

Loughborough Primary School Maths Progression Document

Early Years

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions (including decimals and percentages)
- Ratio and Proportion
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics
- Algebra

Year 1

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions (including decimals and percentages)
- Ratio and Proportion
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics
- Algebra

Year 2

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions (including decimals and percentages)
- Ratio and Proportion
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics
- Algebra

Year 3

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions (including decimals and percentages)
- Ratio and Proportion
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics
- Algebra

Year 4

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions (including decimals and percentages)
- Ratio and Proportion
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics
- Algebra

Year 5

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions (including decimals and percentages)
- Ratio and Proportion
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics
- Algebra

Year 6

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions (including decimals and percentages)
- Ratio and Proportion
- Measurement
- Geometry - properties of shapes
- Geometry - position and direction
- Statistics
- Algebra

Maths at Loughborough Primary School

Intent	Implementation	Impact
What we do	How we do it	How we assess it
<p>Our ambition is ensure our maths curriculum is accessible to all and caters for every child’s ability, whilst ensuring we provide every opportunity for children to reach their full potential. We believe Mathematics is a tool for everyday life.</p> <p>Mathematics teaches us how to make sense of the world around us. Our maths curriculum enables us to develop children’s ability to calculate, communicate, reason and solve problems.</p> <p>We endeavour to ensure all children become fluent in the fundamentals of mathematics so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.</p> <p>We deliver lessons that are creative and engaging. We want children to make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems using a Concrete, Pictorial, into Abstract approach.</p> <p>We intend for our pupils to be able to apply their mathematical knowledge to Science and across a range of other subjects. We want children to recognise that Mathematics has developed over centuries and has been the fundamental basis for huge advances in Science, Engineering, Technology and Sport.</p> <p>We believe in making mathematical learning come alive within a real-life context and endeavour to make sure that the children realise the subject is</p>	<p>Planning: Lessons are planned and sequenced so that new knowledge and skills build on what has been taught before. Teachers use Mathematics Mastery’s yearly overview, Unit narrative and lesson plans to support their planning alongside national curriculum objectives. Staff also refer to the Calculation Policy when teaching formal methods, understanding that sometimes children find their own efficient methods along the way. As part of this process, teachers need to plan the following for mathematics lesson:</p> <ul style="list-style-type: none"> • Precise questioning to test conceptual and procedural knowledge. • How and when manipulatives will be used within in each lesson to scaffold difficult tasks. • Revisiting concepts in oral/ mental starters such as flashback four to ensure learning is committed to long term memory • Tasks and challenge questions to challenge pupils to apply and deepen their learning and mathematical reasoning. <p>‘Maths meetings’ are taught daily which gives children the opportunity to practise and improve their mental maths skills as well as their written calculations. Also, previous units are continually revisited in these sessions, which gives children opportunities to further consolidate their learning and allows them make connections between different units.</p> <p>All children also have access to their own personal account of ‘Times Tables Rockstar’ where they can practise their times tables individually and compete against other pupils and classes in school to develop this fluency.</p> <p>Teaching: At Loughborough, we employ a variety of teaching styles and opportunities for children to learn and develop their Mathematical skills and competencies, both individually and collaboratively. The aim of all lessons is to develop children’s knowledge, understanding and skills, applying these to a variety of contexts. One of the key elements in lessons throughout the school</p>	<p>We carefully measure progression within keys skills across the curriculum. Pupils’ skill, knowledge and understanding is assessed against the National Curriculum attainment targets.</p> <p>In Maths, we monitor and assess the impact of the curriculum on our learners in a number of ways.</p> <p>Monitoring will take place by the class teacher, subject leader, Phase Leaders and Headteacher on a regular basis in the form of observations, data analysis, pupil progress meetings, work sampling and pupil conferencing.</p> <p>Formative Assessment will be a key part of every lesson. The teacher will share the objectives for the lesson with the children and make sure they are clear what is being expected of them to successfully achieve the objective.</p> <p>The short-term assessment will also involve the teacher checking the children’s understanding at the end of the session to inform future planning and lessons.</p> <p>Summative assessment will take place three times throughout the year and will take the form of the NTS termly tests.</p>

<p>essential to everyday life and financial literacy. Irrespective of year group, we want our children to have the ability to reason mathematically and have an appreciation of the beauty and power of mathematics, whilst embracing a sense of enjoyment and curiosity about the subject.</p> <p>We strive for all to be actively engaged in their own learning, to be motivated and eager and to achieve and attain to their full potential in Mathematics.</p>	<p>should be on developing the children’s mental calculation strategies alongside developing the children’s written calculation strategies as laid out in the Calculation Policy.</p> <p>The progression maps are structured using the topic headings as they appear in the National Curriculum:</p> <ul style="list-style-type: none"> • Number and Place Value • Addition and Subtraction • Multiplication and Division • Fractions (including decimals and percentages) • Ratio and Proportion • Measurement • Geometry - properties of shapes • Geometry - position and direction • Statistics • Algebra <p>During Mathematics lessons at Loughborough Primary School, through careful planning and preparation, we aim to ensure that throughout the school children are given opportunities for:</p> <ul style="list-style-type: none"> o A Concrete, Pictorial and Abstract Approach o Problem solving. o Individual, group and whole class activities and discussions. o Open ended and closed tasks. o A range of methods for calculating dependent on ability and type of task. o Directly working with a teacher or a learning support assistant. o The use of high quality maths language (Pupils should read, spell and pronounce mathematical vocabulary correctly). 	<p>The results of these tests will be inputted into the Mark sheet and Sims for analysis. This will inform ‘SHINE’ interventions which provide additional support for identified pupils who need to make accelerated progress.</p> <p>Ultimately, the Impact of Loughborough’s Maths curriculum will be measured in the children’s attitudes to Mathematics alongside outcomes for learners across the school and notably in the nationally released data at EYFS, Year 4 and KS2 SATS.</p>
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Place Value

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Counting	counts up to three or four objects by saying one number name for each item	count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number			count backwards through zero to include negative numbers	interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero	use negative numbers in context, and calculate intervals across zero
	counts actions or objects which cannot be moved		count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward	count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number	count in multiples of 6, 7, 9, 25 and 1 000	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000	
	counts objects to 10, and beginning to count beyond 10	count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens					
	counts out up to six objects from a larger group			find 10 or 100 more or less than a given number	find 1 000 more or less than a given number		
	counts an irregular arrangement of up to ten objects	given a number, identify one more and one less					
	can count a number of things in two groups and recognise that when recombined these still make the same total						
	says the number that is one more than a given number						
	finds one more or one less from a group of up to five						

	<p>objects, then ten objects</p> <p>ELG: count reliably with numbers from one to 20 and say which number is one more or one less than a given number</p>						
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Represent</p>	<p>estimates how many objects they can see and checks by counting them</p> <p>records, using marks that they can interpret and explain</p> <p>Subitise: recognise how many things are in a small group (up to 5) without having to count them (including irregular arrangements)</p>	<p>identify and represent numbers using objects and pictorial representations including the number line</p>	<p>identify, represent and estimate numbers using different representations, including the number line</p>	<p>identify, represent and estimate numbers using different representations</p>	<p>identify, represent and estimate numbers using different representations</p>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Use PV and compare</p>	<p>recognise some numerals of personal significance</p>	<p>use the language of: equal to, more than, less than (fewer), most, least</p>	<p>compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs</p>	<p>compare and order numbers up to 1 000</p>	<p>order and compare numbers beyond 1 000</p>	<p>read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit</p>	<p>read, write, order and compare numbers up to 10 000 000 and determine the value of each digit</p>

	<p>uses the language of 'more' and 'fewer' to compare two sets of objects</p> <p>ELG: place them in order and say which number is one more or one less than a given number</p>					(appears also in Reading and Writing Numbers)	(appears also in Reading and Writing Numbers)
Reading and Writing Numbers (including Roman Numerals)	<p>recognises numerals 1 to 5</p> <p>selects the correct numeral to represent 1 to 5, then 1 to 10 objects</p> <p>ELG: Children count reliably with numbers from one to 20, place them in order</p>	<p>read and write numbers from 1 to 20 in numerals and words.</p>	<p>read and write numbers to at least 100 in numerals and in words</p>	<p>read and write numbers up to 1 000 in numerals and in words</p> <p><i>tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks</i> (copied from Measurement)</p>	<p>read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.</p>	<p>read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Comparing Numbers)</p> <p>read Roman numerals to 1 000 (M) and recognise years written in Roman numerals.</p>	<p>read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Understanding Place Value)</p>

Understanding Place Value	ELG: Children count reliably with numbers from one to 20, place them in order		recognise the place value of each digit in a two-digit number (tens, ones)	recognise the place value of each digit in a three-digit number (hundreds, tens, ones)	recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) <i>find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as units, tenths and hundredths (copied from Fractions)</i>	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers) <i>recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents (copied from Fractions)</i>	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers) <i>identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1 000 where the answers are up to three decimal places (copied from Fractions)</i>
Rounding					round any number to the nearest 10, 100 or 1 000 <i>round decimals with one decimal place to the nearest whole number (copied from Fractions)</i>	round any number up to 1 000 000 to the nearest 10, 100, 1 000, 10 000 and 100 000 <i>round decimals with two decimal places to the nearest whole number and to one decimal place (copied from Fractions)</i>	round any whole number to a required degree of accuracy <i>solve problems which require answers to be rounded to specified degrees of accuracy (copied from Fractions)</i>
Problem Solving		use place value and number facts to solve problems	solve number problems and practical problems involving these ideas.	solve number and practical problems that involve all of the above and with increasingly large positive numbers	solve number problems and practical problems that involve all of the above	solve number and practical problems that involve all of the above	

Addition and Subtraction

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Number Bonds	<p>Finds the total number of items in two groups by counting all of them</p> <p>can count a number of things in two groups and recognise that when recombined these still make the same total</p> <p>can partition numbers in different ways with the aim to identify pairs of numbers that make a total: two groups at first but then understanding we can partition into more than 2 groups</p> <p>ELG: Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.</p>	<p>represent and use number bonds and related subtraction facts within 20</p>	<p>recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p>				

	<p>ELG: Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.</p>						
<p>Written methods</p>	<p>In practical activities and discussion, beginning to use the vocabulary involved in adding and subtracting.</p> <p>Records, using marks that they can interpret and explain</p>	<p>read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)</p>		<p>add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction</p>	<p>add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate</p>	<p>add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition)</p>	
<p>Inverse operations, estimating & checking</p>	<p>Estimates how many objects they can see and checks by counting them.</p>		<p>recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</p>	<p>estimate the answer to a calculation and use inverse operations to check answers</p>	<p>estimate and use inverse operations to check answers to a calculation</p>	<p>use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy</p>	<p>use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.</p>

Problem solving

solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$

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

solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (copied from Measurement)

solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Solve problems involving addition, subtraction, multiplication and division

MULTIPLICATION & DIVISION FACTS

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication & division facts	ELG: they solve problems, including doubling, halving and sharing.	<i>count in multiples of twos, fives and tens</i> (copied from Number and Place Value)	<i>count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward</i> (copied from Number and Place Value)	<i>count from 0 in multiples of 4, 8, 50 and 100</i> (copied from Number and Place Value)	<i>count in multiples of 6, 7, 9, 25 and 1 000</i> (copied from Number and Place Value)	<i>count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000</i> (copied from Number and Place Value)	
			recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	recall multiplication and division facts for multiplication tables up to 12 × 12		

<p style="text-align: center;">Mental calculation</p>	<p>ELG: They solve problems, including doubling, halving and sharing.</p>			<p>write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Written Methods)</p>	<p>use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers</p>	<p>multiply and divide numbers mentally drawing upon known facts</p>	<p>perform mental calculations, including with mixed operations and large numbers</p>
			<p>show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</p>		<p>recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)</p>	<p>multiply and divide whole numbers and those involving decimals by 10, 100 and 1000</p>	<p><i>associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8)</i> (copied from Fractions)</p>

Written calculation

In practical activities and discussion, beginning to use the vocabulary involved in adding and subtracting.

Records, using marks that they can interpret and explain

calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs

write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Mental Methods)

multiply two-digit and three-digit numbers by a one-digit number using formal written layout

multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

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

divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context divide numbers up to 4 digits by a two-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

Properties of numbers: multiples, factors, primes, square and cube numbers

recognise and use factor pairs and commutativity in mental calculations (repeated)

identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.

identify common factors, common multiples and prime numbers
use common factors to simplify fractions;

know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers

use common multiples to express fractions in the same denomination
(copied from Fractions)

establish whether a number up to 100 is prime and recall prime numbers up to 19

recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)

calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm³) and cubic metres (m³), and extending to other units such as mm³ and km³
(copied from Measures)

Order of operations							use their knowledge of the order of operations to carry out calculations involving the four operations
Inverse operations, estimating & checking				<i>estimate the answer to a calculation and use inverse operations to check answers (copied from Addition and Subtraction)</i>	<i>estimate and use inverse operations to check answers to a calculation (copied from Addition and Subtraction)</i>		use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy

Problem solving

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

solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes

solve problems involving addition, subtraction, multiplication and division

solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign

solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

solve problems involving similar shapes where the scale factor is known or can be found (copied from Ratio and Proportion)

Number: Fractions (including Decimals and Percentages)

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Counting in fractional steps			<i>Pupils should count in fractions up to 10, starting from any number and using the 1/2 and 2/4 equivalence on the number line (Non Statutory Guidance)</i>	count up and down in tenths	count up and down in hundredths		
Recognising fractions	ELG: they solve problems, including doubling, halving and sharing	<p>recognise, find and name a half as one of two equal parts of an object, shape or quantity</p> <p>recognise, find and name a quarter as one of four equal parts of an object, shape or quantity</p>	recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity	<p>recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators</p> <p>recognise that tenths arise from dividing an object into 10 equal parts and in dividing one – digit numbers or quantities by 10.</p> <p>recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators</p>	recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten	recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents (appears also in Equivalence)	

Comparing decimals					compare numbers with the same number of decimal places up to two decimal places	read, write, order and compare numbers with up to three decimal places	identify the value of each digit in numbers given to three decimal places
Rounding including decimals					round decimals with one decimal place to the nearest whole number	round decimals with two decimal places to the nearest whole number and to one decimal place	solve problems which require answers to be rounded to specified degrees of accuracy
Equivalence (including fractions, decimals and			write simple fractions e.g. $\frac{1}{2}$ of $\frac{6}{6} = 3$ and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.	recognise and show, using diagrams, equivalent fractions with small denominators	recognise and show, using diagrams, families of common equivalent fractions	identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	use common factors to simplify fractions; use common multiples to express fractions in the same denomination

					<p>recognise and write decimal equivalents of any number of tenths or hundredths</p>	<p>read and write decimal numbers as fractions (e.g. $0.71 = 71/100$)</p> <p>recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents</p>	<p>associate a fraction with division and calculate decimal fractions equivalents (e.g. 0.375) for a simple fraction (e.g. $3/8$)</p>
				<p>recognise and write decimal equivalents to $1/4$; $1/2$; $3/4$</p>		<p>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 as a decimal fraction</p>	<p>recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.</p>

Addition and subtraction of fractions				add and subtract fractions with the same denominator within one whole (e.g. $5/7 + 1/7 = 6/7$)	add and subtract fractions with the same denominator	add and subtract fractions with the same denominator and multiples of the same number recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. $2/5 + 4/5 = 6/5 = 11/5$)	add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
Multiplication and division of fractions						multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $1/4 \times 1/2 = 1/8$) multiply one-digit numbers with up to two decimal places by whole numbers divide proper fractions by whole numbers (e.g. $1/3 \div 2 = 1/6$)

Multiplication and division of decimals

find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths

multiply one-digit numbers with up to two decimal places by whole numbers

multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places

identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places

associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$)

use written division methods in cases where the answer has up to two decimal places

Problem solving

solve problems that involve all of the above

solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number

solve simple measure and money problems involving fractions and decimals to two decimal places.

solve problems involving numbers up to three decimal places

solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25.`

Ratio and Proportion

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Statements only appear in Year 6 but should be connected to previous learning, particularly fractions and multiplication and division</p>	<p>Uses familiar objects and common shapes to create and recreate patterns and build models.</p> <p>Stages of understanding repeated patterns cont.</p> <ul style="list-style-type: none"> - make own AB pattern - spot errors in an AB pattern - can identify the unit of repeat e.g. this is a red-blue pattern - continue, copy, make own ABC pattern - continue a pattern that has ended mid-unit of repeat - can do the above with a range of patterns e.g. ABB, ABBC, AABB - can begin to symbolise unit structure of a pattern the letter R for the red dinosaur <p>ELG: They recognise, create and describe patterns.</p>						<p>Ratio and Proportion objectives only appear in Year 6. However, it is vital that these objectives build upon children's prior learning in other mathematical concepts, in particular: fractions, decimals and percentages.</p>
							<p>solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts</p> <p>solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison</p> <p>solve problems involving similar shapes where the scale factor is known or can be found</p> <p>solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.</p>

Algebra

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Equations	<p>Stages of understanding repeated patterns cont.</p> <ul style="list-style-type: none"> - make own AB pattern - spot errors in an AB pattern - can identify the unit of repeat e.g. this is a red-blue pattern - continue, copy, make own ABC pattern - continue a pattern that has ended mid-unit of repeat - can do the above with a range of patterns e.g. ABB, ABBC, AABB <p>can begin to symbolise unit structure of a pattern the</p>	<p><i>solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as</i></p> <p>$7 = \square - 9$</p> <p>(copied from Addition and Subtraction)</p>	<p><i>recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.</i></p> <p>(copied from Addition and Subtraction)</p>	<p>solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</p> <p>(copied from Addition and Subtraction)</p> <p>solve problems, including missing number problems, involving multiplication and division, including integer scaling</p> <p>(copied from Multiplication and Division)</p>		<p><i>use the properties of rectangles to deduce related facts and find missing lengths and angles</i></p> <p>(copied from Geometry: Properties of Shapes)</p>	<p>express missing number problems algebraically</p>
		<p>represent and use number bonds and related subtraction facts within 20</p> <p>(copied from Addition and Subtraction)</p> <p>enumerate all possibilities of combinations</p>	<p><i>recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</i></p> <p>(copied from Addition and Subtraction)</p>				<p>find pairs of numbers that satisfy number sentences involving two unknowns</p> <p>enumerate all possibilities of combinations of two variables</p>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Formulae</p>	<p>letter R for the red dinosaur</p> <p>can begin to explain the rule of a pattern and then create another pattern with the same rule.</p>				<p>Perimeter can be expressed algebraically as $2(a + b)$ where a and b are the dimensions in the same unit. (from NSG measurement)</p>		<p>use simple formulae</p> <p>recognise when it is possible to use formulae for area and volume of shapes (copied from Measurement)</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Sequences</p>	<p>Begins to identify own mathematical problems based on own interests and fascinations.</p> <p>Orders and sequences familiar events</p> <p>ELG: 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.</p>	<p><i>sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening</i> (copied from Measurement)</p>	<p><i>compare and sequence intervals of time</i> (copied from Measurement)</p> <p>order and arrange combinations of mathematical objects in patterns (copied from Geometry: position and direction)</p>				<p>generate and describe linear number sequences</p>

Measurement

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Comparing and estimating	<p>Orders two or three items by length or height</p> <p>Orders two items by weight or capacity</p> <p>Orders and sequences familiar events</p> <p>Compare units of different sizes e.g. will it be quicker to fill my bottle with a teaspoon or a cup at the water tray?</p> <p>ELG: Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems.</p>	<p>compare, describe and solve practical problems for:</p> <ul style="list-style-type: none"> * lengths and heights [e.g. long/short, longer/shorter, tall/short, double/half] * mass/weight [e.g. heavy/light, heavier than, lighter than] * capacity and volume [e.g. full/empty, more than, less than, half, half full, quarter] * time [e.g. quicker, slower, earlier, later] 	<p>compare and order lengths, mass, volume/capacity and record the results using >, < and =</p>	<p>compare durations of events, for example to calculate the time taken by particular events or tasks</p> <p>estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight (appears also in Telling the Time)</p>	<p>estimate, compare and calculate different measures, including money in pounds and pence (also included in Measuring)</p>	<p>calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes (also included in measuring)</p> <p>estimate volume (e.g. using 1 cm³ blocks to build cubes and cuboids) and capacity (e.g. using water)</p>	<p>calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm³) and cubic metres (m³), and extending to other units such as mm³ and km³.</p>
		<p>sequence events in chronological order using language [e.g. before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]</p>	<p>compare and sequence intervals of time</p>				

Measuring and calculating	<p>Beginning to use everyday language related to money</p> <p>Beginning to use units to measure and compare things</p> <p>ELG: Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and</p>	<p>Measure and begin to record the following:</p> <ul style="list-style-type: none"> * lengths and heights * mass/weight * capacity and volume * time (hours, minutes, seconds) 	<p>choose and use appropriate standard units to estimate and measure</p> <p>length/height in any direction (m/cm);</p> <p>mass (kg/g);</p> <p>temperature (°C);</p> <p>capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels</p>	<p>measure, compare, add and subtract:</p> <p>lengths (m/cm/mm);</p> <p>mass (kg/g);</p> <p>volume/capacity (l/ml)</p>	<p>estimate, compare and calculate</p> <p>different measures, including money in pounds and pence (appears also in Comparing)</p>	<p>use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling.</p>	<p>solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate (appears also in Converting)</p>
	<p>measure the perimeter of simple 2-D shapes</p>	<p>measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres</p>	<p>measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres</p>	<p>recognise that shapes with the same areas can have different perimeters and vice versa</p>			

	objects and to solve problems.	recognise and know the value of different denominations of coins and notes	<p>recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value</p> <p>find different combinations of coins that equal the same amounts of money</p> <p>solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change</p>	add and subtract amounts of money to give change, using both £ and p in practical contexts	find the area of rectilinear shapes by counting squares	<p>calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes</p> <p><i>recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)</i></p> <p>(copied from Multiplication and Division)</p>	<p>calculate the area of parallelograms and triangles</p> <p>calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm³) and cubic metres (m³), and extending to other units [e.g. mm³ and km³].</p> <p>recognise when it is possible to use formulae for area and volume of shapes</p>
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Telling the time

Measures short periods of time in simple ways.

Uses everyday language related to time

Beginning to identify that when the short hand points at a particular number it is time for a specific activity e.g. lunch

Recognise differences between day and night and some of the seasons.

ELG: Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems.

tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.

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.

tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks

read, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)

		recognise and use language relating to dates, including days of the week, weeks, months and years	know the number of minutes in an hour and the number of hours in a day. (appears also in Converting)	estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight (appears also in Comparing and Estimating)	solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days (appears also in Converting)	solve problems involving converting between units of time	
Converting			know the number of minutes in an hour and the number of hours in a day. (appears also in Telling the Time)	know the number of seconds in a minute and the number of days in each month, year and leap year	convert between different units of measure (e.g. kilometre to metre; hour to minute)	convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)	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
					read, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)	solve problems involving converting between units of time	solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate (appears also in Measuring and Calculating)

					solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days (appears also in Telling the Time)	understand and use equivalences between metric units and common imperial units such as inches, pounds and pints	convert between miles and kilometres
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Geometry: Properties of Shapes

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p align="center">Identifying shapes and their properties</p>	<p>Beginning to use mathematical names for 'solid' 3D shapes and 'flat' 2D shapes, and mathematical terms to describe shapes</p> <p>Selects a particular named shape</p> <p>ELG: They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.</p>	<p>recognise and name common 2-D and 3-D shapes, including:</p> <ul style="list-style-type: none"> * 2-D shapes [e.g. rectangles (including squares), circles and triangles] * 3-D shapes [e.g. cuboids (including cubes), pyramids and spheres]. 	<p>identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line</p> <p>identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces</p> <p>identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid</p>		<p>identify lines of symmetry in 2-D shapes presented in different orientations</p>	<p>identify 3-D shapes, including cubes and other cuboids, from 2-D representations</p>	<p>recognise, describe and build simple 3-D shapes, including making nets (appears also in Drawing and Constructing)</p> <p>illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius</p>

Drawing and constructing				draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them	complete a simple symmetric figure with respect to a specific line of symmetry	draw given angles, and measure them in degrees (o)	draw 2-D shapes using given dimensions and angles recognise, describe and build simple 3-D shapes, including making nets (appears also in Identifying Shapes and Their Properties)
Comparing and classifying			compare and sort common 2-D and 3-D shapes and everyday objects		compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes	use the properties of rectangles to deduce related facts and find missing lengths and angles distinguish between regular and irregular polygons based on reasoning about equal sides and angles	compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
Angles				recognise angles as a property of shape or a description of a turn		know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles	

			<p>identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle</p>	<p>identify acute and obtuse angles and compare and order angles up to two right angles by size</p> <p>identify horizontal and vertical lines and pairs of perpendicular and parallel lines</p>	<p>identify:</p> <ul style="list-style-type: none"> * angles at a point and one whole turn (total 360o) * angles at a point on a straight line and ½ a turn (total 180o) * other multiples of 90o 	<p>recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles</p>	
<p>Position, direction and movement</p>	<p>Can describe their relative position such as 'behind' or 'next to'</p> <p>ELG: Children use everyday language to talk about size... position, distance... to compare quantities and objects and to solve problems.</p>	<p>describe position, direction and movement, including half, quarter and three-quarter turns.</p>	<p>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)</p>		<p>describe positions on a 2-D grid as coordinates in the first quadrant</p> <p>describe movements between positions as translations of a given unit to the left/right and up/down</p> <p>plot specified points and draw sides to complete a given polygon</p>	<p>identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed</p>	<p>describe positions on the full coordinate grid (all four quadrants)</p> <p>draw and translate simple shapes on the coordinate plane, and reflect them in the axes.</p>
<p>Pattern</p>		<p>order and arrange combinations of mathematical objects in patterns and sequences</p>					

Statistics							
	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Interpreting, constructing and presenting data			<p>interpret and construct simple pictograms, tally charts, block diagrams and simple tables</p> <p>ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity</p> <p>ask and answer questions about totalling and comparing categorical data</p>	interpret and present data using bar charts, pictograms and tables	interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs	complete, read and interpret information in tables, including timetables	interpret and construct pie charts and line graphs and use these to solve problems
Solving problems	As a class begin to use tally charts e.g. when taking votes for favourite stories			solve one-step and two-step questions [e.g. 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.	solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.	solve comparison, sum and difference problems using information presented in a line graph	calculate and interpret the mean as an average