Calculations Policy

Grendon Primary School

Approved by:	Governing board	**Date:** March 2022	
Last reviewed on:	March 2022		
Next review due	March 2025	**By:** L Pollitt	

Introduction

At Grendon Primary School, we believe that children should be introduced to the process of calculation through practical activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking using particular methods that apply to special cases, and learning to interpret and use signs and symbols involved. In this way, the process moves from concrete to pictorial to abstract.

Choosing and using the appropriate strategy and recording it efficiently is an important tool both for furthering the understanding of ideas and for communicating those ideas to others. A useful method is one that helps children carry out a calculation and can be understood by others.

It is very important that children use the correct mathematical language as a central part of their learning. It is essential that teaching using the strategies outlined in this policy is accompanied by the use of appropriate mathematical vocabulary. New vocabulary should be introduced in a suitable context and explained carefully. High expectations of mathematical language used are essential. Using correct mathematical language is crucial for thinking, learning and communicating. We need to encourage children to explain what they are doing and why they are doing it. We must offer them opportunities to use mathematical language frequently, for example by participating in paired activities, group discussions and games as well as other dialogues. The productive use of spoken language in mathematics allows children to evaluate their learning, support others' suggestions, challenge ideas develop an argument or prove their answer, reason or justify and ask questions.

Written methods are complementary to mental methods and should not be seen as separate from them. The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. It is important children acquire secure mental methods of calculation and one efficient written method of calculation for addition, subtraction, multiplication and division which they know they can rely on when mental methods are not appropriate.

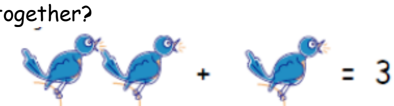
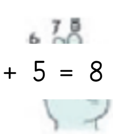
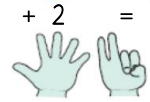
This policy identifies progression in calculation strategies.

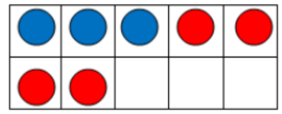
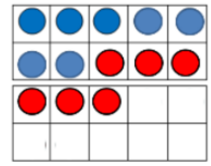
Children should not be made to go onto the next stage if:

1.) they are not ready.
2.) they are not confident.

By the end of Year 6, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings (an extended written method), an efficient written method or a mental method.

Addition

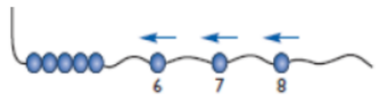
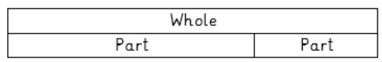
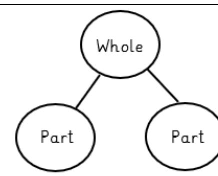
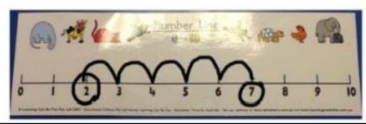
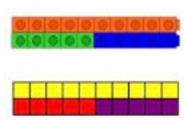
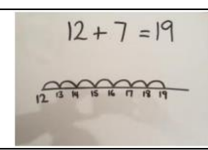
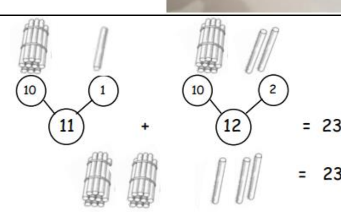
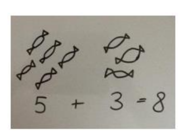
EYFS – Addition	
Vocabulary: add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more…how many more to make…?, How many more is…than…?	
Method	**Example/Representation**
Using a range of practical resources (e.g. counters, shells, cubes, counting bears, unifix cubes and pegs) and real life contexts, pupils develop their understanding of the concept of addition through counting activities.	How many dinosaurs are there?  What about if I gave you two more? 
Children are introduced to the addition symbol (+) as well as the equals sign (=) and use pictures/diagrams to represent the calculation.	There are 2 birds. Another bird flies in. How many are there altogether? 
Store the larger number mentally and use fingers to count on.	Count on from the larger number. A child will choose the larger number, even when it's not the first and count on from there. 3 + 5 = 8 
Children represent an addition number sentence in picture form and are able to solve simple addition number sentences using objects or fingers. Children will begin to explain their reasoning.	 5 + 2 = 7 

<table>
<tr><td>Children will regularly use ten frames to secure their understanding of numbers 1-10 first and then up to 20.</td><td>
3 + 4 = 7

7 + 6 = 13</td></tr>
<tr><td>Diagrams like ‘Adam the Adder’ can be used as an early introduction to a number track. This will help children develop their understanding of addition.</td><td>
</td></tr>
<tr><td colspan="2">Mental strategies
• Counting songs and games. Cbeebies Number Blocks.
• Develop a mental image of the number system.
• Begin to understand the value of a number.
• Automatically recall of number bonds to 5 and some to 10.
• Start to know some double facts.
• Children will be taught to put the biggest number in their head and count on.

</td></tr>
</table>

Year 1 – Addition

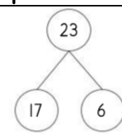
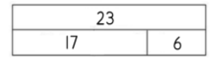
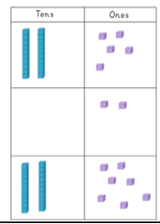
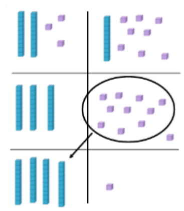
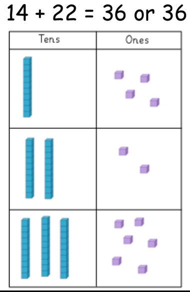
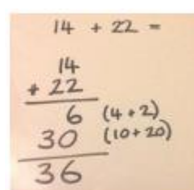
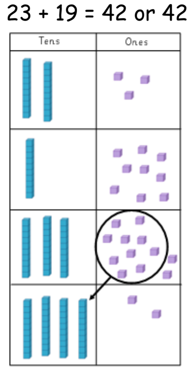
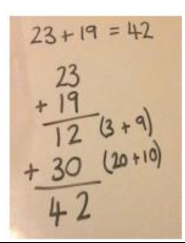
Vocabulary: number bonds, add, more, plus, make, sum, total, altogether, inverse double, near double, equals, is the same as (including equals sign), score, one more, two more…ten more, how many more to make…?, how many more is…than…?, how much more is…?

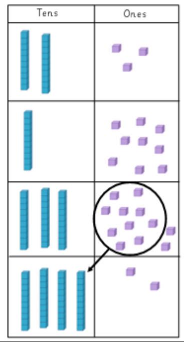
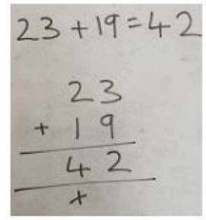
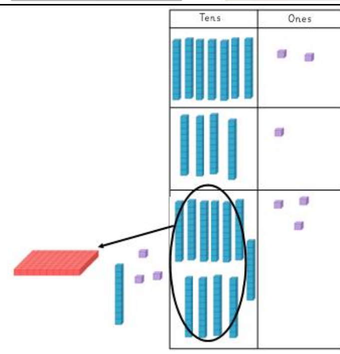
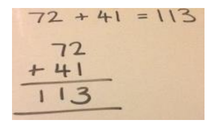
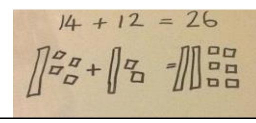
Method	**Example/Representation**
Children will be taught to use a number track to support addition.	4 + 2 = 6 
Bead strings and counting sticks will be used to support addition.	5 + 3 = 8 
Children to understand and use bar models and part-whole model diagrams as a way of working out addition calculations	 
Children will use a prepared number line to solve simple addition stories and number sentences.	2 + 5 = 7 
Children will be taught how to solve simple addition stories with the support of a 100 number square.	11 + 7 = 18 
Children will be taught how to use and interpret bar models to help solve number sentences.	10 = 5 + 5 
Children are taught how to use a blank number line for addition and then encouraged to draw their own number line to help solve problems.	12 + 7 = 19 
Children will partition numbers into tens and ones when adding two 2-digit numbers that lie within the tens boundary.	
Children will solve one-step addition problems using concrete objects and/or pictorial representations.	I have 5 sweets and I am given 3 more. How many do I have altogether? 

Mental strategies

- Know addition can be carried out in any order (commutative)
- Add 1 and 2 digit numbers to 20 including 0
- Number bonds to 20
- Doubles of numbers up to and including double 10
- Adding 10 to a single digit number

- Identify 1 more than a given number.

Year 2 – Addition	
Vocabulary: add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more, ten more…how many more to make…?, How many more is…than…? How much more is…?, regroup, tens boundary	
Method	**Example/Representation**
Using and understanding number lines, bar models, part-whole diagrams and realise the differences.	 
Children will use bundles or other representations when adding a multiple of 10 to a 2-digit number. They will add the 10s and then recombine. A hundred square can support this understanding.	27 is 2 tens and 7 ones. 50 is 5 tens.  There are 7 tens in total and 7 ones. So, 27 + 50 is 7 tens and 7 ones = 77.
Children will use concrete objects and pictorial representations to add: a 2-digit number and ones, three 1-digit numbers and a 2 two-digit number and multiples of 10.	25 + 2 = 27  Also, know that 25 + 2 has 2 tens and 7 ones.
Children will partition numbers into tens and ones when adding two 2-digit numbers that cross the tens boundary.	23 + 18 = 41  Regroup!
Children begin to set out TO + TO (that lie within the tens boundary) in columns and record as expanded column addition.	14 + 22 = 36 or 36 = 14 + 22  
Children begin to set out TO + TO (that cross the tens boundary) in columns and record as expanded column addition.	23 + 19 = 42 or 42 = 19 + 23  Regroup! 

Children begin to set out TO + TO (that cross the tens boundary) in columns and record as column addition.	 Regroup! 
Children begin to set out TO + TO (that cross the hundreds boundary) in columns and record as column addition.	 Regroup! 
Children will solve simple addition problems using concrete objects and pictorial representations, including those involving number, quantities and measures.	For example, Mary has 14 strawberries and George has 12 strawberried. How many strawberries are there altogether? 

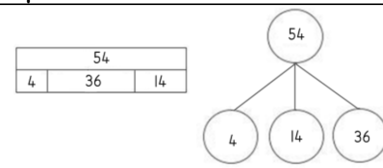
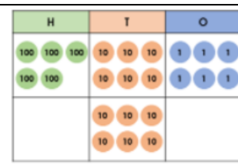
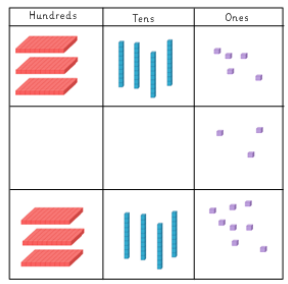
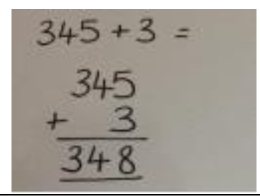
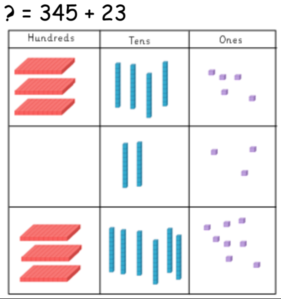
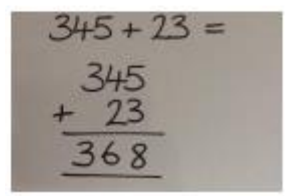
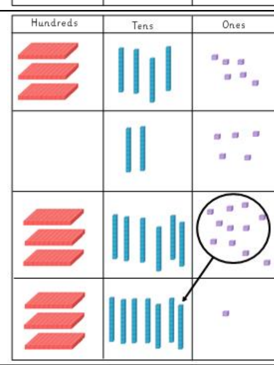
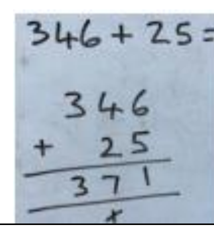
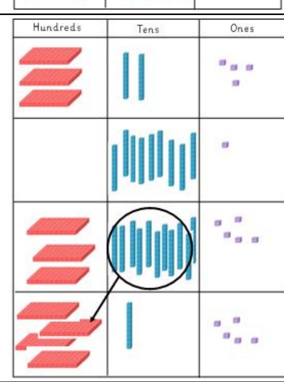
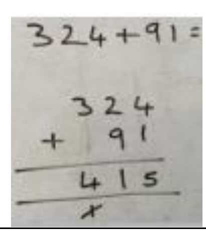
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.

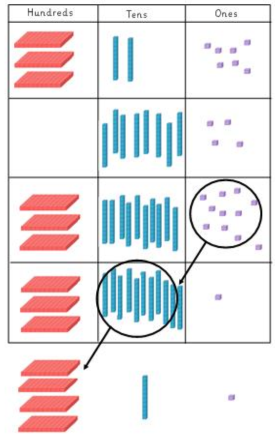
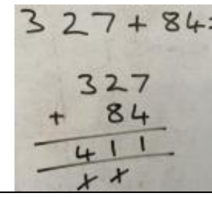
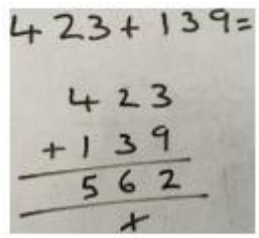
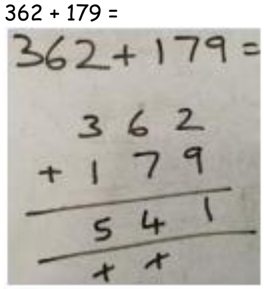
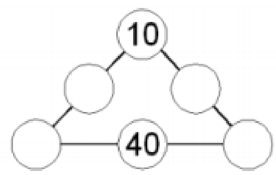
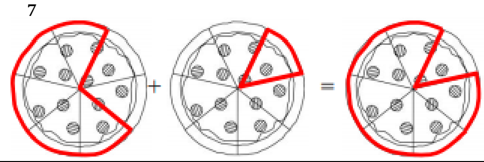
Mental strategies

- Continue to know addition can be carried out in any order (commutative).
- Develop a mental image of the number system.
- Understand the value of a number
- Using what they already know:
    - If I know 4 + 3 = 7, I know that 4 tens + 3 tens = 7 tens
    - If I know that 3 + 7 = 10, I know 30 + 70 = 100.
- Recall of number bonds to 20

Year 3 - Addition

Vocabulary: add, addition, total, plus, sum, more, total, altogether, column addition, estimate, inverse, double, near double, one more, ten more, one hundred more…how many more to make…?, How many more is…than…? How much more is…?, regroup, tens boundary, hundreds boundary

Method	**Example/Representation**
Using and understanding bar models and part-whole diagrams and realise the differences.	
Children are to use other pictorial representations to fully understand the concepts around addition.	
Set out HTO + O (that lie within the tens boundary) in columns and record as column addition.	345 + 3 = 
Set out HTO + TO (that lie within the tens boundary) in columns and record as column addition.	? = 345 + 23 
Set out HTO + TO (that cross the tens boundary) in columns and record as column addition.	Regroup! 
Set out HTO + TO (that cross the hundreds boundary) in columns and record as column addition.	Regroup! 

Set out HTO + O (that cross the hundred and tens boundary) in columns and record as column addition.	 Regroup! 
Children set out HTO + HTO (that cross the tens boundary) in columns and record as column addition	? = 423 + 139  Regroup!
Children set out HTO + HTO (that cross the tens and hundreds boundaries) in columns and record as column addition	362 + 179 =  Regroup!
Children will solve one and two-step addition problems (including missing number problems) using concrete objects and pictorial representations.	This number triangle has missing numbers. The numbers along each edge must add up to 90. Put all the numbers: 20, 30, 50 and 60 in the circles to make the totals correct. 
Pupils practise adding fractions with the same denominator through a variety of increasingly complex problems to improve fluency.	$\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ 

Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.

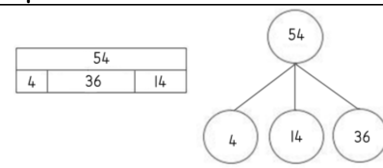
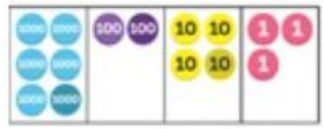
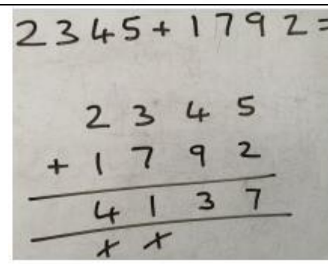
Mental strategies

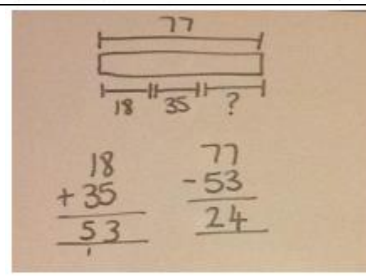
Add numbers mentally, including:

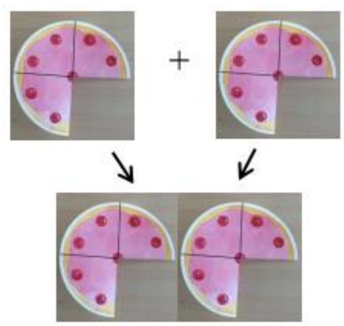
- a three-digit number and a single digit number
- a three-digit number and multiples of 10
- three-digit number and multiples of 100

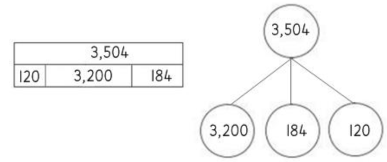
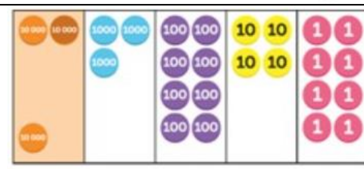
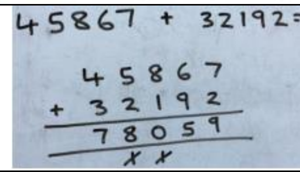
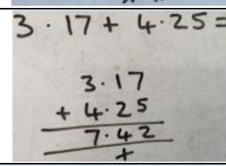
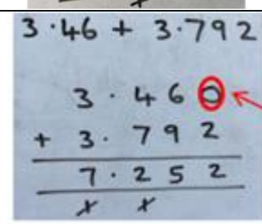
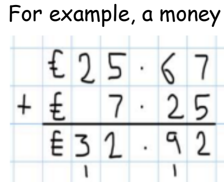
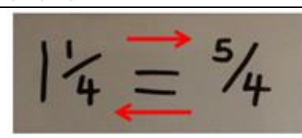
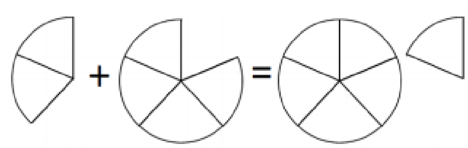
- Estimate the answer to a calculation and use inverse operations to check answers
- Know number pairs that total 1,000 (multiples of 100)
- Doubling numbers.

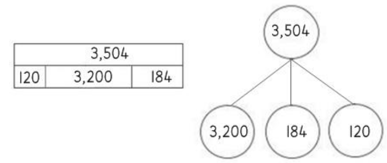
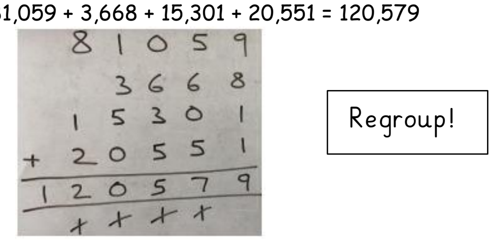
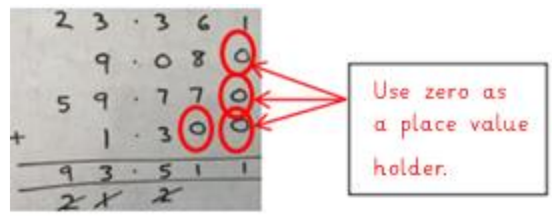
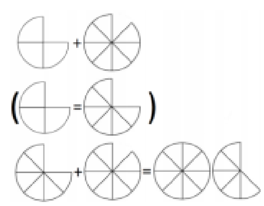
• Calculate 10 or 100 more than any given number

<table>
<tr><th colspan="2">Year 4 - Addition</th></tr>
<tr><td colspan="2">Vocabulary: add, addition, more, plus, increase, sum, total, altogether, score, double, near double, regroup, tens boundary, hundreds boundary, thousands boundary, inverse</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Using and understanding bar models and part-whole diagrams and realise the differences.</td><td>
</td></tr>
<tr><td>Children are to use other pictorial representations to fully understand the concepts around addition.</td><td>
</td></tr>
<tr><td>Children will add numbers with up to 4-digits using the formal written method of column addition.</td><td>

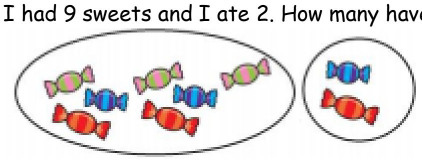
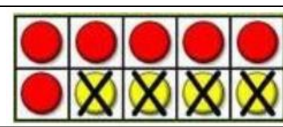
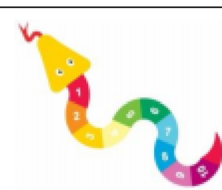
Regroup!</td></tr>
<tr><td>Solve two-step problems using formal jottings and explaining reasoning behind their calculations.</td><td>

Regroup!</td></tr>
<tr><td>Pupils continue to practise in adding fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole.</td><td>$\frac{3}{4} + \frac{3}{4} = \frac{6}{4}$
</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
Add numbers mentally, including:
a four-digit number and multiples of one thousand
Use knowledge of doubles to derive related facts (e.g. 15 + 16 = 31 because 15 + 15 = 30 and 30 + 1 = 31)
Know number pairs that total 1,000 (multiples of 10)
Estimate the answer to a calculation and use inverse operations to check answers</td></tr>
</table>

Year 5 - Addition	
Vocabulary: efficient written method, add, addition, more, plus, increase, sum, total, altogether, score, regroup, tens boundary, hundreds boundary, thousands boundary, tenths boundary, inverse	
Method	**Example/Representation**
Using and understanding bar models and part-whole diagrams and realise the differences.	
Children are to use other pictorial representations to fully understand the concepts around addition.	
Children will add numbers with more than 4-digits using the formal written method of column addition.	 Regroup!
Children will add decimal numbers with the same number of decimal places using the formal written method of column addition.	 Regroup!
Children will add decimal numbers with a different number of decimal places using the formal written method of column addition using 0 as a place value holder.	 Regroup! Use zero as a place value holder.
Solve multi-step problems (that may include subtraction) using formal jottings and explaining reasoning behind their choice of operation and calculation.	For example, a money context: 
Recognise mixed numbers and improper fractions and convert from on to the other.	
Practise adding fractions where calculations exceed one as a mixed number.	$\frac{2}{5}+\frac{4}{5}=\frac{6}{5}=1\frac{1}{5}$ 
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.	
Mental strategies • Add numbers mentally with increasingly large numbers (e.g. 10,162 + 2,300 = 12,462) • Mentally add tenths (e.g. 0.2 + 0.6 = 0.8) and 1-digit numbers and tenths (8 + 0.2) • Use number bonds to 100 knowledge to calculate complements to one using hundredths (e.g. 0.83 + 0.17 = 1) • Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	

<table>
<tr><th colspan="2">Year 6 - Addition</th></tr>
<tr><td colspan="2">Vocabulary: order of operations, column addition, add, in total, answer, regroup, tens boundary, hundreds boundary, thousands boundary, ones boundary, tenths boundary, hundredths boundary, decimal place, inverse</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Using and understanding bar models and part-whole diagrams and realise the differences.</td><td>
</td></tr>
<tr><td>Children will add several numbers of increasing complexity.</td><td>81,059 + 3,668 + 15,301 + 20,551 = 120,579

</td></tr>
<tr><td>Children will add several decimal numbers with a different number of decimals places.</td><td>23.361 + 9.08 + 59.77 + 1.3 = 95.511

</td></tr>
<tr><td>Solve multi-step problems (that may include subtraction) using formal jottings and explaining reasoning behind their calculations.</td><td></td></tr>
<tr><td>Add fractions and mixed numbers with different denominators using the concept of equivalent fractions.</td><td>$\frac{3}{4} + \frac{7}{8} = 1\frac{5}{8}$ $\frac{6}{8} + \frac{7}{8} = \frac{13}{8} = 1\frac{5}{8}$
</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
Add numbers mentally with increasingly large numbers (e.g. 10,162 + 2,300 = 12,462)
Add decimal numbers mentally (up to 2 decimal places)
Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy</td></tr>
</table>

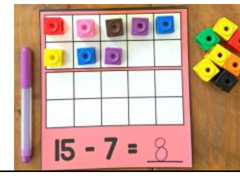
Subtraction

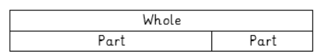
EYFS - Subtraction	
Vocabulary: take away, leave, how many are left/left over?, how many have gone? one less, two less…ten less, how many fewer is…difference between, is the same as	
Method	**Example/Representation**
Using a range of practical resources and real life contexts, pupils develop their understanding of the concept of subtraction as 'taking away' through counting activities	I had 9 sweets and I ate 2. How many have I got left? 
Children will use counting objects, toys or their fingers to answer simple subtraction number sentences and the children will be introduced to the subtraction symbol (-) and reminded of the equals sign (=).	(e.g. 6 – 3 = 3)
Children will make use of a ten frame. E.g. 10 – 4 = 6	
Children will listen to a subtraction story and draw a set of objects (jottings) on whiteboards and cross some off – drawing a picture helps children to visualise the subtraction.	
Children will use their fingers to help with subtraction, e.g. 5 – 2 = 3. A child will start with the biggest number in their head '5' and hold 5 fingers up. They will count back saying '5' (touching their head) '4', '3' *curling one finger down at a time), then count how many fingers are left.	
Children can use characters like 'Suzie the Subtractor' to help develop their understanding of subtraction.	

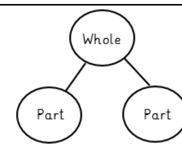
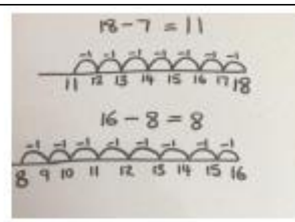
Mental strategies

- Cbeebies Number Blocks.
- Develop a mental image of the number system.
- Children count backwards using familiar number rhymes (e.g. 10 Green Bottles, 5 Fat Sausages).
- Count backwards from different starting points.

<table>
<tr><td colspan="2">Year 1 - Subtraction</td></tr>
<tr><td colspan="2">Vocabulary: subtract, take away, minus, leave, how many fewer is…than…?, how much less is…? Half, halve, how many are left/left over? How many are gone?, one less, two less, ten less…, how many fewer is…than…?, how much less is…? =, equals, sign, is the same as, count on, count back, difference between, how many more is…than…? How much more is…?</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Children will begin to subtract practically and in familiar contexts. They are introduced to more formal recording as they become more confident.</td><td>

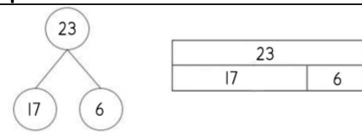
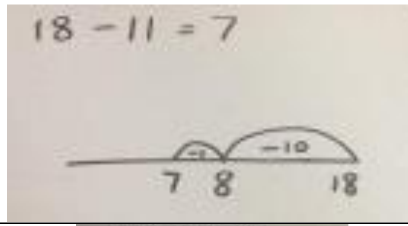
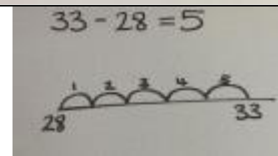
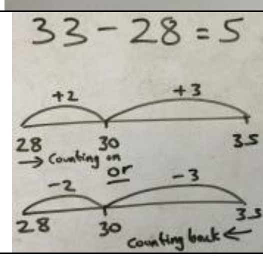
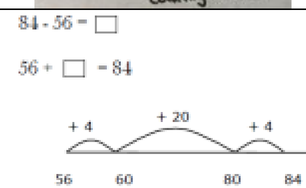
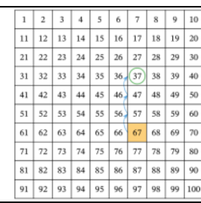
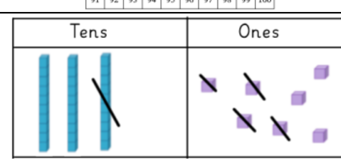

</td></tr>
<tr><td>Children will be taught to use a number track to support subtraction by counting backwards.</td><td>6 – 2 = 4

</td></tr>
<tr><td>Bead strings and counting sticks will be used to support subtraction by counting backwards.</td><td>
</td></tr>
<tr><td>Children will use a prepared number line to solve simple subtraction stories and number sentences by counting backwards.</td><td>7 – 4 = 3
</td></tr>
<tr><td>Children to continue to understand and use bar models and part-whole model diagrams as a way of working out subtraction calculations.</td><td>


</td></tr>
<tr><td>Children will be taught how to solve simple subtraction stories with the support of a 100 number square.</td><td>20 – 4 = 16
</td></tr>
<tr><td>Children are taught how to use a blank number line for subtraction (counting backwards) and then encouraged to draw their own number line to help solve problems.
Children will begin with TO – O that lie within the tens boundary then move onto TO – O that cross the tens boundary.</td><td>
</td></tr>
<tr><td>Children will solve one-step subtraction problems (including missing number problems) using concrete objects and pictorial representations.</td><td>
</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
Subtract 1 and 2 digit numbers to 20 including 0
To know that subtraction is not commutative and that the larger number must always come first.
Use knowledge of number bonds to 10 and 20 to reason (9 + 1 = 10 so 10 – 9 = 1 and 10 - 1 = 9).</td></tr>
</table>

Year 2 - Subtraction

Vocabulary: subtraction, minus, leave, how many are left/left over? How many less is…than…? How much fewer is…? difference between, half, halve, equals, sign, is the same as, partition, inverse, count on, count back, one less, ten less, ten less…one hundred less.

Method	**Example/Representation**
Children are to continue using bar models and part-whole diagrams to understand how this can help subtract.	
Children are encouraged to use a blank number line to solve TO – TO and count back in tens and then ones by: • Positioning the first number in the number sentence at the end of the number line. • Partitioning the second number into tens and ones. • Counting back in tens (or multiples of 10). • Counting back in ones.	
Children will use their knowledge of difference to use a blank number line to count on from the smallest number to the largest number (in tens and ones) to solve subtraction number sentences (TO – TO).	
Children will be encouraged to draw their own number line and begin to decide on the most efficient strategy: whether to starter with the smallest number and count on or start with the larger number and count back.	
Recognise and use inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	
Children to use a hundred square to reinforce subtracting tens from a two-digit number and other subtraction calculations as appropriate.	
Children will use concrete objects and pictorial representations to subtract: a 2-digit number and ones and 2 two-digit numbers.	
Children can then progress onto using the expanded method for subtraction where numbers are written in columns to support place value.	70 5 - 40 2 30 3
Children will solve one and two-step subtraction problems using concrete objects and pictorial representations including those involving number, quantities and measures.	

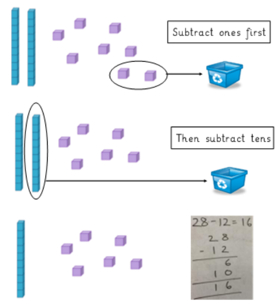
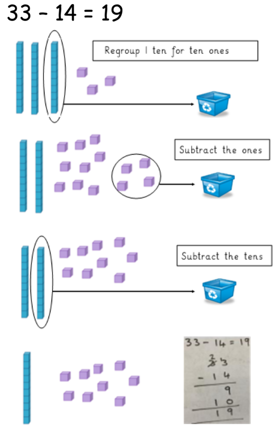
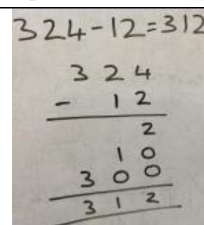
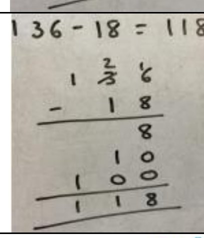
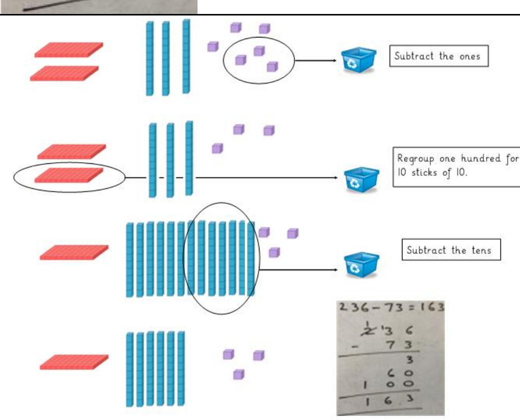
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.

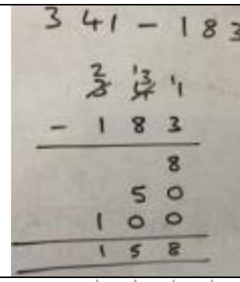
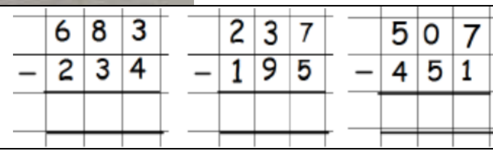
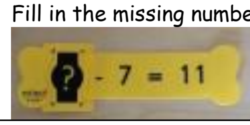
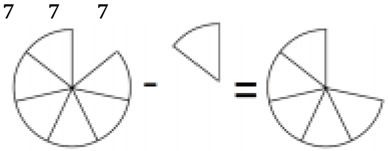
Mental strategies

- To know that subtraction is the inverse of addition
- Use knowledge of inverse to check calculations and solve missing number problems
- Subtract numbers mentally including:
- Subtracting ones from a 2-digit number
- Subtracting a multiple of 10 from a 2-digit number
- Subtracting a 2-digit number from another 2-digit number
- Recall and use subtraction facts to 20 fluently.
- Have a deeper understanding that subtraction is not commutative (unlike addition).
- Use knowledge of number bonds to 100 (multiples of 10) to reason (40+60 = 100 so 100 – 60 = 40 and 100 – 40 = 60).

Year 3 - Subtraction

Vocabulary: leave, subtract, less, minus, column subtraction, inverse, decomposition, regroup, how many are left/left over?, difference between, how many more/fewer is…than…?, how much more/less is…?, is the same as, equals, sign, multiples of tens and hundreds.

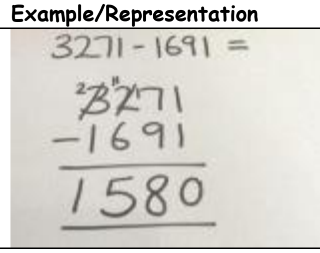
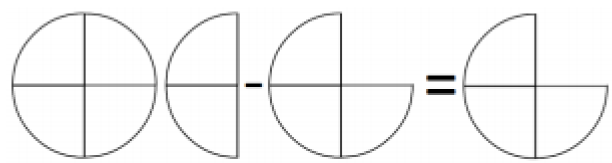
Method	**Example/Representation**
Children begin to set out TO – TO (that lie within the tens boundary) in columns and record as column subtraction.	28 – 12 = 16 
Children begin to set out TO – TO (that cross the tens boundary) in columns and record as column subtraction with decomposition.	33 – 14 = 19 
Children begin to set out HTO – TO (that lie within the tens boundary) in columns and record as column subtraction.	
Children begin to set out HTO – TO (that cross the tens boundary) in columns and record as column subtraction with decomposition.	
Children begin to set out HTO – TO (that cross the hundreds boundary) in columns and record as column subtraction with decomposition.	

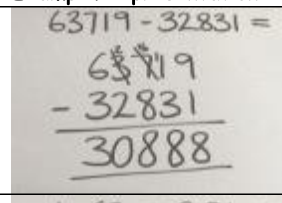
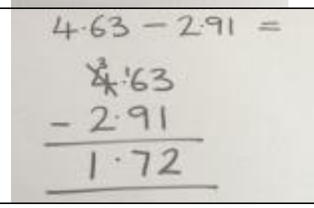
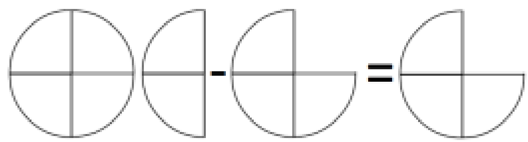
Children begin to set out HTO – TO (that cross the hundreds and tens boundary) in columns and record as column subtraction with decomposition.	
Children set out their calculation in the efficient column subtraction method and record as column subtraction with decomposition.	
Children will solve one and two-step subtraction problems (including missing number problems)	Fill in the missing number 
Children practise subtracting fractions with the same denominator through a variety of increasingly complex problems to improve fluency.	$\frac{6}{7} - \frac{1}{7} = \frac{5}{7}$ 

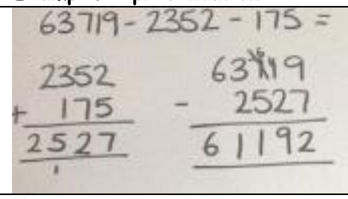
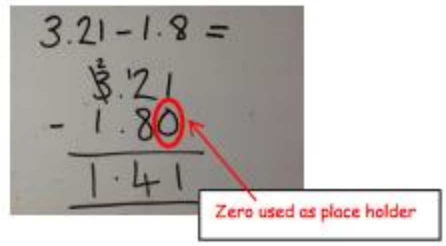
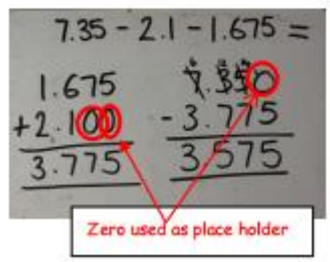
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.

Mental strategies

- Subtracting numbers mentally including:
  - Subtracting a single digit number from a 3-digit number
  - Subtracting a multiple of 10 from a 3-digit number
- Estimate the answer to a calculation and use inverse operations to check answer.

<table>
<tr><td colspan="2" align="center">Year 4 - Subtraction</td></tr>
<tr><td colspan="2">Vocabulary: subtract, subtraction, minus, decrease, leave, how many are left/left over?, difference between, how many more/fewer is…than…?, how much more/less is…?, is the same as, equals, sign, column subtraction, decomposition, regroup, multiples of thousands, inverse.</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Children will subtract numbers with up to 4-digits using the formal written method of column subtraction with decomposition.</td><td>
</td></tr>
<tr><td>Solve two-step problems using formal jottings and explaining the reasoning behind their choice of operation and calculations.</td><td></td></tr>
<tr><td>Children continue to practise in subtracting fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole.</td><td>$\frac{6}{4} - \frac{3}{4} = \frac{3}{4}$
</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
Subtracting numbers mentally including:
Subtracting multiples of one thousand from a 4-digit number
Use of number pairs that total 1,000 (multiples of 10) to calculate subtraction (eg. 1,000 – 300 = 700)
Estimate the answer to a calculation and use inverse operations to check answers.</td></tr>
</table>

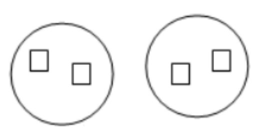
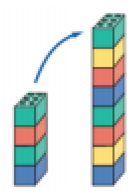
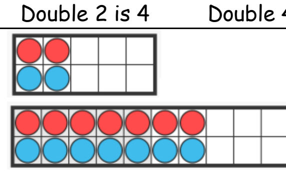
Year 5 - Subtraction	
Vocabulary: efficient written method, subtract, subtraction, minus, decrease, difference between, inverse, decimals, ones and tenths boundary, column subtraction, decomposition, regroup	
Method	**Example/Representation**
Children will subtract numbers with more than 4-digits using the formal written method of column subtraction with decomposition.	
Children will subtract decimal numbers with the same number of decimal places with decomposition. Encourage children to use a square for their decimal point to ensure place value is accurate.	
Solve multi-step problems using formal jottings and explaining reasoning behind their calculations.	
Children are to practise subtracting fractions where calculations exceed one as a mixed number..	$1\frac{2}{4} - \frac{3}{4} = \frac{3}{4}$ $\frac{6}{4} - \frac{3}{4} = \frac{3}{4}$ 
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.	
Mental strategies • Subtracting increasingly large numbers mentally (eg. 12,654 – 1,341 = 11,213) • Mentally subtract tenths (eg. 0.7 – 0.5 = 0.2) and 1-digit whole numbers and tenths (8-0.3 = 7.7) • Use rounding to check answers to calculations and determine, in the context of the problem, levels of accuracy.	

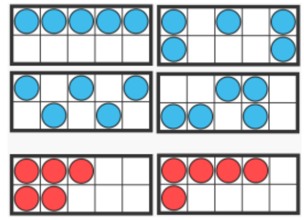
<table>
<tr><th colspan="2">Year 6 - Subtraction</th></tr>
<tr><td colspan="2">Vocabulary: order of operations, subtract, decrease, difference, inverse, decimals, ones, tenths and hundredths boundary, column subtraction, decomposition, regroup.</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Children will subtract several numbers of increasing complexity and be taught to combine some of the numbers so that the subtraction can be completed.</td><td>
</td></tr>
<tr><td>Children will subtract decimal numbers with a different number of decimal places with decomposition.</td><td>
</td></tr>
<tr><td>Children will subtract several decimal numbers with a different number of decimal places be taught to combine some of the numbers so that the subtraction can be completed.</td><td>
</td></tr>
<tr><td>Solve multi-step problems using formal jottings and explaining reasoning behind their calculations.</td><td></td></tr>
<tr><td>Children are to subtract fractions and mixed numbers with different denominators using the concept of equivalent fractions.</td><td>$\frac{4}{6} - \frac{1}{3} = \frac{3}{6}$

$\frac{1}{3} = \frac{2}{6}$

$\frac{4}{6} - \frac{2}{6} = \frac{3}{6}$</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
Subtracting increasingly large numbers mentally (eg. 12,654 – 1,341 = 11,213)
Mentally subtract tenths (eg. 0.7 – 0.5 = 0.2) and 1-digit whole numbers and tenths (8-0.3 = 7.7)
Use rounding to check answers to calculations and determine, in the context of the problem, levels of accuracy.</td></tr>
</table>

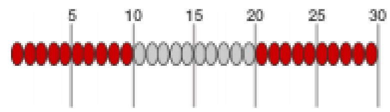
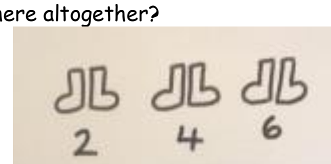
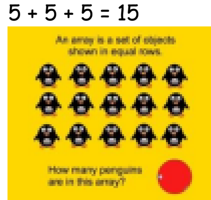
Multiplication

EYFS - Multiplication	
Vocabulary: group, lots of, double	
Method	**Example/Representation**
Children will count in groups of the same number of objects and add them together. The children learn about grouping in practical contexts and through pictorial representations.	Count groups of 2 and then count all objects to add them together. 
Children will recognise doubles on dominoes and dice.	
Children will solve simple problems involving doubling in a variety of ways.	  Double 2 is 4 Double 4 is 8
Ten frames will be used to support doubles up to 10 and then 20. Children will also use tens frames to move numbers around to show different manipulations of the same number.	

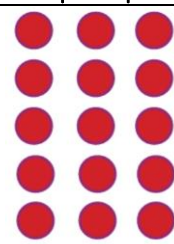
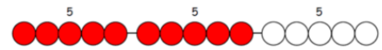
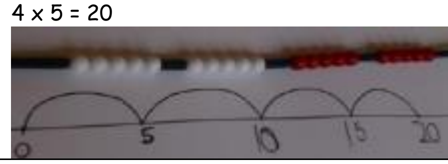
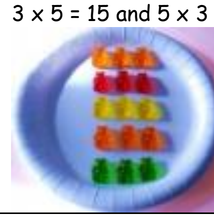
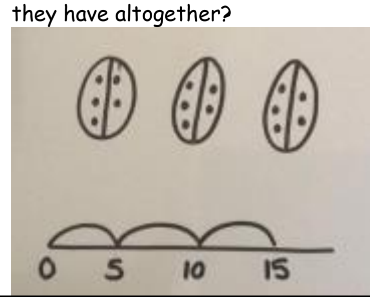
Mental strategies

- Develop a mental image of the number system.
- Understand the value of a number.
- Counting in 2s, 5s and 10s.
- Number patterns on a number line and on a hundred square – 2s, 5s and 10s

Year 1 – Multiplication	
Vocabulary: odd, even, count in twos, fives, count in tens (forwards from/backwards from), how many times? Lots of, groups of, once, twice, five times, ten times, multiple of, times, multiply, multiply by, array, row, column, double	
Method	**Example/Representation**
Children will count in groups of the same number of objects and add them together. The children learn about grouping in practical contexts and through pictorial representations. Bead strings and counting sticks will be used to support counting in sequences of 2s, 5s and 10s.	I have 5 pairs of socks in the bag. How many socks are there? 
Children will recognise and complete patterns and sequences involving multiples of 2, 5 and 10	
Children will be given one-step word problems to solve, involving counting in multiples of 2, 5 and 10 and doubles. Children will use concrete objects and pictorial representations to support their ideas.	Alfie, Joseph and Ben all have a pair of socks. How many socks are there altogether? 
Children will be introduced to an array to support multiplication and to support the understanding that multiplication is repeated addition.	5 + 5 + 5 = 15 
Mental strategies • Count forwards and backwards in multiples of 2s, 5s and 10s. • Recall doubles of numbers up to and including 10.	

Year 2 – Multiplication

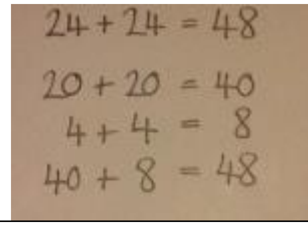
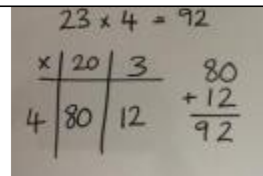
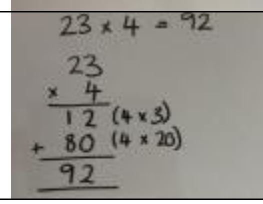
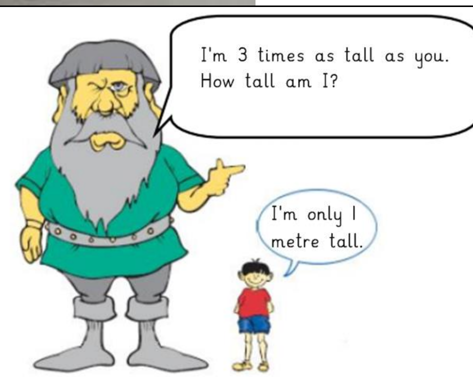
Vocabulary: odd, even, twos, fives, tens, threes, lots of, groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiply by, repeated addition, array, row, column, double

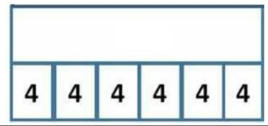
Method	Example/Representation
Reinforce repeated addition to help children to understand the commutative law of multiplication.	 5 + 5 + 5 = 5 x 3 
Children will be able to recognise and write the multiplication symbol (x) in mathematical statements.	7 x 2 = = 2 x 7 7 x = 14 14 = x 7 x 2 = 14 14 = 2 x x ◯ = 14 14 = x ◯
Children will understand the operation of multiplication as repeated addition on a blank number line and will use practical resources to support this.	4 x 5 = 20 
Children will be able to represent a multiplication calculation using an array and write the multiplication symbol within a number sentence. Children will also understand that multiplication can be carried out in any order (commutative).	3 x 5 = 15 and 5 x 3 – 15 
Children will solve one-step multiplication problems (including missing number problems) using concrete objects and pictorial representations.	I have 3 ladybirds with 5 spots on each. How many spots do they have altogether? 

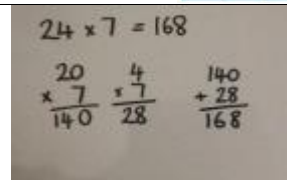
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.

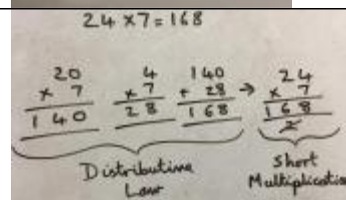
Mental strategies

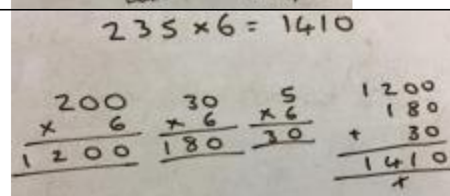
- Count forwards and backwards in multiples of 3.
- Know the 2, 5 and 10 times tables (in and out of order).
- Recognise odd and even numbers (use numicon here if needed).

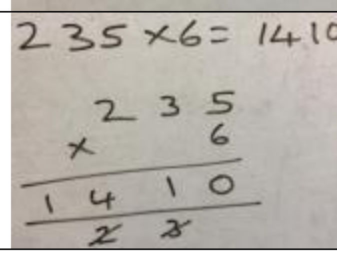
<table>
<tr><td colspan="2">Year 3 – Multiplication</td></tr>
<tr><td colspan="2">Vocabulary: multiply, times, groups of, equal groups of, multiples of, multiplied by, estimate, inverse, grid multiplication, expanded column multiplication, partition, commutative, associative, product.</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Children will learn to calculate doubles of 2-digit numbers through partitioning.</td><td>Double 24 = 24 + 24 = 48

</td></tr>
<tr><td>To use bar models to reinforce multiplication as repeated addition.</td><td>
</td></tr>
<tr><td>Children will be taught to multiply numbers (TO x 0) through partitioning and the formal written method of grid multiplication.</td><td>
</td></tr>
<tr><td>Children will be taught to multiply numbers (TO x 0) using the formal written method of expanded column multiplication and make the link to grid method.</td><td>
</td></tr>
<tr><td>Children will solve problems involving multiplication, including scaling.</td><td>
</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
• Count forwards and backwards in multiples of 4, 8, 50 and 100
• Know the 3, 4 and 8 times tables (in and out of order).
• Connect the 2, 4 and 8 times tables through doubling.
• Use knowledge of place value to calculate multiplication (eg. 2 x 2 = 4, 2 x 20 = 40, 2 x 200 = 400)</td></tr>
</table>

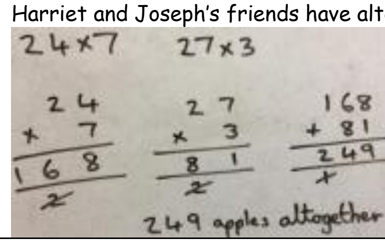
<table>
<tr><td colspan="2">Year 4 – Multiplication</td></tr>
<tr><td colspan="2">Vocabulary: multiply, multiplied by, product, short multiplication, partition, distributive law, commutative, groups of, multiply, times, multiples, inverse</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Children to be asked what calculation can be shown from bar models or part whole diagrams.</td><td>


</td></tr>
<tr><td>Children will be taught to multiply numbers (TO x O) by partitioning the 2-digit number and using two short multiplications along with addition to solve the problem (distributive law)</td><td>


</td></tr>
<tr><td>Children will be taught to multiply numbers (TO x O) using the formal written method of short multiplication and will link with the distributive law method.</td><td>


</td></tr>
<tr><td>Children will be taught to multiply numbers (HTO & O) by partitioning the 3-digit number and using two short multiplications along with addition to solve the problem.</td><td>


</td></tr>
<tr><td>Children will be taught to multiply numbers (HTO x O) using the formal written method of short multiplication and will link with the distributive law method.</td><td>


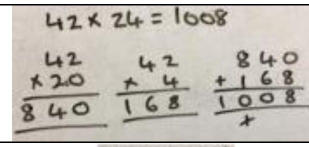
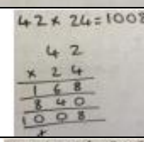
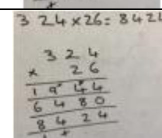
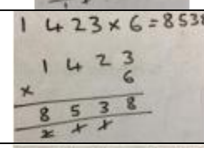
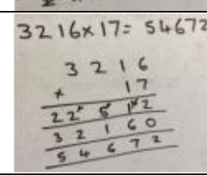
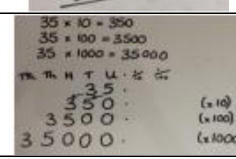
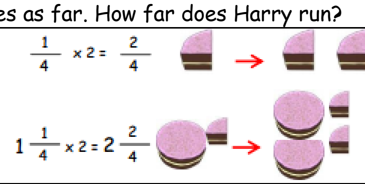
</td></tr>
<tr><td>Solve problems involving multiplying and adding to multiply two or three-digit numbers by one digit.</td><td>Harriet has 7 friends who each have 24 apples. Joseph has 3 friends who each have 27 apples. How many apples do Harriet and Joseph's friends have altogether?


</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies

Know all times tables up to and including 12 x 12 (by end of Year 4)
Recognise and use factor pairs (eg. Factor pairs for numbers up to and including 10)
Know that TO x 5 is TO x 10 then divide by 2.
Know that TO x 9 is TO x 10 then subtract TO
</td></tr>
</table>

Year 5 – Multiplication

Vocabulary: composite numbers, prime number, prime factor, cube number, square number, derive, factor pairs, formal written method, times, multiply, multiplied by, multiple of, product, short multiplication, partition, long multiplication, scaling, decimal place, ones, tenths and hundredths

Method	Example/Representation
Children will be taught to multiply numbers (TO x TO) by partitioning the second 2-digit number and using two short multiplications along with addition to solve the problem	
Children will be taught to multiply numbers (TO x TO) using the formal written method of long multiplication.	
Children will be taught to multiply numbers (HTO & TO) using the formal written method of long multiplication.	
Children will be taught to multiply numbers (ThHTO x O) using the formal written method of short multiplication.	
Children will be taught to multiply numbers (ThHTO x TO) using the formal written method of long multiplication.	
Children will learn to multiply whole numbers and those involving decimals by 10, 100 and 1,000 by moving the digits around the fixed decimal on a place value grid.	
Children will solve problems involving multiplication, including scaling.	Alfie runs 3,400m on Sports Day. His friend, Harry, runs three times as far. How far does Harry run?
With the use of materials and diagrams, pupils will multiply proper fractions and mixed numbers by whole numbers.	

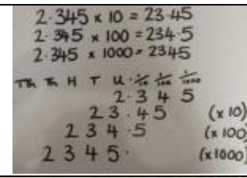
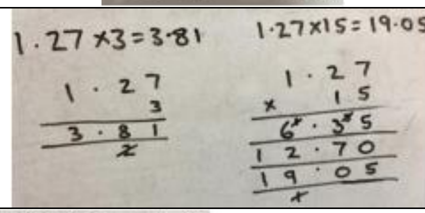
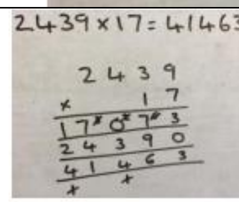
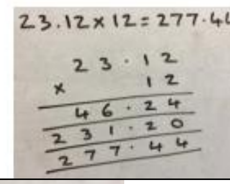
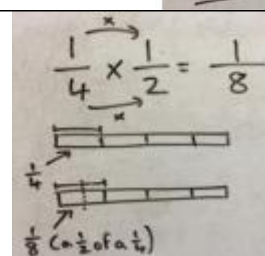
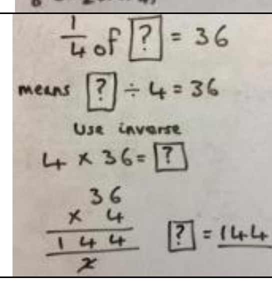
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.

Mental strategies

- Recognise and calculate factor pairs for any number
- Use times table knowledge to derive multiples of any number
- Establish whether a number is a prime number (up to 100) or a composite number (not prime) and recall prime numbers up to 19.
- To know what a square number is and recall all square numbers (up to and including 144)
- To know what a cube number is and recall the first 5 cube numbers.

Year 6 – Multiplication

Vocabulary: common factors, multiples, prime, formal written method, multiply, multiplied by, multiple of, product, short and long multiplication, partition, scaling, decimal place, ones, tenths and hundredths

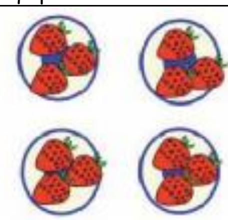
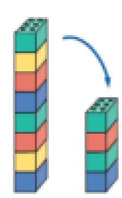
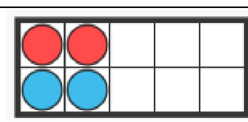
Method	**Example/Representation**
Multiply numbers by 10, 100 and 1,000 where the answers are up to three decimal places.	
Multiply one-digit numbers with up to two decimal places by whole numbers using: • Short multiplication when multiplying by a single digit. • Long multiplication when multiplying by a 2-digit number.	
Multiply multi-digit numbers up to 4 digits by a 2-digit whole number using the formal written method of long multiplication.	 
Multiply simple pairs of fractions, writing the answer in its simplest form.	
Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction.	

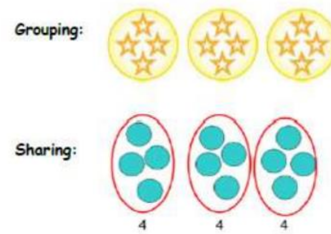
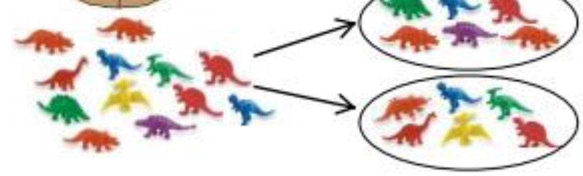
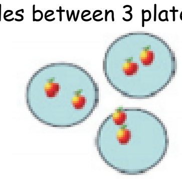
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.

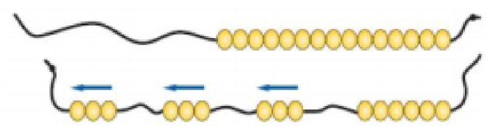
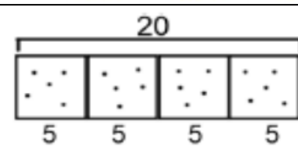
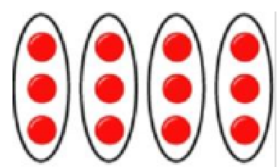
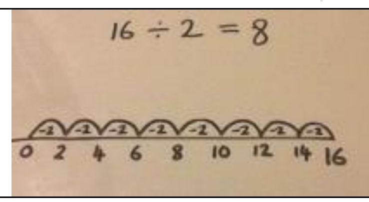
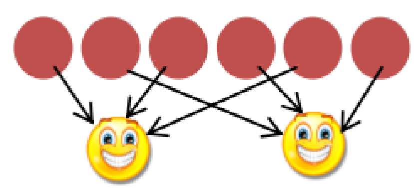
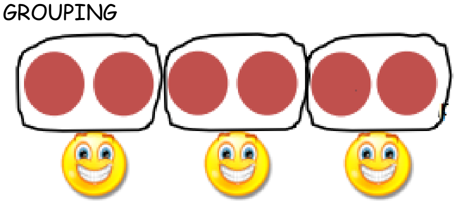
Mental strategies

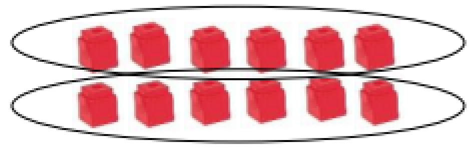
- Use scaling to solve decimal number problems as whole number problems using the rule: 'the number of decimal digits in the question is the same as the number of decimal digits in the answer.'
- Identify common factors, common multiples and prime numbers
- Use common factors to simplify fractions mentally
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

Division

EYFS – Division	
Vocabulary: halve, half, share, share equally, groups	
Method	**Example/Representation**
Children will share objects into equal groups during continuous provision and adult-led activities throughout their Reception experience.	• Sharing of milk at break. • Sharing activities. • Sharing food (special occasions). • Sharing equipment or resources.
Children experience early division by sharing objects equally and counting how many in each group	
Children will solve problems including halving and sharing. Children will understand halving as the opposite of doubling.	What is half of 8? Half of 8 is 4. 
Tens frames will be used to further reinforce halving as the opposite of doubling and sharing between 2.	
Mental strategies • Develop a mental image of the number system • Understand the value of a number	

Year 1 - Division	
Vocabulary: halve, half, share, share equally, groups, equal groups of, divide, divided by, left, left over	
Method	**Example/Representation**
Children will understand equal groups and share items out in play scenarios. There will be lots of apparatus, arrays and picture representations.	Share 12 cakes between 3 people equally: 
Children to be taught the difference between 'grouping' objects and 'sharing'.	
Children will be taught to associate 'half' with dividing by two and recognise, find and name a half as one of two equal parts.	Can you cut the pizza in half?  
Children will be given problems to complete either practically or using pictorial representations.	Can you share 6 apples between 3 plates?  Can you divide 8 between two people? 
Mental strategies • Count forwards and backwards in multiples of 2s, 5s and 10s.	

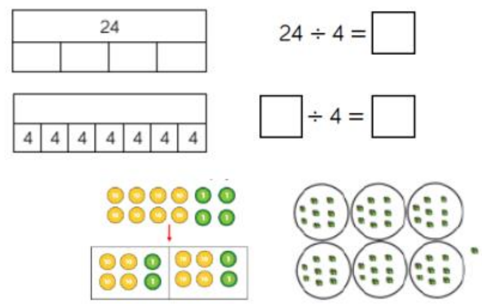
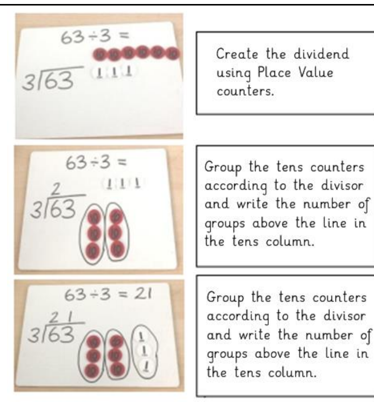
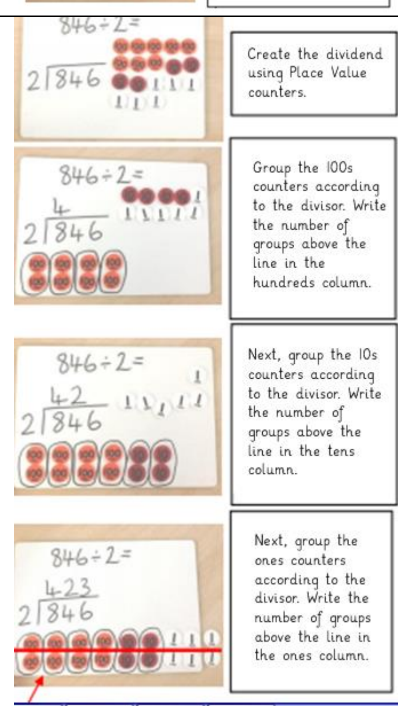
Year 2 - Division	
Vocabulary: groups of, equal groups of, halve, share, share equally, divide, divided by, divided into, repeated subtraction, inverse.	
Method	**Example/Representation**
Children are to continue learning about whether problems require sharing or grouping.	Sharing: 6 sweets are shared between 2 people. How many sweets do they get? Grouping: There are 6 sweets, how many people can have two sweets each?
Children will understand the operation of division as grouping using repeated subtraction on a prepared number line using the division symbol (÷).	15 ÷ 3 = 5 
Use bar models	
Children will be able to represent a division calculation using an array and write the division within a number sentence.	How many groups of 3 are in 12? 12 ÷ 3 = 4 
Children will use a blank number line to carry out repeated subtraction to solve a division number sentence.	
Children will be taught to understand the difference between sharing and grouping. Children will also connect unit fractions to equal sharing and grouping.	If 6 sweets are shared between 2 people, how many do they get each? SHARING  If there are 6 sweets, how many people can have 2 sweets each? GROUPING 
Children will solve one-step division problems (including missing number problems) using concrete objects and pictorial representations.	12 ÷ ? = 6

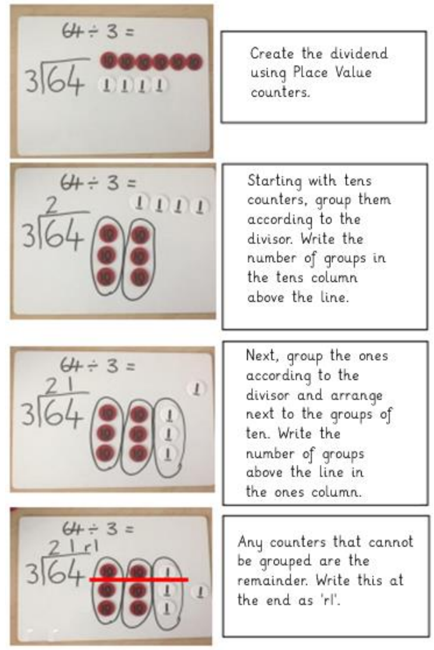
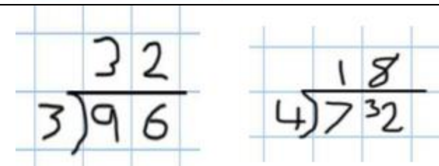
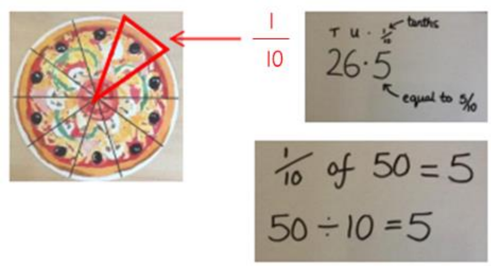
	
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.	

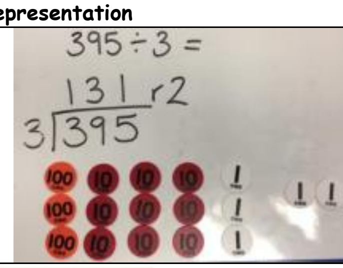
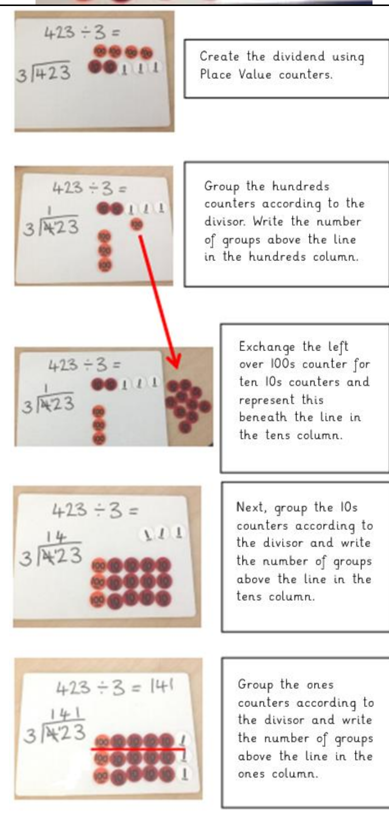
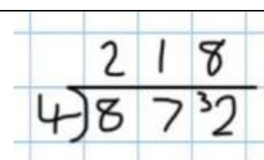
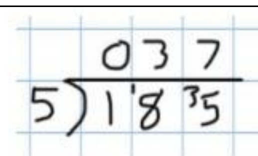
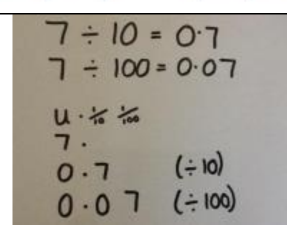
Mental strategies

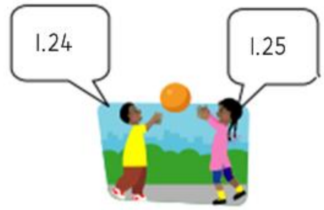
- To know that division is the inverse of multiplication
- Recall division facts for the 2, 5 and 10 times tables
- Recall halves for even numbers up to and including 20

<table>
<tr><th colspan="2">Year 3 – Division</th></tr>
<tr><td colspan="2">Vocabulary: divided by, divide, divided into, grouping, divisor, short division, remainder, inverse, divisor, dividend, quotient

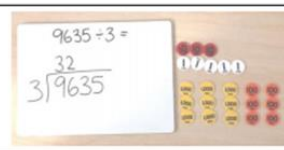
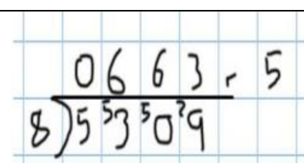
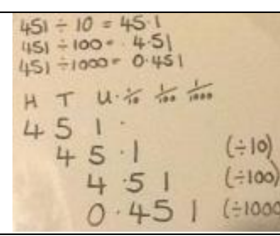
$$\begin{array}{r} \text{quotient} \\ \text{divisor}\overline{)\text{dividend}} \end{array}$$</td></tr>
<tr><th>Method</th><th>Example/Representation</th></tr>
<tr><td>Showing division in many pictorial ways to help children understand grouping and sharing.</td><td>
</td></tr>
<tr><td>Children will use practical resources to support the short division method and will be encouraged to use multiples of the divisor to assist (TO ÷ O)</td><td>
</td></tr>
<tr><td>Children will use practical resources to support the short division method and will be encouraged to use multiples of the divisor to assist (HTO ÷ O)</td><td>
</td></tr>
</table>

<table>
<tr><td>Children will use practical resources to support solving division number sentences with remainders (TO ÷ O)</td><td>
</td></tr>
<tr><td>Children are to then complete division calculations without practical resources and to use the short division method with remainders in some answers.</td><td></td></tr>
<tr><td>Children connect tenths to place value, decimal measures and that tenths is to divide by 10.</td><td>
</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
• To know the division facts from the 3, 4 and 8 times tables
• Use knowledge of place value to calculate division (eg 14 ÷ 2 = 7, 140 ÷ 2 = 70)</td></tr>
</table>

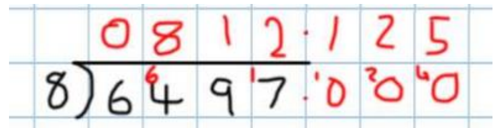
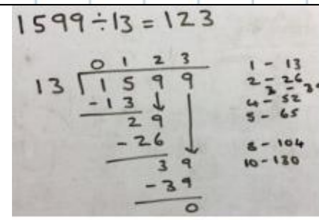
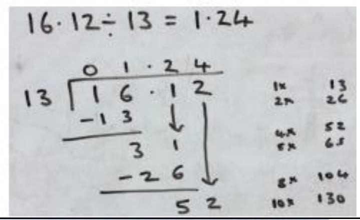
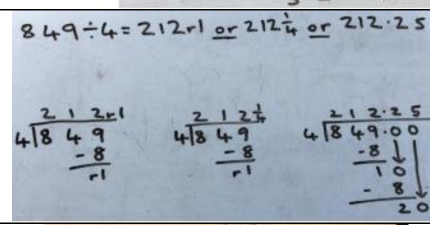
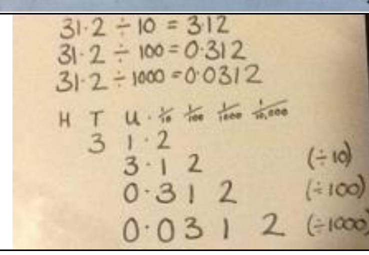
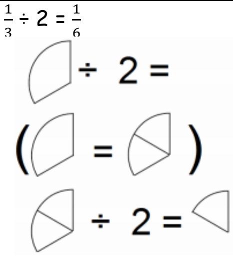
<table>
<tr><th colspan="2">Year 4 - Division</th></tr>
<tr><td colspan="2">Vocabulary: factor, divisor, divided by, divided into, remainders, divisible by, equivalent, short division, derive, quotient, inverse, remainder, multiples, exchange</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Children will use practical resources to support solving division number sentences with remainders (HTO ÷ O)</td><td>
</td></tr>
<tr><td>Children will use practical resources to support the short division method where exchange across place value columns occurs. (HTO ÷ O)</td><td>
</td></tr>
<tr><td>Children are to then complete division calculations without practical resources and to use the short division method with remainders in some final answers.</td><td> </td></tr>
<tr><td>Find the effect of dividing a 1 or 2-digit number by 10 and 100; identifying the value of the digits in the answer as ones, tenths and hundredths.</td><td>
</td></tr>
<tr><td>Count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten.</td><td>What should I cut my pizza into if I have 100 people to serve?</td></tr>
</table>

<table>
<tr><td></td><td>

</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
• To know all related division facts for all times tables up to 12 times table (by the end of Year 4)</td></tr>
</table>

Year 5 – Division	
Vocabulary: divide, divided by, divided into, divisible by, remainder, quotient, inverse, decomposing, factor, decimal place, ones, tenths, scaling, short division	
Method	**Example/Representation**
Children will use practical resources to support solving division number sentences with remainders (ThHTO ÷ O) if necessary.	 Create the dividend using Place Value counters.  Group the 1,000s counters according to the divisor and write the number of groups above the line in the thousands column.  Group the 100s counters according to the divisor and write the number of groups above the line in the hundreds column.  Group the 10s counters according to the divisor and write the number of groups above the line in the tens column.  Group the ones counters according to the divisor and write the number of groups above the line in the ones column. Express remainders as 'r2' as part of the quotient.
Children to continue using the short division method when dividing by a single digit. When children calculate a remainder, a real life context needs to be given where children consider the meaning of the remainder and how to express it, e.g. as a fraction, decimal or as a rounded number.	
Children will learn to divide whole numbers and those involving decimals by 10, 100 and 1,000 by moving the digits around the fixed decimal.	
Children will solve problems involving division, including scaling.	Look at recipes as a real life context here.
Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.	
Mental strategies	

• Multiply and divide numbers mentally drawing upon known facts • Associate fractions with division

<table>
<tr><th colspan="2">Year 6 – Division</th></tr>
<tr><td colspan="2">Vocabulary: divide, divided by, divided into, divisible by, remainder, factor, quotient, inverse, decimal place, ones, tenths, hundredths, scaling, formal written methods.</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Children are to continue with the short division method for dividing by a single digit, including decimals.
Ensure the decimal points are lined up in the question and answer.</td><td>4697 ÷ 8 =
</td></tr>
<tr><td>Divide numbers up to 4 digits by a two-digit whole number using the formal written method of division using key facts to help.</td><td>
</td></tr>
<tr><td>Interpret remainders as whole number remainders, fractions or decimals as part of solving problems in real life contexts.</td><td></td></tr>
<tr><td>Divide numbers decimal numbers with up to 3 decimal places by 10, 100 and 1,000 by moving the digits around a fixed decimal.</td><td></td></tr>
<tr><td>Divide proper fractions by whole numbers.</td><td>$\frac{1}{3} \div 2 = \frac{1}{6}$
</td></tr>
<tr><td colspan="2">Ensure that calculations have missing numbers and the equals sign is at the beginning of calculations when appropriate.</td></tr>
<tr><td colspan="2">Mental strategies
Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
Calculate a fraction of an amount.</td></tr>
</table>