



Maths Curriculum Outline

Aims of Curriculum

The new curriculum aims to ensure that all pupils:

- Become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that all pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- Can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking problems down into a series of simpler steps and persevering in seeking solutions

Guidelines

These objectives are taken from the new National Curriculum in England published in July 2013. They cover the key aspects of Mathematics to be taught throughout Key Stage 1 and Key Stage 2.

The Key Aspects are:

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions
- Geometry
- Measures
- Statistics

We need to ensure that all the topics are covered within a long term and that they are revisited regularly. However, there is flexibility as to when different aspects are taught, allowing teachers to plan to meet the needs of their class as well as providing considerable scope for developing cross curricular links.

The objectives in this document are to be used when planning for learning in Mathematics from Year 1 to Year 6 throughout the school year. There are also some notes which unpick the meaning and implications of these objectives. This is

just guidance and is not a checklist to be followed. In addition to this, teachers should ensure that they are planning opportunities for the children to:

- Practise their mental maths skills including number facts and times tables
- Develop their mathematical ideas, thinking and reasoning through talk
- Use and apply the ideas and concepts which they have been learning in a variety of different situations.

Progression and expectations for each phase

Key Stage 1	The focus in KS 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources. Pupils should also develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money. By the end of Year 2 pupils should know the number bonds to 20 and be precise in using and understanding place value. Pupils should read and spell mathematical vocabulary at a level consistent with their increasing word reading and spelling knowledge at KS 1.
Lower Key Stage 2	The focus in lower KS2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers. Pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number. By the end of Year 4 children should have memorised their multiplication tables up to and include the 12 multiplication table and show precision and fluency in their work. Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

Upper Key Stage 2

The focus in upper KS2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. Pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. Pupils are introduced to the language of algebra as a means of solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them. By the end of Year 6 pupils should be fluent in written methods for all four operations including long multiplication and division, and in working with fractions, decimals and percentages. Pupils should read, spell and pronounce mathematical vocabulary correctly.

It is expected that the majority of pupils will move through the programmes of study at broadly the same pace. Decisions about when to move children on should always be based on the security of their understanding and their readiness to progress to the next stage. Children who grasp concepts rapidly should be challenging through being offered richer, sophisticated and open-ended problems before any acceleration through new content. Those who are not sufficiently confident with earlier material should consolidate their understanding before moving on. The requirement is that children have completed the programme of study before the end of the Key Stage which means we have the flexibility to introduce content earlier or later than set out in the programme of study.

Objectives for Year 1

NUMBER: Number and Place Value

To count up to and past 100 forwards and backwards starting from any numbers

To read and write numbers to 100 in numerals

To count in multiples of two, fives and tens

To identify one more and one less from a given number

To identify and represent numbers using objects and pictorial representations, including on a number line

To compare numbers using the language of equal to, more than, less than (fewer), most, least

To read and write numbers from 1 to 20 in words

NUMBER: Addition and Subtraction

To read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs

To represent and use number bonds and related subtraction facts within 20 by combining and counting on/back

To add and subtract one-digit and two-digit numbers to 20, including zero

To solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations

To solve missing number problems such as $7 = ? - 9$.

NUMBER: Fractions

To recognise, find and name a half as one of two equal parts of an object, shape and quantity

To recognise, find and name a quarter as one of four equal parts of an object, shape or quantity

NUMBER: Multiplication and Division

To solve one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

NUMBER: Measurement

To compare, describe and solve practical problems for:

- Lengths and heights (e.g. long/short, longer/shorter, tall, short, double/half)
- Mass or weight (e.g. heavy/light, heavier than, lighter than)
- Capacity/volume (full/empty, more than, less than, quarter)
- Time (e.g. quicker, slower, earlier, later)

To measure and begin to record the following:

- Lengths and heights
- Mass/weight
- Capacity and volume
- Time (hours, minutes, seconds)

To recognise and know the values of different denominations of coins and notes

To sequence events in chronological order using language (such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening)

To recognise and use language relating to dates, including days of the week, months, and years

To tell the time to the hour and half past the hour and draw the hands on a clock face to show these times

NUMBER: Geometry

To recognise and name common 2-D and 3-D shapes including:

- 2D shapes (e.g. rectangles including squares, circles and triangles)
- 3D shapes (e.g. cuboids including cubes, pyramids and spheres)

To describe position, directions and movements, including half, quarter and three quarter turns.

Objectives for Year 2

NUMBER: Number and Place Value

To count in steps of 2, 3 and 5 from 0, and in tens from any number, forward or backward

To recognise the place value of each digit in a two-digit number (tens and ones)

To identify, represent and estimate numbers using different representations, including the number line

To compare and order numbers to 100 using $<$, $>$ and $=$ signs

To read and write numbers to at least 100 in numerals and in words

To use place value and number facts to solve problems

NUMBER: Addition and Subtraction

To solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures

To solve problems with addition and subtraction applying their increasing knowledge of mental and written methods

To recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100

To add and subtract numbers using concrete objects, pictorial representations, and mentally including: a two-digit number and a one-digit number, a two-digit number and a multiple of 10, two-digit numbers, three one-digit numbers

To show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot

To recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems

NUMBER: Multiplication and Division

To recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers

To calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs

To show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

To solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts

NUMBER: Fractions

To recognise, find and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ of a length, shape, set of objects or quantity

To write simple fractions e.g. $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$

MEASUREMENT

To 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

To compare and order lengths, mass, volume/capacity and record the results using <, > and =

To recognise and use symbols for (£) and pence (p); combine the amounts to make a particular value

To find different combinations of coins that equal the same amounts of money

To solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change

To compare and sequence intervals of time

To 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

GEOMETRY: Properties of Shapes

To identify and describe the properties of 2D shapes, including the number of sides and symmetry in a vertical line

To identify and describe the properties of 3D shapes, including the number of edges, vertices and faces

To identify 2D shapes on the surface of 3D shapes, for example a circle on a cylinder and a triangle on a pyramid

To compare and sort common 2D and 3D shapes and everyday objects

GEOMETRY: Position and Direction

To order and arrange combinations of mathematical objects in patterns

To use mathematical vocabulary to describe position, direction and movement including distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise), and movement in a straight line

STATISTICS

To interpret and construct simple pictograms, tally charts, block diagrams and simple tables

To ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity

To ask and answer questions about totalling and comparing categorical data

Objectives for Year 3

NUMBER: Number and Place Value

To count from 0 in multiples of 4, 8, 50, and 100

To find 10 or 100 more or less than a given numbers

To recognise the place value of each digit in a three-digit number (hundreds, tens and ones)

To compare and order numbers up to 1000

To identify, represent and estimate numbers using different representations

To read and write numbers up to 1000 in numerals and in words

To solve number problems and practical problems involving these ideas

NUMBER: Addition and Subtraction

To add and subtract mentally including: a three-digit number and a one-digit number, a three-digit number and a multiple of 10, a three-digit number and a multiple of 100.

To add and subtract numbers with up to three digits, using formal written methods of column addition and subtraction

To estimate the answer to a calculation and use the inverse operation to check answers

To solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

NUMBER: Multiplication and Division

To recall and use multiplication facts and division facts for the 3, 4 and 8 multiplication tables

To write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit times one-digit numbers, using mental and progressing to formal written methods

To solve problems, involving missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which 'n' objects are connected to 'm' objects

NUMBER: Fractions

To 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

To recognise, find and write fractions of a discrete set of objects, unit fractions and non-unit fractions with small denominators

To recognise and use fractions as numbers; unit fractions and non-unit fractions with small denominators

To recognise and show, using diagrams, equivalent fractions with small denominators

To add and subtract fractions with the same denominator within one whole (e.g. $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$)

To compare and order unit fractions, and fractions with the same denominators

To solve problems that involve all of the above

MEASUREMENT

To measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)

To measure the perimeter of simple 2D shapes

To add and subtract amounts of money to give change using both £ and p in practical contexts

To tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks

To 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

To know the number of seconds in a minute and the number of days in each month, year or leap year

To compare durations of events, for example to calculate the time taken by particular events or tasks

GEOMETRY: Properties of Shapes

To draw 2D shapes and make 3D shapes using modelling materials; recognise 3D shapes in different orientations and describe them

To recognise that angles are a property of shape or a description of a turn

To 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

To identify horizontal and vertical lines and pairs of perpendicular and parallel lines

STATISTICS

To interpret and present data using bar charts, pictograms and tables

To solve one-step and two-step questions such as 'How many more?' and 'How many fewer?' using information presented in scaled bar charts and pictograms and tables

Objectives for Year 4

NUMBER: Number and Place Value

To count in multiples of 6, 7, 9, 25 and 1000

To find 1000 more or less than a given number

To count backwards through zero to include negative numbers

To recognise the place-value of each digit in a four-digit number (thousands, hundreds, tens and ones)

To order and compare numbers beyond 1000

To identify, represent and estimate numbers using different representations

To round any number to the nearest 10, 100 or 1000

To solve number and practical problems that involve all of the above and with increasingly larger positive numbers

To read Roman numerals to 100 (I to C) and know that over time, the numeral system has changed to include the concept of zero and place value

NUMBER: Addition and Subtraction

To add and subtract numbers with up to 4 digits using the formal written methods of column addition and subtraction where appropriate

To estimate and use inverse operations to check answers to a calculation

To solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

NUMBER: Multiplication and Division

To recall multiplication and division facts for multiplication tables up to 12x12

To 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

To recognise and use fact pairs and commutativity in mental calculations

To multiply two-digit and three-digit numbers by a one-digit number using formal written layout

To 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

NUMBER: Fractions (including decimals)

To recognise and show, using diagrams, families of common equivalent fractions

To count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten

To 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

To add and subtract fractions with the same denominator

To recognise and write decimal equivalents of any number of tenths or hundredths

To recognise and write decimal equivalents $\frac{1}{4}$; $\frac{1}{2}$; $\frac{3}{4}$

To find the effect of dividing a one-digit or two-digit number by 10 and 100, identifying the value of the digits in the answer as units, tenths and hundredths

To round decimals with one decimal place to the nearest whole number

To compare numbers with the same number of decimal places up to two decimal places

To solve simple measures and money problems involving fractions and decimals to two decimal places

MEASUREMENTS

To convert between different units of measure (e.g. kilometre to metre, hour to minute)

To measure and calculate perimeter of a rectilinear figure (including squares) in centimetres and metres

To find the area of rectilinear shapes by counting squares

To estimate, compare and calculate different measures, including money in pounds and pence

To read, write and convert time between analogue and digital 12 and 24-hour clocks

To solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.

GEOMETRY: Properties of Shapes

To compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes

To identify acute and obtuse angles and compare and order angles up to two right angles by size

To identify lines of symmetry in 2D shapes presented in different orientations

To complete a simple symmetric figure with respect to a specific line of symmetry

GEOMETRY: Position and Direction

To describe positions on 2D grid as coordinates in the first quadrant

To describe movements between positions as translations of a given unit to the left/right and up/down

To plot specific points and draw sides to complete a given polygon

STATISTICS

To interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs

To solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

Objectives for Year 5

NUMBER: Number and Place Value

To read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit

To count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000

To interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero

To round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000

To solve number problems and practical problems that involved all of the above

To read Roman numerals to 1000 (M) and recognise years written in Roman numerals

NUMBER: Addition and Subtraction

To add and subtraction whole numbers with more than 4 digits including formal written methods (column addition and subtraction)

To add and subtract numbers mentally with increasingly large numbers

To use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

To solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

NUMBER: Multiplication and Division

To identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers

To solve problems involving multiplication and division where larger numbers are used by decomposing them into their factors

To know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers

To establish whether a number up to 100 is prime and recall prime numbers up to 19

To multiply numbers up to 4 digits by a one-digit or two-digit number using a formal written method, including long multiplication for two-digit numbers

To multiply and divide numbers mentally drawing upon known facts

To divide numbers up to 4 digits by a one-digit number using a formal written method of short division and interpret remainders appropriately for the context

To multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

To recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)

To solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign

To solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

NUMBER: Fractions (including decimals and percentages)

To compare and order fractions whose denominators are all multiples of the same number

To identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths

To 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. $2/5 + 4/5 = 6/5 = 1 \frac{1}{5}$)

To add and subtract fractions with the same denominator and multiples of the same

number

To multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

To read and write decimal numbers as fractions (e.g. $0.71 = 71/100$)

To recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents

To round decimals with two decimal places to nearest whole number and to one decimal place

To read, write, order and compare numbers with up to three decimal places

To solve problems involving number up to three decimal places

To recognise the percent symbol (%) and understand that percent relates to 'number of parts per hundred,' and write percentages as a fraction with denominator hundred, and as a decimal fraction

To solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25

MEASUREMENT

To convert between different units of metric measurement (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)

To understand and use equivalences between metric units and common imperial units such as inches, pounds and pints

To measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres

To 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

To estimate volume (e.g. using 1 cm^3 blocks to build cubes and cuboids) and capacity (e.g. using water)

To solve problems involving converting between units of time

To use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling

GEOMETRY: Properties of Shape

To identify 3D shapes, including cubes and other cuboids, from 2D representations

To know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles

To draw given angles, and measure them in degrees ($^\circ$)

To identify:

- Angles at a point and one whole turn (360°)
- Angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°)
- Other multiples of 90°

To use the properties of rectangles to deduce related facts and find missing lengths and angles

To distinguish between regular and irregular polygons based on reasoning about equal sides and angles

GEOMETRY: Position and Direction

To 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

STATISTICS

To solve comparison, sum and difference problems using information presented in a line graph

To complete, read and interpret information in tables, including timetables

Objectives for Year 6

NUMBER: Number and Place Value

To read, write, order and compare numbers to at least 10,000,000 and determine the value of each digit

To round any whole number to a required degree of accuracy

To use negative numbers in context, and calculate intervals across zero

To solve number and practical problems to that involve all of the above

NUMBER: Addition, Subtraction, Multiplication and Division

To multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

To 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

To perform mental calculations, including with mixed operations and large numbers

To identify common factors, common multiples and prime numbers

To use their knowledge of the order of operations to carry out calculations involving the four operations

To solve problems involving addition, subtraction, multiplication and division

To use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy

NUMBER: Fractions (including decimals and percentages)

To use common factors to simplify fractions; use common multiples to express fractions in the same denomination

To compare and order fractions, including fractions > 1

To add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions

To multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $\frac{1}{4} \times \frac{1}{2} = 1/8$)

To divide proper fractions by whole numbers (e.g. $1/3 \div 2 = 1/6$)

To associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $3/8$)

To 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

To multiply one-digit numbers with up to two decimal places by whole numbers

To use written division methods in cases where the answer has up to two decimal places

To solve problems which require answers to be rounded to specified degrees of accuracy

To recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

NUMBER: Ratio and Proportion

To solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts

To solve problems involving the calculation of percentages (e.g. of measures) such as 15% of 360 and the use of percentages for comparison

To solve problems involving similar shapes where the scale factor is known or can be found

To solve problems involving unequal sharing and grouping using knowledge of fractions and multiples

NUMBER: Algebra

To express missing number problems algebraically

To use simple formulae expressed in words

To generate and describe linear number sequences

To find pairs of numbers that satisfy number sentences involving two unknowns

To enumerate all possibilities of combinations of two variables

MEASUREMENT

To solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate

To 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 up to three decimal places

To convert between miles and kilometres

To recognise that shapes with the same areas can have different perimeters and vice versa

To recognise when it is possible to use formulae for area and volume of shapes

To calculate the area of parallelograms and triangles

To 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

GEOMETRY: Properties of Shapes

To draw 2D shapes using given dimensions and angles

To recognise, describe and build simple 3D shapes, including making nets

To compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons

To illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius

To recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles

GEOMETRY: Position and Direction

To describe positions on the full coordinate grid (all four quadrants)

To draw and translate simple shapes on the coordinate plane, and reflect them in the axes

STATISTICS

To interpret and construct pie charts and line graphs and use these to solve problems

To calculate and interpret the mean as an average