

Key Stage 2 Mathematics Programme of Study



Strands	Elements	Year 3	Year 4	Year 5	Year 6
		Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Developing numerical reasoning	Identify processes and connections	- transfer mathematical skills to a variety of contexts and everyday situations - identify the appropriate steps and information needed to complete the task or reach a solution - select appropriate mathematics and techniques to use - select and use suitable instruments and units of measurement - choose an appropriate mental or written strategy and know when it is appropriate to use a calculator - estimate and visualise size when measuring and use the correct units			
	Represent and communicate	- explain results and procedures clearly using mathematical language - refine informal methods of recording written calculations, moving to formal methods of calculation when developmentally ready - use appropriate notation, symbols and units of measurement - select and construct appropriate charts, diagrams and graphs with suitable scales recognise, and generalise in words, patterns that arise in numerical, spatial or practical situations visualise and describe shapes, movements and transformations			
	Review	- select from an increasing range of checking strategies to decide if answers are reasonable - interpret answers within the context of the problem and consider whether answers, including calculator, analogue and digital displays, are sensible - draw conclusions from data and recognise that some conclusions may be misleading or uncertain			

Key

Within the table, text taken from the LNF will appear as non-bold. Text that has been extended from the LNF or that is a specific Mathematics Programme of Study skill will appear as bold. These skills are further identified by the following icons.

Extended skill ▲ **Programme of study skill** ❖ When combined with the LNF statements, these skills form the Key Stage 2 Mathematics Programme of Study.

N.B.

In order to comply with accessibility and legibility, these tables have been designed to be printed at their optimum size of A3.

Key Stage 2 Mathematics Programme of Study



		Year 3	Year 4	Year 5	Year 6
Strands	Elements	Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using number skills	Use number facts and relationships	• read and write numbers to 1 000 • compare and estimate with numbers up to 100 • explain the value of a digit in numbers up to 1 000 ❖ • use mental strategies to recall number facts within 20 • recall 2, 3, 4, 5 and 10 multiplication tables and use to solve multiplication and division problems • multiply numbers by 10 • identify multiples of 2, 3, 4, 5 and 10; use the term multiple ❖ • identify odd and even numbers up to 1 000 ❖	• read and write numbers to 10 000 • compare and estimate with numbers up to 1 000 • use mental strategies to recall multiplication tables for 2, 3, 4, 5, 6 and 10 and use to solve division problems • multiply and divide numbers by 10 and 100 • identify multiples of 2, 3, 4, 5, 6 and 10; use the terms multiple and factor ❖	• read and write numbers to 100 000 • compare numbers with 1 and 2 decimal places • use mental strategies to recall multiplication tables for 2, 3, 4, 5, 6, 8 and 10 and use to solve division problems • multiply and divide numbers and decimals by 10 and 100 • identify multiples of 2, 3, 4, 5, 6, 8 and 10; use the terms multiple and factor ❖ • identify prime numbers as having only two factors; recognise that 1 is not a prime number ❖ • identify prime numbers below 10 ❖	• read and write numbers to 1 million and numbers to 3 decimal places • use mental strategies to recall multiplication tables up to 10 x 10 and use to solve division problems • multiply numbers and decimals by a multiple of 10, e.g. 1.5×30, $1.4\text{cm} \times 20$ • identify multiples of numbers up to 10; use the terms multiple and factor ❖ • identify common multiples of two numbers ❖ • identify common factors of two numbers ❖ • identify prime numbers ❖ • know prime numbers below 20 ❖

Key Stage 2 Mathematics Programme of Study



		Year 3	Year 4	Year 5	Year 6
Strands	Elements	Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using number skills	Fractions, decimals, percentages and ratio	• use halves and quarters • halve 2-digit numbers in the context of number, money and measures • find fractional quantities linked to known multiplication facts, e.g. $\frac{1}{3}$ of 18, $\frac{1}{5}$ of 15 • recognise a quarter as a half of a half ❖	• halve 3-digit numbers in the context of number, money and measures • find fractional quantities using known table facts, e.g. $\frac{1}{6}$ of 30cm • recognise fractions that are several parts of a whole, e.g. $\frac{2}{3}$, $\frac{3}{4}$, $\frac{3}{10}$	• use understanding of simple fraction and decimal equivalences when measuring and calculating, e.g. $\frac{1}{2} = 0.5$, $\frac{1}{10} = 0.1$ • calculate fractional quantities, e.g. $\frac{1}{6}$ of 24 = 3, so $\frac{2}{6}$ of 24 = 15 • use doubling and halving strategies when working with simple proportions • share objects in a given ratio, e.g. red blocks and blue blocks in a ratio of 1:2 ❖ • recognise connections between fractions, e.g. one-tenth is half of one-fifth ❖ • add and subtract fractions with the same denominator ❖ • add fractions with the same denominator to make a whole ❖	• use understanding of simple fraction, decimal and percentage equivalences, e.g. find 25% of 60cm and know that this is equivalent to $\frac{1}{4}$ of 60cm • calculate percentage quantities based on 10%, e.g. 20%, 5%, 15% • use simple ratio and proportion • use ratio to express two or more quantities in words ❖ • state the proportion of a whole that each share represents, e.g. recognise that in a ratio of 1:3, 1 part represents a quarter of the total ❖ • find equivalent fractions and use these to add and subtract fractions ❖ • simplify fractions ❖

Key Stage 2 Mathematics Programme of Study



		Year 3	Year 4	Year 5	Year 6
Strands	Elements	Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using number skills	Calculate using mental and written methods:	- find differences within 100 - use mental strategies to add and subtract 2-digit numbers - use partitioning to double and halve 2-digit numbers define a negative number as being less than 0 ❖	- find differences within 1 000 - add a 2-digit number to, and subtract a 2-digit number from, a 3-digit number using an appropriate mental or written method - use mental strategies to multiply and divide 2-digit numbers by a single digit number identify negative whole numbers on a number line ❖ order whole numbers between -10 and 10 ❖	- find differences between numbers with 1 decimal place - add and subtract 3-digit numbers using an appropriate mental or written method - multiply and divide 3-digit numbers by a single-digit number order negative and positive numbers, including decimals to 1 decimal place ❖	- add and subtract numbers using whole numbers and decimals - multiply 2- and 3-digit numbers by a 2-digit number - divide 3-digit numbers by a 2-digit number add or subtract across zero using a number line, e.g. $-3 + 5$, $4 - 6$ ❖
	Estimate and check:	- check subtraction using addition - check halving using doubling - check multiplication using repeated addition	- check answers using inverse operations - estimate by rounding to the nearest 10 or 100	- check answers using inverse operations - estimate by rounding to the nearest 10, 100 or 1 000	- check answers using inverse operations - estimate by rounding to the nearest 10, 100, 1 000 or whole number
	Manage money	- use different combinations of money to pay for items up to £2 and calculate the change - order and compare items up to £10 - record money spent and saved	- use money to pay for items up to £10 and calculate the change - order and compare items up to £100 - add and subtract totals less than £10 using correct notation, e.g. $£6.85 - £2.76$ - manage money, compare costs from different retailers and determine what can be bought within a given budget	- order and compare the cost of items up to £1 000 - add and subtract totals less than £100 using correct notation, e.g. $£28.18 + £33.45$ - plan and track money and savings by keeping accurate records - realise that budgeting is important	- use the terms profit and loss in buying and selling activities and make calculations for this - understand the advantages and disadvantages of using bank accounts - make comparisons between prices and understand which is best value for money

Key Stage 2 Mathematics Programme of Study



Strands	Elements	Year 3	Year 4	Year 5	Year 6
		Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using measuring skills	Length, weight/mass, capacity	• recognise that perimeter is the distance around a shape • use standard units to estimate and measure: – length: measure on a ruler to the nearest $\frac{1}{2}$ cm – weight/mass: use 5g, 10g and 100g weights • capacity: use litres and half litres; measure to the nearest 100ml ▲ • choose between metric units to measure a length ❖	• measure and calculate the perimeter of squares and rectangles • select and use appropriate standard units to estimate and measure length, weight/mass and capacity ❖ • measure on a ruler to the nearest mm and record using a mix of units, e.g. 1cm 3mm • use weighing scales with divisions to weigh objects to the nearest 5g, 10g, 25g or 100g • measure capacities to the nearest 50ml or 100ml • convert metric units of length to smaller units, e.g. cm to mm, m to cm, km to m • choose appropriate metric units to measure length, weight/mass and capacity ❖	• measure and calculate perimeters • make estimates of length, weight/mass and capacity based on knowledge of the size of real-life objects ❖ • use measuring instruments with 10 equal divisions between each major unit, and record using decimal notation, e.g. 4.2cm, 1.3kg • make use of conversions, e.g. $\frac{1}{4}$ of a km = 250m • recognise the appropriateness of units in different contexts ❖	• read and interpret scales or divisions on a range of measuring instruments • make estimates of length, weight/mass and capacity based on knowledge of the size of real-life objects, recognising the appropriateness of units in different contexts ❖ • record measurements in different ways, e.g. 1.3kg = 1kg 300g • use the language of imperial units in daily use, e.g. miles, pints

Key Stage 2 Mathematics Programme of Study



		Year 3	Year 4	Year 5	Year 6
Strands	Elements	Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using measuring skills	Time	- tell the time to the nearest 5 minutes on an analogue clock and calculate how long it is to the next hour - read hours and minutes on a 12-hour digital clock using am/pm conventions calculate start times, finish times and durations using hours, 30-minute intervals and 15-minute intervals ❖	- tell the time to the nearest minute on analogue clocks - read hours and minutes on a 24-hour digital clock - time and order events in seconds - use calendars to plan events calculate start times, finish times and durations using 5-minute intervals ❖ convert between 12- and 24-hour clock times ❖ estimate the number of minutes everyday activities take to complete ❖	- read and use analogue and digital clocks - time events in minutes and seconds, and order the results calculate start times, finish times and durations using hours and minutes ❖ - carry out practical activities involving timed events and explain which unit of time is the most appropriate estimate the length of time everyday activities take to complete, extending to hours and quarters of hours ❖	- use and interpret timetables and schedules to plan events and activities and make calculations as part of the planning process - estimate how long a journey takes - time events in minutes and seconds to the nearest tenth of a second convert between standard units of time ❖ estimate the length of time everyday activities take to complete with increasing accuracy ❖
	Temperature	take temperature readings using thermometers and interpret readings above and below 0°C	take temperature readings using thermometers and interpret readings above and below 0°C	- measure and record temperatures involving positive and negative readings - calculate temperature differences, including those involving temperature rise and fall across 0°C	- measure and record temperatures involving positive and negative readings - calculate temperature differences, including those involving temperature rise and fall across 0°C

Key Stage 2 Mathematics Programme of Study



		Year 3	Year 4	Year 5	Year 6
Strands	Elements	Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using measuring skills	Area and volume Angle and position	- find areas by counting squares - identify right angles ❖ - recognise that two right angles make a half turn, and that four right angles make a full turn ❖ - describe an angle as more or less than a right angle ❖ - use the four compass points to describe directions	- recognise volume in practical contexts - use a protractor to check if an angle is more or less than a right angle ❖ - use eight compass points to describe direction	- calculate, estimate and compare the area of squares and rectangles using standard units - find volumes by counting and other practical methods - recognise acute and obtuse angles ❖ - draw and measure acute angles in multiples of 10 degrees ❖ - use coordinates to specify location	- calculate the area of squares and rectangles - recognise reflex angles ❖ - draw accurately and measure acute and obtuse angles in multiples of 5 degrees ❖ - calculate a missing angle within a right angle, on a straight line or around a point ❖ - use grid references to specify location
Using geometry skills	Shape	- recognise and classify triangles, squares, rectangles, pentagons and hexagons, including irregular cases ❖ - identify congruent shapes ❖ - recognise 3D shapes, including prisms ❖	- recognise, classify and sketch polygons with up to eight sides, including irregular shapes ❖ - recognise and classify 3D shapes, using their own criteria ❖	- recognise and classify triangles, using their own criteria ❖ - identify congruent shapes and justify whether two or more shapes are congruent ❖	- recognise tetrahedra and square based pyramids ❖ - recognise and sketch different types of quadrilaterals ❖ - explore the tessellation of different shapes ❖ - identify a net of a cube ❖

Key Stage 2 Mathematics Programme of Study



		Year 3	Year 4	Year 5	Year 6
Strands	Elements	Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using geometry skills	Construction	draw lines to the nearest half centimetre ❖	- draw lines to the nearest millimetre ❖ - recognise and draw perpendicular and parallel lines ❖	- draw and label lines accurately, e.g. <i>AB</i> ❖ - draw squares, rectangles and right angled triangles accurately ❖ - construct solids from given nets ❖	- draw cubes and cuboids on isometric paper ❖ - draw nets of cubes on square paper ❖
	Movement	- identify lines of symmetry in 2D shapes ❖ - draw horizontal and vertical lines of symmetry ❖	- draw lines of symmetry ❖ - draw the reflection of a shape in a horizontal or vertical line ❖	- draw the reflection of a shape in any line ❖ - complete a partly drawn shape after rotation ❖ - translate a shape on squared paper horizontally or vertically ❖	- find all the lines of symmetry for a given shape ❖ - identify rotational symmetry of shapes ❖ - identify symmetrical properties of regular polygons ❖
	Number sequences	- explore sequences of whole numbers involving addition and subtraction, e.g. <i>counting in 2s, 3s and 4s from different starting points</i> ❖ - write the next two (or more) terms in sequences that involve addition or subtraction ❖	- explore sequences of positive whole numbers involving addition and subtraction in 2s, 3s, 4s, 5s, 6s, 8s and 10s from different starting points ❖ - write the next two (or more) terms in sequences that involve addition or subtraction ❖	- recognise and state the difference in sequences that involve adding or subtracting ❖ - write the next two (or more) terms in sequences ❖ - show that a number is in the sequence and/or find the position number by continuing the sequence or otherwise ❖	- find the term to term rule for ascending and descending sequences, e.g. <i>3, 7, 11, 15 add 4</i> ❖ - generate a sequence given the first term and the term to term rule ❖ - consider spatial patterns, e.g. <i>square numbers</i> ❖
Using algebra skills					

Key Stage 2 Mathematics Programme of Study



		Year 3	Year 4	Year 5	Year 6
Strands	Elements	Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using algebra skills	Expressions and formulae				- explore general statements through practical activities, e.g. that $a + a + a = 3a$, $3 \times a = 3a$ and $a + a + a + b + b = 3a + 2b$ ❖ - simplify expressions involving the addition of one variable, e.g. $5t + 3t = 8t$ ❖
	Functions and graphs	use one and two step function machines to generate input and output involving addition and subtraction within 100; express, in words, the operations of function machines ❖	use one and two step function machines to generate input and output using all four operations; express, in words, the operations of function machines ❖	- use multistep function machines to generate input and output using all four operations; express, in words, the operations of function machines ❖ - read, plot and write coordinates in one quadrant, e.g. (2, 4) ❖	- express output generated from one step function machines using algebra ❖ - identify the coordinates of a missing point from a regular shape ❖ - refer to the x axis and the y axis ❖
	Equations and inequalities	- find an 'unknown' in one step equations and use this to derive other facts, e.g. $37 + \square = 100$ therefore $100 - 37 = \square$ ❖ - list numbers that are 'greater than' or 'less than' another number ❖ - read statements about numbers expressed using an inequality sign, e.g. $6 > 4$ ❖	- use $<$ $>$ to describe whether a number is less than or greater than another ❖ - find an 'unknown' in two step equations, e.g. $4 \times \square + 1 = 25$ ❖	- solve one step equations using letters to present 'unknowns' with integer solutions, e.g. $6 + a = 10$ and $b + b = 8$ ❖ - use $<$ $>$ to describe whether a number is less than or greater than another, working with different types of numbers ❖	- construct and solve one step equations with whole number solutions ❖ - list numbers between two points using the terminology 'less than or equal to' and 'greater than or equal to' ❖

Key Stage 2 Mathematics Programme of Study



		Year 3	Year 4	Year 5	Year 6
Strands	Elements	Learners are able to:	Learners are able to:	Learners are able to:	Learners are able to:
Using data skills	Collect and record data Present and analyse data Interpret results	- represent data using: - lists, tally charts, tables and diagrams - bar charts and bar line graphs labelled in 2s, 5s and 10s - pictograms where one symbol represents more than one unit using a key - Venn and Carroll diagrams - extract and interpret information from charts, timetables, diagrams and graphs.	- represent data using: - lists, tally charts, tables and diagrams - bar charts and bar line graphs labelled in 2s, 5s and 10s - pictograms where one symbol represents more than one unit using a key - Venn and Carroll diagrams - extract and interpret information from charts, timetables, diagrams and graphs.	- represent data using: - lists, tally charts, tables, diagrams and frequency tables - bar charts, grouped data charts, line graphs and conversion graphs - extract and interpret information from an increasing range of diagrams, timetables and graphs (including pie charts) - use mean, median, mode and range to describe a data set	- represent data using: - lists, tally charts, tables, diagrams and frequency tables - bar charts, grouped data charts, line graphs and conversion graphs - extract and interpret information from an increasing range of diagrams, timetables and graphs (including pie charts) - use mean, median, mode and range to describe a data set
	Probability			- use the words 'certain' and 'impossible' to describe the likelihood of an event occurring ❖ - recognise that some events are impossible and some events are certain ❖ - recognise that some events are more likely than others ❖ - use the words 'likely', 'unlikely' and 'even chance'. ❖	- use numbers to describe the likelihood of an event, e.g. a one-in-six chance ❖ - recognise that some events are equally likely ❖ - identify the outcomes of simple events, e.g. flipping a coin, rolling a dice. ❖

Key Stage 2 mathematics

National curriculum outcomes



The national curriculum outcomes describe the types and range of performance that learners working at a particular outcome should characteristically demonstrate. In deciding on a learner's outcome of attainment at the end of a key stage, teachers should judge which description best fits the learner's performance. Each description should be considered in conjunction with the descriptions for adjacent outcomes.

Outcome 1

Learners anticipate, follow, respond to and join in with familiar number rhymes, stories, songs, activities and games. They show an awareness of number activities, recite, sign or indicate one or more numbers to 5 and count or indicate two objects. They are beginning to compare physical properties of objects. They demonstrate interest in position and the relationship between objects. They match objects or pictures by recognising similarities.

Outcome 2

Learners use mathematics in day-to-day activities and in their play, responding appropriately to key vocabulary and questions. They join in rote counting of numbers from 1 to 10. They recognise and name numbers 1 to 3, and count up to three objects reliably. They record numbers initially by making marks or drawing pictures. They begin to develop an understanding of one-to-one correspondence by matching pairs of different objects or pictures. They understand the concept of 'one more'. In daily activities, they develop an awareness of the purpose of money. They show understanding of words, signs and symbols that describe size and positions. They sort objects using one criterion, and are aware of contrasting qualities.

Outcome 3

Learners use familiar words in practical situations. They rote count to beyond 10, and onwards from a given small number. They carry out simple addition using numbers 1 to 5 and understand that zero means none. They recognise and try to record numerals from 1 to 9. They understand the concept of 'one less'. They compare and order two or more objects by direct observation. They show awareness of time in terms of their daily activities. They talk about or indicate, recognise and copy simple repeating patterns and sequences. When sorting, they recognise when an object is different and does not belong to a familiar category.

Key Stage 2 mathematics

National curriculum level descriptions



The following level descriptions describe the types and range of performance that learners working at a particular level should characteristically demonstrate. In deciding on a learner's level of attainment at the end of a key stage, teachers should judge which description best fits the learner's performance. Each description should be considered in conjunction with the descriptions for adjacent levels.

By the end of Key Stage 2, the performance of the great majority of learners is likely to be within the range of Levels 3 to 6, and by the end of Key Stage 3 within the range 4 to 7. Level 8 is available for very able learners and, to help teachers differentiate Exceptional Performance at Key Stage 3, a description above Level 8 is provided.

Level 1

Learners use mathematics as an integral part of classroom activities. They represent their work with objects or pictures and discuss it. They count, order, add and subtract numbers when solving problems involving up to 10 objects, and can read and write the numbers involved. They count on and back in steps of different sizes and from different numbers. They measure and order objects using direct comparison, and order events. They are aware of the value of different coins. They use everyday language to compare and to describe positions and properties of regular shapes. They recognise, use and make repeating patterns. They sort and classify objects, demonstrating the criterion they have used.

Level 2

Learners talk about their work using familiar mathematical language, and represent it using symbols and simple diagrams. They count sets of objects reliably, and use mental recall of number facts to 10 to add or subtract larger numbers. They order numbers up to 100. They choose the appropriate operation when solving addition or subtraction problems. They identify and use halves and quarters in practical situations. They recognise sequences of numbers. They use mental calculation strategies to solve number, money and measure problems. They use everyday non-standard and standard units to measure length and mass. They distinguish between straight and turning movements, recognise half-turns and quarter-turns and right angles in turns. They sort objects and classify them using more than one criterion. When they have gathered information, they record their results in simple lists, tables, diagrams and block graphs.

Level 3

Learners organise their work, check results, and try different approaches. They talk about and explain their work. They use and interpret mathematical symbols and diagrams. They find particular examples that satisfy a general statement. They use place value in numbers up to 1 000 to make approximations. They use decimal notation in recording money, and recognise negative numbers in the context of temperature. They develop further mental strategies for adding and subtracting numbers with at least two digits. They use mental recall of the 2, 3, 4, 5 and 10 multiplication tables in solving whole-number problems involving multiplication and division, including those giving rise to remainders. They use standard units of length, capacity, mass and time. They classify shapes in various ways. They extract and interpret information presented in simple tables and lists, and construct and interpret bar charts and pictograms.

Level 4

Learners develop their own strategies for solving problems, and present information and results systematically. They search for a solution by trying out ideas of their own. They use their understanding of place value to multiply and divide whole numbers by 10 and 100. They use a variety of mental and written methods for computation, including recall of multiplication facts up to 10×10 . They add and subtract decimals to two places. They check their results are reasonable by considering the context or the size of the numbers. They use simple fractions and percentages to describe approximate parts of a whole. They recognise and describe number patterns and relationships and use simple formulae expressed in words. They use their knowledge of shape to make 3D mathematical models, draw common 2D shapes in different orientations on grids, and reflect simple shapes in a mirror line. They choose and use suitable units and instruments, reading, with appropriate accuracy, numbers on a range of measuring instruments. They find perimeters of shapes, areas by counting squares, and volumes by counting cubes. They use and interpret co-ordinates in the first quadrant. They collect discrete data, group data where appropriate, and use the mode and median as characteristics of a set of data. They draw and interpret frequency diagrams and construct and interpret simple line graphs. They understand and use simple vocabulary associated with probability.

Level 5

Learners identify and obtain information to solve problems, and check whether their results are sensible in the context of the problem. They describe situations mathematically using symbols, words and diagrams and draw their own conclusions, explaining their reasoning. They make general statements of their own, based on available evidence. They use their understanding of place value to multiply and divide whole numbers and decimals. They order, add and subtract negative numbers. They check their solutions by applying inverse operations or estimating using approximations. They calculate fractional or percentage parts of quantities and measurements. They construct and use simple formulae involving one or two operations. They use co-ordinates in all four quadrants. They measure and draw angles to the nearest degree. They recognise, identify and describe all the symmetries of 2D shapes. They convert one metric unit to another and know the rough metric equivalents of imperial units in daily use. They make sensible estimates of a range of everyday measures. They find areas of rectangles and triangles and volumes of cuboids. They read scales on maps, plans and graphs. They use the mean of discrete data and compare two simple distributions. They interpret graphs, diagrams and pie charts. They use the probability scale from 0 to 1, and appreciate that different outcomes may result from repeating an experiment.