



Scheme of Work

SUBJECT: Mathematics

YEAR: 8 Autumn term 1

	Topic : Numbers and the number system	Topic : Counting, comparing and calculating	Topic
Core (Set 2) (Stage 7)	<ul style="list-style-type: none"> Recall prime numbers up to 50 Know how to test if a number up to 150 is prime Highest common factors and lowest common multiples Understand the use of notation for powers Recall the first 15 square numbers Recall the first 5 cube numbers Identify the first 10 triangular numbers Know the meaning of the square root symbol ($\sqrt{\quad}$) Use a scientific calculator to calculate powers and roots Make the connection between squares and square roots (and cubes and cube roots) 	<ul style="list-style-type: none"> Ordering positive and negative numbers Order fractions by writing over a common denominator Order a set of numbers including a mixture of fractions, decimals and negative numbers Make correct use of the symbols = and \neq Use knowledge of place value to calculate with decimals Use knowledge of inverse operations when dividing with decimals Be fluent with long multiplication and division Know the order of operations for the four operations Use brackets in problems involving the order of operations Understand and apply the fact that addition and subtraction have equal priority 	



		<ul style="list-style-type: none"> Understand and apply the fact that multiplication and division have equal priority 	
Themes	Numbers and the number system	Importance of basic calculations and order of operations	
Challenge (Set 1) (Stage 8)	<ul style="list-style-type: none"> Recall prime numbers up to 100 Write a number as a product of its prime factors Use prime factorisations to find the highest common factor & lowest common multiple of two numbers, using Venn diagrams Know how to identify any significant figure in any number Approximate by rounding to any significant figure in any number 	<ul style="list-style-type: none"> Performing the four operations with negative numbers Know how to square (or cube) a negative number Substitute negative numbers into expressions Enter negative numbers into a calculator Use a scientific calculator to calculate with fractions, both positive and negative Interpret a calculator display when working with negative numbers Understand how to use the order of operations including powers Understand how to use the order of operations including roots 	
Support (Set 3) (Stage 6)	<ul style="list-style-type: none"> Understand (order, write, read) place value in numbers with up to eight digits Multiply & divide numbers with up to three decimal places by 10 (100, 1000) Understand and use negative numbers when working in other contexts Know the meaning of a common multiples & factors of two numbers Identify common multiples & factors of two numbers Know how to test if a number up to 120 is prime 	<ul style="list-style-type: none"> Combining the four operations when completing calculations mentally Multiply a four-digit number by a two-digit number using long multiplication Solve multi-step problems involving addition, subtraction and/or multiplication Know that addition and subtraction have equal priority Know that multiplication and division have equal priority 	



		<ul style="list-style-type: none"> • Know that multiplication and division take priority over addition and subtraction • Use short division to divide • Understand and use methods of long division • Know how to write and use the remainder at each step of the division • Write the remainder to a division problem as a whole number or a fraction • Extend beyond the decimal point to write the remainder as a decimal • Identify when division is needed to solve a problem • Extract the correct information from a problem and set up a written division calculation • Interpret a remainder when carrying out division 	
Literacy focus	Spelling of key words	Spelling of key words	
Cross-curricular links			
SMSC & MBV			
ASSESSMENTS	Assessment 1 ~ October/November	Assessment 1 ~ October/November	
Out of school learning	Weekly homework based on work covered in class	Weekly homework based on work covered in class	



	Topic : Visualising and constructing	Topic : Investigating properties of shapes	Topic : Algebraic proficiency: pre-algebra skills
Core (Set 2) (Stage 7)	<ul style="list-style-type: none"> • Know the meaning of faces, edges and vertices • Use correct notation for describing lengths, angles and parallel lines • Know the meaning of 'perpendicular' and identify perpendicular lines • Know the meaning of 'regular' polygons • Identify line and rotational symmetry in polygons • Use ruler and protractor to construct triangles 	<ul style="list-style-type: none"> • Know the vocabulary of 3D shapes • Know the connection between faces, edges and vertices in 3D shapes • Visualise a 3D shape from its net • Recall the names and shapes of special triangles and quadrilaterals • Know the meaning of a diagonal of a polygon • Know the properties of the special quadrilaterals (including diagonals) • Apply the properties of triangles to solve problems • Apply the properties of quadrilaterals to solve problems 	<ul style="list-style-type: none"> • Know the meaning of expression, term, formula, equation, function • Know basic algebraic notation (the rules of algebra) • Use letters to represent variables • Identify like terms in an expression • Simplify an expression by collecting like terms • Know how to multiply a (positive) single term over a bracket (the distributive law) • Substitute positive numbers into expressions and formulae • Given a function, establish outputs from given inputs • Use a mapping diagram (function machine) and expressions to represent a function



Themes	Visualising and constructing 2D and 3D shapes	Quadrilaterals and triangles	Basic essential algebraic skills
Challenge (Set 1) (Stage 8)	<ul style="list-style-type: none"> • Enlarge a 2D shape • Find the centre and scale factor of enlargement • Enlarge a shape using centre of enlargement and a positive integer or fractional scale factor • Know and understand the vocabulary of plans and elevations • Interpret plans and elevations • Use the concept of scaling in diagrams • Measure and state a specified bearing • Construct a scale diagram involving bearings • Use bearings to solve geometrical problems 	<p>Understanding risk 1</p> <ul style="list-style-type: none"> • Know that probability is a way of measuring likeliness • Know and use the vocabulary of probability • Understand the use of the 0-1 scale to measure probability • List all the outcomes for an experiment • Identify equally likely outcomes • Work out theoretical probabilities for events with equally likely outcomes • Know and apply the fact that the sum of probabilities for all outcomes is 1 	<p>Tinkering</p> <ul style="list-style-type: none"> • Know how to write products algebraically • Use fractions when working in algebraic situations • Factorise an expression by taking out common factors • Simplify an expression involving terms with combinations of variables (e.g. $3a^2b + 4ab^2 + 2a^2 - a^2b$) • Know the multiplication (division, power, zero) law of indices • Substitute positive and negative numbers into formulae • Be aware of common scientific formulae • Change the subject of a formula when one or two steps are required
Support (Set 3) (Stage 6)	<ul style="list-style-type: none"> • Use a protractor to draw angles • Use a ruler to draw lines to the nearest millimetre • Complete tessellations of given shapes • Know the names of common 3D shapes • Use mathematical language to describe 3D shapes • Construct 3D shapes from given nets • Draw accurate nets for common 3D shapes • Find all the nets for a cube • Use a net to visualise the edges (vertices) that will meet when folded 	<p>Know the definitions of special triangles</p> <ul style="list-style-type: none"> • Know the definitions of special quadrilaterals • Classify 2D shapes using given categories; e.g. number of sides, symmetry • Know the angle sum of a triangle • Know the angle sum of a quadrilateral • Know how to find the angle sum of a any polygon 	<ul style="list-style-type: none"> • Recognise a simple formula written in words • Interpret the information given in a written formula • Substitute numbers into a one-step and two step formulas written in words • Create a one-step and two step formulas from given information • Use symbols to represent variables in a formula



		<ul style="list-style-type: none"> • Use the angle sum of a triangle to find missing angles • Find the missing angle in an isosceles triangle when only one angle is known • Use the angle sum of a quadrilateral to find missing angles • Know how to find the size of one angle in any regular polygon 	
Literacy focus	Spelling of key words	Spelling of key words	Spelling of key words
Cross-curricular links			
SMSC & MBV			
ASSESSMENTS	Assessment 2 ~ December	Assessment 2 ~ December	Assessment 2 ~ December
Out of school learning	Weekly homework based on work covered in class	Weekly homework based on work covered in class	Weekly homework based on work covered in class



	Topic : Exploring fractions, decimals and percentages	Topic : Proportional reasoning	Topic : Pattern sniffing (sequences)	Topic : Measuring space
Core (Set 2) (Stage 7)	<ul style="list-style-type: none"> Write one quantity as a fraction of another Write a fraction in its lowest terms by cancelling common factors Convert between mixed numbers and top-heavy fractions Understand that a percentage means 'number of parts per hundred' Write a percentage as a fraction 	<ul style="list-style-type: none"> Use ratio notation to describe a comparison of more than two measurements or objects Convert between different units of measurement and state as a ratio Simplify a ratio Find the value of a 'unit' in a division in a ratio problem Divide a quantity in two parts in a given ratio 	<ul style="list-style-type: none"> Use a term-to-term rule to generate sequences Find the term-to-term rule for a sequence Solve problems involving the term-to-term rule for a sequence 	<ul style="list-style-type: none"> Use a ruler and protractor to accurately measure lines and angles to the nearest millimetre or degree Convert fluently between metric units of length/mass/capacity Convert fluently between units of time/money Solve practical problems that involve converting between units
Themes	Consolidation of prior knowledge of fractions, decimals and percentages	Introduction to using ratio in real life situations	Sequences	Understand the metric system of measurements
Challenge (Set 1) (Stage 8)	<ul style="list-style-type: none"> Terminating or recurring fractions Recall decimal and fraction equivalents 	<ul style="list-style-type: none"> Write a ratio to describe a real life situation Find a relevant multiplier in a situation involving proportion 	<ul style="list-style-type: none"> Generate a sequence from a term-to-term rule Understand the meaning of a position-to-term rule Use a position-to-term rule to generate a sequence 	<ul style="list-style-type: none"> Use a ruler and protractor to accurately measure lines and angles to the nearest millimetre or degree



	<ul style="list-style-type: none"> • Write a fraction in its lowest terms by cancelling common factors • Identify when a fraction can be scaled to tenths or hundredths • Use a calculator to change any fraction to a decimal • Convert between fractions/decimals and percentages 	<ul style="list-style-type: none"> • Use fractions fluently in situations involving ratio or proportion • Understand the connections between ratios and fractions • Know and use the connection between speed, distance and time 	<ul style="list-style-type: none"> • Find the position-to-term rule for a given sequence • Use algebra to describe the position-to-term rule of a linear sequence (the nth term) • Use the nth term of a sequence to deduce if a given number is in a sequence • Generate a sequence using a spreadsheet 	<ul style="list-style-type: none"> • Convert fluently between metric units of length/mass/capacity • Convert fluently between units of time/money • Solve practical problems that involve converting between units
Support (Set 3) (Stage 6)	<ul style="list-style-type: none"> • Identify equivalent fractions • Simplify a fraction • Compare fractions • Understand that a fraction is also a way of representing a division • Know standard fraction / decimal / percentage • Use the equivalence between fractions, decimals and percentages when solving problems 	<ul style="list-style-type: none"> • Identify when a comparison problem can be solved using multiplication • Identify when a comparison problem can be solved using division • Identify when a comparison problem requires both division and multiplication • Find the value of a single item in a comparison problem • Use the value of a single item to solve a comparison problem • Understand the meaning of enlargement • Understand the meaning of scale factor 	<ul style="list-style-type: none"> • Use the vocabulary of sequences • Recognise a linear sequence • Describe a number sequence • Find the next term in a linear sequence • Find a missing term in a linear sequence • Generate a linear sequence from its description 	<ul style="list-style-type: none"> • Convert between non-adjacent metric units; e.g. kilometres and centimetres • Use decimal notation up to three decimal places when converting metric units • Convert between Imperial units; e.g. feet and inches, pounds and ounces, pints and gallons • Solve problems involving converting between measures • State conclusions using the correct notation and units



		<ul style="list-style-type: none"> • Recognise when one shape is an enlargement of another • Use a scale factor to complete an enlargement • Find the scale factor for a given enlargement • Use knowledge of fractions to solve a sharing (or grouping) problem • Use knowledge of multiples to solve a sharing (or grouping) problem 		
Literacy focus	Spelling of key words	Spelling of key words	Spelling of key words	Spelling of key words
Cross-curricular links				
SMSC & MBV				
ASSESSMENTS	Assessment 3 ~ February	Assessment 3 ~ February	Assessment 3 ~ February	Assessment 3 ~ February
Out of school learning	Weekly homework based on work covered in class	Weekly homework based on work covered in class	Weekly homework based on work covered in class	Weekly homework based on work covered in class



	Topic : Investigating angles	Topic : Calculating with fractions, decimals and percentages	Topic : Solving equations
Core (Set 2) (Stage 7)	<ul style="list-style-type: none"> Identify fluently angles at a point, angles at a point on a line and vertically opposite angles Identify known angle facts in more complex geometrical diagrams Use knowledge of angles to calculate missing angles in geometrical diagrams Know that angles in a triangles total 180° Find missing angles in triangles Find missing angles in isosceles triangles Explain reasoning using vocabulary of angles 	<ul style="list-style-type: none"> Apply the four operations to fractions and mixed numbers Use calculators to find a percentage of an amount using multiplicative methods Calculate percentage increase and decrease using the multiplier method Compare two quantities using percentages Calculate percentage change 	<ul style="list-style-type: none"> Choose the required inverse operation when solving an equation Identify the correct order of undoing the operations in an equation Solve one-step & two-step equations, when the solution is a whole number/decimal or fraction Check the solution to an equation by substitution
Themes	Basic angle properties	Developing and consolidating skills of calculations with fractions and decimals	Introduction to solving equations focusing on using inverse operations
Challenge (Set 1) (Stage 8)	<ul style="list-style-type: none"> Angles in parallel lines Angles in triangles Interior and exterior angles in polygons 	<ul style="list-style-type: none"> Identify the multiplier for a percentage increase or decrease when the percentage is greater than 100% Use calculators to increase an amount by a percentage greater than 100% Solve problems involving percentage change Solve original value problems when working with percentages Solve problems that require exact calculation with fractions 	<ul style="list-style-type: none"> Solve one-step, two-step & three-step equations,(including the use of brackets) when the solution is a whole positive or negative number/decimal or fraction Identify the correct order of undoing the operations in an equation Solve linear equations, (including the use of brackets) with the unknown on both sides when the solution is a whole positive or negative number/fraction or decimal



			<ul style="list-style-type: none"> Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation Check the solution to an equation by substitution
Support (Set 3) (Stage 6)	<ul style="list-style-type: none"> Identify angles that meet at a point Identify angles that meet at a point on a line Identify vertically opposite angles Know that vertically opposite angles are equal Use known facts to find missing angles Explain reasoning 	<ul style="list-style-type: none"> Add & subtract fractions and mixed numbers Multiply & divide fractions Multiply decimals by whole numbers Find 10% of a quantity Use non-calculator methods to find a percentage of an amount Use decimal or fraction equivalents to find a percentage of an amount where appropriate Solve problems involving the use of percentages to make comparisons 	<ul style="list-style-type: none"> Solve missing number problems expressed in words Find a solution to a missing number problem with two unknowns Find all combinations of two variables that solve a missing number problem with two unknowns Know the basic rules of algebraic notation Express missing number problems algebraically Solve missing number problems expressed algebraically Solve one-step & two-step equations, when the solution is a whole number
Literacy focus	Spelling of key words	Spelling of key words	Spelling of key words
Cross-curricular links			
SMSC & MBV			
ASSESSMENTS	Assessment 4 ~ Easter	Assessment 4 ~ Easter	Assessment 4 ~ Easter
Out of school learning	Weekly homework based on work covered in class	Weekly homework based on work covered in class	Weekly homework based on work covered in class



	Topic : Calculating space	Topic : Checking, approximating and estimating	Topic : Mathematical movement
Core (Set 2) (Stage 7)	<ul style="list-style-type: none"> Recognise that the value of the perimeter can equal the value of area Use standard formulae for area and volume Find missing lengths in 2D shapes when the area is known Know and apply the formula for the area of a trapezium Understand the meaning of and calculate surface area Find missing lengths in 3D shapes when the volume or surface area is known 	<ul style="list-style-type: none"> Approximate by rounding to any number of decimal places Approximate by rounding to the first significant figure in any number Understand estimating as the process of finding a rough value of an answer or calculation Estimate calculations by rounding numbers to one significant figure Use cancellation to simplify calculations Use inverse operations to check solutions to calculations 	<ul style="list-style-type: none"> Write the equation of a line parallel to the x-axis or the y-axis Identify the lines $y = x$ and $y = -x$ Carry out a reflection in a diagonal mirror line (45° from horizontal) Find and name the equation of the mirror line for a given reflection Describe a translation as a 2D vector Carry out and describe a rotation using a given angle, direction and centre of rotation
Themes	Area and perimeter of 2D shapes & volume of cuboids	Understand the rounding or estimating makes checking calculations easier	Reflections and translations
Challenge (Set 1) (Stage 8)	<ul style="list-style-type: none"> Know the vocabulary of circles Know and apply the formula for circumference of a circle Calculate the radius (diameter) of a circle when the circumference or area is known Calculate the perimeter and area of composite shapes that include sections of a circle 	Algebraic proficiency <ul style="list-style-type: none"> Plot graphs of functions of the form $y = mx + c$ Understand the concept of the gradient of a straight line Find the gradient of a straight line on a unit grid Find the y-intercept of a straight line 	Understanding risk 2 <ul style="list-style-type: none"> List all elements in a combination of sets using a Venn diagram List outcomes of an event systematically Use a table to list all outcomes of an event List outcomes of an event using a grid (two-way table)



	<ul style="list-style-type: none"> • Know and apply the formula for the area of a circle • Know and apply the formula for finding the volume of a cylinder 	<ul style="list-style-type: none"> • Distinguish between a linear and quadratic graph • Plot graphs of quadratic functions of the form $y = x^2 \pm c$ • Sketch a simple quadratic graph • Plot and interpret distance-time graphs (speed-time graphs) 	<ul style="list-style-type: none"> • Use frequency trees to record outcomes of probability experiments • Make conclusions about probabilities based on frequency trees • Construct theoretical possibility spaces for combined experiments with equally likely outcomes • Calculate probabilities using a possibility space • Use theoretical probability to calculate expected outcomes • Use experimental probability to calculate expected outcomes
Support (Set 3) (Stage 6)	<ul style="list-style-type: none"> • Recognise that shapes with the same areas can have different perimeters and vice versa • Know and apply the formulas for areas of triangles and parallelograms • Know and apply the formula for the volume of a cuboid • Estimate the volume of cubes and cuboids • Choose appropriate units of volume • Convert between metric units of area in simple cases • Convert between metric units of volume in simple cases 	<ul style="list-style-type: none"> • Approximate any number by rounding to the nearest 1 000 000 • Understand estimating as the process of finding a rough value of an answer or calculation • Estimate multiplication or division calculations that involve multiplying or dividing up to four-digit numbers by a two-digit number • Estimate multiplication calculations that involve multiplying numbers with up to two decimal places by whole numbers 	<ul style="list-style-type: none"> • Use coordinates to describe/write the position of a point in all four quadrants • Construct a 2-D coordinate grid (all four quadrants) • Plot coordinates on a coordinate grid (four quadrants) • Use coordinates to plot a set of points to construct a polygon • Solve problems involving coordinates • Carry out a translation • Carry out a reflection using one of the axes as a mirror line
Literacy focus	Spelling of key words	Spelling of key words	Spelling of key words
Cross-curricular links			
SMSC & MBV			

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ASSESSMENTS	Assessment 5 ~ End of year	Assessment 5 ~ End of year	Assessment 5 ~ End of year
Out of school learning	Weekly homework based on work covered in class	Weekly homework based on work covered in class	Weekly homework based on work covered in class



	Topic : Presentation of data	Topic : Measuring data	Topic :
Core (Set 2) (Stage 7)	<ul style="list-style-type: none"> • Know the meaning of categorical/discrete data • Interpret and construct frequency tables • Construct and interpret pictograms (bar charts, tables) and know their appropriate use • Construct and interpret comparative bar charts • Interpret and construct pie charts and know their appropriate use • Choose appropriate graphs or charts to represent data • Construct and interpret vertical line charts 	<ul style="list-style-type: none"> • Calculate and interpret the mode, mean and median for a set of data values • Use the mean to find a missing number in a set of data • Calculate the mean from a frequency table • Find the mode and median from a frequency table • Understand the range as a measure of spread (or consistency) • Calculate the range of a set of data • Analyse and compare sets of data • Appreciate the limitations of different statistics (mean, median, mode, range) 	
Themes	Consolidation of methods of presenting data done at KS2	Averages	
Challenge (Set 1) (Stage 8)	<ul style="list-style-type: none"> • Know the meaning of continuous data • Construct and interpret a grouped frequency table for continuous data • Construct and interpret frequency diagram/histograms for grouped data with equal class intervals • Plot a scatter diagram of bivariate data • Understand the meaning of 'correlation' 	<ul style="list-style-type: none"> • Find the modal class of set of grouped data • Find the class containing the median of a set of data • Calculate an estimate of the mean from a grouped frequency table • Estimate the range from a grouped frequency table • Analyse and compare sets of data 	



		<ul style="list-style-type: none"> • Appreciate the limitations of different statistics (mean, median, mode, range) • Choose appropriate statistics to describe a set of data • Justify choice of statistics to describe a set of data 	
Support (Set 3) (Stage 6)	<ul style="list-style-type: none"> • Construct and interpret bar and pie charts • Identify the scale used on the axes of a graph • Read values from a line graph involving scaling • Use scaling when constructing line graphs • Answer two-step questions about data in line graphs (e.g. 'How much more?') 	<ul style="list-style-type: none"> • Understand the meaning of 'average' as a typicality (or location) • Understand the mean as a measure of typicality (or location) • Interpret the mean as a way of levelling the data • Calculate the mean of a set of data • Choose an appropriate approximation when required • Use the mean to find a missing number in a set of data 	
Literacy focus	Spelling of key words	Spelling of key words	
Cross-curricular links			
SMSC & MBV			
ASSESSMENTS	Assessment 5 ~ End of year	Assessment 5 ~ End of year	
Out of school learning	Weekly homework based on work covered in class	Weekly homework based on work covered in class	

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