Vernon Primary School

Calculation Policy

'Nobody else is quite like me'

Rationale and Aims

This policy outlines both the **mental** and **written** methods that should be taught from Year 1 to Year 6. It is designed to give pupils a consistent and smooth progression of learning when using the four operations. It has been put in place to ensure that all children have the same experience in their learning of calculations across the school. Children should have the opportunity to explore the different methods at a time in their learning suitable to them. All members of staff will follow the progression in calculations to maintain a consistent approach across Mathematics teaching. This will enable all children to progress well and build upon their confidence in calculating to become successful Mathematicians.

This policy breaks down the progression for the four operations addition, subtraction, multiplication and division. These are flexible in when they should be introduced. Teaching should be pitched at a level appropriate to the individual class and child. This means that in some instances it will be required for Teachers to look further on for next steps and equally to consider previous stages to ensure that each child makes progress.

The Maths Curriculum emphasises the need for formal methods of calculation. At Vernon Primary, we believe that children should be introduced to this when they are ready and have a secure understanding of number. It is of primary importance that the children achieve the correct answer using a method they fully comprehend, rather than taking steps in a process with no understanding. The CPA approach (concrete-pictorial-abstract) is one that is widely recognised as supporting children in developing a deep and sustainable understanding of Mathematics. This is something we promote at Vernon Primary in supporting children in learning new concepts.

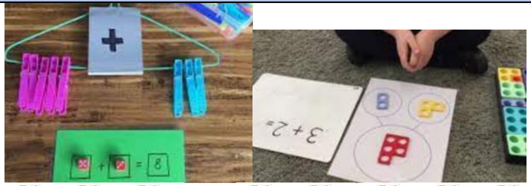
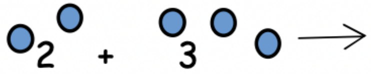
Alongside written methods, children should **secure mental strategies**. When calculating children should decide which strategy they should use. Children should explain and reason as to why they have chosen a strategy and whether it is the most efficient.

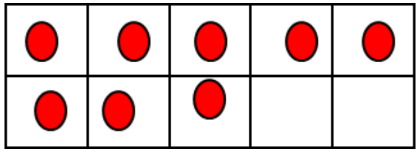
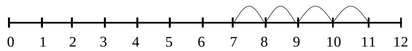
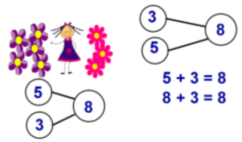
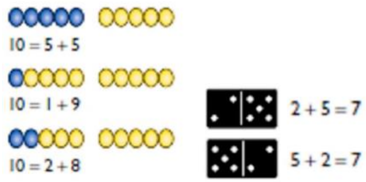
Through this policy, we aim:

- To support greater consistency in the teaching of written calculations across the school.
- To strengthen continuity and progression in children's understanding of the development of written calculations.
- To form a core set of methods which every child will experience and build upon.
- To build on models and images introduced to promote conceptual understanding.
- To provide reference and guidance on the teaching of calculations skills for teaching staff, teaching assistants and parents.

Addition

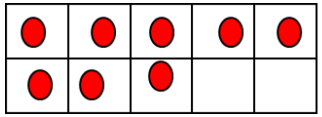
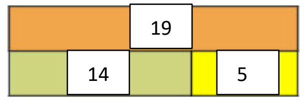
Calculation progression through the primary years

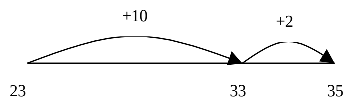
	Branches	EYFS Reception	Method	Model/Examples
Addition EYFS	**Number Bonds**	Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.	**<u>The 5 counting principles</u>** **One to one correspondence**: match one number name to each item to be counted **Stable order**: say the number names in the correct order. **Cardinality**: the last number in the count is the total size of the group **Abstraction**: counting can be applied to any collection – including things that cannot be touched **Order-irrelevance**: the total number counted (cardinal value) remains the same even if the order of the items changes. Through practical activities and use of fingers and through discussion they will begin to use the vocabulary involved in addition. Using objects and pictures, can add together two single digit numbers and count on to find the answer but encourage starting with the larger number.	  'You have five apples and I have three apples. How many apples altogether?' They will record pictorially then numerically 5+3=8 apples  2+3= Using a number line counting from the biggest number.
	Mental Calculations	Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.		
	Written Methods			
	Inverse operations, estimating and checking answers			
	Problem Solving			

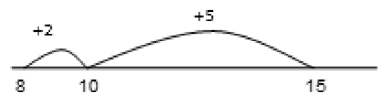
	Branches	Milestone 1 Year 1 National Curriculum	Method	Model/Examples
Addition Year 1	**Number Bonds**	represent and use number bonds and related subtraction facts within 20	**+ = signs and missing numbers** Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'. 2 = 1+ 1 2 + 3 = 4 + 1 Missing numbers need to be placed in all possible places. 3 + 4 = □ □ = 3 + 4 3 + □ = 7 7 = □ + 4 **Counting and Combining sets of Objects** Combining two sets of objects (aggregation) which will progress onto adding on to a set (augmentation)	Combining two sets of objects  Use tens frame and numicon to support children to visualise number facts  Understanding of counting on with a number track.  Understanding of counting on with a number line (supported by models and images). 7+ 4   Use the part, whole model to represent the addition. 
	Mental Calculations	add and subtract one-digit and two-digit numbers to 20, including zero		
		read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)		
	Written Methods	read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)		
	Inverse operations, estimating and checking answers			
	Problem Solving	solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ - 9		

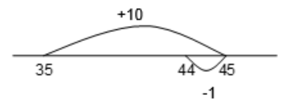
<table>
<tr><th rowspan="2"></th><th rowspan="2">Branches</th><th>Milestone 1</th><th rowspan="2">Method</th><th rowspan="2">Model/Examples</th></tr>
<tr><th>Year 2 National Curriculum</th></tr>
<tr><td rowspan="6">Addition Year 2</td><td>Number Bonds</td><td>recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</td><td rowspan="6">Missing number problems
e.g 14 + 5 = 10 + □
32 + □ + □ = 100
35 = 1 + □ + 5

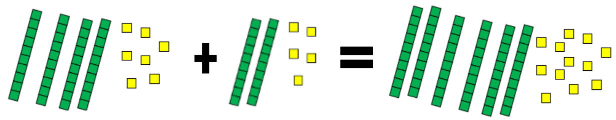
It is valuable to use a range of representations (also see Y1). Continue to use number lines to develop understanding of:
<u>Counting on in tens and ones</u>
23 + 12 = 23 + 10 + 2
= 33 + 2
= 35
<u>Partitioning and bridging through 10.</u>
The steps in addition often bridge through a multiple of 10
e.g. Children should be able to partition the 7 to relate adding the 2 and then the 5.
8 + 7 = 15
<u>Adding 9 or 11 by adding 10 and adjusting by 1</u>
e.g. Add 9 by adding 10 and adjusting by 1
35 + 9 = 44

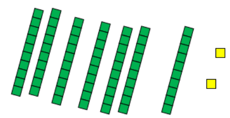
<u>Towards a Written Method</u>
<u>Partitioning in different ways and recombine</u>
47+25
Leading to exchanging:
72
<u>Expanded written method</u>
40 + 7 + 20 + 5 =
40+20 + 7 + 5 =
60 + 12 = 72</td><td rowspan="6">Continue to use tens frame, numicon to support children to visualise number facts.
Introduce the bar model.



14 + 5 = 19









40 + 7
+ 20 + 5
60 + 12 = 72</td></tr>
<tr><td rowspan="2">Mental Calculations</td><td>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 numbers</td></tr>
<tr><td>show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot</td></tr>
<tr><td>Written Methods</td><td></td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td>recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</td></tr>
<tr><td>Problem Solving</td><td>solve problems with addition and subtraction:
* using concrete objects and pictorial representations, including those involving numbers, quantities and measures
* applying their increasing knowledge of mental and written methods
solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (copied from Measurement)</td></tr>
</table>

<table>
<tr><th rowspan="2"></th><th rowspan="2">Branches</th><th>Milestone 2</th><th rowspan="2">Method</th><th rowspan="2">Model/Examples</th></tr>
<tr><th>Year 3 National curriculum</th></tr>
<tr><td rowspan="5">Addition Year 3</td><td>Number Bonds</td><td></td><td rowspan="5">Missing number problems using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.

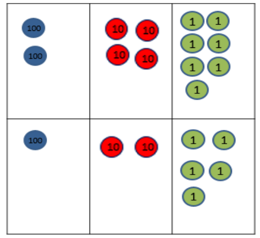
<u>Partition into hundreds, tens and ones</u>
Partition both numbers and recombine.
Count on by partitioning the second number only
e.g.
247 + 125 = 247 + 100 + 20+ 5
= 347 + 20 + 5
= 367 + 5
= 372
Children need to be secure adding multiples of 100 and 10 to any three-digit number including those that are not multiples of 10.

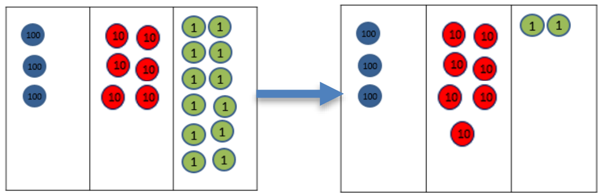
<u>Towards a Written Method</u>
Introduce expanded column addition modelled with place value counters
(Apparatus could be used for those who need a less abstract representation)

Leading to children understanding the exchange between tens and ones.
Some children may begin to use a formal columnar algorithm, initially introduced alongside the expanded method. The formal method should be seen as a more streamlined version of the expanded method, not a new method.</td><td rowspan="5">Continue to use apparatus to support children to visualise number facts. Use the bar model to represent calculations and problems.

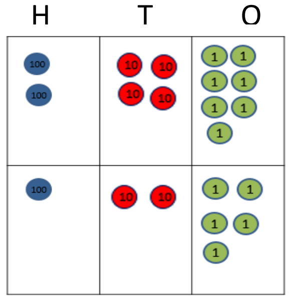
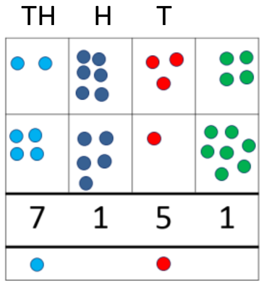

200 + 40 + 7
100 + 20 + 5
300 + 60 +12 = 372

Add the units first in preparation for the compact method

247
+125
12
60
300
372


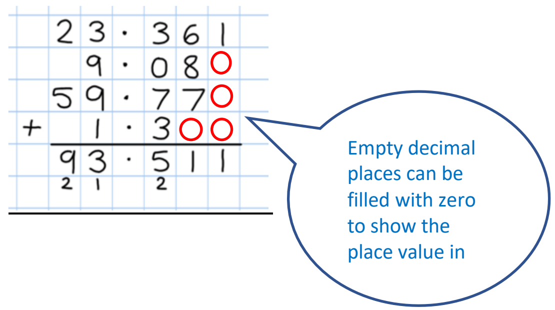


247
+125
372
1</td></tr>
<tr><td>Mental Calculations</td><td>add and subtract numbers mentally, including:
* a three-digit number and ones
* a three-digit number and tens
* a three-digit number and hundreds</td></tr>
<tr><td>Written Methods</td><td>add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction</td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td>estimate the answer to a calculation and use inverse operations to check answers</td></tr>
<tr><td>Problem Solving</td><td>solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction</td></tr>
</table>

	Branches	Milestone 2 Year 4 National Curriculum	Method	Model/Examples
Addition Year 4	**Number Bonds**		Missing number/digit problems:	Continue to use the bar model as in Y3. 
	Mental Calculations		**Mental methods** Should continue to develop, supported by a range of models and images, including the number line.	 200 + 40 + 7 100 + 20 + 5 300 + 60 +12 = 372
	Written Methods	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	**Written methods (progressing to 4-digits)** Expanded column addition modelled with place value counters, progressing to calculations with 4-digit numbers. **Compact written method** Extend to numbers with at least four digits.	247 +125 12 60 300 372 247 +125 372 1  2634 +4517 7151 1 1
	Inverse operations, estimating and checking answers	estimate and use inverse operations to check answers to a calculation	**Children should be able to make the choice of reverting to expanded methods if experiencing any difficulty.** Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits). 72.8 + 54.6 127.4 1 1	£ 32.50 + £ 21.75 = £54.25 £32.50 + £21.75 £54.25
	Problem Solving	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	Use the written method with decimals in the context of money	

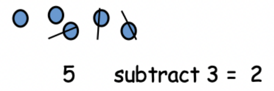
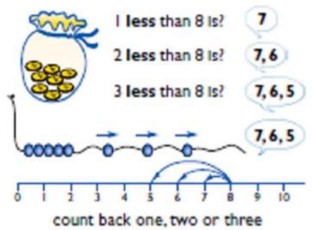
Addition Year 5

Branches	Milestone 3 Year 5	Method	Model/Examples
Number Bonds		**<u>Mental methods</u>** should continue to develop, supported by a range of models and images, including the number line. Children should practise with increasingly large numbers to aid fluency	Continue to use the bar model as in Y4. **2364 + 1999 =** 2364 + 2000 = 4364 4364—1 = 4363
Mental Calculations	add and subtract numbers mentally with increasingly large numbers		**12462 + 2300** = 12462 + 2000 =14462 14462 +300 = 14762
Written Methods	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**<u>Written methods (progressing to more than 4-digits)</u>** As year 4, progressing when understanding of the expanded method is secure, children will move on to the formal columnar method for whole numbers and decimal numbers as an efficient written algorithm.	172.83 + 54.68 227.51 1 1 1 £ 2 3 . 5 9 + £ 7 . 5 5 £ 3 1 . 1 4 1 1 1
Inverse operations, estimating and checking answers	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	Place value counters can be used alongside the columnar method to develop understanding of addition with decimal numbers. The decimal point should be aligned in the same way as the other place value columns, and must be in the same column in the answer.	25.356 + 346.28 becomes: Estimate: 25 + 350 = 375
Problem Solving	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	Children using rounding to estimate answers	25.356 +346.28 371.636 1 1

	Branches	Milestone 3 Year 6	Method	Model/Examples
Addition Year 6	**Number Bonds**		**<u>Mental methods</u>** should continue to develop, supported by a range of models and images, including the number line. **<u>Written methods</u>** As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured. Continue calculating with decimals, including those with different numbers of decimal places **<u>Problem Solving</u>** Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding. Adding several numbers with different numbers of decimal places (including money and measures): • Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row. • Zeros could be added into any empty decimal places, to show there is no value to add.	57 + Δ = 125 149 + 137 + 158 = Δ (Δ + Δ) x Δ = 10 **12 462 + 8456** Estimate: 21 000 = 12 500 + 8 500 12 462 <u>+ 8 456</u> <u>20 918</u> 1 1 
	Mental Calculations	perform mental calculations, including with mixed operations and large numbers		
		use their knowledge of the order of operations to carry out calculations involving the four operations		
	Written Methods	Solve problems involving addition and subtraction		
	Inverse operations, estimating and checking answers	use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.		
	Problem Solving	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why		

Subtraction

Calculation progression through the primary years

	Branches	EYFS Reception	Method	Model/Examples
Subtraction EYFS	**Number Bonds**	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.	Through songs and practical activities. Children will engage in a wide variety of songs and rhymes, games and activities to develop number sense. In practical activities and through discussion they will begin to use the vocabulary involved in subtraction 'You have five apples and I eat one apples. How many apples left?' • They will record pictorially then numerically 5- 1 = 4 apples • Children will also subtract using finger hops on a number line. Using objects and pictures, can subtract a single digit number	   
	Mental Calculations	Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.		
	Written Methods			
	Inverse operations, estimating and checking answers			
	Problem Solving			

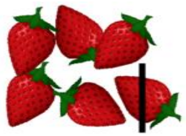
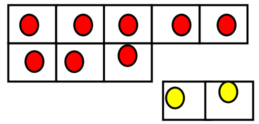
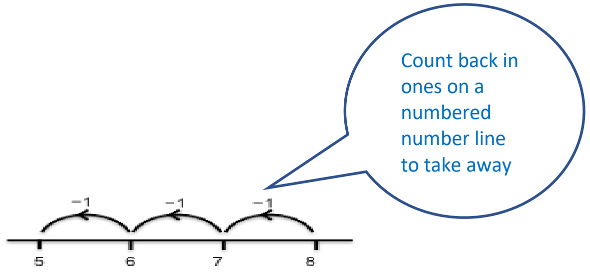
<table>
<tr><th></th><th>Branches</th><th>Milestone 1
Year 1 National Curriculum</th><th>Method</th><th>Model/Examples</th></tr>
<tr><td rowspan="6">Subtraction Year 1</td><td>Number Bonds</td><td>represent and use number bonds and related subtraction facts within 20</td><td rowspan="6"><u>Missing number problems</u>
As well as recalling subtraction facts up to 20, children should be able to subtract zero.

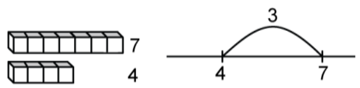
<u>Understand subtraction as take-away</u>

The use of images is valuable for modelling subtraction e.g. Numicon, bundles of straws, apparatus, multi-link cubes, part whole, tens frames

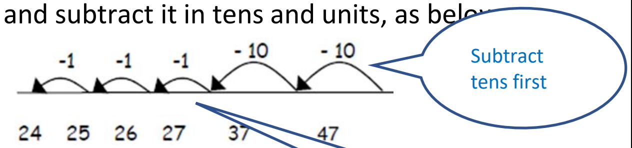
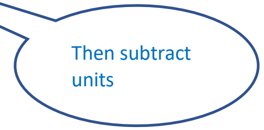
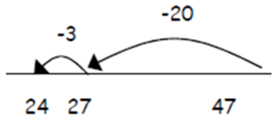
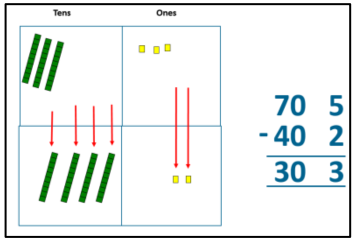
Use concrete objects and pictorial representations. If appropriate, progress from using number lines with every number shown, to number lines with significant numbers shown.

<u>Understand subtraction as finding the difference.</u>
This will be introduced practically with language ‘find the difference’ and ‘how many more’ in a range of familiar contexts.</td><td rowspan="6">Use – = signs and missing numbers
○ = 8 – 3   8 – 3 = ∆
5 = □ – 3   8 – ○ = 5
5 = 8 – ∆   □ – 3 = 5
5 = ○ – □   □ – ○ = 5



The difference between 7 and 4 is 3.</td></tr>
<tr><td rowspan="2">Mental Calculations</td><td>add and subtract one-digit and two-digit numbers to 20, including zero</td></tr>
<tr><td>read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)</td></tr>
<tr><td>Written Methods</td><td>read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)</td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td></td></tr>
<tr><td>Problem Solving</td><td>solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as
7 = □ - 9</td></tr>
</table>

	Branches	Milestone 1 Year 2 National Curriculum	Method	Model/Examples
Subtraction Year 2	**Number Bonds**	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100	Missing number problems	52 – 8 = □; □ – 20 = 25; 22 = □ – 21; 6 + □ + 3 = 11
	Mental Calculations	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 numbers	It is valuable to use a range of representations (also see Y1). Continue to use number lines to model take-away and difference. The link between the two may be supported by an image like this, with 23 being taken away from 47, leaving the difference, which is 24.	**47 - 23 = 24** Partition the second number and subtract it in tens and units, as below  Move towards more efficient jumps back, as below: 
		show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot		
	Written Methods			
	Inverse operations, estimating and checking answers	recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	**<u>Towards written methods</u>** Recording addition and subtraction in expanded columns can support understanding of the quantity aspect of place value and prepare for efficient written methods with larger numbers. The numbers may be represented with apparatus. E.g. 89 – 35 = 54	Introduce this method with examples where **no exchanging** is required. **89 – 35 = 54** 80 + 9 <u>30 + 5</u> <u>50 + 4</u> 
	Problem Solving	solve problems with addition and subtraction: * using concrete objects and pictorial representations, including those involving numbers, quantities and measures * applying their increasing knowledge of mental and written methods *solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change* (copied from Measurement)		

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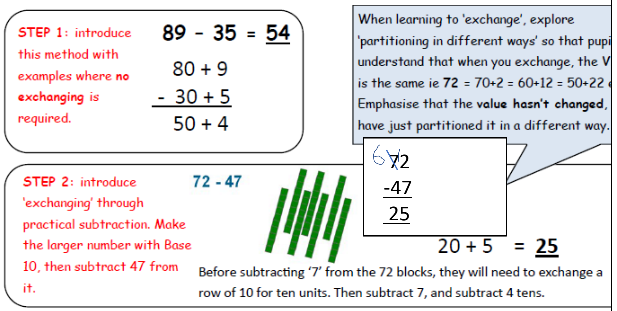
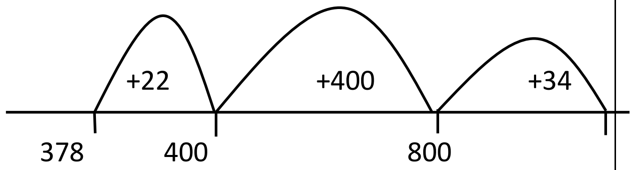
<tr><th rowspan="2"></th><th rowspan="2">Branches</th><th>Milestone 2</th><th rowspan="2">Method</th><th rowspan="2">Model/Examples</th></tr>
<tr><th>Year 3 National curriculum</th></tr>
<tr><td rowspan="5">Subtraction Year 3</td><td>Number Bonds</td><td></td><td rowspan="5"><u>Missing number problems</u>

<u>Mental methods</u> should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving (see Y1 and Y2). Children should make choices about whether to use complementary addition or counting back, depending on the numbers involved.

<u>Written methods (progressing to 3-digits)</u>
Introduce expanded column subtraction with no decomposition, modelled with place value counters (Apparatus could be used for those who need a less abstract representation)
For some children this will lead to exchanging, modelled using apparatus.

A number line and expanded column method may be compared next to each other.</td><td rowspan="5">e.g. □ = 43 – 27; 145 – □ = 138; 274 – 30 = □; 245 – □ = 195; 532 – 200 = □; 364 – 153 = □



834 - 378 =
The library owns 834 books. 378 are out on loan. How many are on the shelves?


7 12 1
834
-378
456</td></tr>
<tr><td>Mental Calculations</td><td>add and subtract numbers mentally, including:
* a three-digit number and ones
* a three-digit number and tens
* a three-digit number and hundreds</td></tr>
<tr><td>Written Methods</td><td>add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction</td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td>estimate the answer to a calculation and use inverse operations to check answers</td></tr>
<tr><td>Problem Solving</td><td>solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction</td></tr>
</table>

Subtraction Year 4

Branches	Milestone 2 Year 4 National Curriculum
Number Bonds	
Mental Calculations	
Written Methods	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
Inverse operations, estimating and checking answers	estimate and use inverse operations to check answers to a calculation
Problem Solving	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

Method

Missing number/digit problems

Mental methods should continue to develop, supported by a range of models and images, including the number line.

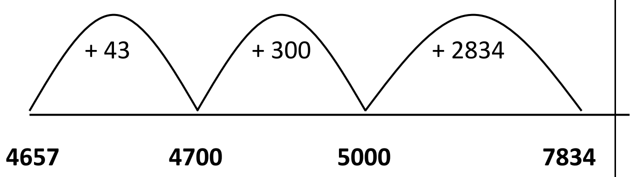
Written methods (progressing to 4-digits)
Expanded column subtraction with decomposition, modelled with place value counters, progressing to calculations with 4-digit numbers.

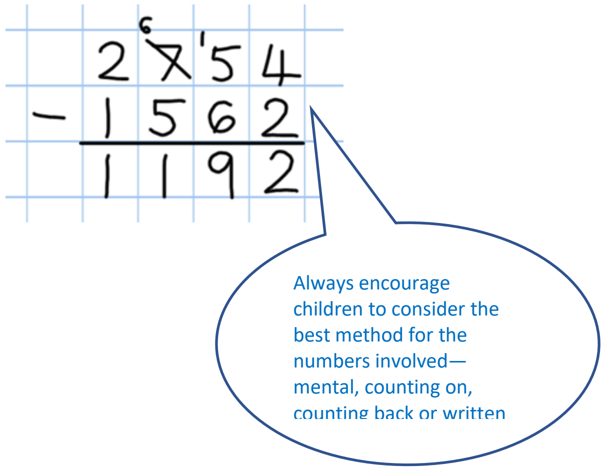
If understanding of the expanded method is secure, children will move on to the formal method of decomposition, which again can be initially modelled with place value counters.

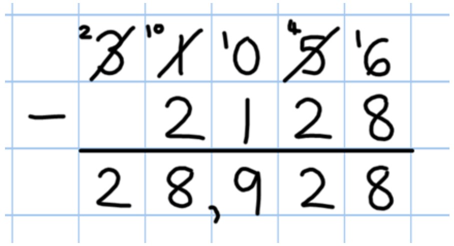
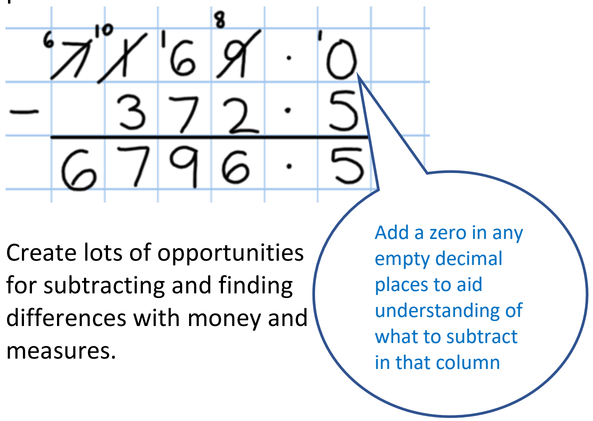
Model/Examples

456 + □ = 710;
1□7 + 6□ = 200; 60 + 99 + □ = 340; 200 – 90 – 80 = □; 225 - □ = 150; □ – 25 = 67; 3450 – 1000 = □; □ - 2000 = 900

7834 – 4657=





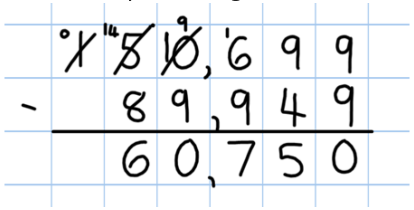
	Branches	Milestone 3 Year 5	Method	Model/Examples
Subtraction Year 5	**Number Bonds**		**<u>Missing number/digit problems</u>**	6.45 = 6 + 0.4 + □; 119 - □ = 86; 1 000 000 - □ = 999 000; 600 000 + □ + 1000 = 671 000; 12 462 – 2 300 = □
	Mental Calculations	add and subtract numbers mentally with increasingly large numbers	**<u>Mental methods</u>** should continue to develop, supported by a range of models and images, including the number line.	
	Written Methods	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**<u>Written methods (progressing to more than 4-digits)</u>** When understanding of the expanded method is secure, children will move on to the formal method of decomposition, which can be initially modelled with place value counters.	 Subtract with decimal values, including mixtures of integers and decimals, aligning the decimal point.
	Inverse operations, estimating and checking answers	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	Progress to calculating with decimals, including those with different numbers of decimal places.	 Create lots of opportunities for subtracting and finding differences with money and measures.
	Problem Solving	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why		

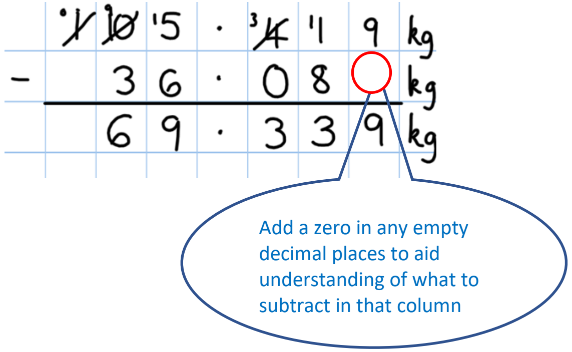
'Nobody else is quite like me'

<table>
<tr><th></th><th>Branches</th><th>Milestone 3
Year 6</th><th>Method</th><th>Model/Examples</th></tr>
<tr><td rowspan="6">Subtraction Year 6</td><td>Number Bonds</td><td></td><td rowspan="6"><u>Missing number/digit problems</u>

<u>Mental methods</u> should continue to develop, supported by a range of models and images, including the number line.

<u>Written methods</u>
As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with decomposition to be secured.
Teachers may also choose to introduce children to other efficient written layouts which help develop conceptual understanding. For example:
Continue calculating with decimals, including those with different numbers of decimal places.</td><td rowspan="6">□ and # each stand for a different number.
= 34. # + # = □ + □ + #. What is the value of □? What if # = 28? What if # = 21
10 000 000 = 9 000 100 + □
7 – 2 x 3 = □; (7 – 2) x 3 = □; (□ - 2) x 3 = 15

Using the compact column method to subtract more complex integers


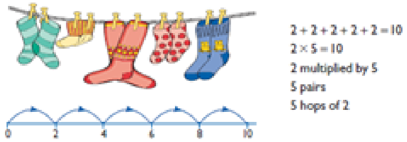
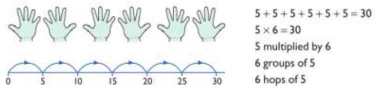
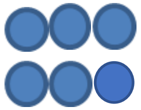
Using the compact column method to subtract money
and measures, including decimals with different numbers of decimal places.

</td></tr>
<tr><td rowspan="2">Mental Calculations</td><td>perform mental calculations, including with mixed operations and large numbers</td></tr>
<tr><td>use their knowledge of the order of operations to carry out calculations involving the four operations</td></tr>
<tr><td>Written Methods</td><td>Solve problems involving addition and subtraction</td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td>use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.</td></tr>
<tr><td>Problem Solving</td><td>solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</td></tr>
</table>

Multiplication

Calculation progression through the primary years

'Nobody else is quite like me'

	Branches	EYFS	Method	Models/Examples
Multiplication EYFS	**Multiplication and division facts**	Although no formal recording of either of these operations will take place in Reception they will begin to lay the foundations. This is particularly true for division as sharing. Children will experience many occasions when they have to share out objects between groups and this begins work on division. As early as possible, division should be referred to as 'shared equally between' to avoid confusion later on in their education. Children may begin to count in 2s when counting e.g. shoes or socks and this lays foundations for multiplication. 'You have 3 lollies and your friend gives you 3 more. How many do you have altogether?  They will record pictorially then numerically 3+3=6 lollies Double 3 is 6		
	Mental Calculations			
	Written Methods			
	Properties of numbers: Multiples, Factors, Prime, Square, cube numbers			
	Order of Operations			
	Inverse operations, estimating and checking answers			
	Problem Solving			

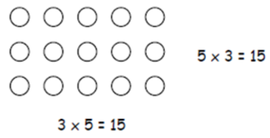
	Branches	Milestone 1 Year 1	Method	Models/Examples
Multiplication Year 1	**Multiplication and division facts**	count in multiples of twos, fives and tens (copied from Number and Place Value	Understand multiplication is related to doubling and combining groups of the same size (repeated addition) Washing line, and other practical resources for counting. Concrete objects. Numicon; bundles of straws, bead strings Problem solving with concrete objects (including money and measures Use cuissenaire and numicon to develop the vocabulary relating to 'times' or 'lots of'.  Use arrays to understand multiplication can be done in any order (commutative)	How many legs will 3 teddies have?  2 + 2 + 2 = 6 There are 3 sweets in one bag. How many sweets are in 5 bags altogether?  3 + 3 + 3 + 3 + 3 = 15 Give children experience of counting in 2s, 5s and 10s    2 x 3 = 6 or 3 x 2 = 6 
	Mental Calculations			
	Written Methods			
	Properties of numbers: Multiples, Factors, Prime, Square, cube numbers			
	Order of Operations			
	Inverse operations, estimating and checking answers			
	Problem Solving	solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher		

<table>
<tr><th rowspan="2"></th><th rowspan="2">Branches</th><th>Milestone 1</th><th rowspan="2">Method</th><th rowspan="2">Models/Examples</th></tr>
<tr><th>Year 2</th></tr>
<tr><td rowspan="9">Multiplication Year 2</td><td rowspan="2">Multiplication and division facts</td><td>count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward (copied from Number and Place Value)</td><td rowspan="9">Expressing multiplication as a number sentence using x
Using understanding of the inverse and practical resources to solve missing number problems.

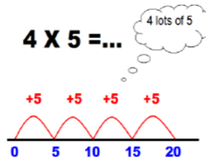
Develop understanding of multiplication using array and number lines (see Year 1). Include multiplications not in the the 2, 5 or 10 times tables.

Begin to develop understanding of multiplication as scaling (3 times bigger/taller)

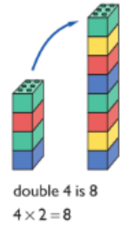
<u>Towards written methods</u>
Use jottings to develop an understanding of doubling two digit numbers.</td><td rowspan="9">7 x 2 = □   □ = 2 x 7
7 x □ = 14   14 = □ x 7
□ x 2 = 14   14 = 2 x □
□ x ◯ = 14   14 = □ x ◯

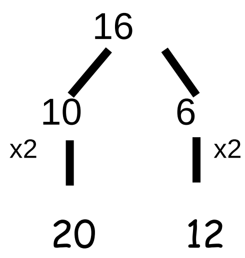


5 x 3 = 3 + 3 + 3 + 3 + 3 = 15
3 x 5 = 5 + 5 + 5 = 15



4 X 5 = 20





20+12=32</td></tr>
<tr><td>recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers</td></tr>
<tr><td>Mental Calculations</td><td>show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</td></tr>
<tr><td>Written Methods</td><td>calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs</td></tr>
<tr><td>Properties of numbers: Multiples, Factors, Prime, Square, cube numbers</td><td></td></tr>
<tr><td>Order of Operations</td><td></td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td></td></tr>
<tr><td>Problem Solving</td><td>solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</td></tr>
</table>

<table>
<tr><th rowspan="2"></th><th rowspan="2">Branches</th><th>Milestone 2</th><th rowspan="2">Method</th><th rowspan="2">Models/Examples</th></tr>
<tr><th>Year 3</th></tr>
<tr><td rowspan="8">Multiplication Year 3</td><td rowspan="2">Multiplication and division facts</td><td>count from 0 in multiples of 4, 8, 50 and 100 (copied from Number and Place Value</td><td rowspan="8">Missing number problems

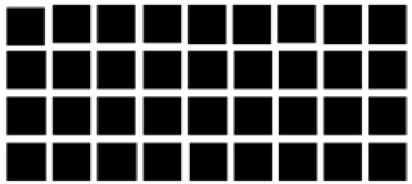
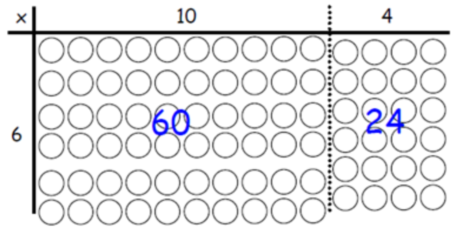
<u>Mental methods</u>
Doubling 2 digit numbers using partitioning
Demonstrating multiplication on a number line – jumping in larger groups of amounts
13 x 4 = 10 groups 4 = 3 groups of 4

<u>Written methods (progressing to 2d x 1d)</u>
Developing written methods using understanding of visual images

Introduce the grid method with children physically making an array to represent the calculation (e.g. make 8 lots of 23 with 10s and 1s place value counters), then translate this to grid method format

Give children opportunities for children to explore this and deepen understanding using apparatus and place value counters</td><td rowspan="8">Continue with a range of equations as in Year 2 but with appropriate numbers.

Use jottings to record method
14 x 4 =
10 x 4 = 40
4 x 4 = 16
40 + 16 = 56


9 x 4 = 36
Eg. 23 x 8 = 184
<table><tr><th>X</th><th>20</th><th>3</th></tr><tr><td>8</td><td>160</td><td>24</td></tr></table>

160 + 24 = 184</td></tr>
<tr><td>recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</td></tr>
<tr><td>Mental Calculations</td><td>write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Written Methods)</td></tr>
<tr><td>Written Methods</td><td>write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Mental Methods)</td></tr>
<tr><td>Properties of numbers: Multiples, Factors, Prime, Square, cube numbers</td><td></td></tr>
<tr><td>Order of Operations</td><td></td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td>estimate the answer to a calculation and use inverse operations to check answers (copied from Addition and Subtraction)</td></tr>
<tr><td>Problem Solving</td><td>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</td></tr>
</table>

<table>
<tr><th></th><th>Branches</th><th>Milestone 2
Year 4</th><th>Method</th><th>Models/Examples</th></tr>
<tr><td rowspan="9">Multiplication Year 4</td><td rowspan="2">Multiplication and division facts</td><td>count in multiples of 6, 7, 9, 25 and 1000 (copied from Number and Place Value)</td><td rowspan="9">Continue with a range of equations with appropriate numbers. Also include equations with missing digits

<u>Mental methods</u>
Counting in multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.
Solving practical problems where children need to scale up. Relate to known number facts. (e.g. how tall would a 25cm sunflower be if it grew 6 times taller?)

<u>Written methods (progressing to 2d and 3d by a 1d)</u>
Children to embed and deepen their understanding of the grid method.

Children to move to the expanded method multiplying units first, then tens by units.

Then when confident, children are to move to the short multiplication method for TU x U progressing to HTU x U</td><td rowspan="9">□2 x 5 = 160
18 x Δ = 72

Use commutativity and other strategies mentally 3 x 6 = 6 x 3 , 2 x 6 x 5 = 10 x 6 , 39x7 = 30 x 7 + 9 x 7.

Eg. 136 x 5 = 680
X | 100 | 30 | 6
5 | 500 | 150 | 30
500
150
+ 30
680

34
X 6
24 (6x4)
180 (6x30)
204

Move to short multiplication when children are confident in carrying for written addition

H T U
3 4
x 6
2 0 4
2

TH H T U
3 2 5
X 7
2 2 7 5
1 3</td></tr>
<tr><td>recall multiplication and division facts for multiplication tables up to 12 × 12</td></tr>
<tr><td rowspan="2">Mental Calculations</td><td>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</td></tr>
<tr><td>recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)</td></tr>
<tr><td>Written Methods</td><td>multiply two-digit and three-digit numbers by a one-digit number using formal written layout</td></tr>
<tr><td>Properties of numbers: Multiples, Factors, Prime, Square, cube numbers</td><td>recognise and use factor pairs and commutativity in mental calculations (repeated)</td></tr>
<tr><td>Order of Operations</td><td></td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td>estimate and use inverse operations to check answers to a calculation
(copied from Addition and Subtraction)</td></tr>
<tr><td>Problem Solving</td><td>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</td></tr>
</table>

Multiplication Year 5

Branches	Milestone 3 – Year 5
Multiplication and division facts	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 (copied from Number and Place Value)
Mental Calculations	multiply and divide numbers mentally drawing upon known facts
	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
Written Methods	multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
	divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
Properties of numbers: Multiples, Factors, Prime, Square, cube numbers	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
	know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
	establish whether a number up to 100 is prime and recall prime numbers up to 19
	recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})
Order of Operations	
Inverse operations, estimating and checking answers	
Problem Solving	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

Method

Mental methods

Solving practical problems where children need to scale up. Relate to known number facts.

Use multiplication facts to solve problems involving squares and cubes.

Written methods

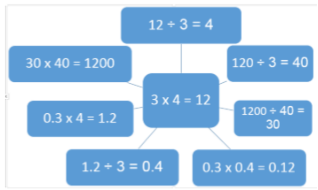
Continue with the grid method for multiplication from Year 4 progressing to short multiplication when children are ready. Children to compare these to see how the steps are related.

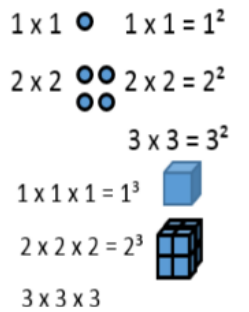
Once children are confident with HTU x U they are to progress to more complex numbers.

Progress to long multiplication when children are confident with their place value and with carrying numbers into next columns.

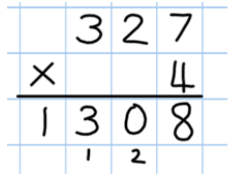
Models/Examples

4 x 35 = 2 x 2 x 35

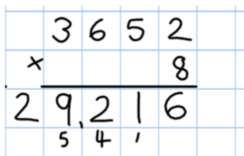


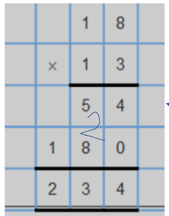


X	300	20	7
4	1200	80	28



Moving towards more complex numbers





18 x 3 on the 1st row (8 x 3 = 24, carrying the 2 for twenty, then '1' x 3).
18 x 10 on the 2nd row. Put a

Multiplication Year 6

Branches	Milestone 3 Year 6
Multiplication and division facts	
Mental Calculations	perform mental calculations, including with mixed operations and large numbers
	associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8) (copied from Fractions)
Written Methods	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 short division where appropriate for the context divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
	use written division methods in cases where the answer has up to two decimal places (copied from Fractions (including decimals))
Properties of numbers: Multiples, Factors, Prime, Square, cube numbers	identify common factors, common multiples and prime numbers *use common factors to simplify fractions; use common multiples to express fractions in the same denomination* (copied from Fractions)
	calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3 (copied from Measures)
Order of Operations	use their knowledge of the order of operations to carry out calculations involving the four operations
Inverse operations, estimating and checking answers	
Problem Solving	solve problems involving addition, subtraction, multiplication and division
	solve problems involving similar shapes where the scale factor is known or can be found (copied from Ratio and Proportion)

Method

Mental methods

Children solve practical problems where they need to scale up and relate to known number facts.

Pupils explore the order of operations using brackets;

Written methods

Continue to refine and deepen understanding of written methods including fluency for using long multiplication.
Children to continue with the grid method and progress to long multiplication when they are ready.

Use short multiplication to multiply a decimal number with up to 2 decimal places by a single digit number.

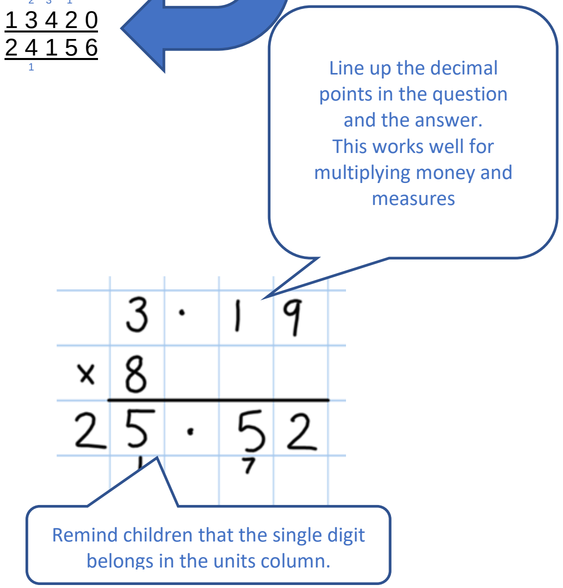
Models/Examples

A bag of four oranges costs thirty seven pence. How much do twelve oranges cost?

2 + 1 x 3 = 5 and (2 + 1) x 3 = 9.

X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

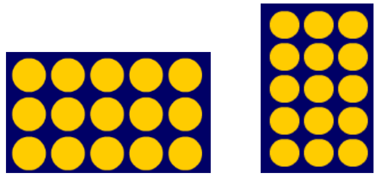
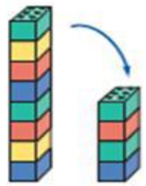
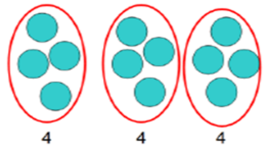
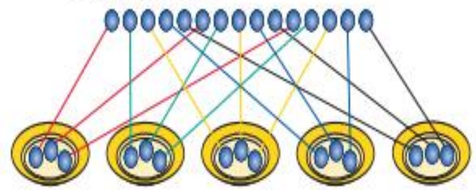
```
  1 3 4 2
X     1 8
1 0 7 3 6
  2 3 1
1 3 4 2 0
2 4 1 5 6
1
```



Division

Calculation progression through the primary years

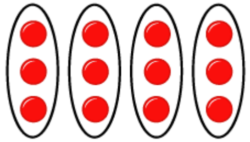
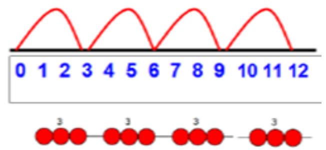
'Nobody else is quite like me'

	Branches	Milestone 1 Year 1	Method	Models/Examples
Division Year 1	**Multiplication and division facts**	count in multiples of twos, fives and tens (copied from Number and Place Value	Children must have secure counting skills- being able to confidently count in 2s, 5s and 10s. Children should be given opportunities to reason about what they notice in number patterns. Group AND share small quantities- understanding the difference between the two concepts. **Grouping** Children should apply their counting skills to develop some understanding of grouping. Use of arrays as a pictorial representation for division. 12 ÷ 3 = 4 There are 3 groups of 4. 12 ÷ 4 = 3 There are 4 groups of 3. Children should be able to find ½ and ¼ and simple fractions of objects, numbers and quantities. **Sharing** Develops importance of one-to-one correspondence. Children should be taught to share using concrete apparatus.	How many groups of 4 can be made with 12 stars? = **3**   15 ÷ 3 = 5 There are 5 groups of 3. 15 ÷ 5 = 3 There are 3 groups of 5   
	Mental Calculations			
	Written Methods			
	Properties of numbers: Multiples, Factors, Prime, Square, cube numbers			
	Order of Operations			
	Inverse operations, estimating and checking answers			
	Problem Solving	solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher		

<table>
<tr><th rowspan="2"></th><th rowspan="2">Branches</th><th>Milestone 1</th><th rowspan="2">Method</th><th rowspan="2">Models/Examples</th></tr>
<tr><th>Year 2</th></tr>
<tr><td rowspan="7">Division Year 2</td><td>Multiplication and division facts</td><td>recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers</td>
<td rowspan="7"><u>÷ = signs and missing numbers</u>
Know and understand sharing and grouping- introducing children to the ÷ sign.

Children should continue to use grouping and sharing for division using practical apparatus, arrays and pictorial representations.

<u>Grouping using a numberline</u>
Group from zero in jumps of the divisor to find our ‘how many groups of 3 are there in 15?’.
15 ÷ 3 = 5
Continue work on arrays. Support children to understand how multiplication and division are inverse. Look at an array – what do you see?</td>
<td rowspan="7">6 ÷ 2 = □   □ = 6 ÷ 2
6 ÷ □ = 3   3 = 6 ÷ □
□ ÷ 2 = 3   3 = □ ÷ 2
□ ÷ ∇ = 3   3 = □ ÷ ∇


12 ÷ 3 = 4
This represents 12 ÷ 3, posed as how many groups of 3 are in 12?
Pupils should also show that the same array can represent 12 ÷ 4 = 2 if grouped horizontally.


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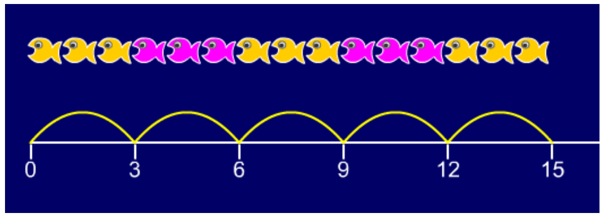

</td></tr>
<tr><td>Mental Calculations</td><td>show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</td></tr>
<tr><td>Written Methods</td><td>calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs</td></tr>
<tr><td>Properties of numbers: Multiples, Factors, Prime, Square, cube numbers</td><td></td></tr>
<tr><td>Order of Operations</td><td></td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td></td></tr>
<tr><td>Problem Solving</td><td>solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</td></tr>
</table>

Division Year 3

Branches	Milestone 2 Year 3
Multiplication and division facts	count from 0 in multiples of 4, 8, 50 and 100 (copied from Number and Place Value recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
Mental Calculations	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Written Methods)
Written Methods	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Mental Methods)
Properties of numbers: Multiples, Factors, Prime, Square, cube numbers	
Order of Operations	
Inverse operations, estimating and checking answers	*estimate the answer to a calculation and use inverse operations to check answers* (copied from Addition and Subtraction)
Problem Solving	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

Method

<u>÷ = signs and missing numbers</u>

Continue using a range of equations as in year 2 but with appropriate numbers.

<u>Grouping</u>

How many 6's are in 30?

<u>Becoming more efficient using a numberline</u>

Children need to be able to partition the dividend in different ways.

<u>Short Division</u>

Once children are secure with division as grouping and demonstrate this using number lines, arrays etc., short division for larger 2-digit numbers should be introduced, initially with carefully selected examples requiring no calculating of remainders at all. Start by introducing the layout of short division by comparing it to an array.

<u>Remainders</u>

49 ÷ 4 = 12 r1

Sharing – 49 shared between 4. How many left over?

Grouping – How many 4s make 49. How many are left over?

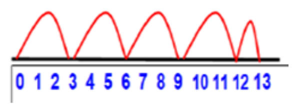
Place value counters can be used to support children apply their knowledge of grouping.

Models/Examples

Step 1

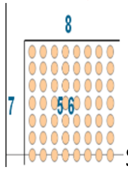
13 ÷ 3 = 4r1

+3 +3 +3 +3 r1



Step 2

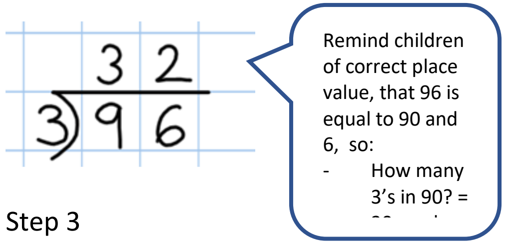
Short division: Limit numbers to **NO** remainders in the answer **OR** carried (each digit must be a multiple of the divisor).



56 ÷ 7 = 8

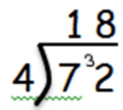
56 ÷ 8 = 7

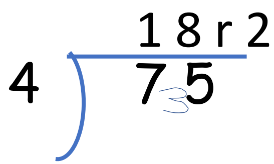
Start by introducing the layout of short division by comparing it to an array.



Step 3

Short division: including working with remainders





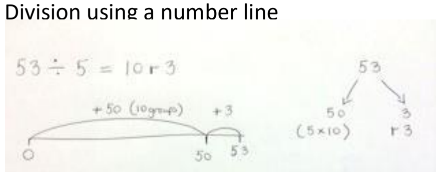
<table>
<tr><th></th><th>Branches</th><th>Milestone 2
Year 4</th><th>Method</th><th>Models/Examples</th></tr>
<tr><td rowspan="9">Division Year 4</td><td rowspan="2">Multiplication and division facts</td><td>count in multiples of 6, 7, 9, 25 and 1000 (copied from Number and Place Value)</td><td rowspan="9"><u>÷ = signs and missing numbers</u>
Continue using a range of equations as in year 3 but with appropriate numbers.

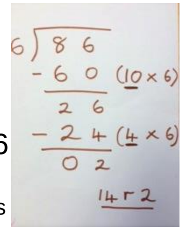
<u>Sharing, Grouping and using a number line</u>
Children will continue to explore division as sharing and grouping, and to represent calculations on a number line until they have a secure understanding.

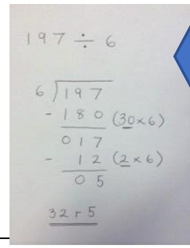
<u>Formal Written Method for Division</u>
Children should progress in their use of written division calculations (chunking)

Calculations should include those with remainders as well as without.

As children become more confident they can progress to the written method for dividing a 3 digit number by a 1 digit number, HTU ÷U.</td><td rowspan="9">Using x = signs and missing numbers
□ = 60 ÷ 5   36 ÷ 9 = 4   □ = 360 ÷ 90
12 = □ ÷5   □ ÷ 4 = 9   4 = □ ÷ 90
Balanced equations
54 ÷ 9 = 3 × □
36 ÷ □ = 63 ÷ Δ

<u>Step 1</u>
Division using a number line


<u>Step 2</u>
Dividend just over 10x the divisor, e.g. 86 ÷ 6
86
60   26
(10 groups of 6)   (4 groups of 6 remainder 2)


<u>Step 3</u>
Move to 3 digit number, HTU ÷U

</td></tr>
<tr><td>recall multiplication and division facts for multiplication tables up to 12 × 12</td></tr>
<tr><td rowspan="2">Mental Calculations</td><td>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</td></tr>
<tr><td>recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)</td></tr>
<tr><td>Written Methods</td><td>multiply two-digit and three-digit numbers by a one-digit number using formal written layout</td></tr>
<tr><td>Properties of numbers: Multiples, Factors, Prime, Square, cube numbers</td><td>recognise and use factor pairs and commutativity in mental calculations (repeated)</td></tr>
<tr><td>Order of Operations</td><td></td></tr>
<tr><td>Inverse operations, estimating and checking answers</td><td>estimate and use inverse operations to check answers to a calculation
(copied from Addition and Subtraction)</td></tr>
<tr><td>Problem Solving</td><td>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</td></tr>
</table>

	Branches	Milestone 3	Method	Models/Examples

Division Year 5

	Year 5
Multiplication and division facts	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 (copied from Number and Place Value)
Mental Calculations	multiply and divide numbers mentally drawing upon known facts
	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
Written Methods	multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
	divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
Properties of numbers: Multiples, Factors, Prime, Square, cube numbers	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
	know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
	establish whether a number up to 100 is prime and recall prime numbers up to 19
	recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})
Order of Operations	
Inverse operations, estimating and checking answers	
Problem Solving	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

<u>÷ = signs and missing numbers</u>
Continue using a range of equations but with appropriate numbers

<u>Formal Written Method for Division</u>
Continued as shown in Year 4, leading to the efficient use of the formal method.

<u>Short division with remainders:</u>
Examples that give rise to remainder answers, division often needs to have a real life problem solving context, where **pupils consider the meaning of the remainder and how to express it,** i.e. as a fraction, a decimal, or as a rounded number or value , depending upon the context of the problem.

<u>Children should progress in their use of written division calculations (chunking)</u>
As children become more confident with HTU ÷U they can progress to the written method for dividing a 3 digit number by a 2 digit number, HTU ÷TU

<u>Quotients should be expressed as decimals and fractions</u>
Children begin to practically develop their understanding of how express the remainder as a decimal or a fraction. Ensure practical understanding allows children to work through this (e.g. what could I do with this remaining 1? How could I share this between 6 as well?)

Using x = signs and missing numbers

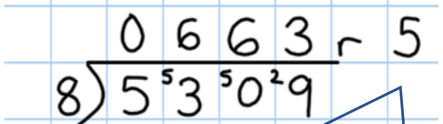
630 ÷ □ = 9　　□ ÷ 9 = 0.7
□ ÷ Δ = 63　　Δ ÷ 90 = 70

Balanced equations

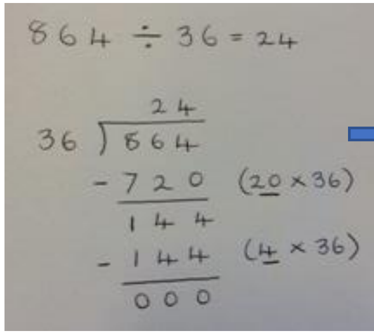
100 ÷ ○ = Δ ÷ 2

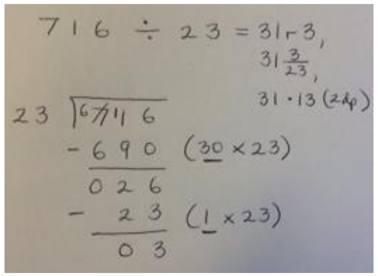
Divide up to 4 digits by a single digit, including those with remainders.

Short division, including remainder answers:

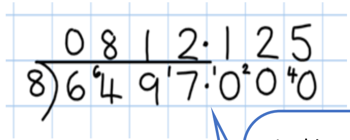
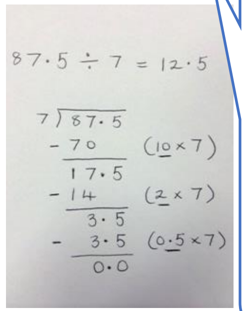
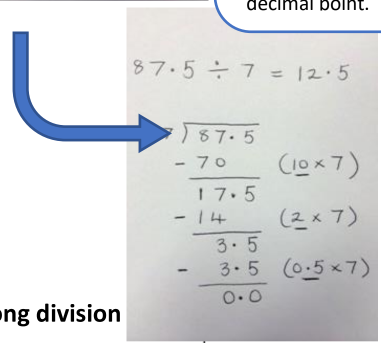
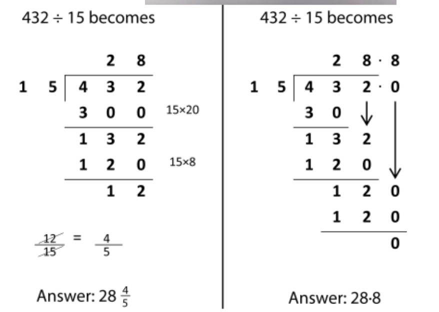


The answer to 5309 ÷ 8 could be expressed as 663 and five eighths, 663 r 5, as a decimal, or rounded as





Division Year 6

Branches	Milestone 3 Year 6	Method	Models/Examples
Multiplication and division facts		**÷ = signs and missing numbers** Continue using a range of equations but with appropriate numbers **Short division with remainders:** Pupils should continue to use this method but with numbers to at least 4 digits and understand how to express remainders as fractions, decimals, whole number remainders or rounded numbers. For real life problems children should consider the most appropriate way to express the remainder. **Children should use written division calculations (chunking)** As children become more confident with HTU ÷TU they can progress to the written method for dividing a 4 digit number by a 2 digit number, THHTU ÷TU **Long Division** Children can progress to the long division method when they are able to see the relationship between chunking and long division. **Remainders** All of the above stages should include calculations with remainders as well as without. Remainders should be interpreted according to the context of the problem.	**Using x = signs and missing numbers** 630 ÷ 0.7 = □ 2.75 ÷ 5 = □ **Balanced equations** □ ÷ 0.4 = Δ ÷ 0.25   In this example rather than expressing the remainder as r1, a decimal point is added after the units because there is still a remainder and the 1 remainder is carried onto zeros after the decimal point.  **Long division** 
Mental Calculations	perform mental calculations, including with mixed operations and large numbers		
	associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8) (copied from Fractions)		
Written Methods	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 short division where appropriate for the context divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context		
	use written division methods in cases where the answer has up to two decimal places (copied from Fractions (including decimals))		
Properties of numbers: Multiples, Factors, Prime, Square, cube numbers	identify common factors, common multiples and prime numbers *use common factors to simplify fractions; use common multiples to express fractions in the same denomination* (copied from Fractions)		
	calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3 (copied from Measures)		
Order of Operations	use their knowledge of the order of operations to carry out calculations involving the four operations		
Inverse operations, estimating and checking answers			
Problem Solving	solve problems involving addition, subtraction, multiplication and division		
	solve problems involving similar shapes where the scale factor is known or can be found (copied from Ratio and Proportion)		

Monitoring and Review:

We are aware of the need to regularly review our policies to take into account the new initiatives, changes in curriculum or developments in technology.

Claire Kitchen
Subject Leader for Mathematics

Policy date – November 2022
Review Date – November 2024
Ratified by Governors – November 2022