**Progression Map-pupils will be taught how to:**

**Number - place value**

**Year 1:**

* 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.
* identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least.
* read and write numbers from 1 to 20 in numerals and words.
* Begin to recognise place value in numbers beyond 20 by reading, counting, writing and comparing numbers up to 100, supported by objects and pictures.

**Year 2:**

* Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward.
* Identify, represent and estimate numbers using different representations, including the number line.
* Compare and order numbers from 0 up to 100: use < > and = signs.
* Read and write numbers to at least 100 in numerals and words.
* Recognise the place value of each digit in a two-digit number (tens, ones).
* Use place value and number facts to solve problems.

**Year 3:**

* Count from 0 in multiples of 4, 8, 50 and 100.
* Find 10 or 100 more or less than a given number.
* Compare and order numbers up to 1000.
* Identify, represent and estimate numbers using different representations.
* Read and write numbers up to 1000 in numerals and in words.
* Solve number problems and practical problems involving these ideas.
* Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)

**Year 4:**

* Count in multiples of 6, 7, 9, 25 and 1000.
* Find 1000 more or less than a given number.
* Count backwards through zero to include negative numbers.
* Order and compare numbers beyond 1000.
* Identify, represent and estimate numbers using different representations.
* Round any number to the nearest 10, 100 or 1000.
* Solve number and practical problems that involve all of the above and with increasingly large positive numbers.
* Read Roman numerals to 100 (1 to C) and know that over time, the numeral system changed to include the concept of zero and place value.
* Recognise the place value of each digit in a four-digit number (thousands, hundred, tens and ones).

**Year 5:**

* Count forwards or backwards in steps of powers of 10 for any given number up to 1000000.
* Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero.
* Round any number up to 100000 to the nearest 10, 100, 10000 and 100000.
* Solve number problems and practical problems that involve all of the above.
* Read Roman numerals to 1000 and recognise years written in Roman numerals.
* Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit.

**Year 6:**

* Round any whole number to a required degree of accuracy.
* Use negative numbers in context, and calculate intervals across zero.
* Solve number and practical problems that involve all of the above.
* Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit

**Addition and subtraction**

**Year 1:**

* Know number bonds and related subtraction facts for numbers up to 10 and 20.
* Read, write and interpret statements involving addition and subtraction and the equals sign.
* Add and subtract one-digit and two-digit numbers to 20, including zero.
* Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = \_\_ – 9.
* Know the vocabulary: put together, add, total, plus, take away, distance between, difference, more than, less than.

**Year 2:**

* Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100.
* Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures.
* Add and subtract numbers using concrete objects, pictorial representations and mentally including:
* a 2-digit number and ones
* a 2-digit number and tens
* two-digit numbers
* adding 3 one-digit numbers
* Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another.
* Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

**Year 3:**

* 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 with up to three-digits, using formal written methods of columnar addition and subtraction.
* Estimate the answer to a calculation and use the inverse operations to check answers.
* Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

**Year 4:**

* Add and subtract numbers with up to 4 digits using the formal written methods of column addition and subtraction where appropriate.
* Estimate and use inverse operations to check answers to a calculation.
* Solve addition and subtraction two –steps problems in context, deciding which operations and methods to use and why.

**Year 5:**

* Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).
* Add and subtract numbers mentally with increasingly large numbers.
* Use rounding to check answers to calculations and determine, in the correct context of a problem, levels of accuracy.
* Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

**Year 6:**

* 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.
* Solve addition and subtraction multistep problems in context, deciding which operations and methods to use and why.

**Multiplication and division**

**Year 1:**

* 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.
* They make connections between arrays, number patterns, counting in steps of 2, 5 and 10.

**Year 2:**

* Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
* Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (¡Ñ), division (¡Ò) 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 materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

**Year 3:**

* Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
* 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.
* Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

**Year 4:**

* Recall multiplication and division facts for multiplication tables up to 12 × 12.
* 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 and divide two-digit and three-digit numbers by a one-digit number using formal written layout.
* Solve problems involving multiplying and adding, 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.

**Year 5:**

* Know and use the 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 19.
* 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 and divide numbers mentally drawing upon known facts.
* 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.
* 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 their knowledge of factors and multiples, squares and cubes.
* 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.

**Year 6:**

* 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 two-digit whole number using the formal written method of long division, and interpret remainders as whole numbers, fractions, or by rounding, as appropriate for the context.
* Divide numbers up to 4 digits by a 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.
* Identify common factors, common multiples and prime numbers.
* Use their knowledge of the order of operations to carry out calculations involving the four operations.

**Fractions**

**Year 1:**

* 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.

**Year 2:**

* Recognise, find, name and write fractions third, quarter, two quarters and three quarters of a length, shapes, set of objects or quantity.
* Write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and ½.

**Year 3:**

* 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.
* Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.
* Recognise and show, using diagrams, equivalent fractions with small denominators.
* Add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7).
* Compare and order unit fractions, and fractions with the same denominators.
* Solve problems that involve all of the above.

**Year 4:**

* Recognise and show, using diagrams, families of common equivalent fractions.
* Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
* 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.
* Add and subtract fractions with the same denominator.
* Recognise and write decimal equivalents of any number of tenths or hundredths.
* Recognise and write decimal equivalents to 1/4, 1/2 , ¾ .
* 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.
* 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.
* Solve simple measure and money problems involving fractions and decimals to two decimal places.

**Year 5:**

* Compare and order fractions whose denominators are all multiples of the same number.
* Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.
* Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, 2/5 + 4/5 = 6/5 = 1 1/5].
* Add and subtract fractions with the same denominator and denominators that are multiples of the same number.
* Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.
* Read and write decimal numbers as fractions [for example, 0.71 = 71/100].
* Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.
* 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.
* 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.
* Solve problems which require knowing percentage and decimal equivalents of ½ ,1/4 ,1/5 , 2/5 ,4/5 and those fractions with a denominator of a multiple of 10 or 25.

 **Year 6:**

* Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.
* Compare and order fractions, including fractions > 1.
* Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.
* Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, 4 1 × 2 1 = 8 1].
* Divide proper fractions by whole numbers [for example, 3 1 ÷ 2 = 6 1].
* Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 8 3].
* Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places.
* Multiply one-digit numbers with up to two decimal places by whole numbers.
* Use written division methods in cases where the answer has up to two decimal places.
* Solve problems which require answers to be rounded to specified degrees of accuracy.
* Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

**Measurement**

**Year 1:**

* compare, describe and solve practical problems for:
* lengths and heights [for example, long/short, longer/shorter, tall/short, double/half
* mass/weight [for example, heavy/light, heavier than, lighter than]
* capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]
* time [for example, quicker, slower, earlier, later]
* measure and begin to record the following:
* length and heights
* mass and weights
* capacity and volumes
* time (hour, minutes, seconds).
* Recognise and know the value of different denominations of coins and notes.
* Sequences events in chronological order using language (for example, before, after, next, today, yesterday, evening, morning, afternoon, tomorrow, first).
* Recognise and use language related to dates, including days of the week, weeks, months and years.
* Tell the time to an hour, half past the hour, draw hands on a clock face to show these times.

**Year 2:**

* Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); 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 = .
* 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.
* 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.
* Know the number of minutes in an hour and the number of hours in a day.

**Year 3:**

* Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml).
* Measure the perimeter of simple 2-D shapes.
* Add and subtract amounts of money to give change, using both £ and p in practical contexts.
* 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 vocabulary such as o’clock, a.m./p.m., morning, afternoon, noon and midnight.
* Know the number of seconds in a minute and the number of days in each month, year and leap year.
* Compare durations of events, for example to calculate the time taken by particular events or tasks.

**Year 4:**

* Convert between different units of measure [for example, kilometre to metre; hour to minute].
* Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres.
* Find the area of rectilinear shapes by counting squares.
* Estimate, compare and calculate different measures, including money in pounds and pence.

**Year 5:**

* Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre).
* Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.
* 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.
* Estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water].
* Solve problems involving converting between units of time.
* Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

**Year 6:**

* 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 miles and kilometres.
* 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 [for example, mm3 and km3].

**Geometry**

**Year 1:**

* Recognise and name common 2-D and 3-D shapes, including:

 -2-D shapes [for example,

 -rectangles (including squares), circles and triangles]

* 3-D shapes [for example, cuboids (including cubes), pyramids and spheres].

**Year 2:**

* Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line.
* 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, [for example, a circle on a cylinder and a triangle on a pyramid].
* Compare and sort common 2-D and 3-D shapes and everyday objects.
* 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).

**Year 3:**

* Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them.
* Recognise angles as a property of shape or a description of a turn.
* 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 horizontal and vertical lines and pairs of perpendicular and parallel lines.

**Year 4:**

* Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.
* Identify acute and obtuse angles and compare and order angles up to two right angles by size.
* 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.

**Year 5:**

* Identify 3-D shapes, including cubes and other cuboids, from 2-D representations.
* Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles.
* Draw given angles, and measure them in degrees (o)
* Identify:

- angles at a point and one whole turn (total 360o)

- angles at a point on a straight line and a ½ turn (total 180o)

- other multiples of 90o

* Use the properties of rectangles to deduce related facts and find missing lengths and angles.
* Distinguish between regular and irregular polygons based on reasoning about equal.
* Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

**Year 6:**

* Draw 2-D shapes using given dimensions and angles.
* Recognise, describe and build simple 3-D shapes, including making nets.
* 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.
* Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.
* Describe positions on a full coordinates grid (all four quadrants).
* Draw and translate simple 2D shapes on the coordinate plane, and reflect them in the axes.
* 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.

**Statistics**

**Year 2:**

* Collect and present data in simple pictograms, tally charts, block graphs and tables.
* Ask and answer simple questions that are presented.

**Year 3:**

* Interpret and present data using bar charts, pictograms and tables.
* Solve one and two step questions using information presented in charts, pictograms and tables.

**Year 4:**

* Interpret and present data using charts and graphs.
* Solve problems using information presented in different graphical ways.

**Year 5:**

* Solve comparison, sum and difference problems using information presented in a line graph
* Complete, read and interpret information in tables, including timetables.

**Year 6:**

* Interpret and construct pie charts and line graphs and use these to solve problems.
* Calculate and interpret the mean as an average.

**Additional Year 6 objectives**

**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 [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.

**Algebra:**

* Use simple formulae.
* Generate and describe linear number sequences.
* Express missing number problems algebraically.
* Find pairs of numbers that satisfy an equation with two unknowns.
* Enumerate possibilities of combinations of two variables.