Maths Curriculum at Lace Hill Academy

Who are we?

Maths has always been held in high regard at Lace Hill Academy, and the teaching and learning of mathematics is an integral part of every classroom. Through our maths curriculum, we aim to build resilience in our pupils, so that they are able to reason and explain ideas as well as use fluency skills to become confident mathematicians. We want our children to gain understanding and make connections between concepts so that they become successful mathematicians. We believe the best way to achieve this is to have a maths curriculum which allows children to revisit and build on the steps they already have. By revisiting previous learning, we are allowing the children to know more and remember more by transferring knowledge from their short-term memory to their long-term memory.

Parents are aspirational for their children and keen to see them become confident and fluent mathematicians. It is vital that parents recognise the need to study at depth within objectives rather than just moving on to the next year group. Using White Rose as a scheme helps to achieve this within lessons, which offers guidance to teachers and subject leads to plan and deliver lessons at the appropriate pace. It encourages depth and mastery within lessons for all children.

White Rose is a supporting resource for teaching maths. It supports children in developing the five big ideas of mastery: **coherence,** connecting new ideas to known concepts; **representation and structure,** noticing patterns and making connections; **mathematical thinking,** working on, thinking and reasoning with a taught idea; **fluency,** quick and efficient recall of facts and procedures; **variation,** giving examples that display an idea as well as those that don't for children to notice, and varying practice questions so that repetition is avoided.
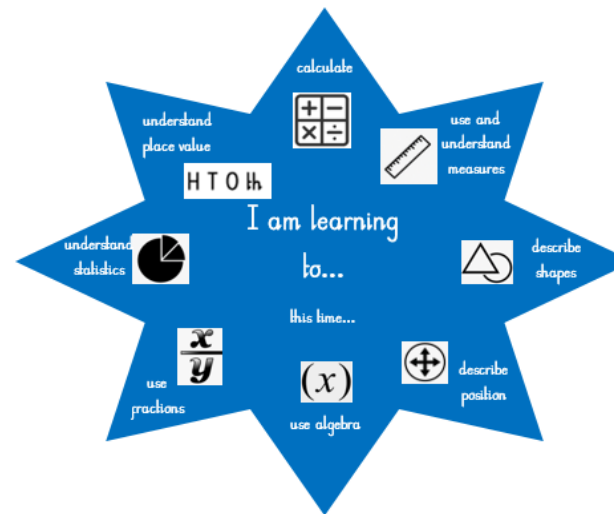
What do we need to know? Why?

Mathematics is an interconnected subject which helps children to make sense of the world around them. It develops their ability to calculate, reason, solve problems and appreciate relationships and patterns in their everyday life. This is shown through the teaching of the eight main domains (number and place value; addition and subtraction; multiplication and division; fractions, decimals and percentages; geometry; measurement; statistics; and algebra).

Our teachers explicitly model skills to children through their use of teaching and learning time. They model vocabulary to enrich discussions of mathematical concepts and empower children to reason and problem solve. Children need to know how to explain their methods and understanding; through open questioning from adults, children develop their questioning and reasoning skills.

What do we need to experience? Why?

When a child leaves our school they will…	I am a Lace Hill mathematician because…
- Be a confident person - Be an independent thinker and self-starter - Empathise with others - Have an inquisitive mind - Take risks with their learning - Bounce back and move forward when faced with a challenge - Be proactive and innovative - Have a sense of belonging	- I demonstrate quick and efficient recall of facts and procedures - I am a mathematical thinker, who reasons and solves problems - I feel confident using mathematical vocabulary - I can make connections in my learning to new ideas and within the world around me - I can describe, explain and represent mathematical concepts in a variety of ways

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Substantive and Procedural Knowledge	Disciplinary Concepts	Domains of mathematics
Substantive knowledge **Number facts** Children need to be fluent in number facts such as number bonds, doubles and halves, equivalents, factor pairs, primes, etc. See fluency progression map below. **Times tables** Children need to know their times tables up to 12x12 by the end of Y4. These underpin many aspects of mathematical learning (fractions, ratio, algebra, statistics) **Symbols** Children need to recognise and understand mathematical symbols in order to be able to read and solve calculations **Procedural knowledge** **Methods** Children need to know specific methods (both mental and written) and be able to apply these skills with any numbers. Methods include: Partitioning Number lines Column method Short multiplication Long multiplication Short division Long division	• Using and applying • Investigating • Reasoning • Problem solving • Analysing • Justifying and proving These disciplinary concepts are taught within all domains of mathematics across all year groups. Children may encounter many of these in one lesson, or one of these across several lessons.	• number and place value • addition and subtraction • multiplication and division • fractions, decimals and percentages • geometry • measurement • statistics • algebra

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At Lace Hill Academy, our maths curriculum is designed so that our children build on prior knowledge and frequently encounter and revisit concepts taught. We follow a concrete, pictorial and abstract (CPA) approach which enables children to visualise the concept by using concrete apparatus first. These manipulatives are used and available across the school so that children can experience these throughout their learning journey. Underpinning the eight main domains (number and place value; addition and subtraction; multiplication and division; fractions, decimals and percentages; geometry; measurement; statistics; and algebra) are the opportunities for children to develop their fluency, reasoning and problem solving skills which directly link to our maths 'Golden Box' (above) which is what we want our Lace Hill mathematicians to achieve. Our curriculum star reflects the main domains of mathematics that children encounter throughout the primary curriculum. Within these domains, the children learn substantive knowledge (number facts) and procedural knowledge (mathematical methods). This knowledge develops the children's fluency.

The planning of teaching and learning always begins with place value as the first unit of work in the Autumn term as this contains the fundamental skills and knowledge that children will need in all other domains. For example, children cannot calculate using column method for subtraction if they do not understand the place value of each digit; they cannot convert measures from kilograms to grams if they do not understand decimal numbers. During lessons, staff will explicit model subject-specific vocabulary and the methods (procedural knowledge) and skills (disciplinary concepts) that children need to use in order to become successful mathematicians. Children will then learn to apply these in other contexts and develop their mathematical thinking as they make connections in their learning.

Children need to see that mathematics is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. We expose children to the links between maths and other curriculum subjects to show them how far maths goes beyond the classroom. Children are also given the opportunity to see how maths is used in real life through cooking sessions, fundraising opportunities and events organised by school parliament.

Maths Curriculum at Lace Hill Academy

LHA Maths Journey (Progression)

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Domains covered	number and place value; addition and subtraction; multiplication and division; fractions; geometry; measurement	number and place value; addition and subtraction; multiplication and division; fractions; geometry; measurement	number and place value; addition and subtraction; multiplication and division; fractions; geometry; measurement; statistics	number and place value; addition and subtraction; multiplication and division; fractions; geometry; measurement; statistics	number and place value; addition and subtraction; multiplication and division; fractions, and decimals; geometry; measurement; statistics	number and place value; addition and subtraction; multiplication and division; fractions, decimals and percentages; geometry; measurement; statistics	number and place value; addition and subtraction; multiplication and division; fractions, decimals and percentages; geometry; measurement; statistics; algebra

LHA Maths Journey (Fluency)

	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Say the number names in order to 5 and write each digit Begin to know the days of the week (and in order) Know all the number bonds to 5 Say the numbers to 10 in order from 0 to 10 and back; then from 0 to 20 in order and back Identify and represent numbers to 10 using a range of objects	Know and recall all number bonds to 10 Know all the days of the week in order and the seasons and months of the year Recall all doubles and halves to 10 Tell the time to the hour and half past the hour Know all addition and subtraction facts for all numbers between 0 and 10 Count forward and backwards in steps of 2, 5 and 10	Know and recall all number bonds to 20 Recall multiplication and division facts for the x2, x5 and x10 times tables Know and recall all doubles and halves of numbers to 20 Tell the time to five minutes, including quarter past/ to the hour Know all addition and subtraction facts for all multiples of 10 to 100	Recall multiplication and division facts for the x4 and x8 times tables Know the number of days in each month, days in a year/leap year, hours in a day, minutes in an hour Know and recall all number bonds to 100 Recall multiplication and division facts for the x9 and x11 times tables Tell the time to the nearest minute	Know the decimal equivalents of $\frac{1}{10}, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ and other non-unit tenths Know and recall all multiplication and division facts for all tables up to 12 x 12 Be able to round a number up to one decimal place to the nearest whole number Recall doubles and halves of multiples of 10 to 500 and 100 to 5000	Know all decimals that total 1 or 10 to 1 decimal place Identify all factor pairs of numbers up to 100 Know how to write numbers in Roman numerals up to 1000 Recall prime numbers up to 19 Recall square numbers up to 12 x 12 and their square roots	Use all multiplication and division facts for the times tables up to 12 x 12 to derive other facts (e.g 3 x 7 = 21, so 300 x 7 = 2100 and 0.3 x 7 = 2.1) Recall the prime numbers within 50 Know the decimal and percentage equivalents of fractions less than 1 Know how to calculate 1%, 5%, 10%, 20%, 25%, 50% and 75% of a number

| | Count in 2s up to 10 | | | Recall multiplication and division facts for the x3 times tables | Know how to write numbers in Roman numerals up to 20 | Know how to write numbers in Roman numerals up to 100 | | |

LHA Maths Journey (Progression in Knowledge and Skills)

Number and Place Value

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
COUNTING							
recite numbers past 5 say one number for each item in order: 1, 2, 3, 4, 5 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	count beyond ten count objects, actions and sounds	count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number **count in multiples of twos, fives and tens** given a number, identify one more and one less	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 backwards through zero to include negative numbers **count in multiples of 6, 7, 9, 25 and 1000** find 1000 more or less than a given number	interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000	use negative numbers in context, and calculate intervals across zero
READING AND WRITING NUMBERS (including Roman Numerals)							
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	**link the number symbol (numeral) with its cardinal number value**	read and write numbers from 1 to 20 in numerals and words; read and write numbers to 100 in numerals	read and write numbers to at least 100 in numerals and in words	read and write numbers up to 1000 in numerals and in words **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 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.	read and write numbers to at least 1 000 000 and determine the value of each digit read Roman numerals to 1000 (M) and recognise years written in Roman numerals.	read and write numbers up to 10 000 000 and determine the value of each digit
COMPARING NUMBERS							

compare quantities using language: more than, fewer than	compare numbers understand the 'one more than/ one less than' relationship between consecutive numbers	use the language of: equal to, more than, less than (fewer), most, least	compare and order numbers from 0 up to 100; use <, > and = signs	compare and order numbers up to 1000	order and compare numbers beyond 1000 compare numbers with the same number of decimal places up to two decimal places	order and compare numbers to at least 1 000 000 and determine the value of each digit	order and compare numbers up to 10 000 000 and determine the value of each digit
			IDENTIFYING, REPRESENTING AND ESTIMATING NUMBERS				
develop fast recognition of up to 3 objects, without having to count them individually (subitising) **link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5**	Subitise **link the number symbol (numeral) with its cardinal number value** explore the composition of numbers to 10	identify and represent numbers using objects and pictorial representations including the number line partition and combine numbers e.g. partition 76 into tens and ones	identify, represent and estimate numbers using different representations, including the number line partition two-digit numbers into different combinations of tens and ones e.g. 23 is the same as 2 tens and 3 ones which is the same as 1 ten and 13 ones	identify, represent and estimate numbers using different representations recognise the place value of each digit in a three-digit number (hundreds, tens, ones)	identify, represent and estimate numbers using different representations recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) identify the value of digits in decimal numbers as units, tenths and hundredths	recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents	**identify the value of each digit to three decimal places**
			ROUNDING (INCLUDING DECIMALS)				
					round any number to the nearest 10, 100 or 1000 round decimals with one decimal place to the nearest whole number	round any number up to 1000000 to the nearest 10, 100, 1 000, 10 000 and 100000 round decimals with two decimal places to the nearest whole number and to one decimal place	round any whole number to a required degree of accuracy solve problems which require answers to be rounded to specified degrees of accuracy
			PROBLEM SOLVING				
solve real world mathematical problems with numbers up to 5			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

NUMBER BONDS AND NUMBER FACTS

		automatically recall number bonds for numbers 0-5 and some to 10	recall at least four of the six number bonds to 10 and reason about associated facts represent and use number bonds within 20; and subtraction facts within 20	recall all number bonds to and within 10 and use these to reason with and calculate bonds to and within 20 recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 recall doubles and halves to 20				
UNDERSTANDING ADDITION AND SUBTRACTION								
			demonstrate an understanding of the commutative law (e.g. 3+2=5 so 2+3=5)	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot				
MENTAL CALCULATIONS								
			add and subtract one-digit and two-digit numbers to 20, including zero	add and subtract numbers where no regrouping is required, using concrete objects, pictorial representations, and mentally, including • a two-digit number and one; • a two-digit number and tens; • two two-digit numbers; • three one-digit numbers	add and subtract numbers mentally, including • a three-digit number and ones; • a three-digit number and tens; • a three-digit number and hundreds		add and subtract numbers mentally with increasingly large numbers	perform mental calculations with mixed operations to carry out calculations involving the four operations
WRITTEN METHODS								

		read, write and interpret mathematical statements involving +, - and = symbols		add numbers with up to three digits using the formal method of columnar addition subtract numbers with up to three digits using the formal method of columnar subtraction	add numbers with up to four digits using the formal method of columnar addition subtract numbers with up to four digits using the formal method of columnar subtraction	add whole numbers with more than 4 digits, including using formal written methods subtract whole numbers with more than 4 digits, including using formal written methods	

ESTIMATING, INVERSE AND CHECKING ANSWERS						
		demonstrate an understanding of inverse relationships involving addition and subtraction	recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems use estimation to check that answers to a calculation are reasonable e.g. knowing that 48+35 will be less than 100	**estimate the answer to a calculation and use inverse operations to check answers**	estimate and use inverse operations to check answers to a calculation	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	use estimation to check answers to calculations, and determine, in the context of a problem, an appropriate degree of accuracy

PROBLEM SOLVING						
		solve one-step problems that involve addition, subtraction and missing numbers using concrete objects and pictorial representations	solve problems with addition and subtraction applying knowledge of written methods and mental methods where regrouping may be required solve missing number problems using addition and subtraction **solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures**	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 problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign**	solve multi-step problems in contexts, deciding which operations and methods to use and why solve problems involving addition and subtraction

Multiplication and Division

MULTIPLICATION AND DIVISON KEY FACTS

			count in multiples of twos, fives and tens	recognise odd and even numbers recall and use multiplication and division facts for the 2, 5 and 10 times tables use multiplication and division facts for 2, 5 and 10 to make deductions outside known multiplication facts e.g. know that multiples of 5 have one digit of 0 or 5 so 92 cannot be a multiple of 5	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables **count from 0 in multiples of 4, 8, 50 and 100**	recall multiplication and division facts for multiplication tables up to 12 x 12 **count in multiples of 6, 7, 9, 25 and 1000**		associate a fraction with division e.g. know that 7 divided by 21 is the same as $\frac{7}{21}$ and that this is equal to $\frac{1}{3}$

MENTAL CALCULATIONS

			solve problems involving multiplication and division using mental methods	write and calculate mathematical statements for multiplication and division using the multiplication tables that you know, including for two-digit numbers times one-digit numbers using mental methods	use place value, known and derived facts to multiple and divide mentally, including multiplying by 0 and 1; dividing by 1; multiplying together three numbers **recognise and use factor pairs and commutativity in mental calculations**	multiply and divide numbers mentally drawing upon known facts multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	perform mental calculations, including with mixed operations and large numbers

WRITTEN METHODS

			recognise the relationships between addition and subtraction and rewrite statements as simplified multiplication statements e.g. 10 + 10 + 10 + 5 + 5 = 3 x 10 + 2 x 5 = 4 x 10 calculate mathematical statements for multiplication and division within the times tables and write them using x, ÷ and = symbols	write and calculate mathematical statements for multiplication using the multiplication tables known, including for two-digit numbers times one-digit numbers using written methods write and calculate mathematical statements for division using the multiplication tables known	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 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	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 two-digit number using the formal written method of short division, and where appropriate, interpreting remainders according to 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 **use written division methods in cases where the answer has up to two decimal places**

MULTIPLES, FACTORS, PRIMES, SQUARE AND CUBE NUMBERS

					recognise and use factor pairs and commutativity in mental calculations	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19 recognise and use square numbers and the notation for squared (^{2}) recognise and use cube numbers and the notation for cubed (^{3})	identify common factors, common multiples and prime numbers
ESTIMATING, INVERSE AND CHECKING ANSWERS; ORDER OF OPERATIONS							
			show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	**estimate the answer to a calculation and use inverse operations to check answers**	**estimate the answer to a calculation and use inverse operations to check answers**		use knowledge of the order of operations to carry out calculations involving the four operations use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree 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 concrete materials, arrays, repeated addition, and multiplication and division facts, including problems in context	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 the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such an 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 multiplication and division using mental methods solve word problems involving multiplication and division with more than one step			solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates **solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign**	

Fractions, Decimals and Percentages

COUNTING IN FRACTIONS

				count up and down in tenths	count up and down in hundredths		

RECOGNISING, FINDING AND WRITING FRACTIONS

		recognise, find and name: a half as one of two equal parts of an object, shape or quantity; a quarter as one of two four parts of an object, shape or quantity	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 and demonstrate understanding that all parts must be equal parts of the whole write simple fractions e.g. $\frac{1}{2}$ of 6 = 3	recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators	recognise that hundredths arise from dividing an object by one hundred and dividing tenths by 10	recognise mixed numbers and improper fractions and convert from one to the other read and write decimal numbers as fractions recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred'	**identify the value of each digit to three decimal places**
COMPARING AND ORDERING							
				compare and order unit fractions, and fractions with the same denominators	compare numbers with the same number of decimal places up to two decimal places	compare and order fractions whose denominators are all multiples of the same number read, write, order and compare numbers with up to three decimal places	compare and order fractions, including fractions >1
EQUIVALENTS (FRACTIONS, DECIMALS AND PERCENTAGES)							

			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 recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ recognise and write decimal equivalents of any number of tenths or hundredths	Identify and name equivalent fractions of a given fraction, represented visually, including tenths and hundredths Write equivalent fractions of a given fraction, represented visually, including tenths and hundredths relate thousandths to decimal equivalents know percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25 write percentages as a fraction with denominator 100, and as a decimal	recall and use equivalences between simple fractions, decimals and percentages, including in different contexts calculate decimal fraction equivalents e.g. 0.375 is equivalent to $\frac{3}{8}$
FRACTIONS: THE FOUR OPERATIONS AND SIMPLIFYING							

				add fractions and subtract fractions with the same denominator within one whole	add and subtract fractions with the same denominator	add and subtract fractions with the same denominator and denominators that are multiples of the same number	add and subtract fractions with different denominators and mixed numbers, using the concept of equivalences
						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
						write mathematical statements >1 as a mixed number e.g. $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$	divide proper fractions by whole numbers
							associate a fraction with division e.g. know that 7 divided by 21 is the same as $\frac{7}{21}$ and that this is equal to $\frac{1}{3}$
							use common factors to simplify fractions; use common multiples to express fractions in the same denomination

DECIMALS: THE FOUR OPERATIONS AND ROUNDING

					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 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	multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places **solve problems which require answers to be rounded to specified degrees of accuracy** multiply one-digit numbers with up to two decimal places by whole numbers **use written division methods in cases where the answer has up to two decimal places**
PROBLEM SOLVING							
				solve fraction problems	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 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 fractions with a denominator of a multiple of 10 or 25 solve problems involving number up to three decimal places	**solve problems which require answers to be rounded to specified degrees of accuracy**
RATIO AND PROPORTION (YEAR 6 ONLY)							

							solve problems involving the relative sizes of two quantities where missing values can be found using integer multiplication and division facts e.g. find $\frac{7}{9}$ of 108 solve problems involving the calculation of percentages and use them for comparison solve problems involving unequal sharing and grouping solve problems involving similar shapes where the scale factor is known or can be found

Geometry: Shape, Position and Direction

PROPERTIES OF SHAPE

talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal mathematical language: sides, corners, straight, flat, round		recognise and name common 2D shapes recognise and name common 3D shapes	identify and describe the properties of 2D shapes (number of sides and lines of symmetry in a vertical line) identify and describe the properties of 3D shapes (number of edges, vertices and faces) name some common 2D and 3D shapes from a group of shapes and describe their properties identify 2D shapes on the surface of 3D shapes	recognise 3D shapes in different orientations and describe them recognise angles as a property of a shape identify horizontal and vertical lines and pairs of parallel and perpendicular lines	identify lines of symmetry in 2D shapes presented in different orientations	use the properties of rectangles to deduce related facts and find missing lengths and angles identify 3D shapes, including cubes and other cuboids, from 2D representations	recognise, describe and build simple 3D shapes, including making nets illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius

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COMPARING AND CLASSIFYING SHAPES						
			compare and sort common 2D and 3D shapes and everyday objects describing similarities and differences		compare and order angles up to two right angles by size compare and classify geometric shapes (triangles and quadrilaterals)	compare acute, obtuse and reflex 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

DRAWING AND CONSTRUCTING SHAPES						
select shapes appropriately: flat surfaces for building, a triangular prism for a roof, etc combine shapes to make new ones – an arch, a bigger triangle, etc	Select, rotate and manipulate shapes to develop spatial reasoning skills Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can			draw 2D shapes and make 3D shapes using modelling materials	complete a simple symmetric figure with respect to a specific line of symmetry	draw given angles and measure them in degrees	draw 2D shapes using given dimensions and angles

ANGLES						
				recognise angles as a description of a turn identify right angles and identify whether angles are greater or less than a right angle recognise that two right angles make half turn, three make three quarters of a turn and four a complete turn	identify acute and obtuse angles	know angles are measured in degrees; estimate their size identify angles at point and one whole turn (total 360°); identify angles at a point on a straight line and ½ a turn (total 180°) draw given angles and measure them in degrees	recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles find unknown angles in any triangles, quadrilaterals and regular polygons

SHAPE: MEASURES

| | | | | measure the perimeter of simple 2D shapes | measure and calculate the perimeter of a rectilinear figure in centimetres and metres

find the area of rectilinear shapes by counting squares | measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres

calculate and compare the area of rectangles using standard units

estimate the area of irregular shapes

estimate volume e.g. using 1cm³ blocks to build cuboids and capacity e.g. using water | recognise that shapes with the same areas can have different perimeters and vice versa

calculate the area of parallelograms and triangles

calculate, estimate and compare volume of cubes and cuboids using units (cm³, m³, mm³ and km³)

recognise when it is possible to use formulae for area and volume of shapes |

| **POSITION, DIRECTION AND MOVEMENT** | | | | | | | |

| understand position through words alone with no pointing

describe a familiar route

discuss routes and locations, using words like 'in front of' and 'behind' | | describe position, direction and movement, including whole, half, quarter and three-quarter turns | use mathematical vocabulary to describe position, direction and movement in a straight line and distinguishing between rotation as a turn and in terms of right angles (clockwise and anti-clockwise) | | describe movements between positions as translations of a given unit to the left/right and up/down | 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 | |

| **CO-ORDINATES** | | | | | | | |

| | | | | | describe positions on a 2D grid as co-ordinates in the first quadrant

plot specified points and draw sides to complete a given polygon | | describe positions on the full co-ordinate grid (all four quadrants)

draw and translate simple shapes on the co-ordinate plane, and reflect them in the axis |

Measurement

COMPARING AND ESTIMATING MEASURES

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make comparisons between objects relating to size, length, weight and capacity	Compare length, weight and capacity	compare and describe: lengths and heights (long/short, tall/short); mass/weight (heavy/light, heavier than, lighter than); capacity and volume (full/empty, more than, less than, half full)	compare and order lengths, mass, volume/capacity and record the results using > , < and = choose and use appropriate standard units to estimate length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml)	compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)	estimate and compare different measures		**use, read, write and convert between standard units, using decimal notation**
	**MEASURING AND CALCULATING MEASURES**
		measure and begin to record mass/weight; capacity and volume; length/height	choose and use appropriate standard units to measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels read scales in divisions of ones, twos, fives and tens	measure, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)	calculate different measures, including money in pounds and pence	understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints	**use, read, write and convert between standard units, using decimal notation**
	**MEASURE: SHAPE**

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				measure the perimeter of simple 2D shapes	measure and calculate the perimeter of a rectilinear figure in centimetres and metres find the area of rectilinear shapes by counting squares	measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres calculate and compare the area of rectangles using standard units estimate the area of irregular shapes estimate volume e.g. using 1cm³ blocks to build cuboids and capacity e.g. using water	recognise that shapes with the same areas can have different perimeters and vice versa calculate the area of parallelograms and triangles recognise when it is possible to use formulae for area and volume of shapes calculate, estimate and compare volume of cubes and cuboids using units (cm^3, m^3, mm^3 and km^3)
MEASURE: MONEY							
		recognise and know the value of different denominations of coins and notes	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 amount of money	add and subtract amounts of money to give change, using both £ and p in practical contexts	calculate money in pounds and pence		
MEASURE: TIME							

begin to describe a sequence of events, real or fictional, using words such as first, then…		compare and describe time (quicker, slower, earlier, later) sequence events in chronological order using correct language recognise and use language relating to dates, including days of the week, weeks, months and years measure and begin to record time (hours, minutes, seconds) tell the time to the hour and half past the hour and draw the hands on a clock face	compare intervals of time sequence intervals of time remember the number of minutes in an hour and the number of hours in a day tell and write the time to five minutes, including quarter past/to and draw the hands on a clock face	record and compare time in terms of seconds, minutes and hours; compare duration of events use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight know the number of seconds in a minute and the number of days in each month, year and leap year estimate and read time with increasing accuracy to the nearest minute **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		

CONVERTING MEASURES							
					convert between different units of measure **solve problems involving converting from hours to minutes; minutes to seconds; years to months, weeks to days**	convert between different units of metric measure **solve problems involving converting between units of time**	**use, read, write and convert between standard units, using decimal notation** convert between miles and kilometres

PROBLEM SOLVING

		solve practical problems for lengths and heights, mass/weight, capacity and volume, and time	**solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures** solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change	**add and subtract amounts of money to give change, using both £ and p in practical contexts**	**solve simple measure and money problems involving fractions and decimals to two decimal places** **solve problems involving converting from hours to minutes; minutes to seconds; years to months, weeks to days**	use all four operations to solve problems involving measure **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

Statistics

INTERPRETING, CONSTRUCTING AND PRESENTING DATA

			interpret and construct simple pictograms, tally charts, block diagrams and simple tables	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** calculate and interpret the mean as an average

PROBLEM SOLVING

			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 totaling and comparing categorical data	Solve one-step and two-step questions e.g. 'how many more/fewer?' using information presented	solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs	solve comparison, sum and different problems using information presented in a line graph	**interpret and construct pie charts and line graphs and use these to solve problems**

Algebra

PATTERNS AND SEQUENCES

talk about and identify the patterns around them, using informal language like pointy, spotty, bobs, etc extend and create ABAB patterns notice and correct an error in a repeating pattern	Continue, copy and create repeating patterns		order and arrange combinations of mathematical objects in patterns and sequences				generate and describe linear number sequences

EQUATIONS

							express missing number problems algebraically find pairs of numbers that satisfy an equation with two unknowns enumerate possibilities of combinations of two variables

FORMULAE

							use simple formulae **recognise when it is possible to use formulae for area and volume of shapes**