Mathematics Department   Key Stage 3

Term	Topic	Learning Outcomes	Assessment

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| Year 7 | Autumn 1 | Unit 1: Analysing and Displaying Data | • Calculate the mode, median and range for a set of data.
• Recall and compare different types of averages.
• Solve unfamiliar problems involving averages.
• Accurately read information from tables and diagrams.
• Display data using tally charts, tables and bar charts.
• Display and interpret data using bar-line charts.
• Compare different representations of averages for different sets of data.
• Interpret simple charts for grouped data.
• Calculate the modal class for grouped data.
• Recall different averages and what they represent.
• Calculate the mean of a set of data.
• Compare sets of data using their ranges and averages.
• Recall averages and what they represent.
• Recall how to use the range to compare data.
• Evaluate which average is most appropriate.
• Draw line graphs.
• Draw dual and compound bar charts.
• Interpret and draw dual and compound bar charts.
• Choose the best representation for different types of data. | Unit 1 and 2 Assessment. |
| | | Unit 2: Number Skills | • Use the priority of operations, including brackets.
• Use multiplication facts up to 10 ⨯ 10 and the laws of arithmetic to do mental multiplication and division.
• Multiply by multiples of 10, 100 and 1000.
• Solve unfamiliar problems involving BIDMAS.
• Round whole numbers to the nearest 10, 100 and 1000.
• Make an estimate to check an answer.
• Use inverse operations to check an answer.
• Use a written method to add and subtract whole numbers of any size. | |

Term	Topic	Learning Outcomes	Assessment
		• Round whole numbers to the nearest 10 000, 100 000 and 1 000 000.	
		• Use an estimate to check an answer to a multiplication.	
		• Use a written method to multiply whole numbers.	
		• Solve unfamiliar problems involving multiplication.	
		• Use a written method to divide whole numbers.	
		• Use inverse operations to check an answer.	
		• Recall and justify what it means if a division calculation has a remainder.	
		• Solve unfamiliar problems involving division.	
		• Round money to the nearest pound or penny.	
		• Interpret the display on a calculator in different contexts.	
		• Use a calculator to solve problems involving money and time.	
		• Order positive and negative numbers.	
		• Add and subtract positive and negative numbers.	
		• Begin to multiply with negative numbers.	
		• Solve unfamiliar problems involving negative numbers.	
		• Calculate multiples and find the lowest common multiple.	
		• List all the factor pairs for any whole number.	
		• Identify common factors, the highest common factor and the lowest common multiple.	
		• Recognise prime numbers.	
		• Connecting remainders to factors and multiples.	
		• Recognise square numbers.	
		• Use a calculator to find squares and square roots.	
		• Use the priority of operations, including powers.	
		• Use index form for powers.	
		• • Do mental calculations with squares and square roots.	

| Autumn 2 | Unit 3: Expressions, Functions and Formulae | • Calculate outputs of simple functions written in words and using symbols.
• Describe simple functions in words.
• Solve unfamiliar problems involving functions.
• Use letters to represent unknowns in algebraic expressions.
• Simplify linear algebraic expressions by collecting like terms.
• Accurately describe what an unknown is, how you can use any letter to represent an unknown number or quantity.
• Multiply and divide algebraic terms
• Simplify with brackets, numbers and letters
• Solve unfamiliar problems involving expressions.
• Write expressions from word descriptions using addition, subtraction, multiplication and division.
• Write expressions to represent function machines.
• Substitute positive whole numbers into simple formulae written in words.
• Substitute positive whole numbers into formulae written with letters.
• Solve unfamiliar problems involving formulae.
• Write simple formulae in words.
• Write simple formulae using letter symbols.
• Identify formulae and functions.
• Identify the unknowns in a formula and a function. | Unit 3 and 4 Assessment. |
| | Unit 4: Decimals and Measure | • Measure and draw lines to the nearest millimetre.
• Write decimals in order of size.
• Round decimals to the nearest whole number and to 1 decimal place.
• Round decimals to make estimates and approximations of calculations.
• Multiply and divide by 10, 100 and 1000.
• Convert measurements into the same units to compare them.
• Solve simple problems involving units of measurement in the context of length, mass and capacity.
• Convert between metric units of length, mass and capacity. | |

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Term	Topic	Learning Outcomes	Assessment
		• Read scale diagrams.	
		• Read scales.	
		• Write decimal measures as two related units of measure.	
		• Interpret metric measures displayed on a calculator.	
		• Multiply decimals by multiples of 10, 100 and 1000.	
		• Multiply decimals mentally.	
		• Check a result by considering whether it is of the right order of magnitude.	
		• Correctly position the decimal point by considering equivalent calculations.	
		• Explore patterns in place value multiplication decimal calculations.	
		• Add and subtract decimals.	
		• Multiply and divide decimals by single-digit whole numbers.	
		• Divide numbers that give decimal answers.	
		• Calculate the perimeter of squares, rectangles and regular polygons.	
		• Calculate the perimeters of composite shapes and polygons.	
		• Solve perimeter problems.	
		• Calculate areas of shapes by counting squares.	
		• Calculate areas of irregular shapes by counting squares.	
		• Calculate the area of rectangles and squares.	
		• Calculate the areas of shapes made from rectangles.	
		• Solve problems involving area.	
		• Choose suitable units to measure length and area.	
		• Use units of measure to solve problems.	
		• • Convert and use metric and imperial units.	

Autumn Term Assessment

Spring 1		**Unit 5: Fractions and Percentages**	• Use fraction notation to describe parts of a shape. • Compare simple fractions. • Use a diagram to compare two or more simple fractions. • Order fractions with different denominators. • Convert an improper fraction to a mixed number. • Identify equivalent fractions. • Simplify fractions by dividing numerator and denominator by common factors. • Add and subtract simple fractions. • Calculate simple fractions of quantities. • Recall inverse operations relating to fractions. • Work with equivalent fractions and decimals. • Write one quantity as a fraction of another. • Recall that percentage is 'the number of parts per 100'. • Convert a percentage to a fraction or decimal. • Compare and work with equivalent percentages, fractions and decimals. • Calculate percentages. • Use different strategies to calculate with percentages. • Express one quantity as a percentage of another. • Justify if it possible to have 110%?	Unit 5 and 6 Assessment.
		Unit 6: Probability	• Use the language of probability • Use a probability scale with words • Place events on the probability scale from 0 to 1 • Identify outcomes and equally likely outcomes • Calculate probabilities • Use a probability scale from 0 to 1 • Use probability notation • Calculate more complex probabilities • Calculate the probability of an event not happening • Record data from a simple experiment • Estimate probability based on experimental data • Make conclusions based on the results of an experiment	

Term	Topic	Learning Outcomes	Assessment
		• Use probability to estimate the expected number of times an outcome will occur • • Apply probabilities from experimental data in simple situations	
Spring 2	*Unit 7: Ratio and Proportion*	• Use direct proportion in simple contexts • Solve simple problems involving direct proportion • Use the unitary method to solve simple word problems involving direct proportion • Use ratio notation • Reduce a ratio to its simplest form by cancelling • Reduce a three-part ratio to its simplest form by cancelling • Identify equivalent ratios • Divide a quantity into two parts in a given ratio • Solve word problems involving ratio • Solve problems with ratios and measures • Use fractions to describe proportions • Use fractions to describe and compare proportions • Describe and use the relationship between fractions, ratio and proportion • Use percentages to describe proportion. • Use percentages to compare simple proportions • • Describe and use the relationship between percentages, ratio and proportion	Unit 7 Assessment.
	Spring Term Assessment		

| Summer 1 | Unit 8: Angles and Lines | • Use a protractor to measure and draw angles
• Identify acute, obtuse and reflex angles
• Estimate the size of angles
• Name and label lines, angles and triangles
• Describe and label lines, angles and triangles
• Identify and compare angle and side properties of triangles
• Use a protractor to draw angles accurately
• Use a ruler and protractor to draw triangles accurately
• Calculate missing angles on a straight-line using angle facts
• Calculate angles around a point and vertically opposite angles using angle facts
• Solve problems involving angles
• Recall and use the rule for the sum of angles in a triangle
• Calculate interior and exterior angles
• Solve angle problems involving triangles
• Identify and name types of quadrilaterals
• Recall and use the rule for the sum of angles in a quadrilateral
• Solve angle problems involving quadrilaterals | Unit 8 and 9 Assessment. |
| | Unit 9: Sequences and Graphs | • Recognise, describe and continue number sequences
• Generate terms of a sequence using a one-step term-to-term rule
• Calculate missing terms in more complex sequences
• Identify patterns and rules in sequences
• Describe how a pattern sequence grows
• Calculate and use number sequences to model real-life problems
• Read and plot coordinates
• Generate and plot coordinates from a rule
• Calculate the midpoint of a line segment
• Solve problems and spot patterns in coordinates
• Describe and continue special sequences
• Use the term-to-term rule to generate more terms in a sequence | |

Term	Topic	Learning Outcomes	Assessment
		• Recognise an arithmetic sequence and a geometric sequence • Recognise, name and plot graphs parallel to the axes • Recognise, name and plot the graphs of y = x and y = –x • Plot straight-line graphs using a table of values • Draw graphs to represent relationships • Generate terms of a sequence using a position-to-term rule • Use linear expressions to describe the nth term of simple sequences	
Summer 2	*Unit 10: Transformations*	• Identify congruent shapes • Use the language of enlargement • Enlarge shapes using given scale factors • Calculate the scale factor given an object and its image • Recognise line and rotational symmetry in 2D shapes • Identify all the symmetries of 2D shapes • Identify reflection symmetry in 3D shapes • Solve problems using line symmetry • Identify the mirror line for a reflection on a coordinate grid • Recognise and carry out reflections in a mirror line • Reflect a shape on a coordinate grid • Describe a reflection on a coordinate grid • Draw rotations • Describe and carry out rotations on a coordinate grid • Translate 2D shapes • • Transform 2D shapes by combinations of transformations	Unit 10 Assessment.
		End of Year 7 Assessment	

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<table>
<tr><td rowspan="2">Year 8</td><td rowspan="2">Autumn 1</td><td>**Unit 1: Number**</td><td>Use written methods to add and subtract more than two numbers (including decimals).
Use mental calculation for multiplication.
Estimate answers to calculations.
Know and use divisibility rules.
Use a written method to divide decimal numbers by integers.
Justify specific divisibility rules.
Add, subtract, multiply and divide positive and negative numbers, including larger numbers.
Add, subtract, multiply and divide positive and negative numbers, including decimals.
Solve unfamiliar problems involving negative numbers.
Calculate using squares, square roots, cubes and cube roots.
State which integers a square root lies between.
Solve unfamiliar problems involving powers and roots.
Calculate squares and roots using a calculator.
Calculate combinations of squares, square roots, cubes, cube roots and brackets.
Use index form.
Write a number as the product of its prime factors.
Use prime factor decomposition to find the highest common factor (HCF) and lowest common multiple (LCM).</td><td>Unit 1 and 2 Assessment.</td></tr>
<tr><td>**Unit 2: Area and Volume**</td><td>Recall and use the formula for the area of a triangle.
Calculate the area of compound shapes made from rectangles and triangles.
Justify why every triangle's area is half of the area of a rectangle of the same base and height.
Recall and use the formula for the area of a parallelogram.
Recall and use the formula for the area of a trapezium.
Justify why areas are product of perpendicular lengths.
Calculate the volume of cubes and cuboids.</td><td></td></tr>
</table>

	Term	Topic	Learning Outcomes	Assessment
			• Calculate the volume of 3D solids made from cuboids.	
			• Solve volume problems.	
			• Justify why volume is measured in cube units.	
			• Sketch nets of 3D solids.	
			• Draw 3D solids on isometric paper.	
			• Draw plans and elevations of 3D solids.	
			• Calculate the surface area of cubes.	
			• Calculate the surface area of cubes and cuboids.	
			• Solve worded problems involving surface area.	
			• Solve problems in everyday contexts involving measures.	
			• Convert between different measures for area, volume and capacity.	
			• Use tonnes and hectares.	
			• • Recall rough metric equivalents of imperial measures.	

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Autumn 2	**Unit 3: Statistics, Graphs and Charts**	• Draw pie charts. • Interpret pie charts. • Justify why pie charts show the proportions of data. • Calculate the mean from a frequency table. • Complete and use two-way tables. • Use tables for grouped data. • Justify which average is most appropriate to represent a set of data for particular contexts. • Draw stem and leaf diagrams for data. • Interpret stem and leaf diagrams. • Compare stem and leaf diagrams and bar charts. • Construct line graphs. • Choose the most appropriate average to use. • Compare two sets of data using statistics or the shape of the graph. • Draw a scatter graph. • Draw a line of best fit on a scatter graph. • Describe types of correlation. • Interpret graphs and charts. • Explain why a graph or chart could be misleading. • Justify when a statistical diagram is appropriate or inappropriate to represent a set of data.	Unit 3 and 4 Assessment.
	Unit 4: Expressions and Equations	• Simplify algebraic powers. • Write and use expressions involving powers. • Justify why an algebraic expression is the generalisation of a rule or relationship. • Expand brackets. • Write and simplify algebraic expressions and formulae using brackets and division. • Identify factors of numbers. • Factorise expressions. • Solve unfamiliar problems involving brackets. • Identify the inverse of a simple function. • Write and solve one-step equations using function machines. • Compare the differences between expressions, formulae and equations. • Solve and write two-step equations using function machines. • Solve problems using equations.	

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Term	Topic	Learning Outcomes	Assessment
		• Justify why solutions to equations can be positive and negative integers, and (simple) decimals and fractions. • Solve one-step equations using the balancing method. • Solve two-step equations using the balancing method. • • Solve multi-step equations using the balancing method.	
		Autumn Term Assessment	

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| | | Unit 5: Real-Life Graphs | • Read conversion graphs.
• Draw, use and interpret conversion graphs.
• Justify why a conversion graph between currencies or units of length, mass and volume will always be a straight line through the origin.
• Draw a simple distance–time graph.
• Interpret a distance–time graph.
• Draw and use graphs to solve distance–time problems.
• Read line graphs.
• Draw and interpret line graphs.
• Describe what interpolation and extrapolation are and use them in context.
• Draw line graphs.
• Draw and interpret line graphs and identify trends.
• Justify why a graph may show seasonal or other variations.
• Draw linear graphs.
• Draw and interpret linear and non-linear graphs from a range of sources.
• Use graphs to solve problems.
• Draw a curved graph.
• Draw and interpret curved graphs from a range of sources.
• Discuss why for some graphs it is more realistic to join data points with a curve than with straight lines | Unit 5 and 6 Assessment. |
| Spring 1 | | Unit 6: Decimals and Ratio | • Round decimals to 2 or 3 decimal places
• Round numbers to a given number of significant figures
• Round numbers to an appropriate degree of accuracy
• Order decimals of any size, including positive and negative decimals
• Multiply any number by 0.1 and 0.01
• Multiply larger numbers
• Multiply decimals with up to and including 2 decimal places
• Divide by 0.1 and 0.01
• Divide by decimals
• Multiply and divide by decimals
• Solve problems involving decimals and all four operations
• Divide a quantity into three or more parts in a given ratio | |

Term	Topic	Learning Outcomes	Assessment
		• Calculate with ratios involving decimals • Solve ratio and proportion problems	
Spring 2	*Unit 7: Lines and Angles*	• Classify quadrilaterals by their geometric properties • Solve geometric problems using side and angle properties of special quadrilaterals • Identify alternate angles on a diagram • Begin to develop proofs of angle facts • Identify corresponding angles • Solve problems using properties of angles in parallel and intersecting lines • Calculate the sum of the interior and exterior angles of a polygon • Calculate the sizes of interior and exterior angles of a polygon • Solve geometric problems, showing reasoning • Solve problems involving angles by setting up equations	Unit 7 Assessment.
	Spring Term Assessment		

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Term	Topic	Learning Outcomes	Assessment
Summer 1	***Unit 8: Calculating with Fractions***	• Identify fractions as more than or less than • Order fractions • Add and subtract fractions with the same denominator • Add and subtract fractions with any size denominator • Multiply integers and fractions by a fraction • Evaluate appropriate methods for multiplying fractions • Identify the reciprocal of a number • Divide integers and fractions by a fraction • Use strategies for dividing fractions • Convert a mixed number to an improper fraction • Use the four operations with mixed numbers	Unit 8 and 9 Assessment.
	Unit 9: Straight-Line Graphs	• Recognise when values are in direct proportion with or without a graph • Plot graphs and read values to solve problems • Plot a straight-line graph • Plot a straight-line graph and calculate its gradient • Plot the graphs of linear equations • Write the equations of straight-line graphs in the form $y = mx + c$	

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Term	Topic	Learning Outcomes	Assessment
Summer 2	**Unit 10: Percentages, Decimals and Fractions**	• Convert time to decimal hours • Recall equivalent fractions and decimals • Recognise recurring and terminating decimals • Order fractions by converting them to decimals or equivalent fractions • Recall equivalent fractions, decimals and percentages • Use different methods to calculate equivalent fractions, decimals and percentages • Use the equivalence of fractions, decimals and percentages to compare two proportions • Express one number as a percentage of another when the units are different • Calculate an amount increased or decreased by a percentage • Use mental strategies to solve percentage problems • Use a multiplier to calculate amounts increased or decreased by a percentage • Use the unitary method to solve percentage problems	Unit 10 Assessment.
	End of Year 8 Assessment		

	Term	Topic	Learning Outcomes	Assessment
Year 9	**Autumn 1**	***Unit 1: Indices and Standard Form***	• Calculate combinations of indices and brackets, including nested brackets. • Use index laws to simplify expressions. • Accurately insert brackets in a calculation. • Calculate with powers and roots. • Calculate combinations of powers, roots, fractions and brackets. • Estimate answers to calculations. • Calculate with numbers written in index form that are raised to a power. • Evaluate negative and zero indices. • Evaluate powers of 10 and their prefixes. • Write large and small numbers using standard form. • Enter and read standard form numbers on a calculator. • Order numbers written in standard form. • Calculate numbers in standard form (non-calculator).	Unit 1 and 2 Assessment.
		Unit 2: Expressions and Formulae	• Write and solve equations with fractions. • Write and solve equations with the unknown on both sides. • Solve unfamiliar problems involving equations. • Use the priority of operations (BIDMAS) when substituting into algebraic expressions. • Substitute values into expressions involving powers and roots. • Solve worded problems involving substitution. • Write mathematical formulae. • Write and use mathematical formulae. • Substitute into formulae and then solve equations to find unknown values. • Change the subject of a formula. • Solve worded problems involving formulae. • Use the rules for indices for multiplying and dividing. • Simplify expressions involving brackets. • Factorise an expression by taking out an algebraic common factor. • Use rule for negative indices correctly. • Expand a single bracket. • Expand double brackets. • Solve unfamiliar problems involving expanding brackets.	

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Autumn 2	*Unit 3: Dealing with Data*	• Identify sources of primary and secondary data. • Choose a suitable sample size and what data to collect. • Identify factors that might affect data collection and plan to reduce bias. • Design and use data collection sheets and tables. • Design an accurate questionnaire. • Calculate mode, median, mean and range from a list. • Calculate the median from a frequency table. • Estimate the mean from a large set of grouped data. • Construct and use a line of best fit to estimate missing values. • Identify and suggest reasons for outliers in data. • Identify further lines of enquiry. • Draw line graphs to represent grouped data. • Draw back-to-back stem and leaf diagrams. • Interpret back-to-back stem and leaf diagram. • Write a report to show survey results.	Unit 3 and 4 Assessment.
	Unit 4: Multiplicative Reasoning	• Enlarge 2D shapes using a positive whole number scale factor and centre of enlargement. • Identify the centre of enlargement by drawing lines on a grid. • Recall that the scale factor is the ratio of corresponding lengths. • Enlarge 2D shapes using a negative whole number scale factor. • Enlarge 2D shapes using a fractional scale factor. • Calculate an original value using inverse operations. • Calculate percentage change. • Solve problems using compound measures. • Solve problems using constant rates and related formulae. • Solve problems involving the comparison of compound measures or constant rates requiring converting units. • Solve best-buy problems.	

Term	Topic	Learning Outcomes	Assessment
		• Solve problems involving inverse proportion. • Solve problems using inverse proportion and compound measures.	
	Autumn Term Assessment		

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Term	Topic	Learning Outcomes	Assessment
Spring 1	**Unit 6: Sequences and Equations**	• Use the nth term to generate an arithmetic sequence. • Calculate and use the nth term of an arithmetic sequence. • Recognise and continue geometric sequences. • Recognise and continue quadratic sequences. • Represent inequalities on a number line. • Calculate integer values that satisfy an inequality. • Form equations from a worded question. • Construct and solve equations including fractions or powers. • Use trial and improvement to solve an equation if you do not have an algebraic method • Write formulae connecting variables in direct or inverse proportion. • Use algebra to solve problems involving direct or inverse proportion.	Unit 6 and 9 Assessment.
	Unit 9: Probability	• Identify mutually exclusive outcomes and events • Calculate the probabilities of mutually exclusive outcomes and events • Calculate estimates of probability from experiments • Decide whether a dice or spinner is unbiased • Justify why a dice or spinner is bias or unbiased • List all the possible outcomes of one or two events in a sample space diagram • Decide if a game is fair • Justify if a game is fair or not, using knowledge of bias. • Display all the possible outcomes of two events in a two-way table • Calculate probabilities from two-way tables • Draw Venn diagrams • Calculate probabilities from Venn diagrams	
	Spring Term Assessment		

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Term	Topic	Learning Outcomes	Assessment
		End of KS3	