Appendix 2 – Stage overviews

Stage G

Block 1	**Place Value**	• Understand the place value of numbers up to 10 000 000 • Read and write numbers up to 10 000 000 • Use <, > and = signs to compare numbers up to 10 000 000 • Order number up to 10 000 000 • Interpret and represent numbers on numbers lines • Count forward in whole number steps • Count backwards in whole number steps
Block 2	**Adding, subtracting and the bar model**	• Use number bonds to 10, 20 and 100 • Introduce to the bar model and how it can be used for addition • Add two numbers using column addition including carries • Add sets of numbers using column addition including carries • Introduce the bar model and how it can be used for subtraction • Subtract two numbers using column addition including carries • Subtract sets of numbers using column addition including carries
Block 3	**Times tables and multiplication**	• Recall and use number facts for the 2, 5 and 10 times tables • Recall and use number facts for the 3 and 4 times tables • Recall and use number facts for the 6 and 7 times tables • Recall and use number facts for the 8 and 9 times tables • Recall and use number facts for the 11 and 12 times tables • Multiplying two digit numbers by a single digit using long multiplication. • Multiplying many digit numbers by a single digit using long multiplication.
Assessment of blocks 1-3	
Block 4	**The fraction wall**	• Split shapes, objects or sets of objects into equal size parts • Express proportions of shapes, objects or sets of objects using fractions • Split 'wholes or ones' to create a fraction wall • Look at equivalence on fraction wall • Compare fractions within fraction wall using numerators • Compare fractions within fraction wall using denominators • Link understanding of fraction wall back to sets of objects.
Block 5	**Multiplying, dividing and rounding integers**	• Multiply integers by 10 • Multiply integers by 100 and 1000 • Divide integers by 10 • Divide integers by 100 and 1000 • Round numbers up to 10 000 000 to the nearest 10 • Round numbers up to 10 000 000 to the nearest 100 • Round numbers up to 10 000 000 to the nearest 1000
Block 6	**Negative Numbers**	• Understand the concept of negative numbers • Count forwards and backwards in whole number steps involving negatives • Compare positives and negatives • Order positives and negatives in ascending or descending order • Moving up and down the number line in integers • Find the difference between two numbers involving negatives • Solve problems in context involving negatives
Assessment of blocks 4-6	
Block 7	**Measuring lengths and perimeter**	• Accurately measure lines in both cm and mm • Accurately draw lines in both cm and mm • Measure and calculate the perimeter of 2D shapes when dimensions are unknown • Calculate the perimeter of rectangles when dimensions are known • Calculate the perimeter of other rectilinear shapes when dimensions are known • Finding perimeters of more complex shapes • Calculating missing lengths from perimeter

Block 8	**Division**	- Understand division as the process of sharing into groups - Solve division problems by 'counting on' - Solve missing number multiplication problems and establish link with division - Recall and use times table facts to solve division problems - Recall and use times table facts to solve more complex division problems - Identify fractions of amounts by division - Understand that multiplication is commutative and division is not
	Assessment of blocks 7-8	
Block 9	**Shapes and symmetry**	- Identify a line of symmetry of a 2D shape - Identify a line of symmetry of a pattern and for a diagram of a reflection - Use a line of symmetry to produce or complete a symmetrical pattern - Know that a shape and its reflection are congruent - Know and use the names of special types of triangle - Know and use the names of polygons - Compare and classify 2D shapes using given categories; e.g. number of sides
Block 10	**Time**	- Read and write times using the digital 24-hour clock - Write times using analogue 12-hour clock - Convert between 12-hour time and 24-hour notation - Solve problems involving converting from hours, minutes and seconds - Solve problems involving converting from weeks to days - Solve problems involving converting from years to months - Know calendar facts and use to solve related problems
Block 11	**Coordinates**	- Use coordinates to describe the position of a point in the first quadrant - Plot points in the first quadrant using co-ordinates - Use coordinates to plot a set of points to construct a polygon - Link compass directions to coordinates - Describe movements as translations of a given unit to the left/right - Describe movements as translations of a given unit to the up/down - Describe movements as translations of a given unit to the left/right and up/down
	Assessment of blocks 9-11	
Block 12	**Money**	- Recognise the value of coins and solve problems involving them - Add amounts of money when the units are the same - Add amounts of money when the units are different - Subtract amounts of money when the units are the same - Subtract amounts of money when the units are different - Record a practical money problem using £ and/or p notation - Solve practical problems that involve calculating change in manageable amounts
	End of school Year tests assessing all work taught this academic year	
Block 13	**Equivalent fractions**	- Express the relationship between quantities in a picture as a fraction - Express the relationship between quantities in a table as a fraction - Identify equivalent fractions from diagrams - Find families of equivalent fractions - Create diagrams to show families of equivalent fractions - Calculate a unit fraction of an amount when the answer is an integer - Calculate a non-unit fraction of an amount when the answer is an integer
Block 14	**Presentation of data**	- Collect data and construct tally and frequency tables - Interpret a pictogram where the symbol represents multiple items - Construct a pictogram where the symbol represents multiple items - Interpret a bar chart - Construct a bar chart - Interpret data in tables - Answer two-step questions about charts and tables (e.g. 'How many more?')

Stage F

Block 1	**Addition subtraction and the bar model**	• Introduce to the bar model and how it can be used for addition • Addition of integers up to 10 000 000 using column method • Addition of integers and decimals up to 2 d.p. using column method • Introduce to the bar model and how it can be used for subtraction • Subtraction of integers up to 10 000 000 using column method • Subtraction of integers and decimals up to 2 d.p. using column method • Solving more complex problems using bar method
Block 2	**Multiples, factors and primes**	• Find multiples and common multiples by listing • Find factors and common factors by listing • Calculate and test whether numbers are prime or composite • Find prime factors and write prime factor decomposition of numbers • Find common multiples using prime factors • Find common factors using prime factors • Solve problems involving common factors and multiples
Block 3	**Multiplication and division**	• Mental methods for multiplication and division • Multiply numbers up to 10 000 000 by a single digit • Multiplication of 2 digit numbers by 2 and 3 digit numbers • Division of integers up to 1000 by single digits using long division • Division of integers by 2 digit numbers using long division • Division with remainders writing as fractions • Interpreting solutions to division in context
Assessment of blocks 1-3	
Block 4	**Fractions**	• What is a fraction and expressing using bar model • Identify equivalent fractions using common multiples • Simplify fractions using common factors • Compare fractions using common numerators • Compare fractions using common denominators • Order fractions • Understand fractions association with division and finding fractions
Block 5	**Negative numbers**	• Extending the number line and moving up and down • Combine positives and negatives • Add negative numbers to positives or negatives • Subtract negative numbers from positives or negatives • Multiplication involving positive and negative numbers • Multiplication involving positive and negative numbers • Order of operation involving positives and negatives
Block 6	**Decimals and rounding**	• Read, write and counting on in decimals, adding to number lines • Compare decimals giving explanations • Order decimals up to 4 d.p. • Round decimals to the nearest integer • Round decimals to 1 and 2 d.p. • Approximate using an informal method (not using significant figures) • Write decimals as fractions
Assessment of blocks 4-6	
Block 7	**Angles**	• Use a protractor to draw angles up to 360° • Use a protractor to measure angles up to 360° • Use the words acute, right, obtuse and reflex when describing angles • Know the angle sum for straight lines and points • Know the angle sum of a triangle and use to find missing angles • Know the angle sum of a quadrilateral and use to find missing angles • Find the missing angle in an isosceles triangle when only one angle is known

Block	Topic	Objectives
Block 8	Properties of shapes and solids	• Know the definitions of special triangles • Know the definitions of special quadrilaterals • Classify 2D shapes using given categories; e.g. number of sides, symmetry • Know the names of common 3 solids • Use mathematical language to describe 3D solids • Construct 3D solids from given nets • Draw accurate nets for common 3D solids
		Assessment of blocks 7-8
Block 9	Area	• Understand concept of area and approximate areas of complex shapes • Calculate areas of rectangles • Calculate areas of rectangle compound shapes • Recognise that shapes with the same areas can have different perimeters • Discover how area of triangles can be found • Know that the area of a triangle is given by the formula area = ½ × base × height • Calculate the areas of more complex triangles
Block 10	Proportional reasoning	• Identify when a comparison problem can be solved using multiplication or division • Identify when a comparison problem requires both division and multiplication • Use the value of a single item to solve a comparison problem • Use ratio notation to describe a comparison of more than two measurements • Identify when a ratio is written in its lowest terms and simplify using common factors • Find a quantity using a ratio and another quantity • Divide a quantity in two parts in a given ratio
Block 11	Fractions and percentages	• Understand that a percentage represent a fraction of 100 • Convert fractions to percentages and vice-versa • Calculate fractions of amounts • Use fraction equivalents to find a percentage of an amount • Use non-calculator methods to find a percentage of an amount (combining %s) • Increase quantities by a percentage • Decrease quantities by a percentage
		Assessment of blocks 9-11
Block 12	Measurements	• Reading Scales • Understand and estimate and measure using metric measurements for length • Understand and estimate and measure using metric measurements for weight • Understand and estimate and measure using metric measurements for capacity • Convert between metric units of length • Convert between metric units of weight and capacity • Solve problems involving lengths, weight and capacity
		End of school Year tests assessing all work taught this academic year
Block 13	Squares, cubes roots and order of operations	• Identify square numbers and understand associated notation • Identify triangular numbers and their links to square • Identify cube numbers and understand notation • Understand the meaning of square roots and links with squares • Use trial and error/improvement to estimate square roots • Use order of operations for + - x ÷ () • Use order of operations with squares, cubes and roots.
Block 14	Averages and data	• Understand the mean as a measure of typicality • Calculate the mean of a set of data • Use the mean to find a missing number in a set of data • Understand that pie charts show proportions and calculate frequencies from angles • Use a table of frequencies to work out angles and draw pie charts • Use scaling when constructing line graphs • Answer two-step questions about data in line graphs (e.g. 'How much more?')

Stage E

Block 1	**Addition subtraction and the bar model**	• Introduce to the bar model and how it can be used for addition • Addition of integers up to 10 000 000 using column method • Addition of integers and decimals up to 2 d.p. using column method • Introduce to the bar model and how it can be used for subtraction • Subtraction of integers up to 10 000 000 using column method • Subtraction of integers and decimals up to 2 d.p. using column method • Solving more complex problems using bar method
Block 2	**Multiples, factors and primes**	• Find multiples and common multiples by listing • Find factors and common factors by listing • Calculate and test whether numbers are prime or composite • Find prime factors and write prime factor decomposition of numbers • Find common multiples using prime factors • Find common factors using prime factors • Solve problems involving common factors and multiples
Block 3	**Multiplication and division**	• Mental methods for multiplication and division • Multiply numbers up to 10 000 000 by a single digit • Multiplication of 2 digit numbers by 2 and 3 digit numbers • Division of integers up to 1000 by single digits using long division • Division of integers by 2 digit numbers using long division • Division with remainders writing as fractions • Interpreting solutions to division in context
Assessment of blocks 1-3	
Block 4	**Fractions**	• What is a fraction and expressing using bar model • Compare fractions using numerators • Compare fractions using denominators • Order fractions • Identify equivalent fractions using common multiples • Simplify fractions using common factors • Understand fractions association with division and finding fractions
Block 5	**Negative numbers**	• Extending the number line and moving up and down • Combine positives and negatives • Add negative numbers to positives or negatives • Subtract negative numbers from positives or negatives • Multiplication involving positive and negative numbers • Multiplication involving positive and negative numbers • Order of operation involving positives and negatives
Block 6	**Decimals and rounding**	• Read, write and counting on in decimals, adding to number lines • Compare decimals giving explanations • Order decimals up to 4 d.p. • Round decimals to the nearest integer • Round decimals to 1 and 2 d.p. • Approximate using an informal method (not using significant figures) • Write decimals as fractions
Assessment of blocks 4-6	
Block 7	**Lines and angles**	• Use notation for parallel lines and identify perpendicular lines • Know the meaning of 'regular' polygons • Identify line and rotational symmetry in polygons • Use AB notation for describing lengths and ABCDE notation for polygons • Use <ABC notation for describing angles • Use ruler and protractor to construct triangles from written descriptions • Use ruler and compasses to construct triangles when all three sides known

Block 8	**Algebraic thinking**	- Know the meaning of expression, term and equation - Use letters to represent variables and basic algebraic notation - Identify like terms in an expression - Simplify expressions by collecting like terms - Know how to multiply a single term by a bracket - Substitute numbers into expressions and formulae - Use the order of operations correctly in algebraic situations
		Assessment of blocks 7-8
Block 9	**Fractions**	- Convert mixed numbers to improper fractions and vice versa - Apply addition to proper fractions, improper fractions and mixed numbers - Apply subtraction to proper fractions, improper fractions and mixed numbers - Multiply proper and improper fractions - Multiply mixed numbers - Divide a proper fraction by a proper fraction - Apply division to improper fractions and mixed numbers
Block 10	**Solving equations**	- Use the bar model to represent equations - Solve one and two step equations using the bar model looking at order - Introduce formal written method for solving one and two step equations - Solve two step equations when solution is a fraction - Solve equations involving brackets both ways - Solve three step equations with any type of solution - Check solutions to equations using substitution
Block 11	**Sequences**	- Use a term-to-term rule to generate linear and nonlinear sequences - Describe number sequences and find term to term rules - Use position-to-terms rule and use to generate a sequences - Find the position-to-term rule for a given sequence - Use position to term rules to create formulae for patterns - Use the nth term of a sequence to deduce if a given number is in a sequence - Generate a sequence using a spreadsheet
		Assessment of blocks 8-11
Block 12	**Transformations**	- Plot and describe coordinates in all four quadrants - Write equations of, identify and draw lines parallel to x and y axis - Identify and draw the lines y = x and y = -x - Reflect shapes in horizontal, vertical and 45° mirror lines - Find the equation of a mirror line for a given reflection - Use vectors to translate shapes - Carry out a rotation using a given angle direction and centre - Describe rotations using mathematical language
		End of school Year tests assessing all work taught this academic year
Block 13	**Representations of solids**	- Identify and define solids using vertices, edges and sides - Using isometric paper draw 2 dimensional representations of solids - Linking isometric drawing to nets of solids - Looking at 3D solids from different viewpoints - Drawing plan and elevations to represent solids - Using a plan and elevation to construct a solid - Linking between all representations
Block 14	**Understanding averages**	- Identify mean, medians and modes for sets of data. - Use mean, median and mode to find missing data within sets. - Identify scenarios where different averages could be used and limitations - Understand the range as a measure of spread (or consistency - Calculate means from frequency tables and bar charts - Calculate modes, median and range from frequency tables and bar charts - Analyse and compare sets of data

Stage D

Block 1	**Rounding and approximation**	• How and why to do we round numbers? • What is a significant figure and how do we round using them? • How do we round small numbers to significant figures? • If an answer is given to a degree of significant figures what are the largest and smallest values this could take? • How and why do we approximate? • When approximating in what order should I do the calculation? • How can approximation be used to solve problems?
Block 2	**Formulae**	• How can formulae be used to show the relationship between measurements? • What can be calculated from a formula? • How do we use formulae to find a variable that is not the subject? • Why is it sometimes useful to change the subject of formulae? • In what order do we rearrange more complicated formulae? • What do we do if we can't solve a problem algebraically? (trial and improvement) • What steps do we have to show to fully justify our answers when using trial and improvement?
Block 3	**Ratio and proportion**	• How can the relationship between two or more quantities be written as a ratio and can they be expressed in more than one way? • What is the link between ratios and fractions? • If we know the ratio between two quantities what else can we find? • How do ratios on maps and scale drawings work? • What is meant by direct proportion and how does this link to ratio? • How can we use direct proportion to solve problems (including converting common metric and imperial measures)? • How can we use proportion find which item represents the best value?
		Assessment of blocks 1-3
Block 4	**Percentage change**	• How can calculators to find a percentage of an amount using multiplicative methods? • How do we identify the multiplier for a percentage increase or decrease? • How do we use calculators to increase or decrease an amount by a percentage using a multiplier? • How do we solve repeat percentage problems using multipliers? • How do we solve compound percentage problems? (including finding using index notation) • Can we derive a formula for percentage change? How do we calculate the percentage change including percentage increase / decrease?
Block 5	**Proof**	• How do we show that two expressions are always equal? • What is the difference between a proof and a demonstration? • How can we write odd and even numbers algebraically? • How can we show that an expression is a particular multiple? • How can we describe consecutive numbers algebraically? • How can we describe the relationship between other numbers on a number grid? • What problems can be solved with proof?
Block 6	**Straight Line Graphs**	• How can we find corresponding x and y values for an equation • How do we draw the graph of a linear equation written in terms of x and y? • For equations in the form of $y=mx + c$ what effect does changing c have? • For equations in the form of $y=mx + c$ what effect does changing m have? • How do we find the gradient of a line segment? • Can we identify an equation from its graph? • What else can we spot about graphs just by looking at their equations?
		Assessment of blocks 4-6
Block 7	**Perimeter of shapes**	• What is pi? • How can we calculate the circumference of a circle • How do we calculate the lengths of arcs? • How do we calculate the perimeter of segments? • If we know the perimeter of a sector can we calculate its radius or angle? • How do we calculate the perimeter of circle composites? • If we know the know the perimeter of a composite shape what can we deduce about the shape?

Block 8	Geometry and angles	- What patterns can we spot when we have a set of parallel lines intersected by line segment? - What language is used to describe angles on parallel lines and can we use are derived facts to solve problems - How can we calculate the internal angles of regular polygons? - What are external angles and how can they be calculated for regular polygons? - What can we deduce about polygons from their external and internal angles? - Can we solve problems involving non-regular shapes using what we have learnt about external and internal angles? - What is tessellation and how can we identify if shapes will tessellate?
Assessment of blocks 7-8		Assessment of blocks 7-8
Block 9	Compound measures	- Why is it important to be able to convert between different units of time? - What is meant by speed and how is it calculated? - What can we deduce about an object if we know its speed (finding distances and times) - How can journeys be represented graphically? - What is density and what problems can be solved using it? - Are there any other compound measures?
Block 10	Probability	- How do we calculate the theoretical probability of an event occurring? - How can we compare probabilities - How can probabilities be calculated from two way tables? - How can probabilities be calculated using Venn diagrams? - What is meant by relative frequency? - How are theoretical probabilities and relative frequencies linked? (bias) - How do we calculate how often we expect an event to occur?
Block 11	Area of shapes	- How do we calculate the area of compound shapes? - How do I calculate the areas of irregular shapes? - How do we derive a formula for the area of a parallelogram? - How do we derive a formula for the area of a trapezium? - How do I derive a formula for the area of a circle? - How do I find the area of shapes involving semi-circles and quadrants? - How do I find the area of sectors?
		Assessment of blocks 9-11
Block 12	Volume and surface area of prisms	- What is meant by volume? - How do we calculate volumes of cuboids? - What are prisms and how do we calculate their volume? - Is a cylinder a prism and how do we calculate its volume? - How do we calculate the surface area of cuboids? - How do we calculate the surface area of other prisms? - How do we calculate the area of the curved face of a cylinder?
		End of school Year tests assessing all work taught this academic year
Block 13	Pythagoras Theorem	- What is the relationship between the lengths of the sides in a triangle? - What are Pythagorean Triples? - How can Pythagoras Theorem be used to find the hypotenuse of a triangle? - How can Pythagoras Theorem be used to find other sides in a triangle? - Can Pythagoras Theorem be used to solve problems involving non-right angled triangles (dropping a vertical and splitting in two) - What problems can be solved using Pythagoras theorem? - How can Pythagoras be used to prove if a triangle is right angled?
Block 14	Grouped and bivariant data	- Why do we group continuous and discrete data in different ways? - Is it possible to find the mean for grouped data? - Can other averages be found from data which has been grouped? - How can grouped data be represented graphically? - How do we compare two sets of grouped data? - How do we establish if there is a relationship between two separate variables? - How do we describe the relationship between variables?