

**Purpose of study**

Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore 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 (National Curriculum 2014)

Our school ethos

Our pedagogy mainly derives from a child centred approach to learning and it is our belief that children learn best if:

- teaching involves small steps and is of high quality
- they are motivated and involved
- first hand and concrete experiences are part of their learning
- children have time to practise
- children feel confident and are in a positive environment
- learning is accessible
- there is a promotion of precise use of mathematical language
- use of cross-curricular links where possible
- success is celebrated

Intent

- To develop all children's understanding of the principles of mathematics
- To develop well-rounded and successful mathematicians, informed by the National Curriculum, and exposed to carefully designed lessons with opportunities to explore and challenge, taught with a clear mathematics objective
- To deliver a maths mastery curriculum which is based on small steps teaching, allowing the majority of children to progress together
- To provide opportunities to develop fluency and to be able to apply this knowledge through reasoning and problem solving
- To provide the opportunities to build year on year on prior mathematical understanding
- To use technology such as online tools, resources and expertise
- To provide a framework for teachers from which they have autonomy to deploy their specialised skills and learning strategies, whilst ensuring a consistent approach to the use of models designed to support children in their understanding

Aims

The national 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 Statutory Framework for the Early Years Foundation Stage requires that mathematics involves:

- providing children with opportunities to develop and improve their skills in counting, understanding and using numbers, calculating simple addition and subtraction problems; and to describe shapes, spaces, and measure

The early learning goals for mathematics are:

- *Numbers:* children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.
- *Shape, space and measures:* children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.

Key concepts and skills

Our children will have a knowledge and understanding of:

- Number and Place Value and rounding
- Addition and Subtraction
- Multiplication and Division
- Fractions

- Decimals (from Year 4)
- Percentages (from Year 5)
- Measures
- Properties of Shapes
- Position, direction and movement
- Data
- Ratio and proportion (from Year 6)
- Algebra

Our children will be able to:

- Recall a range of number facts fluently and automatically
- Consider a range of problems, work out the steps needed and apply the appropriate mathematics to solve them
- Use a range of concrete materials to support their calculation, reasoning and to provide proof.
- Learn without limits, making cross-curricular links to secure mastery

Implementation

In the Early Years Foundation Stage, we follow the EYFS Curriculum and Development Matters. The NCETM Number Blocks materials support teaching. Daily sessions are dedicated to the teaching and learning of mathematics and opportunities for furthering children's thinking and understanding are exploited daily through continuous provision. In EYFS, maths sessions develop fluency and practise key numeracy skills. Observation, photographs, records of discussion with children and some recorded maths work are the main sources of evidence in EYFS. In Reception, a majority of the number teaching and learning is through our use of our Mastering Number programme resourced by NCETM; these sessions are supplemented by the Reception White Rose scheme of learning.

Throughout Key Stage 1 and 2, mathematics is taught following the Herts for Learning scheme and is supplemented where appropriate with other materials such as White Rose and NCETM resources. Herts for Learning promotes small steps in learning and variation to enhance pupils' understanding. In Key Stage One Mastering Number is continued to extend understanding of number using a rekenrek among other resources. In Key Stage 2, to ensure that key skills taught early in the year are not forgotten, Quick Maths plans ensure key areas are revisited.

It is essential that children have a good knowledge of number facts. To ensure that this is developed, all year groups from EYFS to Year 6 take part in the Race for Recall in which children work on learning number facts which are appropriate for their age and development. A short, weekly timed test is taken before moving on to the next level. Home learning is linked to rapid recall and parents are encouraged to support their children in their learning.

Our practical implementation:

Teaching programme	Main teaching resource	Teacher planning	Child recording	Teacher recording	Assessment	Timetable allocation
Daily lessons Rapid intervention within lesson by CT or LSA Mastering Number- Rec, Year 1 and Year 2 Quick Maths session- KS2 Intervention groups (organised through pupil progress meetings)	EYFS- Early Years Stage Foundation Curriculum, supplemented by White Rose resources and NCETM resources in Reception Year 1 to Year 6- Herts for Learning Scheme of Work, supplemented by other resources e.g. White Rose and NCETM	Weekly planner showing objective, success criteria, hinge question, SEN adaptation and evaluation Daily lesson structure	EYFS: Maths books with plain paper. Observations of practical activities added to Tapestry. KS1: 2cm squared maths Books KS2: 1cm squared maths books	Live and detailed feedback in pupils' books Tracking sheets	Herts for Learning termly diagnostic assessments Class tracking grids Daily self-assessment using 'three trays' Year 2 and Year 6 statutory end of year assessments	Nursery- four taught maths sessions with three directed activities per week Reception- daily maths teaching, as well as 10 minutes daily Quick Maths/ Mastering Number KS1: 50 minutes per day, as well as 10 minutes daily Quick Maths KS2: 1 hour per day, as well as 10 minutes daily Quick Maths

EYFS mathematics scheme of learning yearly overview

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Nursery	Colour and shape	Numbers to 5	Size and measure	Days of the week and positional language	Numbers to 5 and beyond	Coins and patterns
Reception	Numbers to 10	Numbers beyond 10	Recognising patterns	Measuring	Number facts	Number facts

Key Stage 1 mathematics scheme of learning yearly overview

Autumn	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Year 1	Geometry	Numbers to ten							Numbers to twenty		Geometry	
	Positional language including ordinal numbers	Finding patterns in numbers (including subitising) Counting & comparison (more, less, fewer)	Estimating and ordering Regrouping the whole	Part whole addition and subtraction	Solving problems using part or whole unknown Comparison	Equality and balance	Making ten and some more Estimating and ordering One more and one less	Doubling and halving Odd & even numbers	Name and properties of 2D and 3D shapes			
Year 2	Numbers to twenty		Place Value		Addition and Subtraction							
	Securing fluency to twenty		Making tens and some more Regrouping two-digit numbers Counting on and back in ones and tens from any number	Representing, ordering and comparing numbers to 100 Quantities for measures Estimation & magnitude	Numbers to 20- mental addition and subtraction Finding complements of 10 and 100 including measures	Add and subtract numbers mentally using 1 and 2 digit numbers	Finding part or whole unknown	Money- making combinations and finding change Comparison (difference, more, less, fewer) Measures- estimation and measuring using different scales				

Spring	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Year 1	Measures		Numbers to twenty					Measures	Extending counting-numbers to 100	Measures
	The language of comparing length, height, mass and speed Sequencing events- days of the week and months of the year		Adding using 'Think 10' Subtraction using 'Think 10'		Equality and balance Part or whole unknown	Language and problem solving (part or whole unknown) Comparison (difference, more, less, fewer) including statistics		Coins and combinations to 20p Ordering and comparing	Counting in 2s, 5s, and 10s	Non-standard measures and introducing simple standard measures
Year 2	Statistics	Addition and Subtraction			Measures-Time	Multiplication and Division				
	Totalling and comparing amounts in block graphs, pictograms, tables and tally charts	Written addition method Commutativity in addition but not in subtraction Written subtraction method		Problem solving with addition and subtraction in a range of contexts	Telling the time: O'clock, half past, quarter past and quarter to Estimating, ordering and comparing time	Double and halve one and two-digit numbers and amounts of money Times tables- 2s, 5s and 10s. Patterns and strategy (counting in 3s)	Multiplication- multiples and repeated addition Multiplication- numbers of groups, group size and product Multiplication problem solving		Division- sharing and grouping Problems including remainders	

Summer	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Remaining Weeks
Year 1	Multiplication and division				Measure-time	Fractions			Numbers to twenty	Place value			Review and close the gap sessions focusing upon high value learning
	Equal and unequal groups and remainders Repeated addition and arrays (number of group and size of group) Problem solving (identifying the number of groups and the size of the group)		Scaling and counting in 2s to 24	Sharing and grouping problems	Telling the time, O'clock and half past	Sharing into equal groups	Equal or unequal parts of shapes	Of continuous quantities including capacity	Review of learning	Numbers to one hundred- Place value and digits, making tens and some more Estimation, ordering and comparison			

Year 2	Fractions		Measures-time	Addition, subtraction, multiplication & division	Multi-plication & division	Geometry	Addition, subtraction multi-plication & division	Geometry	Place Value-addition & subtraction	Review and close the gap sessions focusing upon high value learning
	Finding halves, quarters and thirds of amounts Finding halves, quarters and thirds of shapes Finding three-quarters of shapes and amounts	Equivalence Fractions of continuous quantities	Telling the time to the nearest 5 minutes	Problem solving for all operations (including fractions)	Equality and balance	Properties of 2-D and 3-D shapes Classifying and sorting Symmetry	Mental calculation review	Sequencing Rotation and right angles	Place value and written calculation review	

Daily on-going practise

Year 1 and 2

- Days of the week and months of the year should be revised daily through routine discussion of date.
- Sequencing of events in chronological order reinforced through use of a daily timetable.
- Children can compare the numbers of children choosing each choice on the dinner menu, identifying which has the most votes, whether choices are equal or whether some have fewer votes.
- Once time has been taught, children should have their attention drawn to the clock when it is o'clock or half past.

Year 2

- Days of the week and months of the year should be revised daily through routine discussion of date.
- Children should be encouraged to calculate the totals on the dinner register, and practise mental calculation strategies through questions such as "how many more are having red than yellow?"
- Once time has been taught, children should be asked to let you know what the time is, or to inform you when it is 12.00. They could be asked to work out how much longer we have until lunchtime, or what time we will finish an activity if we spend half an hour more on it.
- Pictograms and bar charts should be placed in the classroom and referred to regularly. For example – how many birthdays do we have in November? How many children have moved up 3 levels on Race for Recall? What is the total number of children who have moved up more than 3 levels?

Mastering Number

Key number concepts are reinforced and practised daily in Key Stage 1, through the NCETM resources Mastering Number programme using different representations including the rekenrek. This gives all children key learning in the structure of numbers and key concepts.

Race for Recall

Key concepts for Year 1 and 2 will be reinforced and practised through stages 1 and 2 of the Race for Recall. These include number bonds within 5, 10, 20 and 100; one more and one less than any number to 100; doubling and halving; and multiplication facts for the 2, 5 and 10 times tables. Children will be given a series of activities to practise these at home, and weekly short timed tests will be carried out to assess their progress.

Lower Key Stage 2 mathematics scheme of learning yearly overview

Autumn	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Year 3	Place value		Addition and subtraction						Statistics	Geometry		
	Place value and regrouping Counting on and back in ones, tens and hundreds	Estimation, magnitude and rounding Measures- comparison	Mental fluency- addition Mental fluency- subtraction Fact families and applying the inverse			Written addition	Written subtraction	Problem solving- worded problems	Interpreting bar charts and tables	Angles incl. right angles Parallel & Perpendicular lines, Vertical & horizontal lines	2-D Shape- Properties and Drawing	Perimeter incl. problem solving Using written & mental methods
Year 4	Place Value	Addition and Subtraction		Multiplication and division			Place value, addition, subtraction, multiplication & division	Multiplication and division- conversion		Statistics	Measurement	
	Place value- order and compare numbers beyond 1000 Rounding, estimation and magnitude	Securing addition and subtraction mental fluency	Securing formal written addition and subtraction fluency	Counting in multiples of 6, 7, 9, 25 and 100 Multiplication and division facts (times tables)		Factor pairs, integer scaling and correspondence problems	Problem solving incl. measures to apply place value, mental strategies and arithmetic laws	Multiply and divide a one or two-digit number by 10 and 100 Measure- conversion of units Measures- compare, estimate and calculate		Discrete and continuous data (time graphs), including application of scales and division	Perimeter	

Spring	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Year 3	Multiplication and division		Statistics	Multiplication and division	Fractions				Multiplication	
	Multiplication- 3,4, and 8 times tables including counting Division- 1,2,3,5,4,and 8 times tables Multiplication- strategy, associative and distributive Laws		Pictograms and scaled bar charts	Multiplication and division worded problems	Finding fractions of discrete and continuous quantities	Ordering and comparing fractions Adding and subtracting fractions Fractions- problem solving with unit and non-unit fractions			Multiplication- multiplying multiples of ten Multiplication- formal written multiplication methods	
Year 4	Geometry	Division and fractions		Addition and subtraction- money	Fractions			Multiplication and division		
	Properties of shape symmetry	Decimal numbers Calculating with decimals		Measure- money Problem solving involving decimals to two decimal places	Add and subtract fractions with the same denominator Finding fractions of quantities Fractions in the context of measure		Equivalent fractions, ordering and comparing	Multiply two and three-digit numbers by a one-digit number using a formal written layout Divide two and three-digit numbers by a one-digit number using a formal written layout		

Summer	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Remaining Weeks
Year 3	Division		Multi- plication & division	Division	Measure- time		Addition, subtraction, multiplication and division		Place value and decimals		Measure	Geometry	Review and close the gap sessions focusing upon high value learning
	Division problem solving- sharing and grouping	Division- two and three-digit numbers by one-digit numbers including halving	Multiplication on division and fractions- scaling and correspondence problems	Division- long division	Time- hours, minutes, seconds, days, weeks, months, years Time- telling the time (analogue and digital) and estimation Time- duration		Securing the four operations with whole number including problem solving		Place value and decimals- ten times greater and ten times smaller Place value and decimals- regrouping Place value and decimals- estimation, comparing and rounding		Measuring and problem solving	3-D shape- building and identifying properties	

Year 4	Measure	Statistics	Roman numerals Negative numbers	Geometry		Multiplication and division	Measure	Fractions	Multiplication and division Negative numbers	Review and close the gap sessions focusing upon high value learning
	Time- read, write, calculate and convert time on analogue and digital 12 and 24 hour clocks	Statistics- interpret and present continuous and discrete data Solve problems incorporating measures	Roman numerals to 100 and zero Negative numbers- counting through zero and calculating in context	Angles Properties of triangles	Coordinates in the first quadrant and translation Position and direction, incorporating angles and plotting points of a shape	Multiplication and division review	Area	Fractions review	Application and problem solving- developing operation sense	

Daily on-going practise

Quick Maths

A daily Quick Maths session will take place in Year 3 and 4 outside of the daily maths lesson so teachers can plan to revisit a mixture of skills and concepts learnt throughout KS2. These will follow the Quick Maths termly planning. It is particularly important at this stage that all areas are revisited to support children's ability to solve multi-step problems and to apply their knowledge in a wide range of contexts.

Race for Recall

Multiplication knowledge for Year 3 and 4 will be reinforced and practised through stages 3 and 4 of the Race for Recall. These include multiplication and division facts for all times tables, building on prior learning of 2, 5 and 10 times tables in stage 2. Children will be given a series of activities to practise these at home, and weekly short timed tests will be carried out to assess their progress. Where necessary it is expected that children will move back to stage 2 to learn any facts that are not yet secure and that children who have secured all facts will move on to stage 5.

Upper Key Stage 2 mathematics scheme of learning yearly overview (planning for Year 6 is flexible and may change due to pupil and class assessments)

Autumn	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Year 5	Place value			Multiplication and division		Place value Multiplication and division	Addition and subtraction		Multiplication	Division	Fractions	
	Place value and rounding of large numbers Interpret negative numbers	Place value of numbers with up to three decimal numbers		Multiply and divide by 10, 100 and 1,000 Properties of number-multiples, factors and common factors Prime and composite numbers		Multiply and divide Mentally solve problems involving knowledge of key facts	Add and subtract using a range of strategies	Add and subtract using formal written methods	Formal written method for multiplication	Formal written method of short division	Equivalent fractions Compare and order fractions Adding and subtracting fractions	
Year 6	Place Value		Addition, subtraction, multiplication and division		Fractions			Fractions, decimals & percentages	Multiplication	Measures	Division	Geometry
	Place value Multiply and divide by 10, 100 and 1,000	Choosing effective mental calculation strategies	Problem solving with four operations Application of factors, multiples and primes		Equivalent fractions Comparing and ordering fractions Adding and subtracting fractions			Fraction and decimals Equivalent fractions, decimals & percentages Calculating percentages	Formal written method of multiplication	Area of parallelograms and triangles	Formal written method of short division	Properties of shape

Spring	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Year 5	Addition, subtraction, multiplication and division	Fractions	Measure			Percentages		Geometry	Measure Geometry	
	Problem solving- All four operations	Multiply fractions by whole numbers Fraction problem solving	Measure- converting units of measure	Area Volume and capacity		Percentages Problem solving- percentages		3-D shapes from 2D representations Reflection and translation	Perimeter Estimate, compare, measure and draw angles Identify unknown angles	

Year 6	Addition, subtraction, multiplication and division	Division	Measures	Geometry	Fractions		Ratio and proportion	Measures	Statistics	Algebra
	Order of operations and algebra	Formal written method for long division	Exploring relationships between perimeter and area	Recognise and find angles Reflection and translation	Multiplying fractions Dividing fractions Fractions problem solving		Ratio and proportion	Volume Measures	Statistics- interpret line graphs and pie charts	Algebra and sequences

Summer	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Remaining weeks
Year 5	Multiplication and division		Multiplication and division scaling	Measure	Fractions, decimals & percentages	Measure	Addition, subtraction, multiplication and division	Geometry		Statistics		Roman numerals	Review and close the gap sessions
	Formal methods for division and multiplication in Increasingly complex problems Strategies for multiplication and division (mental and written)		Solving problems involving scaling by simple fractions and rates	Conversions of imperial and metric units of measure	Fractions, decimals and percentages problem solving	Reading timetables and calculating with time	Solve problems involving the four operations	Distinguish between regular and irregular polygons Use properties of rectangles		Statistics- solve comparison, sum and difference problems using information in a line graph	Statistics- interpreting and evaluating information presented in charts and tables	Roman numerals	focusing upon high value learning
Year 6	Statistics	Addition, subtraction, multiplication and division	Consolidation of key learning	Post SATs 1		Post SATs 2		Post SATs 3		Post SATs 4		Post SATs 5	
	Statistics- calculate & interpret mean average Application of previous years' learning	Application of known facts and calculation strategies		Constructing pie charts		Statistical representations		Further algebra		Financial maths and enterprise		Maths preparation for KS3	

Daily on-going practiseQuick Maths

A daily Quick Maths session will take place in Year 5 and 6 outside of the daily maths lesson so teachers can plan to revisit a mixture of skills and concepts learnt throughout KS2. These will follow the Quick Maths termly planning. It is particularly important at this stage that all areas are revisited to support children's ability to solve multi-step problems and to apply their knowledge in a wide range of contexts.

Race for Recall

Children who are not yet secure in their times table knowledge will be given daily practise to complete at home in addition to a ten minute daily fluency session. Other children will develop their fluency when multiplying by decimals and fractions. Multiplication skills will be reinforced through Stage 5 of Race for Recall. All children will be given a series of activities to practise at home and there will be a short weekly timed test to assess their progress.