Maths

Sticklepath Intent

Our curricular aims are to develop **Growing Minds** that are **Curious, Critical Communicators**.

Mathematics teaching at Sticklepath aims to create curious, critical, communicators through a mastery curriculum focused on developing the skills of reasoning, problem solving and fluency. This is done through a concise progression of skills taught in small steps that build on children's previous learning. Skills based enrichment tasks are used to ensure that children's mathematical understanding is extended deeper, challenging them to think about the maths from a different point of view. Targeted pre-teach interventions are used to close the gap and support children to become more active and influential in maths lessons.

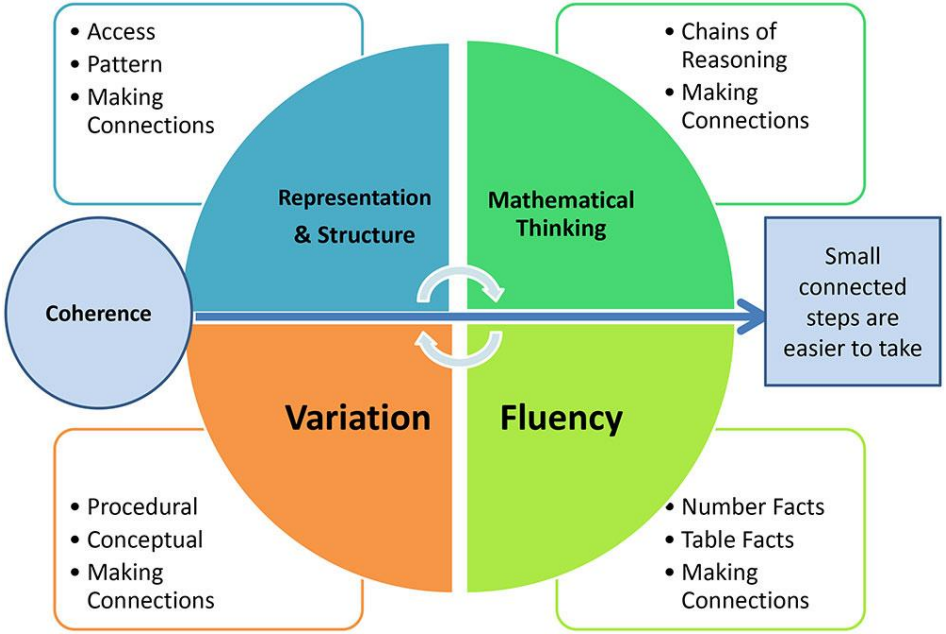
Children are taught to notice, reason, justify and generalise. Children build consensus through communication, using stem sentences to structure their discussions with appropriate mathematical vocabulary. The persistent use of stem sentences also allows pupils to hook back to previous learning.

At Sticklepath there is a consistent use of representation used across the school to help children see the underlying structure of the maths. Maths is an extremely abstract concept and so we ensure that children move through the concrete, pictorial and abstract phases of understanding using key manipulatives purposefully and appropriately to support their learning. Pupils are encouraged to hook back to previous learning and are supported through the use of clear and consistent stem sentences. Children at Sticklepath have the opportunity for regular fluency practice throughout the day. ensuring that pupils problem solving skills are underpinned with strong number sense and fluency.

Pupils at Sticklepath have the chance to engage with data and numbers across the curriculum. We want the children to understand the value of mathematical literacy and how it can allow them to make sense, interpret and be critical of the information they see in day to day life. Teachers use a rich enquiry based curriculum to give children the opportunity to engage with real life numbers and develop a deep curiosity for the world around them.

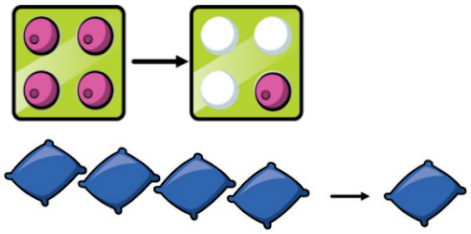
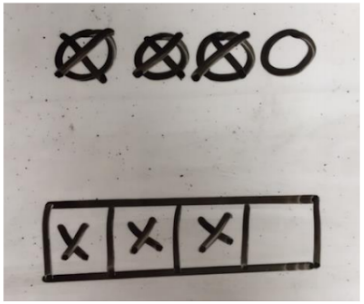
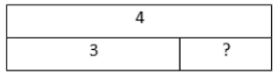
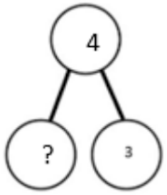
The 5 big ideas

Coherence	Lessons are broken down into small, connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts
Structure and Representation (CPA)	Representations used in lessons expose the mathematical structure being taught, the aim being that students can do the maths without recourse to the representation
Mathematical Thinking and Reasoning	If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others
Fluency	Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics
Variation	Variation is twofold. It is firstly about how the teacher represents the concept being taught, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical relationships and structure.



Calculation policy: Subtraction

Key language: take away, less than, the difference, subtract, minus, fewer, decrease.

Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used). 4 – 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	4- 3 = ☐ = 4 – 3  

Sticklepath knowledge statements							
Concept	ELG	Y1	Y2	Y3	Y4	Y5	Y6
Number & Place value	Verbally count beyond 20, recognising the pattern of the counting system; Compare quantities up to 10 in different contexts, recognising when one quantity is greater than,	count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number count, read and write numbers to 100 in numerals; 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 and backward recognise the place value of each digit in a two-digit number (tens, ones) identify, represent and estimate numbers using different representations, including the number line compare and order	count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number recognise the place value of each digit in a three-digit number (hundreds, tens, ones) compare and order numbers up to 1000 identify, represent and estimate numbers using	count in multiples of 6, 7, 9, 25 and 1000 find 1000 more or less than a given number count backwards through zero to include negative numbers recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) order and compare numbers beyond 1000 identify, represent and estimate	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit round any whole number to a required degree of accuracy use negative numbers in context, and calculate intervals across zero solve number and practical problems that involve all of the above.

	less than or the same as the other quantity; Explore and represent patterns within numbers up to 10, including evens and odds,	identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least read and write numbers from 1 to 20 in numerals and words.	numbers from 0 up to 100; use <, > and = signs read and write numbers to at least 100 in numerals and in words use place value and number facts to solve problems.	different representations read and write numbers up to 1000 in numerals and in words solve number problems and practical problems involving these ideas.	numbers using different representations round any number to the nearest 10, 100 or 1000 solve number and practical problems that involve all of the above and with increasingly large positive numbers 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.	round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 solve number problems and practical problems that involve all of the above read Roman numerals to 1000 (M) and recognise years written in Roman numerals.	
Addition & Subtraction	Have a deep understanding of number to 10, including the composition of each number; 14 Subitise (recognise quantities without counting) up to 5; Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.	read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs represent and use number bonds and related subtraction facts within 20 add and subtract one-digit and two-digit numbers to 20, including zero solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 =_ – 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 recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 add and subtract numbers using concrete objects, pictorial representations, and mentally, including: ● a two-digit number and ones ● a two-digit number and tens ● two two-digit numbers ● adding three one-digit	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 with up to three digits, using formal written methods of columnar addition and subtraction estimate the answer to a calculation and use inverse operations to check answers solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate estimate and use inverse operations to check answers to a calculation solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) add and subtract numbers mentally with increasingly large numbers use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.	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 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 divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context perform mental calculations, including with mixed operations and large numbers identify common factors, common multiples and prime numbers use their knowledge of the order of operations to carry out calculations involving the four operations solve addition and

			numbers show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.				subtraction multi-step problems in contexts, deciding which operations and methods to use and why solve problems involving addition, subtraction, multiplication and division use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
Multiplication and division	Explore and represent patterns within numbers up to 10, including how quantities can be distributed equally.	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.	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables 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 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.	recall multiplication and division facts for multiplication tables up to 12 × 12 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 recognise and use factor pairs and commutativity in mental calculations multiply two-digit and three-digit numbers by a one-digit number using formal written layout 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.	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 (nonprime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19 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 and divide numbers mentally drawing upon known facts 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 and divide whole numbers and those involving decimals by 10, 100 and 1000 recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)	

						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 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.	
Fractions	Explore and represent patterns within numbers up to 10, including double facts	recognise, find and name a half as one of two equal parts of an object, shape or quantity recognise, find and name a quarter as one of four equal parts of an object, shape or quantity	recognise, find, name and write fractions ⅓ ,¼ , 2/4 and ¾ of a length, shape, set of objects or quantity write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and ½ .	count up and down in tenths; 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 nonunit fractions with small denominators recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators recognise and show, using diagrams, equivalent fractions with small denominators add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7] compare and order unit fractions, and fractions with the same denominators solve problems that involve all of the above.	recognise and show, using diagrams, families of common equivalent fractions count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. 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 add and subtract fractions with the same denominator recognise and write decimal equivalents of any number of tenths or hundredths recognise and write decimal equivalents to ¼ ,½ , ¾ 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	compare and order fractions whose denominators are all multiples of the same number identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, ⅖ + ⅘ = 6/5 =1 ⅕] add and subtract fractions with the same denominator and denominators that are multiples of the same number multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams read and write decimal numbers as fractions [for example, 0.71 = 71/100] recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents round decimals with two decimal places to the nearest	use common factors to simplify fractions; use common multiples to express fractions in the same denomination compare and order fractions, including fractions > 1 add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, ¼ × ½ = ⅛] divide proper fractions by whole numbers [for example, ⅓ ÷ 2 = ⅙] associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, ⅜] identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places

					whole number compare numbers with the same number of decimal places up to two decimal places solve simple measure and money problems involving fractions and decimals to two decimal places.	whole number and to one decimal place read, write, order and compare numbers with up to three decimal places solve problems involving number up to three decimal places 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, and as a decimal solve problems which require knowing percentage and decimal equivalents of ½ , ¼ , ⅕ , ⅖ , ⅘ and those fractions with a denominator of a multiple of 10 or 25.	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 solve problems which require answers to be rounded to specified degrees of accuracy recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.
Ratio & proportion							solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison solve problems involving similar shapes where the scale factor is known or can be found solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.
Algebra							use simple formulae generate and describe linear number sequences express missing number

							problems algebraically find pairs of numbers that satisfy an equation with two unknowns enumerate possibilities of combinations of two variables.
Measurement	Children use every day language to talk about size, weight, capacity, distance, time, and money to compare quantities and objects	compare, describe and solve practical problems for: ● lengths and heights [for example, long/short, longer/shorter, tall/short, double/half] ● mass/weight [for example, heavy/light, heavier than, lighter than] ● capacity and volume [for example, full/empty, more than, less than, half, half full, quarter] ● time [for example, quicker, slower, earlier, later] measure and begin to record the following: ● lengths and heights ● mass/weight ● capacity and volume ● time (hours, minutes, seconds) recognise and know the value of different denominations of coins and notes sequence events in chronological order using language [for example, before	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 compare and order lengths, mass, volume/capacity and record the results using >, < and = recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value find different combinations of coins that equal the same amounts of money solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change compare and sequence intervals of time tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times know the number of	measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) measure the perimeter of simple 2-D shapes add and subtract amounts of money to give change, using both £ and p in practical contexts tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., 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 compare durations of events [for example to calculate the time taken by particular events or tasks].	Convert between different units of measure [for example, kilometre to metre; hour to minute] measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres find the area of rectilinear shapes by counting squares estimate, compare and calculate different measures, including money in pounds and pence read, write and convert time between analogue and digital 12- and 24-hour clocks solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.	convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water] solve problems involving converting between units of time use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.	solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate 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 convert between miles and kilometres recognise that shapes with the same areas can have different perimeters and vice versa recognise when it is possible to use formulae for area and volume of shapes calculate the area of parallelograms and triangles 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 [for example, mm3 and km3].

		and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening] recognise and use language relating to dates, including days of the week, weeks, months and years tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	minutes in an hour and the number of hours in a day.				
Geometry Properties of shape	Children explore characteristics of everyday objects and shapes and use mathematical language to describe them	recognise and name common ● 2-D and 3-D shapes, including: 2-D shapes [for example, rectangles (including squares), circles and triangles] ● 3-D shapes [for example, cuboids (including cubes), pyramids and spheres].	identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid] compare and sort common 2-D and 3-D shapes and everyday objects	draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them recognise angles as a property of shape or a description of a turn 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 identify horizontal and vertical lines and pairs of perpendicular and parallel lines.	compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes identify acute and obtuse angles and compare and order angles up to two right angles by size identify lines of symmetry in 2-D shapes presented in different orientations complete a simple symmetric figure with respect to a specific line of symmetry.	identify 3-D shapes, including cubes and other cuboids, from 2-D representations know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles draw given angles, and measure them in degrees (o) identify: ● 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 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.	draw 2-D shapes using given dimensions and angles recognise, describe and build simple 3-D shapes, including making nets compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.
Geometry Position and direction		describe position, direction and movement, including whole, half, quarter and three quarter turns.	order and arrange combinations of mathematical objects in patterns and sequences use mathematical vocabulary to describe position, direction and movement, including movement in a straight		describe positions on a 2-D grid as coordinates in the first quadrant describe movements between positions as translations of a given unit to the left/right and up/down plot specified points and draw	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.	describe positions on the full coordinate grid (all four quadrants) draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

			line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anticlockwise).		sides to complete a given polygon.		
Statistics			interpret and construct simple pictograms, tally charts, block diagrams and simple tables 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.	interpret and present data using bar charts, pictograms and tables solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.	interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. 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 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.

Sticklepath Factual Fluency progression document

"We consider someone to be fluent in a technique, procedure, idea, concept or facts at the point at which they no longer **need to** give it attention.

Fluency demands more of students than memorisation of a single procedure or collection of facts. It encompasses **a mixture of efficiency, accuracy and flexibility**.

Quick and efficient recall of facts and procedures is important in order for students to keep track of sub-problems, think strategically and solve problems. Fluency also demands the **flexibility to move between different contexts and representations of mathematics**, to recognise relationships and make connections, and to make appropriate choices from a whole toolkit of methods, strategies and approaches.

- Efficiency – using an appropriate strategy or algorithm (with speed)
- Accuracy – finding correct solutions
- Flexibility – adapting strategy and transferring across contexts

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Additive factual fluency	Addition and subtraction within 10.	Addition and subtraction across 10.	Secure and maintain fluency in additive reasoning within and across 10.			
Multiplicative factual fluency	Counting in groups of 2 & 10.	Recall the 2, 5 & 10 multiplication tables.	Recall the 4, 8 multiplication tables with corresponding division facts.	Recall the 3, 6, 7, 9, 11, 12 multiplication table with corresponding division facts.	Secure and maintain fluency in all of the multiplication tables and corresponding division facts, through continued practice.	
		Counting in groups of 3.	Recall the 3 multiplication times tables			
			Scale numbers by a factor of 10	Scale numbers by a factor of 100	Scale numbers by a factor of 1 tenth and 1 hundredth	Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100,

						1,000, 1 tenth, 1 hundredth or 1 thousandth times the size

Multiplication and division facts

The full set of multiplication calculations that pupils need to be able to solve by automatic recall are shown in the table below. Pupils must also have automatic recall of the corresponding division facts.

1 × 1	1 × 2	1 × 3	1 × 4	1 × 5	1 × 6	1 × 7	1 × 8	1 × 9	1 × 10	1 × 11	1 × 12
2 × 1	2 × 2	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9	2 × 10	2 × 11	2 × 12
3 × 1	3 × 2	3 × 3	3 × 4	3 × 5	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10	3 × 11	3 × 12
4 × 1	4 × 2	4 × 3	4 × 4	4 × 5	4 × 6	4 × 7	4 × 8	4 × 9	4 × 10	4 × 11	4 × 12
5 × 1	5 × 2	5 × 3	5 × 4	5 × 5	5 × 6	5 × 7	5 × 8	5 × 9	5 × 10	5 × 11	5 × 12
6 × 1	6 × 2	6 × 3	6 × 4	6 × 5	6 × 6	6 × 7	6 × 8	6 × 9	6 × 10	6 × 11	6 × 12
7 × 1	7 × 2	7 × 3	7 × 4	7 × 5	7 × 6	7 × 7	7 × 8	7 × 9	7 × 10	7 × 11	7 × 12
8 × 1	8 × 2	8 × 3	8 × 4	8 × 5	8 × 6	8 × 7	8 × 8	8 × 9	8 × 10	8 × 11	8 × 12
9 × 1	9 × 2	9 × 3	9 × 4	9 × 5	9 × 6	9 × 7	9 × 8	9 × 9	9 × 10	9 × 11	9 × 12
10 × 1	10 × 2	10 × 3	10 × 4	10 × 5	10 × 6	10 × 7	10 × 8	10 × 9	10 × 10	10 × 11	10 × 12
11 × 1	11 × 2	11 × 3	11 × 4	11 × 5	11 × 6	11 × 7	11 × 8	11 × 9	11 × 10	11 × 11	11 × 12
12 × 1	12 × 2	12 × 3	12 × 4	12 × 5	12 × 6	12 × 7	12 × 8	12 × 9	12 × 10	12 × 11	12 × 12

Pupils must be fluent in these facts by the end of year 4, and this is assessed in the multiplication tables check. Pupils should continue with regular practice through year 5 to secure and maintain fluency.

The 36 most important facts are highlighted in the table. Fluency in these facts should be prioritised because, when coupled with an understanding of commutativity and fluency in the formal written method for multiplication, they enable pupils to multiply any pair of numbers.

Addition and Subtraction facts

The full set of addition calculations that pupils need to be able to solve with automaticity are shown in the table below. Pupils must also be able to solve the corresponding subtraction calculations with automaticity.

Pupils must be fluent in these facts by the end of year 2, and should continue with regular practice through year 3 to secure and maintain fluency. It is essential that pupils have automatic recall of these facts before they learn the formal written methods of columnar addition and subtraction.

To be taught in Year 1 (within 10)

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

To be taught in year 2 (across 10)

Sentence Frames - Multiplication and Division			
	Multiplication	**Division**	**Fractions**
Rec			
1	**Multiplication means** adding the same number again and again.	**Sharing** is putting into ……. Equal Groups. The answer is how many in each group.	A **Fraction** is an equal part of the whole. **Half** means splitting into 2 equal groups. **Quarter** means splitting into 4 equal groups.
2	**Multiplication means** adding the same number again and again. 5x2 **means** 5 added 2 times **Commutative means** the calculation can be swapped around and the total stays the same.	**Division** is **sharing** or **grouping**. **Sharing** is putting into ……. Groups. The answer is how many in each group. **Grouping** is putting into groups of ……. The answer is how many groups.	A **Fraction** is an equal part of the whole. The **bottom number** tells you, how many equal parts. The **top number** tells you, how many parts you get. **Half** means splitting into 2 equal groups. **Quarter** means splitting into 4 equal groups.
3	**Multiplication means** adding the same number again and again. **Commutative means** the numbers can be swapped around but the answer stays the same. The tricky bit is remembering the tenness of ten. **Expanded column-** First multiply the ones-- the answer is ___ Next multiply the tens, the answer is ____ **Doubling**	**Sharing** is putting into ……. Groups. The answer is how many in each group. **Grouping** is putting into groups of ……. The answer is how many groups.	A **Fraction** is an equal part of the whole. The **bottom number** tells you, how many equal parts. The **top number** tells you, how many parts you get. **Equivalent Fractions** have **the equa**l value, even though they may look different. When you add or subtract fractions with the same denominator, you only use the numerator.

	‘Doubling is when you add the same number again’ **Halving** ‘Halving is when you split the number into 2 equal groups’		The denominator stays the same.
4	**Making a number ten/ hundred times bigger:** To make my number 10 times bigger, I need to move it over one column to the left and put in a 0 as a place holder. To make my number 100 times bigger, I need to move my number 2 places to the left and add two 0s as placeholders. **Grid method- partitioning-** This number has __ ones, ___ tens and __ hundreds so I need to partition it into a grid. **Expanded column-** First multiply the ones-- the answer is ___ Next multiply the tens, the answer is ____ Then multiply the hundreds, the answer is ___ Then add them all together. **3 digit x 1 digit column multiplication:** First, multiply the ones. Next, multiply the tens (don’t forget to add the extra tens) Then, multiply the hundreds (don’t forget to add the extra hundreds)	**Division -** Simple division facts- 24 / 4 = ? I know I can count in 4s until I get to 24. My answer is the amount of times I counted. 240 / 4 = I know that 24 divided by 4 is 6, so I know I need to make my answer ten times bigger.	A fraction is an **equal part** of a whole. The denominator shows how many equal parts your whole is split into. The numerator shows how many parts have been selected. **When finding fraction of a number:** I know that I have to split the number into _____ equal parts because the denominator is __. I am trying to find __/__ so I need to circle ___. **When finding fraction of amount/ knowing a part to problem solve:** Do you know the part or the whole? Getting them to explain- I know a part of the number. A ¼ of the number is 4 so I need to multiply it by 4. **When adding and subtracting fractions:**
5	**Factor x Factor = Product** There are a few factors There are millions of multiples **Factor x Factor = Multiple**	**Short division** **Short division as grouping:** 426÷ 3 = There is one three in four with one left over to	**Numerator** - How many equal parts do you have? **Denominator** - How many equal parts is the whole divided into?

	Composite numbers: A composite number is a number with more than 2 factors. It is any number that is not a prime number. **Prime numbers:** A prime number is a number with only 2 factors – 1 and itself. **Multiplying and dividing by powers of 10:** To **multiply by 10** my number moves up the columns **one column to the left.** To **multiply by 100** my number moves up the columns **two column to the left**. To **multiply by 1000** my number moves up the columns **three column to the left.** (vice versa for division) To **divide by 10** my number moves up the columns **one column to the right.** Mnemonics: XL - extra large e.g. multiply to the left Dividing goes down The number of zeros in the multiple of ten shows how many columns to move E.g. 1<u>00</u> two zeros so move two places. **Long Method:** I know that I need to start by multiplying the ones. Then the tens, followed by the hundreds **I know that** 2 x 3 = 6 **so** 20 x 3 = 60 **(**etc**.)** **I know that** 4 **ones** multiplied by 5 **ones** is 20 **ones** so 4 **ones** multiplied by 5 **tens** is 20 tens	carry... **Short division as sharing:** 426÷ 3 = I had 100 spare so I swapped it for ten 10s. Now I have 12 tens to share.	If I know that 1/10 of a number is eight, then 2/10 of the number is 16, 3/10 of the number is 24, and so on; the whole number is 10/10, so it will be 10 × 8, that is, 80. I know 1/3 of 15 can be solved using 15 Smarties, dividing the set into 3 equal parts and finding how many in one part. Show the calculation '15 ÷ 3 = 5' and 1/3 of 15=5 ' I know ¼ is one whole split into 4 equal parts which is the same as 1÷4.

6	When solving a long multiplication question: First multiply the ones for the first line of calculation		Simplifying fractions: **Adding fractions**: First make the denominators the same then add the numerators. **Subtracting fractions**: First make the denominators the same then subtract the numerators. **Multiplying common fractions**: Multiply the numerators then multiply the denominators. **Multiplying a common fraction by a whole number**: Multiply the numerator by the whole number. The denominator stays the same. **Dividing common fraction by a whole number**: Multiply the denominator by the whole number. The numerator stays the same.

Sentence Frames - Addition and Subtraction			
	Place Value	Addition	Subtraction

Rec	15 has one ten and 5 ones.	**Addition** is putting the parts together. That makes the whole**.**	**Subtraction** is taking away a part from the whole. That leaves the other part.
1	17 has one ten and 7 ones. 71 has seven tens and 1 one.	**Addition** is putting the **parts** together. That makes the **whole.** When you add, the **whole** is always on its own. Bonds to 10: …. and…… make 10. 10 is …. and ……	**Subtraction** is taking away a part from the whole. That leaves the other part. When you subtract, the **whole** is before the symbol.
2	**Partitioning** is splitting the **whole** number into **parts**. 9's the biggest **digit** you can put in any column (link to counting actions learned in year 1) 0-9 are digits. Number above 9 are made using digits in different columns. Closed numberlines startegy:: First you use the number clues, then you work out the **pattern.** Teen (like queen- action) numbers have 1 ten, ty (sip cup of tea-action) numbers have 0 ones.	**Concept** **Addition** is putting together the parts,that makes the whole**.** **Addition is commutative** **Commutative** means we can switch the parts around and the whole stays the same. When you add, the **whole** is always on its own. Bonds to 10: …. and…… make 10. 10 is …. and …… E.g 17 + 5 = 22 22 = 17 + 5 **Strategy** **Column Method:** 1st you add the ones, then you add the tens **Exchanging when you're adding:** 10 ones make one 10. 10 tens make 100.	**Concept** **Subtraction** is taking away a part from the whole. That leaves the other part. When you subtract, the **whole** is before the subtraction symbol. **Strategy** When the **whole and part are far apart, take away the part.** **When the whole and part are close together, count on from the part** **.** **Column subtraction:** 1st you subtract the ones, then you subtract the tens. **Exchanging when you're subtracting:** Exchange 1 ten for 10 ones.
3	When we reach 10 ones we exchange it for a complete ten. Ten one make a ten. Ten tens make 100. Ten 100's make 1000.	The whole is always the biggest. **Column Addition** First we add the ones, then we do the tens. First, we add the ones and carry over.	The whole is always the biggest. **Column Subtraction** I exchange one hundred for ten tens. I exchange one ten for ten ones.

	362 has 3 hundreds 6 tens and 2 ones. I know the next number is…. because…. **Number lines** First find the number clues. Then count the intervals. What are we going to try? Your start number is the size of your step. The second number is how many steps you are taking. **Rounding** “I know (435) is closer on the number line to (400) than (500) This means (435) would round up/down to (400)”	Next, we add the tens and carry over. Then we add the hundreds and carry over. When you add the answer gets bigger I exchange ten ones for one ten. I exchange ten tens for one hundred.	First, we subtract the ones and exchange one ten for ten ones. Next, we subtract the tens and exchange one hundred for ten tens Then we subtract the hundreds.
4	When we reach 10 ones we exchange it for a complete ten. Ten one make a ten. Ten tens make 100. Ten 100’s make 1000. 362 has 3 hundreds 6 tens and 2 ones. I know the next number is…. Because…. Nine is the largest digit you can have in a PV column before you move up. **Rounding** “I know (435) is closer on the number line to (400) than (500) This means (435) would round	(We carry above the next column over) **Column Addition:** First, we add the ones and carry over. Next, we add the tens and carry over. Then we add the hundreds and carry over. Then we add the thousands together.	First we subtract the ones. Next we subtract the tens Then we subtract the hundreds Then we subtract the thousands. **For exchanging -** I haven’t got enough so I need to go next door and exchange 1 ten/hundred/thousand for 10 ones/tens/hundreds. **Mental Methods** Are the numbers close together? Then count on

	up/down to (400)” ‘Negative numbers are numbers less than zero’ → I View Xrays Like Courageous Doctor Mike.		
5	**Place Value** I know that the is XX,XXX,XXX because it has X in the millions column, XXX in the thousands column and XXX **Numberlines** I know that X goes here because it is halfway between A and B. I know that X goes here because it is only a bit more/less than Y. - needs to be more precise though!	**Addend + Addend = Sum** **Mental Methods:** **Round and Adjust** Because I added too much I need to take it away again If I add to the addend I need to subtract from the sum **Equivalent** I noticed that one addend was only X away from Y so I moved X from one addend to the other **Partition** When calculating X + Y I chose to partition X into A and B because it is easier to add A to Y then B.	**Minuend - Subtrahend = Difference** **Mental Methods:** **Round and Adjust** If I take away too much I have to give it back If I add to the subtrahend I need to add the same to the difference **Equivalent** If I add to the subtrahend I have to add to the difference. **Partition** When calculating X - Y I chose to partition X into A and B because it is easier to subtract A from Y then B. **Add instead** I noticed that there was only a small difference between X and Y. So I started counting up from the subtrahend until I reached the minuend to find the difference.
6			