What makes a good Mountfields Lodge Mathematician?

- The ability to understand important concepts and make connections within mathematics.
- The ability to **independently** use a broad range of mathematical skills when applying mathematics.
- The ability to use a fluent knowledge and recall of number facts and the number system.
- Showing initiative when solving problems in a wide range of contexts, including those that are unfamiliar.
- Fluency in performing and **communicating** written and mental calculations **independently** and when using mathematical techniques.
- **Perseverance** when faced with challenges, including a commitment to learn from false starts.
- **Exploring** a range of strategies when solving problems, including using practical equipment.
- The ability to **communicate** using a wide range of mathematical vocabulary.
- The ability to reason, spot patterns and generalise to make sense of their mathematical thinking.
- A commitment to ensure accuracy of mathematical thinking by checking back.

Progression Map for Maths – To know and use numbers

Aspect of Subject	KS1	Y3/4	Y5/6
Place value	• Recognise the place value of each digit in a two-digit number (tens, ones). Round any two digit number to the nearest ten.	• Recognise the place value of each digit in a four-digit number. (thousands, hundreds, tens, and ones) • Round any number to the nearest 10, 100 or 1000.	• Round any whole number to a required degree of accuracy. • Determine the value of each digit in any number.
Solving problems	• Use place value and number facts to solve problems.	• Solve number and practical problems with increasingly large positive numbers.	• Solve number and practical problems.
Comparing	• Use the language of: equal to, more than, less than (fewer), most and least. • Compare and order numbers from 0 up to 100; use <, > and = signs.	• Order and compare numbers beyond 1000.	• Order and compare numbers up to 10 000 000.
Counting	• Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number. • Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens. • Given a number, identify one more and one less. • Count in steps of 2, 3, 5 and 10 from 0 or 1 and in tens from any number, forward and backward.	• Count in multiples of 2 to 9, 25, 50, 100 and 1000. • Find 1000 more or less than a given number where the answer is a positive number. • Count forwards and backwards through zero to include negative numbers.	• Read numbers up to 10 000 000. • Use negative numbers in context and calculate intervals across zero.

Representing	• Identify, represent and estimate numbers using different representations, including the number line. • Read and write numbers initially from 1 to 20 and then to at least 100 in numerals and in words. Identify and represent numbers using objects and pictorial representations including a number line.	• Identify, represent and estimate numbers using different representations. • 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 and write numbers up to 1000 in numerals and in words.	• Write numbers up to 10 000 000 • Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Progression Map for Maths – Fractions, decimals, percentages, ratio and proportion

Aspect of Subject	KS1	Y3/4	Y5/6
Solving problems	• Write simple fractions for example, 1/2 of 6 = 3.	• Add and subtract fractions with the same denominator within one whole. • Solve problems involving increasingly harder fractions. • Calculate quantities and fractions to divide quantities (including non-unit fractions where the answer is a whole number). • Add and subtract fractions with the same denominator. • 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. • Solve simple measure and money problems involving fractions and decimals to two decimal places. To begin to understand the concept of ratio.	• Add and subtract fractions with the same denominator and denominators that are multiples of the same number. • Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. • Multiply proper fractions, mixed numbers and one digit numbers with up to two decimal places by whole numbers, supported by materials and diagrams. • Multiply simple pairs of proper fractions, writing the answer in its simplest form. • Solve problems which require knowing percentage and decimal equivalents of, 1/2, 1/4, 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25. • Divide proper fractions by whole numbers. • Multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places.

			Ratio and proportion • 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 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.
Recognising fractions	• Recognise, find and name a half as one of two equal parts of an object, shape or quantity. • Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity. • Recognise, find, name and write fractions 1/2, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity. Recognise 1/3 of a shape.	• Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators. • Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators. • Round decimals with one decimal place to the nearest whole number. • Compare numbers with the same number of decimal places up to two decimal places. • Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.	• Compare and order fractions whose denominators are all multiples of the same number. • Compare and order fractions, including fractions > 1. • Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number. • Round decimals with two decimal places to the nearest whole number and to one decimal place. • Read, write, order and compare numbers with up to three decimal places. • Identify the value of each digit in numbers given

		• Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. • Compare and order unit fractions and fractions with the same denominators.	to three decimal places. • Solve problems involving number up to three decimal places. • 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, and as a decimal.
Equivalence	• Recognise the equivalence of 2/4 and 1/2.	• Recognise and show, using diagrams, families of common equivalent fractions. • Recognise and write decimal equivalents of any number of tenths or hundredths. • Recognise and write decimal equivalents to 1/4, 1/2, 3/4.	• Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths. • Read and write decimal numbers as fractions. • Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents. • Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. • Associate a fraction with division and calculate decimal fraction equivalents. • Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

Progression Map for Maths – Addition and subtraction

Aspect of Subject	KS1	Y3/4	Y5/6
Checking	• Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	• 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.
Using number facts	• Represent and use number bonds and related subtraction facts within 20. • Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.	• Solve problems, including missing number problems, using number facts, place value and more complex addition and subtraction.	• Add and subtract negative integers.
Complexity	• Solve one-step problems with addition and subtraction: • Using concrete objects and pictorial representations including those involving numbers, quantities and measures. • Read write and interpret the addition (+), subtraction (-) and equals (=) signs. • Applying their increasing knowledge of mental and written methods.	• Solve two-step addition and subtraction problems in contexts, deciding which operations and methods to use and why.	• Solve multi-step addition and subtraction problems in contexts, deciding which operations and methods to use and why.
Methods	• Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: • One-digit and two-digit numbers to 20, including zero. • A two-digit number and ones. • A two-digit number and tens. • Two two-digit numbers. • Adding three one-digit numbers. • Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.	• Add and subtract numbers with up to 4 digits using the informal written methods of columnar addition and subtraction. • 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 whole numbers with more than 4 digits, including using formal written methods. (columnar addition and subtraction; moving towards decomposition) • Add and subtract numbers mentally with increasingly large numbers.

Progression Map for Maths – Multiplication and division

Aspect of Subject	KS1	Y3/4	Y5/6
Methods	• Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (.), division (÷) and equals (=) signs. • Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. • Solve problems involving multiplication and division using mental methods.	• Multiply and divide two-digit and three-digit numbers by a one-digit number using formal written layout. • 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. • Recognise and use factor pairs and commutativity in mental calculations.	• Multiply multi-digit numbers up to 4 digits by a one or two-digit whole number using the formal written method of long multiplication. • Divide numbers up to 4 digits by a one or 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. • Divide numbers up to 4 digits by a one or two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context. • Perform mental calculations, including with mixed operations and large numbers.
Checking	• Use known multiplication facts to check the accuracy of calculations.	• Recognise and use the inverse relationship between multiplication and division and use this to check calculations and solve missing number problems.	• Estimate and use inverse operations and rounding to check answers to a calculation and the reasonableness of answers.
Complexity	• Solve one-step problems involving multiplication and division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	• Solve problems involving multiplying and dividing, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems (such as n objects are connected to m objects).	• Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. • Solve problems involving multiplication and division, including scaling by simple fractions

			and problems involving simple rates. • Use knowledge of the order of operations to carry out calculations involving the four operations.
Using multiplication and division facts	• Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables To begin to learn the 3 and 4 times tables. • Recognise odd and even numbers. • Use multiplication and division facts to solve problems.	• Recall multiplication and division facts for multiplication tables up to 12 × 12.	•Identify multiples and factors including finding all factor pairs of a number. Identify common factors, common multiples. Know and use vocabulary of prime numbers, prime factors and composite (non-prime numbers). • Establish whether a number up to 100 is prime and recall prime numbers up to 50. • Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. • Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3). • Solve problems involving multiplication and division including using knowledge of factors and multiples, squares and cubes. Multiply and divide numbers mentally drawing upon known facts.

Progression Map for Maths - Algebra

Aspect of Subject	KS1	Y3/4	Y5/6
Algebra	• Solve addition and subtraction problems involving missing numbers.	• Solve addition and subtraction, multiplication and division problems that involve missing numbers. • Generate and describe simple number sequences.	• Express missing number problems algebraically. • Find pairs of numbers that satisfy an equation with two unknowns. • Generate and describe a variety of number sequences. • Enumerate possibilities of combinations of two variables • Use simple formulae.

Progression Map for Maths – Measurement

Aspect of Subject	KS1	Y3/4	Y5/6
Solving problems	• Choose and use appropriate standard units to estimate and measure length/height (m/cm); mass (kg/g); temperature (℃); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels. • Compare and order lengths, mass, volume/capacity and record the results using >, < and =. Begin to understand mass, volume and length using non-standard units of measurement.	• Convert between different units of measure. (for example, kilometre to metre; hour to minute) • Estimate, compare and calculate different measures. • Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml).	• Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate. Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places. • Convert between different units of metric measure. • Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints. •• Use all four operations to solve problems involving measure (for example, length, mass, volume, money) using decimal notation, including scaling.
Money	• Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value. • Find different combinations of coins that equal the same amounts of money. • Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change. • Recognise and know the value of different denominations of coins and notes.	Estimate, compare and calculate money in pounds and pence. • Add and subtract amounts of money to give change. (£ and p)	
Time	• Compare and sequence intervals of time. • Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times.	• Read, write and convert time between analogue and digital 12- and 24-hour clocks. • Solve problems involving converting from hours to minutes; minutes to	Solve problems involving converting between units of time.

	• Know the number of minutes in an hour and the number of hours in a day. Measure and begin to record time Compare, describe and solve practical problems for time • Sequence events in chronological order using language. • Recognise and use language relating to dates, including days of the week, weeks, months and years. • Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	seconds; years to months; weeks to days. • Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks. • Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use appropriate vocabulary. • Know the number of seconds in a minute and the number of days in each month, year and leap year. • Compare durations of events.	
Mass, length, capacity and volume	• Measure and begin to record, Compare, describe and solve practical problems for: Mass and weight, Capacity and volume, lengths and heights Measure to the nearest cm, nearest 100ml and nearest 100g	Measure to the nearest mm/decimal centimetre, nearest 5ml and nearest 5g.	• Convert between miles and kilometres. • Estimate volume and capacity.
Area, perimeter and volume		• Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres. • Find the area of rectilinear shapes by counting squares. • Measure the perimeter of simple 2-D shapes.	• Recognise that shapes with the same areas can have different perimeters and vice versa. • Recognise when it is possible to use formulae for area and volume of shapes. • Calculate the area of parallelograms and triangles. Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm3) and cubic metres (m3), and extending to other units. • Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres. • Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes.

Progression Map for Maths – Properties of shapes

Aspect of Subject	KS1	Y3/4	Y5/6
Symmetry	• understand that shapes change when reflected in a mirror.	• Identify lines of symmetry in 2-D shapes presented in different orientations. • Complete a simple symmetric figure with respect to a specific line of symmetry.	• Identify planes of symmetry in 3-D shapes.
Properties of 2D shapes	• Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line. • Recognise and name common 2D shapes. • Compare and sort common 2-D shapes and everyday objects.	• Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes. • Recognise angles as a property of shape • Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.	• Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons. • Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. • Distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • Use the properties of rectangles to deduce related facts and find missing lengths and angles. • Identify properties e.g. equal lengths, circles, triangles, quadrilaterals and other 2D figures using appropriate language

Properties of 3D shapes	• Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces. • Identify 2-D shapes on the surface of 3-D shapes. Recognise and name common 3D shapes. • Compare and sort common 3-D shapes and everyday objects.	• Recognise 3-D shapes in different orientations and describe them.	• Identify 3-D shapes, including cubes and other cuboids, from 2-D representations. • Identify horizontal and vertical lines and pairs of perpendicular and parallel lines. • Identify face, edge and vertex properties of cubes, cuboids, tetrahedral, prisms, cylinders, pyramids, cones and spheres.
Construct shapes	• Draw 2-D shapes and make them using modelling materials.	• Draw 2-D shapes and make 3-D shapes using modelling materials.	• Recognise, describe and build simple 3-D shapes, including making nets. • Draw 2-D shapes using given dimensions and angles.

Progression Map for Maths – Position, direction and movement

Aspect of Subject	KS1	Y3/4	Y5/6
Movement	• Order and arrange combinations of mathematical objects in patterns and sequences. • Use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise).	• Describe movements between positions as translations of a given unit to the left/right and up/down.	• Identify, describe and represent the position of a shape following a reflection, rotation or translation, using the appropriate language, and know that the shape has not changed.
Coordinates		• Describe positions on a 2-D grid as coordinates in the first quadrant. • Plot specified points and draw sides to complete a given polygon.	• Describe positions on the full coordinate grid. (all four quadrants) • Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.
Angles	Describe position, direction and movement, including whole, half, quarter and three-quarter turns.	• Recognise angles as an amount of rotation. • Identify right angles, recognise that 2 right angles make a half turn and 4 make a whole turn. • Identify angles that are greater than a right angle. • To know and understand the term obtuse and acute angle • Angles at a point on a straight line and a turn (total 180°) and other multiples of 90°.	• Estimate, measure and draw an angle accurately with a protractor • To know and understand the term reflex angle • To know and use angle relations in parallel lines to deduce unknown angles • Recognise angles where they meet at a point, are on a straight line, or are vertically opposite and find missing angles.

Progression Map for Maths - Statistics

Aspect of Subject	KS1	Y3/4	Y5/6
Constructing and Interpreting	• Interpret and construct simple pictograms, tally charts, block diagrams and simple tables.	• 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	• Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity. • Ask and answer questions about totalling and comparing categorical data.	• Solve one-step and two-step questions (for example, 'How many more?' and 'How many fewer?') using information presented in scaled bar charts, pictograms and tables. • Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs	• Solve one-step and two-step questions (for example, 'How many more?' and 'How many fewer?') using information presented in scaled bar charts, pictograms and tables (consolidating previous objectives). • Solve comparison, sum and difference problems using information presented in a line graph.
Mean		• Begin to calculate and interpret the mean as an average.	• Calculate and interpret the mean as an average.