At St Paul's, our maths curriculum aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

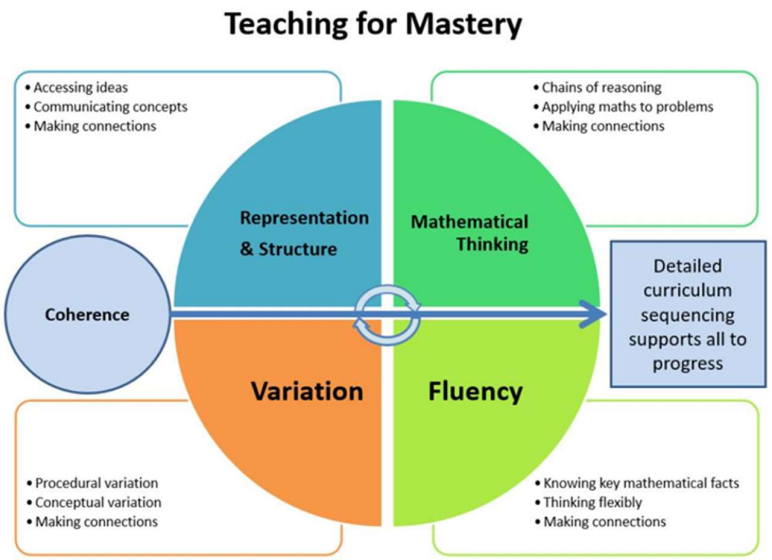
To support the children to be successful mathematicians, we nurture their abilities to:

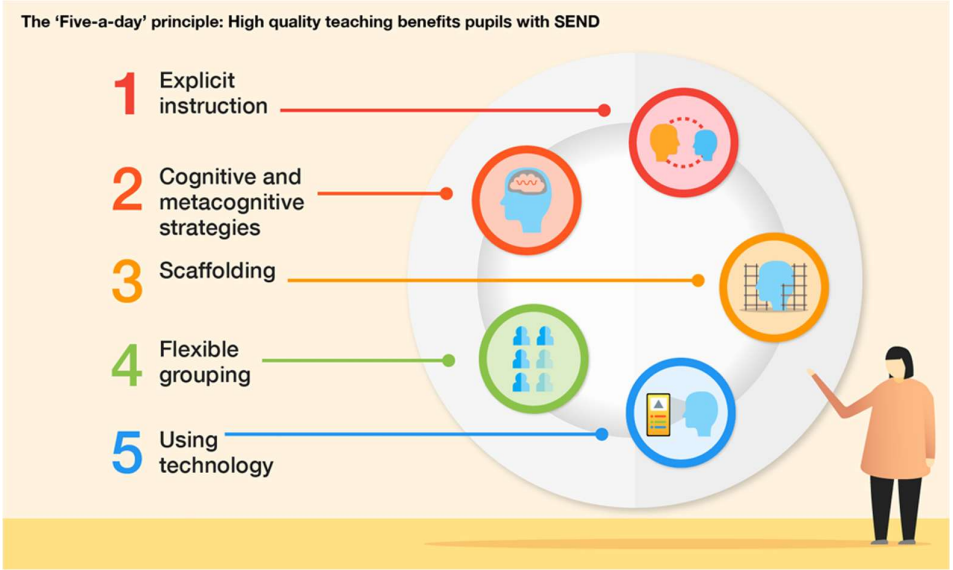
- Spot patterns
- Solve problems
- Use what they already know
- Find the most efficient method
- Work systematically

Our curriculum is split into two sections – fluency and lessons. Fluency gives the children the opportunity to regularly rehearse maths recall and skills to minimise 'forgetting'. It focusses on the **declarative knowledge** of mathematical facts, such as times tables, and **procedural knowledge**, such as written calculation. Lessons are when new content is taught, so covers declarative, procedural and **conditional knowledge** (reasoning and problem solving). Content in each category can be prefaced with the sentence stems below.

Declarative Knowledge	Procedural Knowledge	Conditional Knowledge
I know that…	I know how…	I know when…

Our curriculum and teaching structure are designed following principles from the NCETM and EEF.





Pupils are taught through **whole-class interactive teaching**, where the focus is on all pupils working together on the same content at the same time, balancing **procedural fluency** and **conceptual understanding**. Where a pupil fails to grasp a concept or procedure, this is identified quickly and **early intervention** takes place. The use of **precise vocabulary** is expected in order for children and adults to convey their reasoning and understanding effectively.

NCETM – Essence of Maths Teaching for Mastery

We use a **Mastery Flow Structure** to support children to progress from 'novice' to 'master' through each block of work. Within this structure, children are continually given opportunities for rehearsal practice ensuring a balance of facts, methods and strategies (type 1*) with proof and explanation (type 2*). Type 1 rehearsal is also strengthened through daily fluency sessions which gives the children the opportunity to retrieve, rehearse and embed their learning – see Fluency Intent document. **Ofsted research review*

Mastery Flow Structure					
Stage	**Stage 1** (on the working wall)		**Stage 2**		**Stage 3**
	Represent		**Explain**		**Mastery**
Typical teaching & learning activity	*Standard question layout – e.g. 4+6=* 1. Use concrete manipulatives 2. Use pictorial representations 3. Use abstract methods 4. Mental calculation if applicable		*Varied question structure* 5. Missing box problems 6. Inverse calculations 7. Error correction 8. Word problems 9. What's the same, what's different…		*Rich tasks demonstrating mastery* 10. Always, sometimes, never 11. Non-examples 12. NRICH 13. Maths games requiring logical reasoning
Typical questioning and language	• Show me • What does this look like?		• Explain • Why • Compare		• Convince me that… • Justify • Prove • How do you know? • What if…?
Progression in reasoning *	**1. Describe** what they have done	2. **Explain** what they have done	3. **Convince** others	4. **Justify** the argument	5. **Prove** the argument

All children should have the opportunity to share their thoughts on problems, using the correct language to explain their reasoning. Therefore, word problems are used to elicit initial understanding of the subject. These problems will be shared and on the working wall, with children explaining them in their books.

**Based on NRICH Progression in reasoning.*

When introducing new content, teachers will use an '**I do, we do, you do'** approach to support children in developing a full understanding and moving to independence. This uses worked examples to create **Steps to Success** for the method being taught. For example, when learning to find a fraction of an amount, we would agree our **S2S** as:

1. Divide the amount by the denominator
2. Multiply the result by the numerator

Through the Mastery Flow Structure, the children would already understand why this process works having used manipulatives and representations to demonstrate it.

Those children who demonstrate full understanding are then encouraged to continue their learning independently through Stage 2 and then 3, whilst those requiring more support remain in Stage 1 with scaffolding and supervision until they are ready to progress. During this time, it is vital to find the precise misconceptions that children have (possibly using the S2S) in order to remove them. Teachers will often draw attention to misconceptions in the **I do** stage of teaching.

At all stages, if a child is having difficulty, they should be encouraged to ask themselves, '**What do I know?**', then step back to a suitable point in the Mastery Flow Structure. This will often be within Stage 1 - Represent. Children are also expected to use **jottings** and record their ideas as often as possible in order to aid recall, spot patterns and **develop independence** in their learning. This may take the form of continuing sequences in questions, drawing images or simply writing numbers to minimise cognitive load. Whilst these jottings can take many forms, children are expected to **develop systematic, logical and accurate approach to their presentation** as it will aid pattern spotting and checking for errors.

We also encourage children to use the process - **Choose, Use & Check (CUC)**, which also starts with the question, '**What do I know?**'

1. **Choose** your method
2. **Use** your method
3. **Check** your answer

S2S - CUC		
Choose	**Use**	**Check**
What do I know? • Look at the numbers. Do I notice anything special? • Do I know the answer? • Can I make an approximate guess? • Can I do it in my head? • Which method should I use?	• Think about the S2S for that method • Follow the S2S for that method	• Read the question again • Does my answer fit to the question? • Is my answer approximately correct? • If not, check you did the S2S properly

Typical Lesson Structure
1. Introduction/recapping of key vocabulary 2. Problem to elicit current level of knowledge & understanding – e.g. word problem, talking mat, 3. Teaching 4. Practice – I do, we do, you do 5. AfL – who is ready for independence & and who needs more support?

Further support	Independence
• What are the misconceptions? • Re-teach • Re-practice • What do I know? • What resources would support? • Who is ready for independence?	Practice some more questions in Stage 1 to ensure they are confident independently. Then move on to Stage 2 and 3.

It is vital that teaching and practice is not rushed and time is spent to fully ascertain the understanding of the children. This will allow teachers to flexibly group in order to remove any misconceptions and also allow for independent work.

Small steps in learning may require different amounts of time to cover them fully. Therefore, they may take less than a lesson, a full lesson or a few days. For example, *Multiplying by 0* may take up only part of a lesson, whereas *Short Division* will likely take a number of days.

<table>
<tr><th colspan="4">Foundation Stage</th></tr>
<tr><td rowspan="2">Development Matters</td><td colspan="2">Early Learning Goal - Number</td><td>Early Learning Goal – Numerical Patterns</td></tr>
<tr><td colspan="2">• Have a deep understanding of number to 10, including the composition of each number;
• 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.</td><td>• 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, less than or the same as the other quantity;
• Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.</td></tr>
<tr><td rowspan="4">Foundation Stage</td><td>Cardinality & Counting</td><td>Comparison</td><td>Composition</td></tr>
<tr><td>• Counting: saying number words in sequence
• Counting: tagging each object with one number word
• Counting: knowing the last number counted gives the total so far
• Subitising: recognising small quantities without needing to count them all
• Numeral meanings
• Conservation: knowing that the number does not change if things are rearranged</td><td>• More than/less than
• Identifying groups with the same number of things
• Comparing numbers and reasoning
• Knowing the ‘one more than/one less than’ relationship between counting numbers</td><td>• Part-whole: identifying smaller numbers within a number
• Inverse operations
• A number can be partitioned into different pairs of numbers
• A number can be partition into more than two numbers
• Number bonds: knowing which pairs make a given number</td></tr>
<tr><td>Pattern</td><td>Shape & Space</td><td>Measures</td></tr>
<tr><td>• Continuing, copying, making an AB pattern
• Spot an error in an AB pattern
• Identifying the unit of repeat
• Continuing an ABC pattern
• Continuing a pattern which ends mid-unit
• Making their own ABB, ABBC patterns
• Spotting an error in an ABB pattern
• Symbolising the unit structure
• Generalising structures to another context or mode
• Making a pattern which repeats around a circle/board with fixed number of spaces
• Pattern spotting around us</td><td>• Developing spatial awareness: experiencing different viewpoints
• Developing spatial vocabulary
• Representing spatial relationships
• Developing shape awareness through construction
• Identifying similarities between shapes
• Showing awareness of properties of shape
• Describing properties of shape
• Developing an awareness of relationships between shapes</td><td>• Recognising attributes
• Comparing amounts of continuous quantities
• Showing awareness of comparison in estimating & predicting
• Comparing indirectly
• Recognising the relationship between the size and number of units
• Beginning to use units to compare things
• Beginning to use time to sequence events
• Beginning to experience specific time durations</td></tr>
</table>

When learning about each number throughout the year, we cover the aspects of Cardinality & Counting, Comparison and Composition. When revisiting Pattern, Shape & Space and Measures each term, we build on the children’s current level of understanding. We also give opportunities to practise and develop this understanding through Continuous Provision.

Year group	Autumn	Spring	Summer
Foundation Stage	• Match, sort & compare • Talk about measure & patterns • It's me 1, 2, 3 • Circles and triangles • 1, 2, 3, 4, 5 • Shapes with 4 sides	• Alive in 5 • Mass & capacity • Growing 6, 7, 8 • Length, height & time • Building 9 & 10 • Explore 3D shapes	• To 20 & beyond • How many now? • Manipulate, compose & decompose • Sharing & grouping • Visualise, build & map • Make connections
1	• Place value • Addition & subtraction • Shape	• Place value • Addition & subtraction • Place value • Length & height • Mass & volume	• Multiplication & division • Fractions • Position & direction • Place value • Money • Time
2	• Place value • Addition & subtraction • Shape	• Money • Multiplication & division • Length & height • Mass, capacity & temperature	• Fractions • Time • Statistics • Position & direction
3	• Place value • Addition & subtraction • Multiplication & division	• Multiplication & division • Length & perimeter • Fractions • Mass & capacity	• Fractions • Money • Time • Shape • Statistics
4	• Place Value • Addition & subtraction • Area • Multiplication & division	• Multiplication & division • Length & perimeter • Fractions • Decimals	• Decimals • Money • Time • Shape • Statistics • Position & direction
5	• Place Value • Addition & subtraction • Multiplication & division • Fractions	• Multiplication & division • Fractions • Decimals & percentages • Perimeter & area • Statistics	• Shape • Position & direction • Decimals • Negative numbers • Converting units of measure • Volume
6	• Place Value • Four Operations • Fractions • Converting unit of measure	• Ratio • Algebra • Decimals • FDP • Area, perimeter and volume • Statistics	• Shape • Position & direction

This plan may vary slightly each year to allow for differing number of weeks in each term.

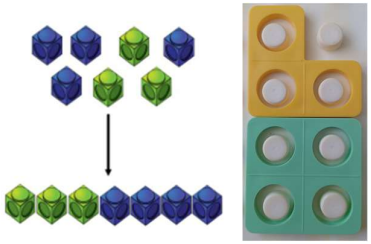
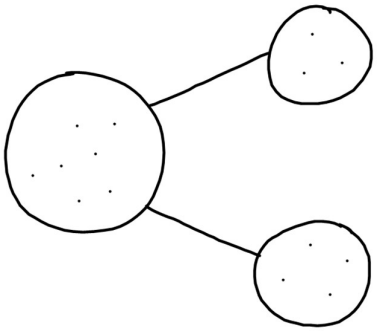
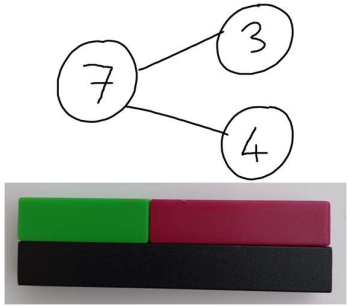
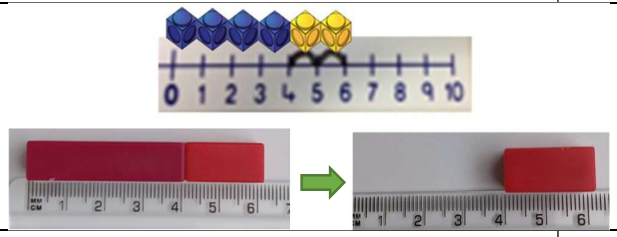
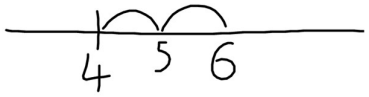
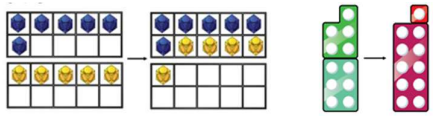
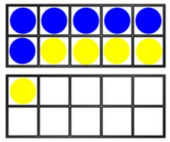
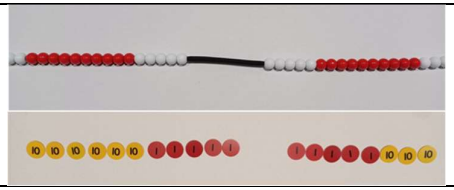
FS	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Getting to know you		Match, sort & compare		Talk about measure & patterns		It's me 1, 2, 3		Circles & triangles	1, 2, 3, 4, 5		Shapes with 4 sides
Spring	Alive in 5		Mass & capacity	Growing 6, 7, 8		Length, height & time		Building 9 & 10			Explore 3D shapes	
Summer	To 20 & beyond		How many now?	Manipulate, compose and decompose		Sharing & grouping		Visual, build & map			Make connections	

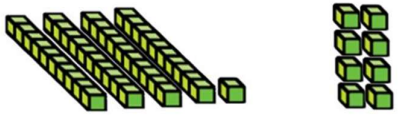
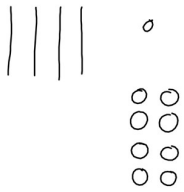
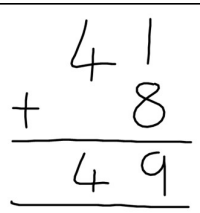
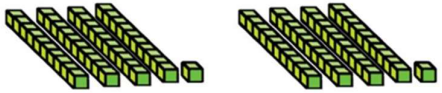
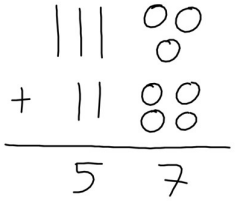
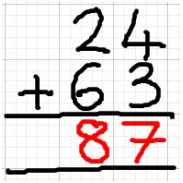
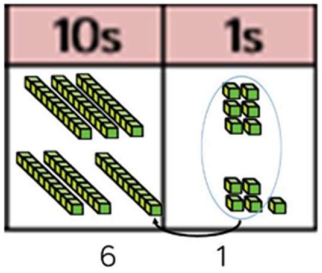
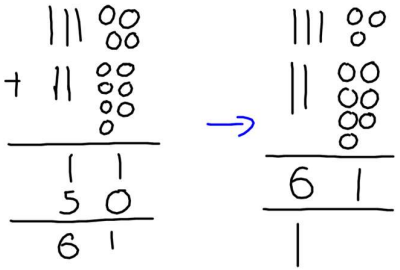
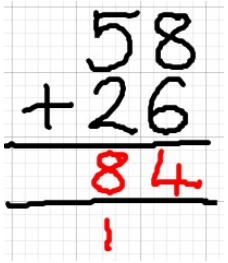
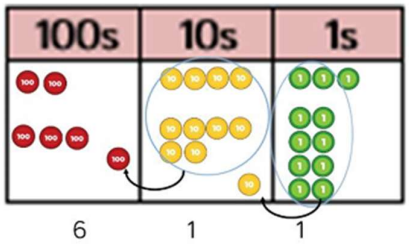
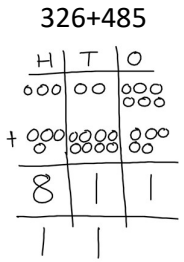
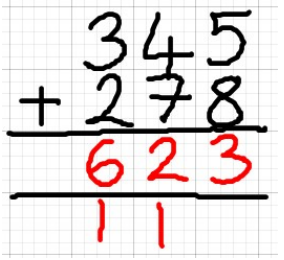
Y1	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Place value (within 10)					Addition & subtraction (within 10)					Shape	
Spring	Place value (within 20)			Addition & subtraction (within 20)			Place value (within 50)		Length & height		Mass & volume	
Summer	Multiplication & division			Fractions		Position & direction	Place value (within 100)		Money	Time		

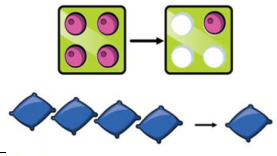
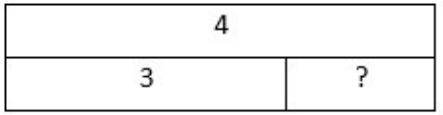
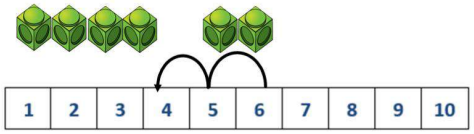
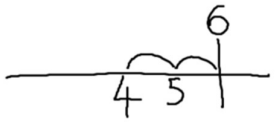
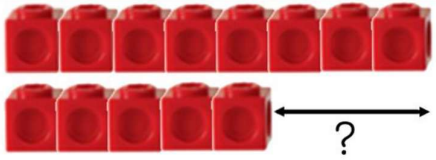
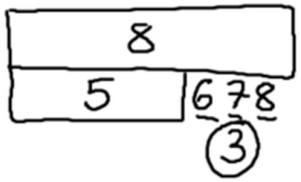
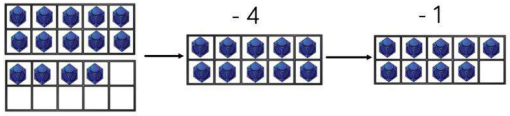
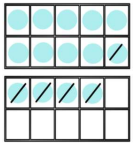
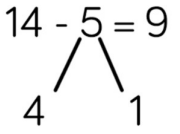
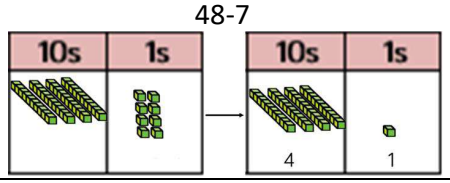
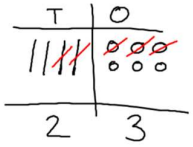
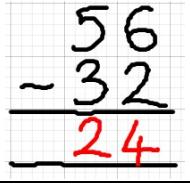
Y2	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Place value				Addition & subtraction					Shape		
Spring	Money		Multiplication & division				Length & height			Mass, capacity & temperature		
Summer	Fractions			Time			Statistics		Position & direction			

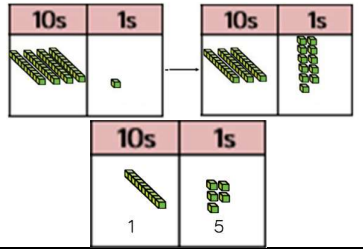
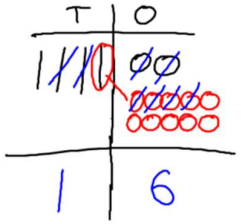
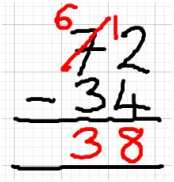
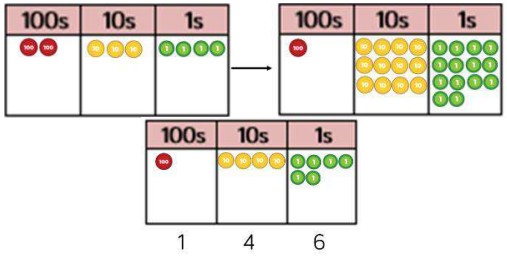
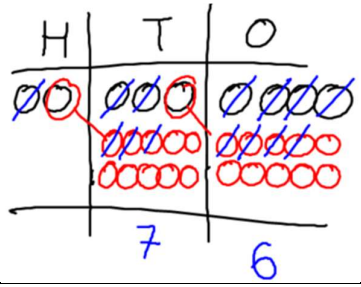
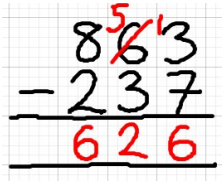
Y3	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Place value			Addition & subtraction					Multiplication & division A			
Spring	Multiplication & division B			Length & perimeter			Fractions A			Mass & capacity		
Summer	Fractions B		Money		Time			Shape		Statistics		
Y4	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Place value				Addition & subtraction			Area	Multiplication & division A			
Spring	Multiplication & division B			Length & perimeter		Fractions				Decimals A		
Summer	Decimals B		Money		Time			Shape		Statistics	Position & direction	
Y5	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Place value			Addition & subtraction		Multiplication & division A			Fractions A			
Spring	Multiplication & division B			Fractions B		Decimals & percentages			Perimeter & area		Statistics	
Summer	Shape			Position & direction		Decimals			Negative numbers	Converting units		Volume
Y6	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Place value		Four operations					Fractions				Converting units
Spring	Ratio		Algebra		Decimals		FDP		Area, perimeter & volume		Statistics	
Summer	Shape			Position & direction								

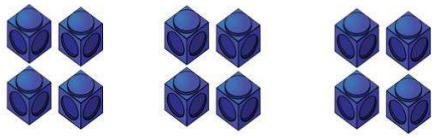
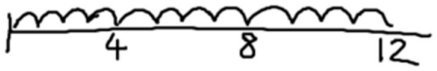
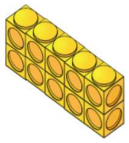
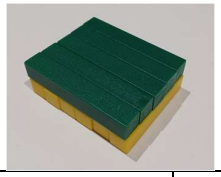
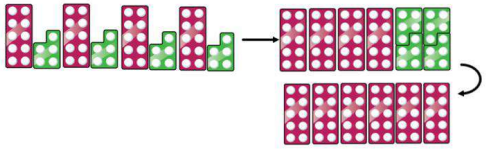
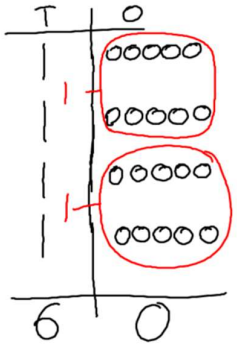
This plan may vary slightly each year to allow for differing number of weeks in each term. Spare weeks are to be used for consolidation and revision.

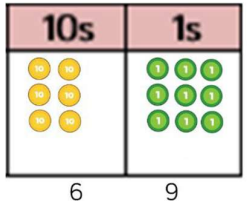
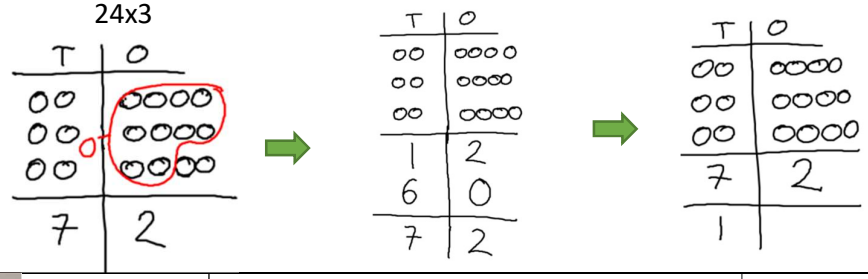
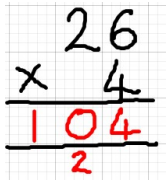
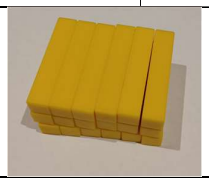
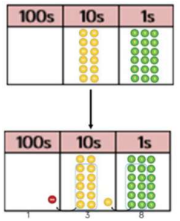
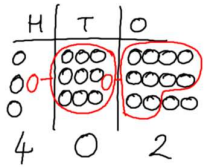
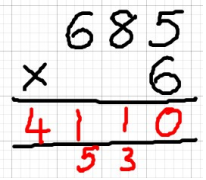
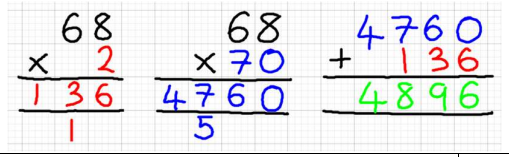
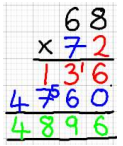
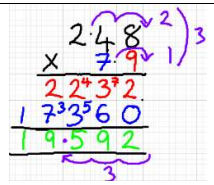
Progression within Stage 1			
Addition	**Concrete manipulatives**	**Pictorial representations**	**Abstract methods**
Combining two parts to make one whole			
Counting on using number lines			N/A
Regrouping to make 10			$6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$
Complements		N/A	65+35=100

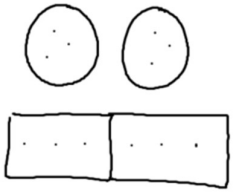
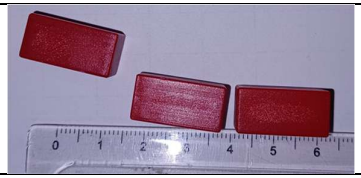
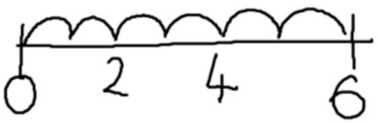
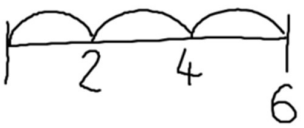
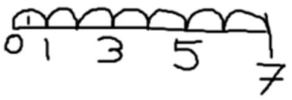
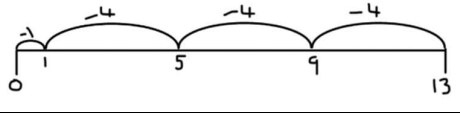
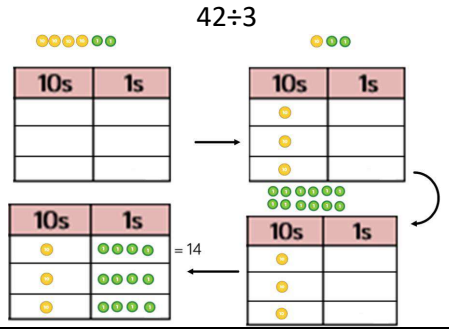
TO+O			
2 x 2 no carry			
2 x 2 with carry			
Formal method			

Progression within Stage 1			
Subtraction	**Concrete manipulatives**	**Pictorial representations**	**Abstract methods**
Physically taking away and removing objects from a whole			
Counting back			N/A
Finding the difference/counting on	 		8-5=◯ 5+◯=8
Making 10			
2x2 no exchange		46-23 	

2x2 with exchange	41-26 	42-26 	
Formal method	234-88 	234-158 	

Progression within Stage 1			
Multiplication	**Concrete manipulatives**	**Pictorial representations**	**Abstract methods**
Repeated addition			4+4+4=12
Numberlines			
Arrays to illustrate commutativity	  6x5  2 lots of 5 5 lots of 2	N/A	N/A
Partition to multiply		15x4 	15x4 10x4=40 5x4=20 20+40=60 So 15x4=60

2x1		24x3 	
Multiplying three numbers		N/A	3x5x6 5x6=30 30x3=90
Short multiplication		134x3  Then as above	
Long multiplication	Children should be confident using the abstract method for 3x1.	Use partition if necessary 	
Multiplication with decimals	‘bounce’ out the decimals, then ‘bounce’ back in again – this is using powers of 10 to adjust and re-adjust.		

Progression within Stage 1			
Division	**Concrete manipulatives**	**Pictorial representations**	**Abstract methods**
Sharing			
Repeated subtraction			
2x1 with remainder			
Sharing using PV counters		N/A	N/A

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 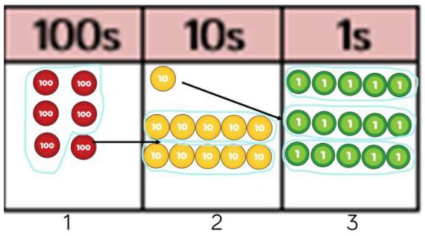
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 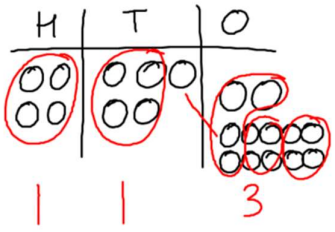
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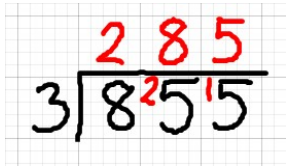
<td> 
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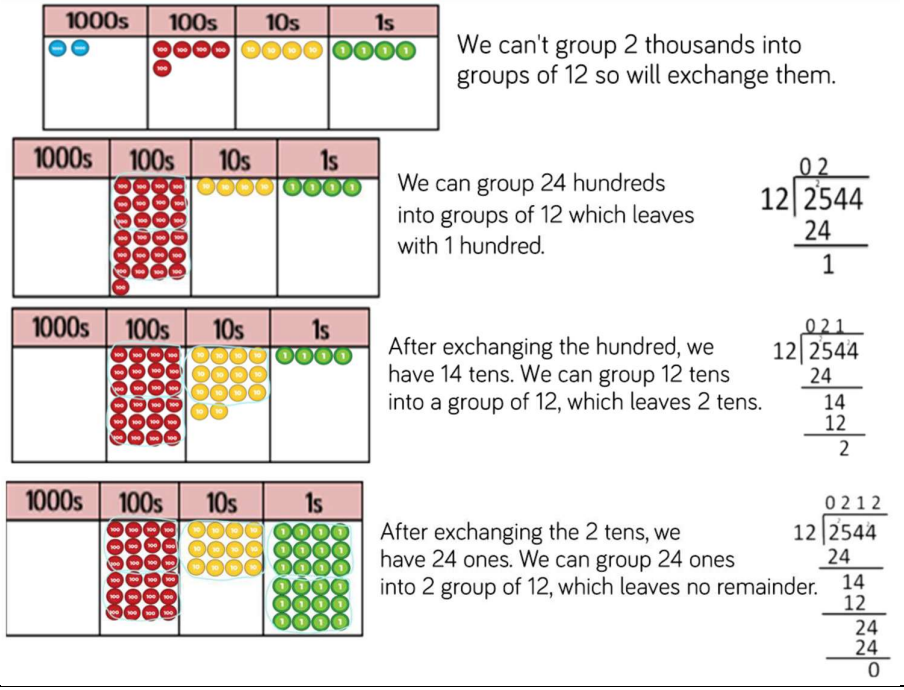
<td>Long Division</td>
<td> 
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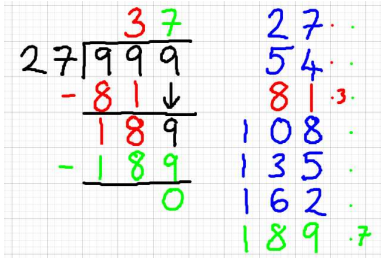
<td> 
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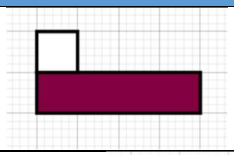
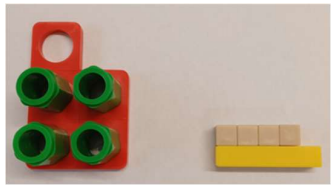
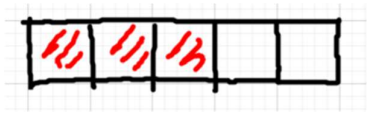
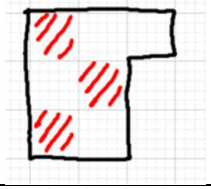
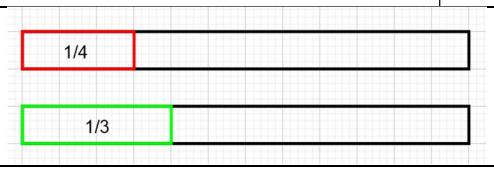
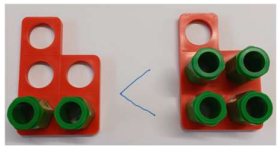
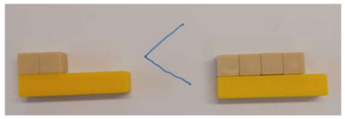
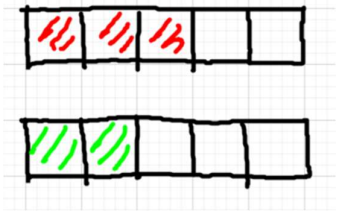
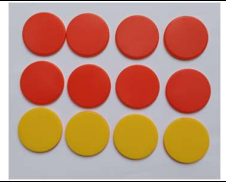
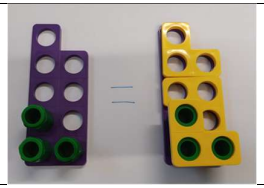
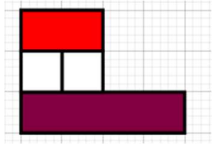
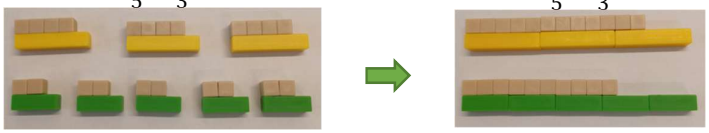
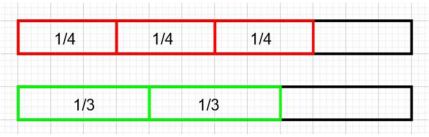
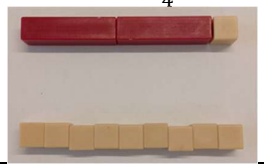
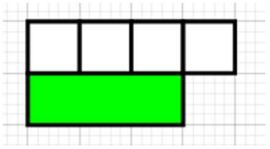
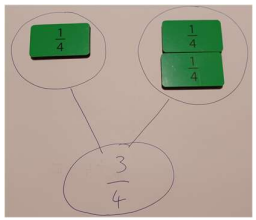
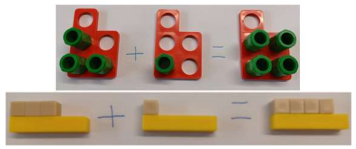
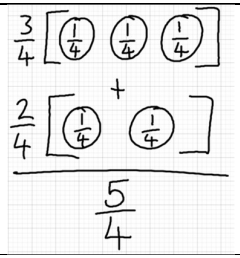
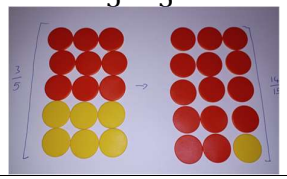
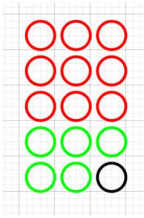
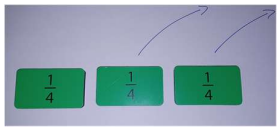
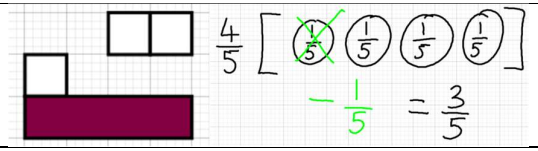
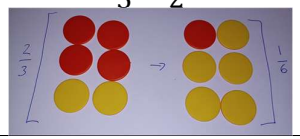
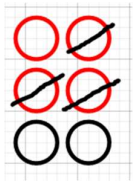
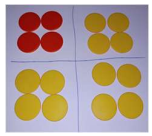
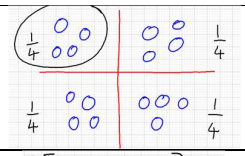
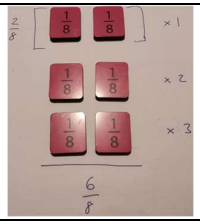
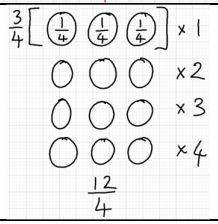
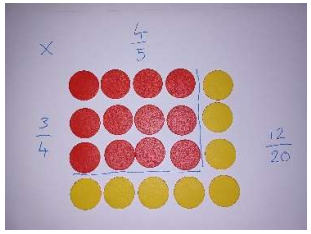
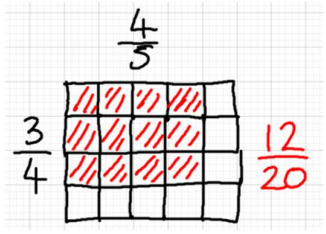
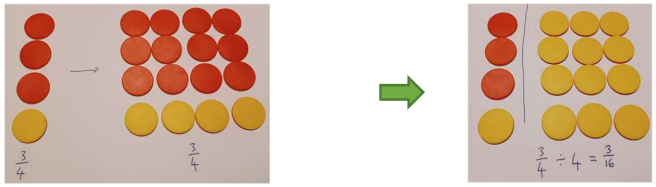
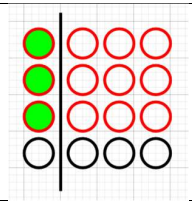
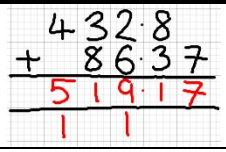
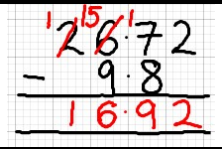
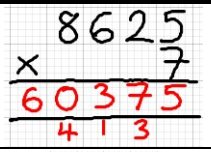
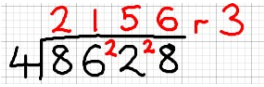
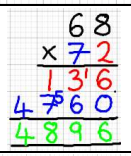
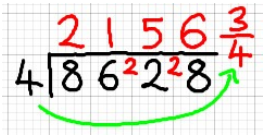
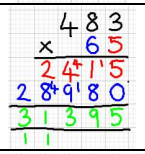
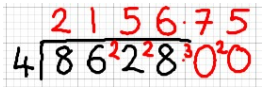
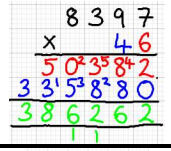
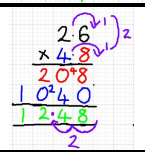
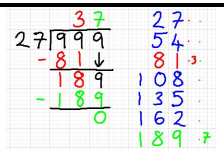
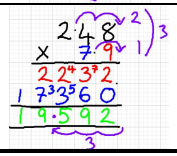
Progression within Stage 1			
Fractions	**Concrete manipulatives**	**Pictorial representations**	**Abstract methods**
Counting in fractions	 		$\frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4}$
Recognising fractions		 	N/A
Compare & order unit fractions			N/A
Compare & order fractions with the same denominator	 		$\frac{3}{5} > \frac{2}{5}$
Equivalent/simplify fractions	  		$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$

Compare & order fractions with different denominators	$\frac{4}{5}$ & $\frac{2}{3}$  $\frac{4}{5} > \frac{2}{3}$		$\frac{4}{5} > \frac{2}{3}$
Improper fractions & mixed numbers	$2\frac{1}{4} = \frac{9}{4}$ 		$\frac{4}{3} = 1\frac{1}{3}$
Addition of fractions with the same denominator	 		$\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$
Addition of fractions with different denominators	$\frac{3}{5} + \frac{1}{3}$  1 whole = 15 so $\frac{1}{3}$ = 5; Make 5 more red.		$\frac{3}{5} + \frac{1}{3} = \frac{14}{15}$
Subtraction of fractions with the same denominator	 		$\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$

Subtraction of fractions with different denominator	$\frac{2}{3}-\frac{1}{2}$ 	1 whole = 6 so ½ = 3; We have 4 (red) so remove 3; that leaves 1 So $\frac{1}{6}$		$\frac{2}{3}-\frac{1}{2}=\frac{1}{6}$
Find a fraction of an amount				$\frac{1}{4}of\ 16 = 4$
Multiplication of fractions by integer				$\frac{3}{4}$ x 4 = $\frac{12}{4}$ = 3
Multiplication of fraction x fraction		Create $\frac{3}{4}$ with counters. Then extend by adding additional counters so you can easily split it into fifths. Remove yellow counters from view and make only $\frac{4}{5}$ of the rest red. Replace missing yellow counters to see full image.		$\frac{4}{5}$ x $\frac{3}{4}$ = $\frac{12}{20}$ 4x3 = 12 (numerators) 5x4 = 20 (denominators)
Division of fractions by integer				$\frac{3}{4} \div 4 = \frac{3}{16}$ If the numerator is divisible by the divisor, you can simply do N ÷ divisor. Eg. 3/4 ÷ 3 = ¼

Written Calculation Progression								
Year	**Addition**		**Subtraction**		**Multiplication**		**Division**	
2	2 x 2 no carry	$\begin{array}{r} 24 \\ +63 \\ \hline 87 \end{array}$	2 x 2 no carry	$\begin{array}{r} 56 \\ -32 \\ \hline 24 \end{array}$				
	2 x 2 with carry	$\begin{array}{r} 58 \\ +26 \\ \hline 84 \\ 1 \end{array}$	2 x 2 with exchange	$\begin{array}{r} {}^{6}\not{7}{}^{1}2 \\ -34 \\ \hline 38 \end{array}$				
3	3 x 3	$\begin{array}{r} 345 \\ +278 \\ \hline 623 \\ 11 \end{array}$	3 x 3	$\begin{array}{r} 8{}^{5}\not{6}{}^{1}3 \\ -237 \\ \hline 626 \end{array}$	2 x 1	$\begin{array}{r} 26 \\ \times \quad 4 \\ \hline 104 \\ 2 \end{array}$		
4	4 x 4	$\begin{array}{r} 6289 \\ +7936 \\ \hline 14225 \\ 111 \end{array}$	4 x 4	$\begin{array}{r} {}^{5}\not{6}{}^{11}\not{2}{}^{14}\not{5}{}^{1}7 \\ -3898 \\ \hline 2359 \end{array}$	3 x 1	$\begin{array}{r} 685 \\ \times \quad 6 \\ \hline 4110 \\ 53 \end{array}$	3 x 1	$3\overline{)8^{2}5^{1}5}$ quotient 285

Year	Addition		Subtraction		Multiplication		Division	
5	Uneven decimal		Uneven decimal		4 x 1		4 x 1 r number	
					2 x 2		4 x 1 r fraction	
					3 x 2		4 x 1 r decimal	
					4 x 2			
6					Decimal		3 x 2	
					Decimal		4 x 2