

Maths



At Francis Askew, we offer the children a progressive mathematics curriculum based on the National Curriculum to develop mathematical knowledge and skills for our children. Pupils develop a deep understanding of key concepts that have been carefully considered and identified as the core knowledge and skills required to successfully achieve in maths. The key concepts are revisited and developed as the pupils move through the school to ensure their knowledge and skills are firmly embedded within their long term memory. These key concepts complement work carried out across the school reinforcing our 6 broad curriculum drivers (see overall Curriculum Intent). The expectation is that, by the end of primary school, children will know and understand these key concepts and will give them a solid foundation ready to enter the maths curriculum at KS3.

Key Concepts:

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions, Decimals and Percentages
- Geometry
- Statistics
- Shape
- Measures

Our progressive objectives show what pupils should know and be able to do in each aspect of mathematics by the end of each year group – progressively building up knowledge and skills related to the key concepts. The objectives build on previous learning and are used to support planning and the ongoing assessments of pupils' work. In addition to this, pupils make rich connections across mathematical key concepts to develop **fluency, application, mathematical reasoning** and competence in **solving increasingly sophisticated problems**.

End points:

By the end of EYFS children will:

- Have a secure understanding of number and numerical Patterns across the new EYFS Framework
- Have a deep understanding of numbers to 10, being able to develop their skill of subitising up to 5 as well as automatically recalling number bonds up to 5 and even 10.
- Be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers.
- Use every day language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects in order to help them solve problems.
- Recognise, create and describe patterns, exploring characteristics of everyday objects and shapes, using their mathematical language to describe them.

By the end of Key Stage 1 children will:

- 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 [for example, concrete objects and measuring tools].
- Develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary.
- Be able to use a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.
- Know the number bonds to 20 fluently and be precise in using and understanding place value.
- Read and spell mathematical vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

By the end of Lower Key Stage 2 children will:

- Become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value.
- Develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.
- Develop their ability to solve a range of problems, including with simple fractions and decimal place value.

- Be able to draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them.
- Use measuring instruments with accuracy and make connections between measure and number.
- By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.
- Read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

By the end of Upper Key Stage 2 children will:

- 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.
- 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.
- Be introduced to the language of algebra as a means for solving a variety of problems.
- Develop their understanding of geometry and measures to consolidate and extend knowledge developed in number.
- Classify shapes with increasingly complex geometric properties and learn the vocabulary they need to describe them.
- Be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.
- Read, spell and pronounce mathematical vocabulary correctly.

A typical teaching sequence in maths will cover the following aspects. The order and areas of focus will be adapted to suit the key concept being taught:-

1. Recall of number facts – focus on key arithmetic skills
2. Practical activities using a range of manipulatives, allowing children to develop concrete, pictorial and abstract understanding of concepts.
3. Pupils demonstrate their knowledge through various fluency tasks / questions
4. Pupils apply their knowledge and skills through reasoning and problem solving
5. Individual, group and whole class activities, tasks and discussions take place

6. Work with ICT when appropriate (calculators should be introduced near the end of KS2 when written methods and mental arithmetic strategies are secure)
7. Master formal, written calculation methods
8. Develop mathematical vocabulary and present a mathematical justification, argument or proof.

At the beginning of each unit and throughout, children revisit prior learning and link this to new concepts being taught. Additionally, at the end of a learning sequence, children reflect on their new learning and skills and there is opportunity for further teaching when knowledge or skills have not been retained.

Progression through key concepts in relation to the end points

EYFS / Key Stage 1

Year Group	<p><u>Key Performance Indicators - Place Value</u> <u>KS1 End points</u></p> <ul style="list-style-type: none"> - 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 [for example, concrete objects and measuring tools]. - Know the number bonds to 20 fluently and be precise in using and understanding place value. - Read and spell mathematical vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.
Nursery	<p>Subitise numbers up to 5. Match numerals to an amount. Recognise numerals up to 5. Use the cardinal principle up to 5. Use rekenrek and numicon to aid their understanding of numbers up to 5. Show fingers up to 5. Touch count numbers up to 10. Recite numbers up to 10.</p>

	<p>Compare amounts using numbers up to 5. Introduced to the 'one-ness' of one, the two ness of two and the 'three-ness' of three.</p>
Reception	<p>Children begin using numbers and counting up to 5. Children compare quantities of identical objects and non-identical objects. Children begin using numbers and counting up to 10. Children compare groups of objects and numbers up to 10. Children are introduced to doubling, halving and sharing numbers and objects within numerical patterns. Children learn which numbers are odd and which numbers are even as well as understanding why.</p>
1	Count to hundred, forwards and backwards, beginning with 0 or 1, or from any given number.
	Count, read and write numbers to 100 in numerals and words.
	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.
	Given a number, identify one more or one less.
	Count in multiples of twos, fives and tens.
2	Count in steps of 2, 3 and 5 from 0 and in tens from any number, forward and backward.
	Recognise the place value of each digit in a two digit number (tens, ones)
	Identify, represent and estimate numbers to 100 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.
	Partition any two-digit number into different combinations of tens and ones, explaining their thinking verbally, in pictures or using apparatus.

Year Group	<u>Key Performance Indicators - Addition and Subtraction</u>
	<p><u>KS1 end points</u></p> <ul style="list-style-type: none"> - 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 [for example, concrete objects and measuring

	<p>tools].</p> <p>- Know the number bonds to 20 fluently and be precise in using and understanding place value.</p>
Nursery	<p>Children subitise using numbers up to 5.</p> <p>Children use the cardinal principle with numbers up to 5.</p> <p>Children recite numbers up to 10.</p> <p>Children touch count accurately up to 5.</p> <p>Children begin to learn how to use the part whole model verbally.</p> <p>Children combine two groups to find a whole.</p>
Reception	<p>Children find one more and one less.</p> <p>Children find changes within 5.</p> <p>Children combine two groups to find the whole amount.</p> <p>Children are introduced to the part whole model and learning how to use it with numbers up to 10.</p> <p>Children learn how to add by counting on.</p> <p>Children learn how to take away by counting back.</p>
1	Represent and use number bonds and related subtraction facts (within 20)
	Add and subtract one digit numbers (to 20), including zero.
	Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.
2	Can partition two digit numbers into different combinations of tens and ones
	Recall all number bonds to and within 10 and use these to reason with and calculate bonds to and within 20, recognising other associated additive relationships.
	Add and subtract any 2 two-digit numbers using an efficient strategy, explaining their method verbally, in pictures or using apparatus (e.g. $48 + 35$; $72 - 17$)

Year Group	<u>Key Performance Indicators - Multiplication and Division</u>
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1	Count in multiples of twos, fives and tens.
2	Recall multiplication and division facts for 2, 5 and 10 and use them to solve simple problems, demonstrating an understanding of commutativity as necessary.

Year Group	<u>Key Performance Indicators - Fractions</u>
Nursery	Children arrange up to 4 objects. Children learn how to sort two objects in different ways. Children learn how to sort into 2 groups using colour, size and objects. Children then sort into 3 groups using colour, size and objects.
Reception	Children continue learning how to sort objects into groups
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.
2	Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and of a length, shape, set of objects or quantity.
	Write simple fractions for example, $\frac{1}{2}$ of 6 = 3 Add and subtract fractions with the same denominator within one whole.

Year Group	<u>Key Performance Indicators - Shape</u> <u>Key Stage 1 end point</u> - Develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary.
Nursery	Children identify and discuss the basic properties of 2D and 3D shapes. Children identify and describe patterns. Children make a pattern trajectory. Children continue to make and copy patterns as well as spotting errors. Children are introduced to repetition.
Reception	Children are introduced to 2D shapes and 3D shapes learning their names and recognising them. Children begin making simple patterns then once confident, explore more complex patterns.

1	Recognise and name common 2D and 3D shapes, including rectangles, squares, circles and triangles, cuboids, pyramids and spheres.
2	Name and describe properties of 2-D and 3-D shapes, including number of sides, vertices, edges, faces and lines of symmetry.

Year Group	Key Performance Indicators - Measure
	Key Stage 1 end point - Be able to use a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.
Nursery	Children compare size, height, length and colour. Children describe a sequence of events.
Reception	Children learn about their day and when events occur. Children are introduced to length, height, distance, weight, volume and capacity using numbers, objects and practical exploration.
1	Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.
	Recognise and know the value of different denominations of coins and notes.
2	Use different coins to make the same amount.
	Read the time on a clock to the nearest 15 minutes.

Lower Key Stage 2

Year Group	<u>Key Performance Indicators - Place Value</u>
	<u>Lower Key Stage 2 End points</u>
	<ul style="list-style-type: none"> - Become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. - Read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.
3	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).
	Compare and order numbers up to 1000
	Read and write numbers up to 1000 in numerals and in words.
	Recognise the place value of each digit in a three digit number (hundreds, tens and ones)
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.
	Recognise the place value of each digit in a four digit number (thousands, hundreds, tens and ones)
	Order and compare numbers beyond 1000.
	Round any number to the nearest 10, 100 or 1000.

Year Group	<u>Key Performance Indicators – Addition and Subtraction</u>
	<u>Lower Key Stage 2 End points</u>
	- Develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.
3	Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.
4	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Year Group	<u>Key Performance Indicators – Multiplication and Division</u>
	<u>Lower Key Stage 2 End points</u> - By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.
3	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
4	Recall and use multiplication and division facts for multiplication tables up to 12 x 12.
	Multiply two digit and three digit numbers by a one digit number using formal written layout.
	Divide two and three digit numbers by a one digit number using an informal method.
	Recognise and use factor pairs and commutativity in mental calculations.

Year Group	<u>Key Performance Indicators – Fractions and Decimals</u>
	<u>Lower Key Stage 2 End points</u> - Develop their ability to solve a range of problems, including with simple fractions and decimal place value.
3	Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.
	Add and subtract fractions with the same denominator within one whole.
4	Recognise and show, using diagrams, families of common equivalent fractions.
	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 $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$
	Round decimals with one decimal place to the nearest whole number.
	Find the effect of dividing a one or two digit number by 10 or 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Year Group	Key Performance Indicators – Shape
	Lower Key Stage 2 End points - Be able to draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them.
3	Recognise angles as a property of shape or a description of a turn.
	Identify right angles, recognise that two right angles make a half-term, 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.
4	Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.
	Identify lines of symmetry in 2D shapes presented in different orientations.
	Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.
	Identify acute and obtuse angles and compare and order angles up to two right angles by size.
	Describe positions on a 2D grid as coordinates in the first quadrant.
	Describe movements between positions as translations of a given unit to the left/ right and up/ down.

Year Group	Key Performance Indicators – Measure
	Lower Key Stage 2 End points - Use measuring instruments with accuracy and make connections between measure and number.
3	Measure, compare, add and subtract: lengths (m/cm/mm).
	Tell and write the time from an analogue clock, including using Roman numerals and 12-hour and 24-hour clocks.
4	Read, write & convert time between analogue and digital 12 and 24 hour clocks.
	Convert between different units of measure eg kilometre to metre.

Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
Convert between different units of measure [for example, kilometre to metre]
Find the area of rectilinear shapes by counting squares.
Solve simple measure and money problems involving fractions and decimals to two decimal places.

Year Group	<u>Key Performance Indicators – Statistics</u>
3	Interpret and present data using bar charts, pictograms and tables.
4	Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.

Upper Key Stage 2

Year Group	<u>Key Performance Indicators - Place Value</u>
	<u>Upper Key Stage 2 End points</u> <ul style="list-style-type: none"> - Extend their understanding of the number system and place value to include larger integers. - Be introduced to the language of algebra as a means for solving a variety of problems - Read, spell and pronounce mathematical vocabulary correctly.
5	Read, write, order and compare numbers to at least 1000000 and determine the value of each digit.
	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 1000000 to the nearest 10, 100, 1000, 10000 and 100000
	Establish whether a number up to 100 is prime and recall prime numbers up to 19
6	Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.
	Round any whole number to a required degree of accuracy.
	Use negative numbers in context, and calculate intervals across zero.
	Use simple formulae

Year Group	<u>Addition and Subtraction</u>
	<ul style="list-style-type: none"> - 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. - Be fluent in written methods for all four operations, including long multiplication and division.
5	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
6	Perform mental calculations using efficient strategies to simplify calculations where appropriate, including with mixed operations and large numbers.

	Solve problems with multi-steps involving addition, subtraction, multiplication and division.
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Year Group	<u>Key Performance Indicators - Multiplication and Division</u>
	<u>Upper Key Stage 2 End points</u> <ul style="list-style-type: none"> - 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. - Be fluent in written methods for all four operations, including long multiplication and division.
5	Multiply and divide whole numbers by 10, 100 and 1000.
	Multiply numbers up to 4 digits by a one or two digit number using a formal written method, including long multiplication for 2 digit 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.
6	Multiply multi-digit number up to 4 digits by a 2 digit number using the formal written method of long multiplication.
	Divide numbers up to 4 digits by a 2 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.
	Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division, interpreting remainders according to context.
	Perform mental calculations using efficient strategies to simplify calculations where appropriate, including with mixed operations and large numbers.
	Identify common factors, common multiples and prime numbers.
	<u>Solve problems with multi-steps involving addition, subtraction, multiplication and division.</u>

Year Group	Key Performance Indicators - Fractions, Decimals and Percentages Upper Key Stage 2 End points <ul style="list-style-type: none"> - 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. - Be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.
5	Compare and order fractions whose denominators are 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
	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 $0.71 = 71/100$
	Read, write, order and compare numbers with up to three decimal places.
	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.
	Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
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.	
6	Calculate using decimals, fractions and percentages
	Compare and order fractions, including fractions > 1
	Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions.
	Multiply simple pairs of proper fractions, writing the answer in its simplest form for example $1/4 \times 1/2 = 1/8$
	Divide proper fractions by whole numbers e.g. $1/3 \div 2 = 1/6$
	Recall and use equivalences between simple fractions, decimals and percentages, expressing as equivalent quantities
	Identify the value of each digit in numbers given to three decimal places and multiply numbers by 10, 100 and 1000 giving answers up to 3dp.
Multiply one digit numbers with up to 2dp by whole numbers.	

Use written division methods in cases where the answer has up to two decimal places.
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 the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
Solve problems involving similar shapes where the scale factor is known or can be found.

Year Group	<u>Key Performance Indicators - Shape</u>
	<u>Upper Key Stage 2 End points</u>
	<ul style="list-style-type: none"> - Develop their understanding of geometry and measures to consolidate and extend knowledge developed in number. - Classify shapes with increasingly complex geometric properties and learn the vocabulary they need to describe them.
5	Identify 3D shapes, including cubes and other cuboids, from 2D representations.
	Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.
	Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles.
	Draw given angles, and measure them in degrees (o)
6	Draw 2D shapes using given dimensions and angles.
	Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons.
	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).
	Illustrate and name parts of circles, including radius, diameter and circumference and know that diameter is twice the radius.

Year Group	<u>Key Performance Indicators - Measure</u>
5	Measure and calculate the perimeter of composite rectilinear shapes in cm and m.
	Convert between different units of metric measure (for example, km and m; cm and m; cm and mm; g and kg; l and ml)
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 3dp.

Year Group	<u>Key Performance Indicators - Statistics</u>
5	Complete, read and interpret information in tables including timetables.
6	Interpret and construct pie charts and line graphs and use these to solve problems.
	Calculate the mean as an average.