

Mathematics

Our mathematics curriculum provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Aims

Our curriculum for mathematics 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 pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- 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 down problems into a series of simpler steps and persevering in seeking solutions

The school has a policy that calculators are not used as a substitute for good written and mental arithmetic. They are therefore only introduced near the end of key stage 2 (year 5/6) to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure.

Our curriculum encourages pupils to talk about their mathematical reasoning, which is a key factor in developing mathematical vocabulary and presenting a mathematical justification, argument or proof. In this way pupils learn to make their thinking clear to themselves as well as others, and teachers ensure that pupils build secure foundations by using discussion to probe and remedy any misconceptions.

Content

Key Stage 1 (Years 1 and 2)

The principal focus of our mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This involves working with numerals, words and the 4 operations, including with practical resources for example, concrete objects and measuring tools.

At this stage, pupils develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teachers also help pupils to use 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 will know the number bonds to 20 and be precise in using and understanding place value. An emphasis is placed on practice at this early stage.

The curriculum ensures that pupils are able to read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Over the course of the 2 years pupils will cover:

- Number - number and place value
- Number - addition and subtraction
- Number - multiplication and division
- Number - fractions
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics

Lower Key Stage 2 (Year 3 and 4)

The principal focus of our mathematics curriculum in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the 4 operations, including number facts and the concept of place value. This ensures that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

We aim to also make sure that pupils also develop their ability to solve a range of problems, including simple fractions and decimal place value. Teaching also ensures 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. Our curriculum ensures that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of year 4, it is our aim that pupils will have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work, and can read and spell mathematical vocabulary correctly and confidently, using their growing word-reading knowledge and their knowledge of spelling.

Over the course of the curriculum, pupils will learn about:

- Number - number and place value
- Number - addition and subtraction
- Number - multiplication and division
- Number - fractions
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics

Upper Key Stage 2 (Years 5 and 6)

The principal focus of our mathematics curriculum in upper key stage 2 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.

At this stage, pupils develop their ability to solve a wide range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures aims to consolidate and extend knowledge developed in number. Teaching also ensures that pupils classify shapes with increasingly complex geometric properties and pupils learn the vocabulary they need to describe them.

By the end of year 6, the curriculum followed aims to make sure that pupils are fluent in written methods for all 4 operations, including long multiplication and division, and in working with fractions, decimals and percentages, and pupils are able to read, spell and pronounce mathematical vocabulary correctly.

Over the course of the curriculum, pupils will learn about:

- Number - number and place value
- Number - addition and subtraction
- Number - multiplication and division
- Number - fractions
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics

Key Stage 3 (Years 7, 8 and 9 and extension for Year 5 and 6)

The mathematics curriculum for key stage 3 builds on key stage 2 and connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. As a result learners are encouraged to apply their mathematical knowledge in science, geography, computing and other subjects.

As learners develop more advanced mathematical understanding, the curriculum aims to:

Develop fluency

- consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots
- select and use appropriate calculation strategies to solve increasingly complex problems
- use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships
- substitute values in expressions, rearrange and simplify expressions, and solve equations
- move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs]
- develop algebraic and graphical fluency, including understanding linear and simple quadratic

functions

- use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics

Capacity to reason mathematically

- extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations
- extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically
- identify variables and express relations between variables algebraically and graphically
- make and test conjectures about patterns and relationships; look for proofs or counter-examples
- begin to reason deductively in geometry, number and algebra, including using geometrical constructions
- interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning
- explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally

Solve problems

- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics
- begin to model situations mathematically and express the results using a range of formal mathematical representations
- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems

The above will be delivered through the coverage of:

- Number
- Algebra
- Ratio, proportion and rates of change
- Geometry and measures
- Probability