# Progression in Maths

At the centre of the mastery approach to the teaching of mathematics is the belief that all pupils have the potential to succeed. Children should all have access to their age-appropriate curriculum content and, rather than just being extended with new learning, they should deepen their conceptual understanding by tackling varied and challenging problems. Similarly with calculation strategies, pupils must not simply rote learn procedures but demonstrate their understanding of these principles and concepts through the use of concrete materials and pictorial representations to ensure fluency and depth of understanding. The rationale of the concrete-pictorial-abstract (CPA) approach is that for pupils to have a true understanding of a mathematical concept, they need to master all three phases. Reinforcement is achieved by going back and forth between these representations. Pupils who grasp concepts rapidly should be challenged through rich and sophisticated problems before any acceleration through new content. Those pupils who are not sufficiently fluent with earlier material should consolidate their understanding, including additional practice, before moving on, which is evident in our unit overviews. There is also an emphasis placed on instant recall of number bonds and times tables. These need to be mastered to aid with calculations and more challenging problems in readiness for the Multiplication Test at the end of Year 4.

This document outlines the progression of learning to be taught and used from Year 1 – Year 6 (see separate document for progression within EYFS), in line with the requirements of the 2014 Primary National Curriculum. This guidance is to make teachers and parent/carers aware of the progression of strategies that pupils are formally taught that will support them to perform mental and written calculations. In addition, it will support teachers in identifying appropriate pictorial representations and concrete materials to help develop understanding. We have assigned objectives to year groups from National Curriculum expectations. However, it is important to remember that it may sometimes be necessary to revisit strategies from previous year groups if children are working below age related expectations. This guidance only details progressive steps; teachers must plan opportunities for pupils to apply these.

## Number and Place Value

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number | | | Count backwards through 0 to include negative numbers | | |
| Count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s | Count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward | Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number | Count in multiples of 6, 7, 9, 25 and 1,000 | Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000 | |
| Given a number, identify 1 more and 1 less | Compare and order numbers from 0 up to 100; use <, > and = signs | Compare and order numbers up to 1,000 | Order and compare numbers beyond 1,000<br><br>Find 1,000 more or less than a given number | | |
| 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 | Identify, represent and estimate numbers using different representations, including the number line | Identify, represent and estimate numbers using different representations | Identify, represent and estimate numbers using different representations | Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through 0 | Use negative numbers in context, and calculate intervals across 0 |
| Read and write numbers from 1 to 20 in numerals and words | Read and write numbers to at least 100 in numerals and in words | Read and write numbers up to 1,000 in numerals and in words | Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of 0 and place value | Read Roman numerals to 1,000 (M) and recognise years written in Roman numerals | read, write, order and compare numbers up to 10,000,000 and determine the value of each digit |
| | Recognise the place value of each digit in a two-digit number (10s, 1s) | Recognise the place value of each digit in a 3-digit number (100s, 10s, 1s) | Recognise the place value of each digit in a four-digit number (1,000s, 100s, 10s, and 1s) | Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit | |
| | Use place value and number facts to solve problems | 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 |
| | | | 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 |

## Addition and Subtraction

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| Add and subtract one-digit and two-digit numbers to 20, including 0 | Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:<br>• a two-digit number and 1s<br>• a two-digit number and 10s<br>• 2 two-digit numbers<br>• adding 3 one-digit numbers | Add and subtract numbers mentally, including:<br>• a three-digit number and 1s<br>• a three-digit number and 10s<br>• a three-digit number and 100s | | Add and subtract numbers mentally with increasingly large numbers | Perform mental calculations, including with mixed operations and large numbers |
| Read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs | Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems | 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, an appropriate degree of accuracy |
| 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 | Add and subtract numbers with up to 3 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) | |
| Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? − 9 | Solve problems with addition and subtraction:<br>• using concrete objects and pictorial representations, including those involving numbers, quantities and measures<br>• applying their increasing knowledge of mental and written methods | 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<br><br>Solve problems involving addition, subtraction, multiplication and division |
| | Show that addition of 2 numbers can be done in any order (commutative) and subtraction of 1 number from another cannot | | | | |

## Multiplication and Division

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| | Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers | 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 | Multiply and divide numbers mentally, drawing upon known facts<br><br>Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000 | Perform mental calculations, including with mixed operations and large numbers |
| | Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs | 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 | Use place value, known and derived facts to multiply and divide mentally, including:<br>multiplying by 0 and 1;<br>dividing by 1;<br>multiplying together 3 numbers | Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers | |
| | | | 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 |
| | Show that multiplication of 2 numbers can be done in any order (commutative) and division of 1 number by another cannot | | Recognise and use factor pairs and commutativity in mental calculations | Identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers | Use their knowledge of the order of operations to carry out calculations involving the 4 operations |
| 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 multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts | 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 | Solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects | Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes<br><br>Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign<br><br>Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates | |
| | | | | Establish whether a number up to 100 is prime and recall prime numbers up to 19 | Identify common factors, common multiples and prime numbers |
| | | | | 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 long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context<br><br>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 |
| | | | | Recognise and use square numbers and cube numbers, and the notation for squared ($^2$) and cubed ($^3$) | |

## Fractions (Part 1)

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| Recognise, find and name a half as 1 of 2 equal parts of an object, shape or quantity<br><br>Recognise, find and name a quarter as 1 of 4 equal parts of an object, shape or quantity | Recognise, find, name and write fractions 1/3 , 1/4 , 2/4 and 3/4 of a length, shape, set of objects or quantity | Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators | | | Use common factors to simplify fractions; use common multiples to express fractions in the same denomination |
| | Write simple fractions, for example 1/2 of 6 = 3 and recognise the equivalence of 2/4 and 1/2 | | | | |
| | | 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 | Count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10 | | |
| | | Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators | | 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 ] | |
| | | 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 | |
| | | Add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7 ] | Add and subtract fractions with the same denominator | 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 |
| | | 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 |
| | | 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 | | |
| | | | | 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 [for example, 1/4 × 1/2 = 1/8 ] |
| | | | | | Divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6 ] |
| | | | | | Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8 ] |

## Fractions (Part 2)

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| | | | Recognise and write decimal equivalents of any number of tenths or hundreds | 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 | read and write decimal numbers as fractions [for example, 0.71 = 71/100 ] | |
| | | | 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 | | Identify the value of each digit in numbers given to 3 decimal places and multiply and divide numbers by 10, 100 and 1,000 giving answers up to 3 decimal places |
| | | | Round decimals with 1 decimal place to the nearest whole number | Round decimals with 2 decimal places to the nearest whole number and to 1 decimal place | |
| | | | Compare numbers with the same number of decimal places up to 2 decimal places | Read, write, order and compare numbers with up to 3 decimal places | |
| | | | | | Multiply one-digit numbers with up to 2 decimal places by whole numbers |
| | | | | | Use written division methods in cases where the answer has up to 2 decimal places |
| | | | Solve simple measure and money problems involving fractions and decimals to 2 decimal places | Solve problems involving number up to 3 decimal places | solve problems which require answers to be rounded to specified degrees of accuracy |
| | | | Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per 100', and write percentages as a fraction with denominator 100, and as a decimal fraction | | |
| | | | 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 | | |
| | | | | | Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts |

# Geometry (Part 1)

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| Recognise and name common 2-D and 3-D shapes, including:<br>• 2-D shapes [for example, rectangles (including squares), circles and triangles]<br>• 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] | Identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line<br><br>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] | | | Identify 3-D shapes, including cubes and other cuboids, from 2-D representations | Recognise, describe and build simple 3-D shapes, including making nets |
| | Compare and sort common 2-D and 3-D shapes and everyday objects | | Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes | | Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons |
| | | Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them | | | Draw 2-D shapes using given dimensions and angles |
| | | | | | Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius |

# Geometry (Part 2)

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| Describe position, direction and movement, including whole, half, quarter and three-quarter turns | 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) | Recognise angles as a property of shape or a description of a turn<br><br>Identify right angles, recognise that 2 right angles make a half-turn, 3 make three-quarters of a turn and 4 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 2 right angles by size | Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles | |
| | | | | Draw given angles, and measure them in degrees (°) | |
| | | | | Identify:<br>• angles at a point and 1 whole turn (total 360°)<br>• angles at a point on a straight line and half a turn (total 180°)<br>• other multiples of 90°<br>• use the properties of rectangles to deduce related facts and find missing lengths and angles<br>• distinguish between regular and irregular polygons based on reasoning about equal sides and angles | 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 | 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 | | |
| | | | 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 know that the shape has not changed | Describe positions on the full coordinate grid (all 4 quadrants) |
| | | | 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 | | |

| Geometry (Part 3) | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|
| | | Order and arrange combinations of mathematical objects in patterns and sequences | | | | |
| | | Interpret and construct simple pictograms, tally charts, block diagrams and 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 | |
| | | 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 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 | |
| | | | | | | Interpret and construct pie charts and line graphs and use these to solve problems |
| | | | | | | Calculate and interpret the mean as an average |

# Measurements (Part 1)

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| Compare, describe and solve practical problems for:<br>• lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]<br>• mass/weight [for example, heavy/light, heavier than, lighter than]<br>• capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]<br>• time [for example, quicker, slower, earlier, later] | Compare and order lengths, mass, volume/capacity and record the results using >, < and = | | Convert between different units of measure [for example, kilometre to metre; hour to minute] | Convert between different units of metric measure [for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre]<br><br>Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints | 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 3 decimal places<br><br>Convert between miles and kilometres |
| Measure and begin to record the following:<br>• lengths and heights<br>• mass/weight<br>• capacity and volume<br>• time (hours, minutes, seconds)<br>• recognise and know the value of different denominations of coins and notes<br>• sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening] | 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<br><br>Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value | 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 3 decimal places where appropriate |
| | | Measure the perimeter of simple 2-D shapes | Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres | Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres | |
| | | | Find the area of rectilinear shapes by counting squares | Calculate and compare the area of rectangles (including squares), including using standard units, square centimetres ($cm^2$) and square metres ($m^2$), and estimate the area of irregular shapes | |
| | | | | | Recognise that shapes with the same areas can have different perimeters and vice versa |
| | | | | Estimate volume [for example, using 1 $cm^3$ blocks to build cuboids (including cubes)] and capacity [for example, using water] | Recognise when it is possible to use formulae for area and volume of shapes<br><br>Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres ($cm^3$) and cubic metres ($m^3$), and extending to other units [for example, $mm^3$ and $km^3$] |
| | | | | | Calculate the area of parallelograms and triangles |

## Measurements (Part 2)

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|
| | Find different combinations of coins that equal the same amounts of money | Add and subtract amounts of money to give change, using both £ and p in practical contexts | | | |
| | Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change | | Solve problems involving converting from hours to minutes, minutes to seconds, years to months, weeks to days | Solve problems involving converting between units of time | |
| Recognise and use language relating to dates, including days of the week, weeks, months and years | Compare and sequence intervals of time<br><br>Know the number of minutes in an hour and the number of hours in a day | Compare durations of events [for example, to calculate the time taken by particular events or tasks]<br><br>Know the number of seconds in a minute and the number of days in each month, year and leap year | | | |
| Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times | 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 | 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 | | |
| | | 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, am/pm, morning, afternoon, noon and midnight | Estimate, compare and calculate different measures, including money in pounds and pence | | |
| | | | | Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling | |

| Algebra | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|
| | | | | | | Use simple formulae |
| | | | | | | Generate and describe linear number sequences |
| | | | | | | Express missing number problems algebraically |
| | | | | | | Find pairs of numbers that satisfy an equation with 2 unknowns |
| | | | | | | Enumerate possibilities of combinations of 2 variables |

| Ratio and Proportion | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|
| | | | | | | Solve problems involving the relative sizes of 2 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 |