

Mathematics Curriculum Summary

The aim of the Maths curriculum is to create confident mathematicians who can problem solve, apply creativity, pursue their own investigations and have an enjoyment of playing with numbers, shape and mathematical concepts. It is taught by means of a spiral curriculum whereby certain topics are constantly revisited but at an ever higher level. We aim to cover all of the material included in the National Numeracy strategy. Given the high ability levels of many of our pupils we are very much aware of the need to extend children by providing challenging material that increases their depth of understanding, their enjoyment of the subject and their ability to rise to a challenge.

Key Skills and Content

Kindergarten (KG)

The KG Mathematics curriculum is based on the EYFS Framework, 'Development Matters'.

- say and use names in order in familiar contexts;
- count reliably up to ten objects;
- recognise numerals 1 to 9;
- use developing mathematical ideas and methods to solve practical problems;
- in practical activities and discussion begin to use the vocabulary involved in adding and subtracting;
- use language such as 'more' or 'less' to compare two numbers;
- find one more or one less than a number from one to ten, using objects;
- begin to relate addition to combining two groups of objects and subtraction to 'taking away';
- use language such as 'greater', 'smaller', 'lighter' or 'heavier' to compare two quantities;
- talk about, recognise and recreate simple patterns;
- use language such as 'circle' or 'bigger' to describe the shape and size of solids and flat shapes.

Transition 1 (T1)

- count reliably at least twenty objects;
- read, write and order whole numbers to a least 100;
- count on and back in ones from any small number, and in tens from and back to zero;
- read, write and order numbers from 0 to at least 20; understand and use the vocabulary of comparing and ordering these numbers;
- within the range 0 to 30 say the number that is 1 or 10 more or less than any given number;
- understand the operations of addition, and of subtraction and use the related vocabulary;
- know by heart the number bonds to 10;
- use mental strategies to solve simple problems using counting, addition, subtraction, doubling and halving, explaining methods and reasoning orally;
- compare two lengths, capacities or masses by direct comparison;
- suggest suitable standard or non-standard units and measuring equipment to estimate then measure a length, mass or capacity;
- use everyday language to describe features of familiar 2-D and 3-D shapes.
- Understand symmetry

Transition 2 (T2)

- Count, read, write and order whole numbers to 100 and beyond, knowing what each digit represents and counting reliably by grouping
- Round numbers to the nearest 10
- Describe and extend number sequences, counting on and back in 2s, 5s, 10s starting from any two-digit number
- Understand that multiplication is repeated addition, division as sharing and halving is the inverse of doubling
- Recognise two-digit multiples of 10, 5 and 2
- Understand and use 'half' and 'quarter' and recognize that two-quarters and one-half are equal
- Know the facts for the 2, 3, 4, 5 and 10 multiplication tables
- Understand that addition is the inverse of subtraction and state the subtraction corresponding to a given addition
- Know doubles to 10
- Use mental strategies to carry out addition and subtraction efficiently such as the knowledge that numbers can be added in any order, near doubles,
- Read a variety of simple scales to the nearest division
- Estimate, measure and compare lengths, masses and capacities using standard units suggest suitable units and equipment for such measurements.
- Use the common names for 2-D and 3-D shapes, sort shapes and describe a range of their features as well as use mathematical vocabulary to describe position, direction and movement.
- Read analogue and digital time and learn how to present data in a variety of ways.
- Know the days of the week and the months of the year in order
- Recognise all coins and use pound and pence notation and give change
- Solve mathematical problems and carry out investigations and solve problems by sorting, classifying and organizing information in simple ways
- Recognise lines of symmetry
- Recognise basic turns and angles, including right angles

Form 1

- Develop a wide range of strategies for calculating using mental methods with three-digit numbers
- Understand how to calculate using pencil and paper methods and more formal procedures for calculating using larger numbers
- Count in multiples of 4, 8, 50 and 100 and find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Read, write, compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- solve number problems and practical problems
- Make estimations and use known strategies to check the answer
- Know 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
- Count up and down in tenths
- Recognize, find and write fractions of a discrete set of objects, as numbers and as diagrams including equivalent fractions and add and subtract fractions with the same denominator within one whole
- 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].
- Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- Understand and use right angles
- Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.
- Interpret and present data using bar charts, pictograms and tables

Form 2

- Count in multiples of 6, 7, 9, 25 and 1000 and, find 1000 more or less than a given number and recognise the place value of each digit in a four-digit number
- count backwards through zero to include negative numbers
- Read, write, order and compare numbers beyond 1000
- Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems
- 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.
- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- Estimate and use inverse operations to check answers to a calculation
- Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.
- Recall multiplication and division facts for multiplication tables up to 12×12
- Use place value, known and derived facts to multiply and divide mentally
- Multiply two-digit and three-digit numbers by a one-digit number
- 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.
- Recognise and write decimal equivalents of any number of tenths or hundredths
- Recognise and write decimal equivalents
- 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
- Convert between different units of measure
- Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres and find the area of rectilinear shapes
- Estimate, compare and calculate different measures, including money in pounds and pence
- Read, write and convert time between analogue and digital 12- and 24-hour clocks
- 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.
- Describe positions on a 2-D grid as coordinates in the first quadrant
- Describe movements between positions as translations of a given unit to the left/right and up/down
- Plot specified points and draw sides to complete a given polygon
- Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs
- Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

Form 3

- Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Understand and use negative numbers
- Round any number up to 1 000 000 and use this to check calculations
- Solve number problems and practical problems

- Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.
- 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
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- 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)
- Compare and order fractions whose denominators are all multiples of the same number and identify, name and write equivalent fractions
- Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example
- Read and write decimal numbers as fractions
- 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
- 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
- Convert between different units of measure
- Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- Calculate and compare the area of rectangles
- Estimate volume and capacity
- Identify 3-D shapes, including cubes and other cuboids, from 2-D representations
- Understand, estimate and use a wide variety of different types of angles, using properties of shapes to deduce facts
- Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.
- 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
- Solve comparison, sum and difference problems using information presented in a line graph
- Complete, read and interpret information in tables, including timetables.

Form 4

- Read, write, order, use and compare numbers up to 10 000 000, determining the value of each digit, rounding numbers
- Use negative numbers in context, and calculate intervals across zero
- Solve number and practical problems
- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written methods
- Perform mental calculations, including with mixed operations and large numbers
- Identify common factors, common multiples and prime numbers
- Use estimation to check answers to calculations
- Understand and calculate using fractions including simplifying, equivalence and comparing
- Associate a fraction with division and calculate decimal fraction equivalents
- Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers

- Understand and use algebra to solve problems including generating and describe linear number sequences and expressing missing number problems
- Solve problems involving the calculation and conversion of units of measure
- Use, read, write and convert between units of measurement, converting measurements of length, mass, volume and time
- Recognise that shapes with the same areas can have different perimeters and vice versa and recognise when it is possible to use formulae for area and volume of shapes
- Calculate the area of parallelograms and triangles
- 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
- Illustrate and name parts of circles, including radius, diameter and circumference
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles
- 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.
- Interpret and construct pie charts and line graphs and use these to solve problems and calculate and interpret the mean as an average.

Forms 5 and 6

- Understand and use place value for decimals, measures and integers of any size
- Order positive and negative integers, decimals and fractions
- Use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation
- Use the 4 operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative
- Use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals
- Recognise and use relationships between operations including inverse operations
- Use integer powers and associated real roots
- Work interchangeably with terminating decimals and their corresponding fractions
- Define and interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively, express 1 quantity as a percentage of another, compare 2 quantities using percentages, and work with percentages greater than 100%
- Interpret fractions and percentages as operators
- Use standard units of mass, length, time, money and other measures, including with decimal quantities
- Round numbers and measures to an appropriate degree of accuracy
- Use approximation through rounding to estimate answers
- Use and interpret algebraic notation
- Substitute numerical values into formulae and expressions
- Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors
- Simplify and manipulate algebraic expressions to maintain equivalence
- Understand and use standard mathematical formulae
- Model situations or procedures by translating them into algebraic expressions or formulae and by using graphs
- Use algebraic methods to solve linear equations
- Work with coordinates in all 4 quadrants
- Recognise, sketch and produce graphs of linear and quadratic functions of 1 variable with appropriate scaling, using equations in x and y and the Cartesian plane
Interpret mathematical relationships both algebraically and graphically
- Use linear and quadratic graphs
- Recognise geometric and arithmetic sequences and find the n th term

- Change freely between related standard units
- Use scale factors, scale diagrams and maps
- Use ratio notation, including reduction to simplest form
- Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions
- Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics
- Solve problems involving direct proportion, including graphical representations
- Use compound units such as speed, unit pricing and density to solve problems
- Calculate and solve problems involving shapes and their angles
- Draw, measure and label line segments shapes, their angles, proportions and use shapes in a variety of ways including translations, rotations, reflections, enlargement
- Understand and solve problems about probability
- Use, construct and interpret a wide variety of graphs, charts and tables

Contribution to Spiritual, Moral, Social and Cultural Education

Mathematics develops SMSC in a wide variety of ways, including:

- Developing an awareness of symmetry, harmony, proportion and balance
- Giving an awareness of infinity (e.g. through the concept of the infinity of number)
- Teaching children to work collaboratively
- Developing creativity as children investigate, problem solve, explore different solutions
- Developing a wonder in the world and how maths works
- Enabling children to understand the contribution made by mathematicians from other cultures
- Understanding the use of Maths in architecture and design around the world
- Use of art to explore Maths from around the world (e.g. Mondrian)