage problems ● Recognise and solve percentage problems (non-calculator) ● Recognise and solve percentage problems (calculator) ● Solve problems with repeated percentage change (H) Maths & money: ● Solve problems with bills and bank statements ● Calculate simple interest ● Calculate compound interest ● Solve problems with Value Added Tax ● Calculate wages and taxes	● Compare rotation and reflection of shapes ● Find the result of a series of transformations (H) Pythagoras' theorem: ● Squares and square roots ● Identify the hypotenuse of a right-angled triangle ● Determine whether a triangle is right-angled ● Calculate the hypotenuse of a right-angled triangle ● Calculate missing sides in right-angled triangles ● Use Pythagoras theorem on coordinate axes	● Direct proportion and conversion graphs ● Solve problems with inverse proportion ● Graphs of inverse relationships ● Solve ratio problems given the whole or a part ● Solve 'best buy' problems ● Solve problems ratio and algebra (H) Rates: ● Solve speed, distance and time problems without a calculator ● Solve speed, distance and time problems with a calculator ● Use distance/time graphs	

	• Factors, Multiples and Primes • Conjectures about number • Expand a pair of binomials • Conjectures with algebra		• Solve problems with exchange rates • Solve unit pricing problems	• Explore proofs of Pythagoras' theorem • Use Pythagoras' theorem in 3-D shapes (H)	• Solve problems with density, mass and volume • Solve flow problems and their graphs • Rates of change and their units • Convert compound units (H)	
Key Terminology	line graph, variable, linear, linear relationship, non-linear, gradient, origin, intercept, proportional, rate, line of best fit, interpolation, extrapolation, outlier and, or common factor cubic equation cubic expression expand the product (of two linear expressions) factorise identically equal to (≡) identity	adjacent (side) angle: acute, obtuse, right, reflex angles at a point angles on a straight line base (of plane shape or solid) base angles centre circle concave, convex degree (°) diagonal diagram edge (of solid) equal (sides, angles) face horizonal, vertical identical (shapes) intersect, intersection line, line segment opposite (sides, angles) parallel perpendicular plane point polygon: pentagon, hexagon,	exponent greater than or equal to (≥) less than or equal to (≤) significant figures standard (index) form upper bound, lower bound index, indices index law index notation proportional to (∝) proportionality compound interest constant cost price, selling price reciprocal cancel, cancellation convert decimal fraction equivalent,	Right-angled Triangle Hypotenuse Pythagoras Theorem Square, Square root, adjacent opposite axis of rotation symmetry plane symmetry plane of symmetry Conjectures, construct, reason, geometrical	Covert, density, flow, rates, ratio, proportion, parts, inverse, proportionate, direct proportion Enlarge, scale factor, similarity	biased event experimental probability sample sample space theoretical probability theory common factor cubic equation cubic expression expand the product (of two linear expressions) factorise identically equal to (≡) identity index law inequality quadratic equation quadratic expression region simultaneous equations subject of

	index law inequality quadratic equation quadratic expression region simultaneous equations subject of the formula take out common factors	octagon quadrilateral: arrowhead, delta, kite, parallelogram, rectangle, rhombus, square, trapezium regular, irregular shape side (of 2-D shape) solid (3-D) shape: cube, cuboid, cylinder, hemisphere, prism, pyramid, square-based pyramid, sphere, tetrahedron three-dimensional (3-D) triangle: equilateral, isosceles, scalene, right-angled two-dimensional (2-D) vertex, vertices vertically opposite angles	equivalence fraction lowest terms mixed number numerator, denominator percentage (%) proper/improper fraction proportion ratio, including notation 3 : 2 simplest form			the formula take out common factors