

Mathematics Overview

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.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects. The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Information and communication technology (ICT)

Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. Teachers should use their judgement about when ICT tools should be used.

Spoken language

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

National Curriculum Knowledge

By the end of KS1 Pupils should...

- 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].
 - Recognise, describe, draw, compare and sort different shapes and use the related vocabulary.
 - Teaching should also involve using 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. An emphasis on practice at this early stage will aid fluency.
- Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Value	Resilience	Integrity	Democracy	Creativity	Gratitude	Diversity
Key Events	Key Events	Harvest Festival Black History Month (October) Mental Health Day Show Racism the Red Card	Remembrance Day Anti-bullying Week Christingle	Children's mental health week Safer Internet Day	World Book Day Science Week	Diversity day GRT Month

	Year 1	Year 2
Place value: Count	<ul style="list-style-type: none"> count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number Count numbers to 100 in numerals; count in multiples of twos, fives and tens 	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
Place value: Represent	<ul style="list-style-type: none"> identify and represent numbers using objects and pictorial representations read and write numbers to 100 in numerals <p>read and write numbers from 1 to 20 in numerals and words</p>	<ul style="list-style-type: none"> read and write numbers to at least 100 in numerals and in words identify, represent and estimate numbers using different representations, including the number line
Place value: Use and compare	<ul style="list-style-type: none"> given a number, identify one more and one less 	<ul style="list-style-type: none"> recognise the place value of each digit in a two-digit number (tens, ones) compare and order numbers from 0 up to 100; use <, > and = signs
Place value: Problems/Rounding	<ul style="list-style-type: none"> solve one-step problems using concrete objects and pictorial representations 	<ul style="list-style-type: none"> use place value and number facts to solve problems
Addition & subtraction: Calculations	<ul style="list-style-type: none"> add and subtract one-digit and two-digit numbers to 20, including zero 	<ul style="list-style-type: none"> add and subtract numbers using concrete objects, pictorial representations, and mentally, including: <ul style="list-style-type: none"> a two-digit number and ones a two-digit number and tens two two-digit numbers adding three one-digit numbers
Addition & subtraction: Problems	<ul style="list-style-type: none"> solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square + 2$ $\square - 9 = 2$ 	<ul style="list-style-type: none"> solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods
Multiplication & division: Recall/Use	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
Multiplication & division: Calculations	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs
Multiplication & division: Problems	<ul style="list-style-type: none"> solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher 	<ul style="list-style-type: none"> solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts
Fractions: Recognise and write	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> recognise, find, name and write fractions of $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
Fractions: Compare	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$
Fractions: Calculations	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> write simple fractions such as $\frac{1}{2}$ of $6 = 3$
Algebra	<ul style="list-style-type: none"> solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square + 2$ $\square - 9 = 2$ 	<ul style="list-style-type: none"> recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems
Using measures	<ul style="list-style-type: none"> compare, describe and solve practical problems for: <ul style="list-style-type: none"> lengths and heights mass/weight 	<ul style="list-style-type: none"> choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature ($^{\circ}\text{C}$); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels

	<ul style="list-style-type: none"> ➤ capacity and volume ➤ time · measure and begin to record the following: ➤ lengths and heights ➤ mass/weight ➤ capacity and volume · time (hours, minutes, seconds) 	<ul style="list-style-type: none"> · compare and order lengths, mass, volume/capacity and record the results using >, < and =
Money	<ul style="list-style-type: none"> · recognise and know the value of different denominations of coins and notes 	<ul style="list-style-type: none"> · recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value · find different combinations of coins that equal the same amounts of money · solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving · change
Time	<ul style="list-style-type: none"> · sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening] · recognise and use language relating to dates, including days of the week, weeks, months and years · tell the time to the hour and half past the hour and draw the hands on a clock face to show these times 	<ul style="list-style-type: none"> · compare and sequence intervals of time · 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 · know the number of minutes in an hour and the number of hours in a day
2-D shapes	<ul style="list-style-type: none"> · recognise and name common 2-D shapes [for example, rectangles (including squares), circles and triangles] 	<ul style="list-style-type: none"> · identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line · identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid] · compare and sort common 2-D shapes and everyday objects
3-D shapes	<ul style="list-style-type: none"> · recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] 	<ul style="list-style-type: none"> · recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] · compare and sort common 3-D shapes and everyday objects
Position and direction	<ul style="list-style-type: none"> · describe position, direction and movement, including whole, half, quarter and three-quarter turns 	<ul style="list-style-type: none"> · order and arrange combinations of mathematical objects in patterns and sequences · use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)
Present and interpret data		<ul style="list-style-type: none"> · interpret and construct simple pictograms, tally charts, block diagrams and simple tables
Solve statistical problems		<ul style="list-style-type: none"> · ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity · ask and answer questions about totalling and comparing categorical data

RECEPTION

Number Comparison

Development matters		Birth to 5 matters	
3 and 4 year olds	Reception	Range 5	Range 6
<ul style="list-style-type: none"> · Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5. · Experiment with their own symbols and marks as well as numerals. 	<ul style="list-style-type: none"> · Count objects, actions and sounds. · Compare numbers. 	<ul style="list-style-type: none"> · Compares two small groups of up to five objects, saying when there are the same number of objects in each group, e.g. You've got two, I've got two. Same! 	<ul style="list-style-type: none"> · Uses number names and symbols when comparing numbers, showing interest in large numbers · Estimates of numbers of things, showing understanding of relative size

Counting

Development matters		Birth to 5 matters	
3 and 4 year olds	Reception	Range 5	Range 6

<ul style="list-style-type: none"> Recite numbers past 5. Say one number for each item in order: 1, 2, 3, 4, 5. 	<ul style="list-style-type: none"> Count beyond ten. 	<ul style="list-style-type: none"> May enjoy counting verbally as far as they can go Points or touches (tags) each item, saying one number for each item, using the stable order of 1,2,3,4,5. Uses some number names and number language within play, and may show fascination with large numbers Begin to recognise numerals 0 to10 	<ul style="list-style-type: none"> Enjoys reciting numbers from 0to 10 (and beyond) and back from 10 to 0 Increasingly confident at putting numerals in order 0 to 10 (ordinality)
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Cardinality

Development matters		Birth to 5 matters	
3 and 4 year olds	Reception	Range 5	Range 6
<ul style="list-style-type: none"> Develop fast recognition of up to3 objects, without having to count them individually ('subitising'). Know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle'). Show 'finger numbers' up to 5. 	<ul style="list-style-type: none"> Subitise Link the number symbol (numeral) with its cardinal number value. 	<ul style="list-style-type: none"> Subitises one, two and three objects (without counting) Counts up to five items, recognising that the last number said represents the total counted so far (cardinal principle) Links numerals with amounts up to 5 and maybe beyond Explores using a range of their own marks and signs to which they ascribe mathematical meanings 	<ul style="list-style-type: none"> Engages in subitising numbers to four and maybe five Counts out up to 10 objects from a larger group Matches the numeral with a group of items to show how many there are (up to 10)

Composition

Development matters		Birth to 5 matters	
3 and 4 year olds	Reception	Range 5	Range 6
<ul style="list-style-type: none"> Solve real world mathematical problems with numbers up to 5. 	<ul style="list-style-type: none"> Understand the 'one more than/one less than' relationship between consecutive numbers. Explore the composition of numbers to 10. Automatically recall number bonds for numbers 0-5 and some to 10. 	<ul style="list-style-type: none"> Through play and exploration, beginning to learn that numbers are made up (composed) of smaller numbers Beginning to use understanding of number to solve practical problems in play and meaningful activities Beginning to recognise that each counting number is one more than the one before Separates a group of three or four objects in different ways, beginning to recognise that the total is still the same 	<ul style="list-style-type: none"> Shows awareness that numbers are made up (composed) of smaller numbers, exploring partitioning in different ways with a wide range of objects Begins to conceptually subitise larger numbers by subitising smaller groups within the number, e.g. sees six raisins on a plate as three and three In practical activities, adds one and subtracts one with numbers to 10 Begins to explore and work out mathematical problems, using signs and strategies of their own choice, including (when appropriate) standard numerals, tallies and "+" or "-"

SHAPE, SHAPE AND MEASURE

Spatial Awareness

Development matters		Birth to 5 matters	
3 and 4 year olds	Reception	Range 5	Range 6
<ul style="list-style-type: none"> Compare quantities using language: 'more than', 'fewer than', Understand position through words alone – for example, "The bag is under the table," – with no pointing. Describe a familiar route. Discuss routes and locations, using words like 'in front of' and 'behind'. 	<ul style="list-style-type: none"> Select, rotate and manipulate shapes in order to develop spatial reasoning skills. 	<ul style="list-style-type: none"> Responds to and uses language of position and direction Predicts, moves and rotates objects to fit the space or create the shape they would like 	<ul style="list-style-type: none"> Uses spatial language, including following and giving directions, using relative terms and describing what they see from different viewpoints Investigates turning and flipping objects in order to make shapes fit and create models; predicting and visualising how they will look (spatial reasoning) May enjoy making simple maps of familiar and imaginative environments, with landmarks

Shape

Development matters		Birth to 5 matters	
3 and 4 year olds	Reception	Range 5	Range 6
<ul style="list-style-type: none"> • Talk about and explore 2D and 3D shapes (for example, circles rectangles, triangles and cuboids) using informal and mathematical language: ‘sides’, ‘corners’, ‘straight’, ‘flat’, ‘round’. • Select shapes appropriately: flat surfaces for building, a triangular prisms for a roof, etc. • Combine shapes to make new ones – an arch, a bigger triangle, etc. 	<ul style="list-style-type: none"> • Compose and decompose shapes so that children recognize a shape can have other shapes <i>within</i> it, just as numbers can. 	<ul style="list-style-type: none"> • Chooses items based on their shape which are appropriate for the child’s purpose • Responds to both informal language and common shape names • Shows awareness of shape similarities and differences between objects • Enjoys partitioning and combining shapes to make new shapes with 2D and 3D shapes • Attempts to create arches and enclosures when building, using trial and improvement to select blocks 	<ul style="list-style-type: none"> • Uses informal language and analogies, (e.g. <i>heart-shaped and hand-shaped leaves</i>), as well as mathematical terms to describe shapes . • Enjoys composing and decomposing shapes, learning which shapes combine to make other shapes • Uses own ideas to make models of increasing complexity, selecting blocks needed, solving problems and visualising what they will build.

Pattern

Development matters		Birth to 5 matters	
3 and 4 year olds	Reception	Range 5	Range 6
<ul style="list-style-type: none"> • Talk about and identify the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like ‘pointy’, ‘spotty’, ‘blobs’, etc. • Extend and create ABAB patterns – stick, leaf, stick, leaf. • Notice and correct an error in a repeating pattern. 	<ul style="list-style-type: none"> • Continue, copy and create repeating patterns. 	<ul style="list-style-type: none"> • Creates their own spatial patterns showing some organisation or regularity • Explores and adds to simple linear patterns of two or three repeating items, e.g. stick, leaf(AB) or stick, leaf, stone (ABC) • Joins in with simple patterns in sounds, objects, games and stories dance and movement, predicting what comes next 	<ul style="list-style-type: none"> • Spots patterns in the environment, beginning to identify the pattern “rule” • Chooses familiar objects to create and recreate repeating patterns beyond AB patterns and begins to identify the unit of repeat

Measure

Development matters		Birth to 5 matters	
3 and 4 year olds	Reception	Range 5	Range 6
<ul style="list-style-type: none"> • Make comparisons between objects relating to size, length, weight and capacity. • Begin to describe a sequence of events, real or fictional, using words such as ‘first’, ‘then...’ 	<ul style="list-style-type: none"> • Compare length, weight and capacity. 	<ul style="list-style-type: none"> • In meaningful contexts, finds the longer or shorter, heavier or lighter and more/less full of two items • Recalls a sequence of events in everyday life and stories. 	<ul style="list-style-type: none"> • Enjoys tackling problems involving prediction and discussion of comparisons of length, weight or capacity, paying attention to fairness and accuracy • Becomes familiar with measuring tools in everyday experiences and play • Is increasingly able to order and sequence events using everyday language related to time • Beginning to experience measuring time with timers and calendars