

Mathematics Knowledge Sequencing at Patrington Primary

Mathematics Understanding, Knowledge and Skills objectives:

<p>Intent:</p>	<p>At Patrington Primary Academy, we aim for our children to be able to think and solve problems mathematically, by using appropriate knowledge, concepts, and skills.</p> <p>By providing a mastery pedagogy, we aim for children:</p> <ul style="list-style-type: none"> ● to develop a deeper understanding and breadth of knowledge by providing opportunities for inter-connecting and linking of mathematical concept ● to become fluent in place value and number ● to develop high levels of cognitive thinking when solving problems and reasoning <p>Our approach aims to broaden their knowledge and understanding of how mathematics is used in the wider world; transferable mathematical skills and to empower children in their decision making in a range of contexts, ensuring they are well equipped for their future.</p>
<p>Impact:</p>	<p>We do this by providing them with rich and enjoyable experiences in all aspects of maths, leading to our children having positive attitudes with the confidence to explore a range of mathematical problems resiliently. Lessons are carefully crafted using a Concrete, Pictorial, Abstract approach, to ensure a deep conceptual understanding is secured. Learning is developed using the NCETM Prioritisation for Maths, supplemented with tasks from various others. Independent learning is designed to enable children to master a skill through varied fluency and apply this to reasoning and problem solving. Tasks are carefully designed to support and challenge all children without putting a 'ceiling' on their learning in a 'low threat, high challenge' environment. Assessment for learning is used consistently during the lesson to move children forward and extend their thinking and understanding or to support children to access the work at their level to work as independently as possible.</p>
<p>Implementation:</p>	<p>At Patrington Primary Academy, our pupils will have:</p>

	<ul style="list-style-type: none"> ● A mathematical education that is rich in real-life contexts and allows them to apply the knowledge and skills they have learnt. ● Regular opportunities to explain their reasoning and mathematical thinking in relation to problems set in real life contexts. ● Opportunities to apply their mathematical knowledge across other areas or the curriculum. ● The ability to recall facts and procedures, including the recollections of times tables. ● Become fluent, competent and efficient mathematicians.
Substantive knowledge in Computing:	At Patrington, children learn a range of mathematical concepts that act as foundations for their journey through school and beyond.
Disciplinary knowledge in Computing:	Based on the foundations of the substantive knowledge acquired through school, children can apply these concepts to form well-reasoned responses to mathematical questioning and understand the processes that allow them to draw their own conclusions. This allows to children to apply their knowledge in a real life contexts and adjust their mathematical thinking as a result
Mathematics:	The study of number, pattern, geometry and form; using reasoning and fluency to find, order and solve problems.

Number: Number and Place Value

COUNTING							
Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

<p>Recites numbers from 0 to 5 (and beyond) and back from 5 to 0</p>	<p>Counts up to five items, recognising that the last number said represents the total counted so far</p> <p>Links numerals with amounts up to 5 and maybe beyond</p> <p>Subitises quantities up to 5 (ELGs)</p> <p>Verbally count beyond 20, recognising the pattern of the counting system (ELGs)</p>	<p>count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number</p>			<p>count backwards through zero to include negative numbers</p>	<p>interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero</p>	<p>use negative numbers in context, and calculate intervals across zero</p>
		<p>count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens</p>	<p>count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward</p>	<p>count from 0 in multiples of 4, 8, 50 and 100;</p>	<p>count in multiples of 6, 7, 9, 25 and 1 000</p>	<p>count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000</p>	
		<p>given a number, identify one more and one less</p>		<p>find 10 or 100 more or less than a given number</p>	<p>find 1 000 more or less than a given number</p>		

COMPARING NUMBERS

Comparing numbers 'big, small, lots, more'	Compares two small groups of up to five objects, saying when there are the same number of objects in each group, e.g. You've got two, I've got two. We have the same. Uses number names and symbols when comparing numbers, showing interest in large 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 1 000	order and compare numbers beyond 1 000	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)	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>compare numbers with the same number of decimal places up to two decimal places</i> (copied from Fractions)		

IDENTIFYING, REPRESENTING AND ESTIMATING NUMBERS

Explores the concept of identifying numbers (in and around their environment)	Explores using a range of their own marks and signs to which they ascribe mathematical meanings	identify and represent numbers using objects and pictorial representations including the number line	identify, represent and estimate numbers using different representations, including the number line	identify, represent and estimate numbers using different representations	identify, represent and estimate numbers using different representations		
Represents numbers in play '2 cars, 4 candles' and through	Identifying and representing numbers using objects and pictorial						

adult interactions and song	representations <hr/> Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity ELGs						
-----------------------------	---	--	--	--	--	--	--

READING AND WRITING NUMBERS (including Roman Numerals)

Nursery	Reception		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recognises numbers that are special to them/familiar within the environment such as their age	Begin to recognise numerals 0 to 5 Points or touches (tags) each item, saying one number for each item, using the stable order of 1,2,3,4,5		read and write numbers from 1 to 20 in numerals and words.	read and write numbers to at least 100 in numerals and in words	read and write numbers up to 1 000 in numerals and in words		read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Comparing Numbers)	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><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></p> <p>(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 Roman numerals to 1 000 (M) and recognise years written in Roman numerals.</p>	
--	--	--	--	--	---	--	--	--

UNDERSTANDING PLACE VALUE

	<p>Composition of numbers to 10</p> <p>Subitizing to 10</p> <p>Number patterns</p>			<p>recognise the place value of each digit in a two-digit number (tens, ones)</p>	<p>recognise the place value of each digit in a three-digit number (hundreds, tens, ones)</p>	<p>recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)</p>	<p>read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit</p> <p>(appears also in Reading and Writing Numbers)</p>	<p>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)</p>
--	--	--	--	---	---	---	--	--

						<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</i> (copied from Fractions)	<i>recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents</i> (copied from Fractions)	<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</i> (copied from Fractions)
--	--	--	--	--	--	---	---	--

ROUNDING							
Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					round any number to the nearest 10, 100 or 1 000	round any number up to 1 000 000 to the nearest 10, 100, 1 000, 10 000 and 100 000	round any whole number to a required degree of accuracy

					<i>round decimals with one decimal place to the nearest whole number</i> (copied from Fractions)	<i>round decimals with two decimal places to the nearest whole number and to one decimal place</i> (copied from Fractions)	<i>solve problems which require answers to be rounded to specified degrees of accuracy</i> (copied from Fractions)
--	--	--	--	--	---	---	---

PROBLEM SOLVING

	Begins to explore and work out mathematical problems, using signs and strategies of their own choice, including (when appropriate) standard numerals, tallies and “+” or “-”		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
--	--	--	--	---	--	--	---

Number: Addition and Subtraction

NUMBER BONDS

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	<p>number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. ELGs</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>				
MENTAL CALCULATION							
	<p>Shows awareness that numbers are made up (composed) of smaller numbers, exploring partitioning in different ways with a wide range of objects</p> <p>In practical activities, adds one and subtracts one with numbers to 5</p>	<p>add and subtract one-digit and two-digit numbers to 20, including zero</p>	<p>add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> * a two-digit number and ones * a two-digit number and tens * two two-digit numbers 	<p>add and subtract numbers mentally, including:</p> <ul style="list-style-type: none"> * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds 		<p>add and subtract numbers mentally with increasingly large numbers</p>	<p>perform mental calculations, including with mixed operations and large numbers</p>

			* adding three one-digit numbers				
		read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot				use their knowledge of the order of operations to carry out calculations involving the four operations

WRITTEN METHODS							
Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs		add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar	

		(appears also in Mental Calculation)				addition and subtraction)	
--	--	--------------------------------------	--	--	--	---------------------------	--

INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS

			recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	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, levels of accuracy.
--	--	--	---	--	---	--	---

PROBLEM SOLVING

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
---------	-----------	--------	--------	--------	--------	--------	--------

		<p>solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as</p> <p>7 = * - 9</p>	<p>solve problems with addition and subtraction:</p> <ul style="list-style-type: none"> * using concrete objects and pictorial representations, including those involving numbers, quantities and measures * applying their increasing knowledge of mental and written methods 	<p>solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction</p>	<p>solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why</p>	<p>solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</p>	<p>solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</p>
			<p><i>solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (copied from Measurement)</i></p>				<p>Solve problems involving addition, subtraction, multiplication and division</p>

Number: Multiplication and Division

MULTIPLICATION & DIVISION FACTS

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		<p><i>count in multiples of twos, fives and tens</i></p> <p>(copied from Number and Place Value)</p>	<p><i>count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward</i></p> <p>(copied from Number and Place Value)</p>	<p><i>count from 0 in multiples of 4, 8, 50 and 100</i></p> <p>(copied from Number and Place Value)</p>	<p><i>count in multiples of 6, 7, 9, 25 and 1000</i></p> <p>(copied from Number and Place Value)</p>	<p><i>count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000</i></p> <p>(copied from Number and Place Value)</p>	
			<p>recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers</p>	<p>recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</p>	<p>recall multiplication and division facts for multiplication tables up to 12×12</p>		

--	--	--	--	--	--	--	--

MENTAL CALCULATION

				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)	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	multiply and divide numbers mentally drawing upon known facts	perform mental calculations, including with mixed operations and large numbers
--	--	--	--	---	--	---	--

			show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot		recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	<i>associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$)</i> (copied from Fractions)
--	--	--	---	--	---	--	--

WRITTEN CALCULATION

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			<p>calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs</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 Mental Methods)</p>	<p>multiply two-digit and three-digit numbers by a one-digit number using formal written layout</p>	<p>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</p>	<p>multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</p>

						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
							<i>use written division methods in cases where the answer has up to two decimal places (copied from Fractions (including decimals))</i>

PROPERTIES OF NUMBERS: MULTIPLES, FACTORS, PRIMES, SQUARE AND CUBE NUMBERS

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					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

						<p>know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers</p>	<p><i>use common factors to simplify fractions; use common multiples to express fractions in the same denomination</i></p>
						<p>establish whether a number up to 100 is prime and recall prime numbers up to 19</p>	<p>(copied from Fractions)</p>
						<p>recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)</p>	<p><i>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</i></p> <p>(copied from Measures)</p>

ORDER OF OPERATIONS

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
							use their knowledge of the order of operations to carry out calculations involving the four operations

INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS

				<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

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		<p>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</p>	<p>solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</p>	<p>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</p>	<p>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</p>	<p>solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes</p>	<p>solve problems involving addition, subtraction, multiplication and division</p>
						<p>solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</p>	

						<p>solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates</p>	<p><i>solve problems involving similar shapes where the scale factor is known or can be found</i></p> <p>(copied from Ratio and Proportion)</p>
--	--	--	--	--	--	--	---

Number: Fractions (including decimals and percentages)

COUNTING IN FRACTIONAL STEPS							
Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			<p><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></p>	count up and down in tenths	count up and down in hundredths		
RECOGNISING FRACTIONS							

		recognise, find and name a half as one of two equal 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	recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators	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)	
				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 name a quarter as one of four equal parts of an object, shape or quantity		recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators			

COMPARING FRACTIONS

				compare and order unit fractions, and fractions with the same denominators		compare and order fractions whose denominators are all multiples of the same number	compare and order fractions, including fractions >1
--	--	--	--	--	--	---	---

COMPARING DECIMALS

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					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 PERCENTAGES)

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

ADDITION AND SUBTRACTION OF FRACTIONS

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
				add and subtract fractions with the same denominator within one whole (e.g. $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$)	add and subtract fractions with the same denominator	add and subtract fractions with the same denominator and multiples of the same number	add and subtract fractions with different denominators and mixed numbers, using the
						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. $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$)	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. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$)
							multiply one-digit numbers with up to

							two decimal places by whole numbers
							divide proper fractions by whole numbers (e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$)
MULTIPLICATION AND DIVISION OF DECIMALS							
Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
							multiply one-digit numbers with up to two decimal places by whole numbers
					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 and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places

							<p>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</p>
							<p>associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$)</p>
							<p>use written division methods in cases where the answer has up to two decimal places</p>

PROBLEM SOLVING

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
---------	-----------	--------	--------	--------	--------	--------	--------

				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 problems involving numbers up to three decimal places	
					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 with a denominator of a multiple of 10 or 25.	

Ratio and Proportion

Statements only appear in Year 6 but should be connected to previous learning, particularly fractions and multiplication and division

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
---------	-----------	--------	--------	--------	--------	--------	--------

							<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>

Measurement

COMPARING AND ESTIMATING

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		<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] 	<p>compare and order lengths, mass, volume/capacity and record the results using $>$, $<$ and $=$</p>		<p>estimate, compare and calculate different measures, including money in pounds and pence</p> <p>(also included in Measuring)</p>	<p>calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes (also included in measuring)</p> <hr/> <p>estimate volume (e.g. using 1 cm^3 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 (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3.</p>

		* time [e.g. quicker, slower, earlier, later]					
		sequence events in chronological order using language [e.g. before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]	compare and sequence intervals of time	compare durations of events, for example to calculate the time taken by particular events or tasks			
				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)			

MEASURING and CALCULATING

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
---------	-----------	--------	--------	--------	--------	--------	--------

		<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 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</p>	<p>measure, compare, add and subtract:</p> <p>lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)</p>	<p>estimate, compare and calculate different measures, including money in pounds and pence</p> <p>(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</p> <p>(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>

MEASURING and CALCULATING

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		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	add and subtract amounts of money to give change, using both £ and p in practical contexts			
	find different combinations of coins that equal the same amounts of money						
	solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change						
					find the area of rectilinear shapes by counting squares	calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm ²) and square metres (m ²) and estimate the area of irregular shapes	calculate the area of parallelograms and triangles

						<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, 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>

TELLING THE TIME

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		<p>tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.</p>	<p>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.</p>	<p>tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks</p>	<p>read, write and convert time between analogue and digital 12 and 24-hour clocks</p> <p>(appears also in Converting)</p>		

		<p>recognise and use language relating to dates, including days of the week, weeks, months and years</p>	<p>know the number of minutes in an hour and the number of hours in a day.</p> <p>(appears also in Converting)</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</p> <p>(appears also in Comparing and Estimating)</p>			
					<p>solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days</p> <p>(appears also in Converting)</p>	<p>solve problems involving converting between units of time</p>	

CONVERTING

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			<p>know the number of minutes in an hour and the number of hours in a day.</p> <p>(appears also in Telling the Time)</p>	<p>know the number of seconds in a minute and the number of days in each month, year and leap year</p>	<p>convert between different units of measure (e.g. kilometre to metre; hour to minute)</p>	<p>convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)</p>	<p>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 to three decimal places</p>
					<p>read, write and convert time between analogue and digital 12 and 24-hour clocks</p> <p>(appears also in Converting)</p>	<p>solve problems involving converting between units of time</p>	<p>solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate</p> <p>(appears also in Measuring and Calculating)</p>

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

Geometry: Properties of Shapes

IDENTIFYING SHAPES AND THEIR PROPERTIES							
Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

		<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 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>identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces</p>				<p>illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius</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>				

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 ($^{\circ}$)	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

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
---------	-----------	--------	--------	--------	--------	--------	--------

			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	compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
						distinguish between regular and irregular polygons based on reasoning about equal sides and angles	

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:</p> <ul style="list-style-type: none"> * angles at a point and one whole turn (total 360°) * angles at a point on a straight line and ½ a turn (total 180°) * other multiples of 90° 	<p>recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles</p>
				<p>identify horizontal and vertical lines and pairs of perpendicular and parallel lines</p>			

Statistics

INTERPRETING, CONSTRUCTING AND PRESENTING DATA

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
---------	-----------	--------	--------	--------	--------	--------	--------

			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
			ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity				
			ask and answer questions about totalling and comparing categorical data				

SOLVING PROBLEMS

				<p>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.</p>	<p>solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.</p>	<p>solve comparison, sum and difference problems using information presented in a line graph</p>	<p>calculate and interpret the mean as an average</p>
--	--	--	--	--	--	--	---

Algebra

EQUATIONS							
Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

		<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>$7 = * - 9$</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><i>solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. (copied from Addition and Subtraction)</i></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><i>solve problems, including missing number problems, involving multiplication and division, including integer scaling</i></p> <p>(copied from Multiplication and Division)</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>				find pairs of numbers that satisfy number sentences involving two unknowns
		<p><i>represent and use number bonds and related subtraction facts within 20</i></p> <p>(copied from Addition and Subtraction)</p>					enumerate all possibilities of combinations of two variables

FORMULAE							
Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	3
					<p><i>Perimeter can be expressed algebraically as $2(a + b)$ where a and b are the</i></p>		use simple formulae

					<p><i>dimensions in the same unit.</i></p> <p><i>(Copied from NSG measurement)</i></p>		<p><i>recognise when it is possible to use formulae for area and volume of shapes</i></p> <p><i>(copied from Measurement)</i></p>
--	--	--	--	--	--	--	--

SEQUENCES

		<p><i>sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening</i></p> <p><i>(copied from Measurement)</i></p>	<p><i>compare and sequence intervals of time</i></p> <p><i>(copied from Measurement)</i></p>				<p>generate and describe linear number sequences</p>
--	--	--	--	--	--	--	--