BRINDLEY HEATH ACADEMY

Progression in Maths Map

The progression maps are structured using the topic headings as they appear in the National Curriculum:
Number – Number and Place Value
Number – Addition and Subtraction
Number – Multiplication and Division
Number- Fractions (including decimals and percentages)
Ratio and Proportion
Measurement
Geometry – properties of shapes
Geometry – position and direction
Statistics
Each of the above categories has been divided into sub categories to illustrate progression in key areas.
All programmes of study statements are included and some appear twice. This is indicated in the text. This occurs where:

- **The statement has central relevance to more than one sub category within a topic;**
- **The statement has central relevance to more than one mathematics topic. This is done to reflect the aims of the curriculum that pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems (Mathematics programmes of study: key stages 1 and 2 page 3). However the connections made are not intended to be exhaustive and teachers should seek to support pupils in making other connections.**

	Year 3	Year 4	Year 5	Year 6
NUMBER: NUMBER AND PLACE VALUE				
COUNTING		Count backwards through zero to include negative numbers	Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero	Use negative numbers in context, and calculate intervals across zero
	Count from 0 in multiples of 4, 8, 50 and 100;	Count in multiples of 6, 7, 9, 25 and 1000	Count forwards or backwards in steps of powers of 10 for any given number up to 1000 000	

	Find 10 or 100 more or less than a given number	Find 1000 more or less than a given number		
COMPARING NUMBERS	Compare and order numbers up to 1000	Order and compare numbers beyond 1000	Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit	Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
IDENTIFYING, REPRESENTING AND ESTIMATING NUMBERS	Identify, represent and estimate numbers using different representations	Identify, represent and estimate numbers using different representations		
READING AND WRITING NUMBERS (including Roman numerals)	Read and write numbers up to 1,000 in numerals and in words		Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit	Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
		Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.	Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.	
UNDERSTANDING PLACE VALUE	Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)	Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)	Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit	Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
ROUNDING		Round any number to the nearest 10, 100 or 1 000	Round any number up to 1 000 000 to the nearest 10, 100, 1 000, 10 000 and 100 000	Round any whole number to a required degree of accuracy

		round decimals with one decimal place to the nearest whole number (copied from Fractions)	*round decimals with two decimal places to the nearest whole number and to one decimal place* (copied from Fractions)	*solve problems which require answers to be rounded to specified degrees of accuracy* (copied from Fractions)
PROBLEM SOLVING	Solve number problems and practical problems involving these ideas.	Solve number and practical problems that involve all of the above and with increasingly large positive numbers	Solve number problems and practical problems that involve all of the above	Solve number and practical problems that involve all of the above
NUMBER: ADDITION AND SUBTRACTION				
MENTAL CALCULATIONS	Add and subtract numbers mentally, including: * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds		Add and subtract numbers mentally with increasingly large numbers	Perform mental calculations, including with mixed operations and large numbers
				Use their knowledge of the order of operations to carry out calculations involving the four operations
WRITTEN METHODS	Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	
INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS	Estimate the answer to a calculation and use inverse operations to check answers	Estimate and use inverse operations to check answers to a calculation	Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

PROBLEM SOLVING	Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
				Solve problems involving addition, subtraction, multiplication and division
MULTIPLICATION AND DIVISION				
MULTIPLICATION AND DIVISION FACTS	*Count from 0 in multiples of 4, 8, 50 and 100* (copied from Number and Place Value)	*Count in multiples of 6, 7, 9, 25 and 1 000* (copied from Number and Place Value)	*Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000* (copied from Number and Place Value)	
	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	Recall multiplication and division facts for multiplication tables up to 12 × 12		
MENTAL CALCULATIONS	Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Written Methods)	Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers	Multiply and divide numbers mentally drawing upon known facts	Perform mental calculations, including with mixed operations and large numbers
		Recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)	Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	*Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^{3}/_{8}$)* (copied from Fractions)

WRITTEN CALCULATIONS	Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Mental Methods)	Multiply two-digit and three-digit numbers by a one-digit number using formal written layout	Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers	Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
			Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	Divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
PROPERTIES OF NUMBER: MULTIPLES, FACTORS, PRIME, SQUARE AND CUBE NUMBERS		Recognise and use factor pairs and commutativity in mental calculations (repeated)	Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.	Identify common factors, common multiples and prime numbers
				Use common factors to simplify fractions; use common multiples to express fractions in the same denomination (copied from Fractions)
			Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers	*Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimeter cubed (cm^3) and cubic*

				meters (m^3), and extending to other units such as mm^3 and km^3 (copied from Measures)
			Establish whether a number up to 100 is prime and recall prime numbers up to 19	
			Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)	
ORDER CALCULATIONS				Use their knowledge of the order of operations to carry out calculations involving the four operations
INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS	*Estimate the answer to a calculation and use inverse operations to check answers* (copied from Addition and Subtraction)	*Estimate and use inverse operations to check answers to a calculation* (copied from Addition and Subtraction)		Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
NUMBER: FRACTIONS INCLUDING DECIMALS AND PERCENTAGES				
COUNTING IN FRACTIONAL STEPS	Count up and down in tenths	Count up and down in hundredths		
#RECOGNISING FRACTIONS	Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators	Recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten	Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents (appears also in Equivalence)	
	Recognise that tenths arise from dividing an object into 10 equal parts and in dividing one – digit numbers or quantities by 10.			

	Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators			
COMPARING FRACTIONS	Compare and order unit fractions, and fractions with the same denominators		Compare and order fractions whose denominators are all multiples of the same number	Compare and order fractions, including fractions >1
COMPARING DECIMALS		Compare numbers with the same number of decimal places up to two decimal places	Read, write, order and compare numbers with up to three decimal places	Identify the value of each digit in numbers given to three decimal places
ROUNDING DECIMALS		Round decimals with one decimal place to the nearest whole number	Round decimals with two decimal places to the nearest whole number and to one decimal place	Solve problems which require answers to be rounded to specified degrees of accuracy
EQUIVLENCE INCLUDING DECIMALS, FRACTIONS AND PERCENTAGES	Recognise and show, using diagrams, equivalent fractions with small denominators	Recognise and show, using diagrams, families of common equivalent fractions	Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination
		Recognise and write decimal equivalents of any number of tenths or hundredths	Read and write decimal numbers as fractions (e.g. 0.71 = $^{71}/_{100}$)	Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^{3}/_{8}$)
			Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents	
		Recognise and write decimal equivalents to $^{1}/_{4}$; $^{1}/_{2}$; $^{3}/_{4}$	Recognise the per cent symbol (%) and understand that per cent relates to “number of parts per hundred”, and write percentages as a fraction with denominator 100 as a decimal fraction	Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

ADDITION AND SUBTRACTION OF FRACTIONS	Add and subtract fractions with the same denominator within one whole (e.g. $^{5}/_{7} + {}^{1}/_{7} = {}^{6}/_{7}$)	Add and subtract fractions with the same denominator	Add and subtract fractions with the same denominator and multiples of the same number	Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
			Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. 2/5 + 4/5 = 6/5 = 11/5)	
MULTIPLICATION AND DIVISION OF FRACTIONS			Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $^{1}/_{4} \times {}^{1}/_{2} = {}^{1}/_{8}$)
				Multiply one-digit numbers with up to two decimal places by whole numbers
				Divide proper fractions by whole numbers (e.g. $^{1}/_{3} \div 2 = {}^{1}/_{6}$)
MULTIPLICATION AND DIVISION OF DECIMALS				Multiply one-digit numbers with up to two decimal places by whole numbers
		Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths		Multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places
				Identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places

				associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8)
				Use written division methods in cases where the answer has up to two decimal places
PROBLEM SOLVING	Solve problems that involve all of the above	Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number	Solve problems involving numbers up to three decimal places	
		Solve simple measure and money problems involving fractions and decimals to two decimal places.	Solve problems which require knowing percentage and decimal equivalents of $^{1}/_{2}$, $^{1}/_{4}$, $^{1}/_{5}$, $^{2}/_{5}$, $^{4}/_{5}$ and those with a denominator of a multiple of 10 or 25.	
RATIO AND PROPORTION				
STATEMENTS ONLY APPEAR IN YEAR SIX AND SHOULD BE CONNECTED TO PREVIOUS LEARNING, PARTICUARLY FRACTIONS, MULTIPLICATION AND DIVISION				Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
				Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
				Solve problems involving similar shapes where the scale factor is known or can be found

				Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.
MEASUREMENT				
COMPARING AND ESTIMATING		Estimate, compare and calculate different measures, including money in pounds and pence (also included in Measuring)	Calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes (also included in measuring)	Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3.
			Estimate volume (e.g. using 1 cm^3 blocks to build cubes and cuboids) and capacity (e.g. using water)	
	Compare durations of events, for example to calculate the time taken by particular events or tasks			
	Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight (appears also in Telling the Time)			
MEASURING AND CALCULATING	Measure, compare, add and subtract: **lengths** (m/cm/mm); **mass** (kg/g); **volume/capacity** (l/ml)	Estimate, compare and calculate **different measures,** including **money in pounds and pence** (appears also in Comparing)	Use all four operations to solve problems involving measure (e.g. **length, mass, volume, money**) using decimal notation including scaling.	Solve problems involving the calculation and conversion of **units of measure**, using decimal notation up to three decimal places where appropriate (appears also in Converting)

	Measure the **perimeter** of simple 2-D shapes	Measure and calculate the **perimeter** of a rectilinear figure (including squares) in centimeters and meters	Measure and calculate the **perimeter** of composite rectilinear shapes in centimeters and meters	Recognise that shapes with the same areas can have different **perimeters** and vice versa
	Add and subtract amounts of **money** to give change, using both £ and p in practical contexts			
		Find the area of rectilinear shapes by counting squares	Calculate and compare the area of squares and rectangles including using standard units, square centimeters (cm^2) and square meters (m^2) and estimate the area of irregular shapes	Calculate the area of parallelograms and triangles
			Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}) (copied from Multiplication and Division)	
				Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimeters (cm^3) and cubic meters (m^3), and extending to other units [e.g. mm^3 and km^3].
				Recognise when it is possible to use formulae for area and volume of shapes

TELLING THE TIME	Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks	Read, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)		
	Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight (appears also in Comparing and Estimating)			
		Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days (appears also in Converting)	Solve problems involving converting between units of time	
GEOMETRY-: PROPERTIES OF SHAPES				
IDENTIFYING SHAPES AND THEIR PROPERTIES		Identify lines of symmetry in 2-D shapes presented in different orientations	Identify 3-D shapes, including cubes and other cuboids, from 2-D representations	Recognise, describe and build simple 3-D shapes, including making nets (appears also in Drawing and Constructing)
				Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
DRAWING AND CONSTRUCTING SHAPES	Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them	Complete a simple symmetric figure with respect to a specific line of symmetry	Draw given angles, and measure them in degrees (^{o})	Draw 2-D shapes using given dimensions and angles
				Recognise, describe and build simple 3-D shapes, including

				making nets (appears also in Identifying Shapes and Their Properties)
COMPARING AND CLASSIFYING		Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes	Use the properties of rectangles to deduce related facts and find missing lengths and angles	Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
			Distinguish between regular and irregular polygons based on reasoning about equal sides and angles	
ANGLES	Recognise angles as a property of shape or a description of a turn		Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles	
	Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle	Identify acute and obtuse angles and compare and order angles up to two right angles by size	Identify: * angles at a point and one whole turn (total 360°) * angles at a point on a straight line and ½ a turn (total 180°) * other multiples of 90°	Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles
	Identify horizontal and vertical lines and pairs of perpendicular and parallel lines			
GEOMETRY: POSITON AND DIRECTION				
POSITION, DIRECTION AND MOVEMENT		Describe positions on a 2-D grid as coordinates in the first quadrant	Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and	Describe positions on the full coordinate grid (all four quadrants)

			Know that the shape has not changed	
		Describe movements between positions as translations of a given unit to the left/right and up/down		Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.
		Plot specified points and draw sides to complete a given polygon		
STATISTICS				
INTERPRETING, CONSTRUCTING AND PRESENTING DATA	Interpret and present data using bar charts, pictograms and tables	Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs	Complete, read and interpret information in tables, including timetables	Interpret and construct pie charts and line graphs and use these to solve problems
SOLVING PROBLEMS	Solve one-step and two-step questions [e.g. 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.	Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.	Solve comparison, sum and difference problems using information presented in a line graph	Calculate and interpret the mean as an average
ALGERBRA				
EQUATIONS	Solve problems, *including* ***missing number*** *problems, using number facts, place value, and more complex addition and subtraction.* (copied from Addition and Subtraction)		*Use the properties of rectangles to deduce related facts and find* ***missing lengths and angles*** (copied from Geometry: Properties of Shapes)	Express missing number problems algebraically
	Solve problems, including ***missing number*** *problems, involving multiplication and division, including integer scaling* (copied from Multiplication and Division)			
				Find pairs of numbers that satisfy number sentences involving two unknowns

				enumerate all possibilities of combinations of two variables
FORMULAE		*Perimeter can be expressed algebraically as 2(a + b) where a and b are the dimensions in the same unit.* *(Copied from NSG measurement)*		Use simple formulae
				*Recognise when it is possible to use **formulae** for area and volume of shapes* (copied from Measurement)
SEQUENCES				Generate and describe linear number sequences