

## Version History

Date:	Document Version	Document Revision History	Document Author/Reviewer
13.2.2015	2.1	Document drafted	H Moorcroft S Wilson J Mallinson
25.2.2015	2.1	Staff meeting to formulate addition and subtraction sections of policy	S Wilson J Mallinson in conjunction with all staff
11.3.2015	2.1	Staff meeting to look at multiplication section and review the contents of the addition and subtraction sections	S Wilson J Mallinson in conjunction with all teaching staff
18.3.2015	2.1	Division section discussed	S Wilson J Mallinson in conjunction with all teaching staff
20.5.2015	2.1	Policy placed before teaching staff to check it and discuss ARE statements (Appendix B)for September 2015	
8.3.2022-24.3.2022	2.2	Policy amended to include mastery and numicon images Amendments made in light of discussions	S Wilson Presented to staff
15.1.2026	2.3	Policy reviewed to match white rose hub skills progression Focus on the inclusion of oracy and the use of subject specific vocabulary	S Wilson Presented to staff

## Contents

Pages	
1	Version History
3	Policy Statement
4	Aims of the Calculation Policy
5-11	Addition
12-17	Subtraction
18-24	Multiplication
25-30	Division
Appendix A	Etchells Way maths
Appendix B	ARE statements for each Year group

## Policy Statement

This policy outlines approaches to **mental** and **written** calculations taught at Etchells School from Years 1-6. It is designed to ensure consistency and progression of learning when using and applying the four rules of number.

This policy has been formed with the staff of Etchells Primary, as a result of changes to the Maths National Curriculum2014. The three main aims of the curriculum are to develop pupils' **fluency, reasoning and problem solving**.

The calculation policy is organised according to Age related 'performance descriptors' as set out in the National Curriculum 2014, however all pupils will be taught according to the stage they are currently working at, moving on when they are secure.

Children should secure **mental strategies** and rapid recall of facts e.g. by Year 4 children are expected to accurately recall the multiplication facts up to  $12 \times 12$ .

The policy outlines **written methods** for addition, subtraction, multiplication and division that will be taught in each year group. Calculations that require a written method will be presented to the children with a wide variety of models and images, such as number lines, manipulatives and interactive resources. There is an emphasis on children articulating, explaining and justifying methods and strategies they have used. Fluency will be taught in every class in KS1 and KS2 for 15 minutes each day.

## Aims of the calculation policy

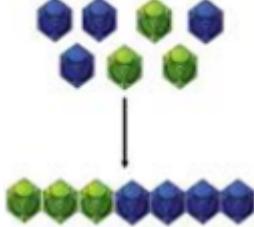
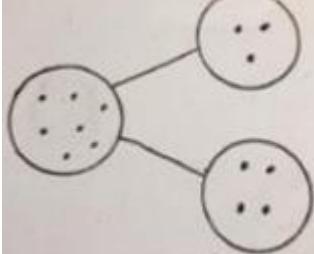
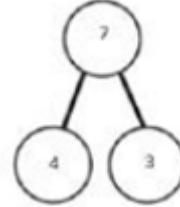
To ensure a consistent approach to the presentation, teaching and learning of mental and written calculations.

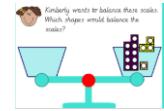
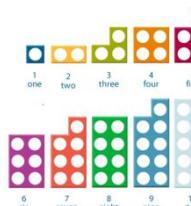
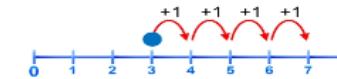
To strengthen progression in children's understanding and application of a range of methods.

To build on the use of a wide variety (variation) of models, manipulatives and images introduced, in order to promote conceptual understanding and fluency.

To provide guidance to teaching staff, teaching assistants and parents.

To ensure that pupils are provided with the skills to progress through **concrete**, **pictorial** and **abstract** levels of learning

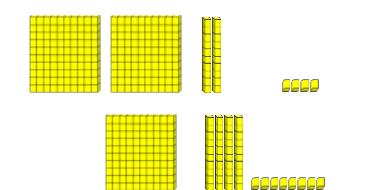
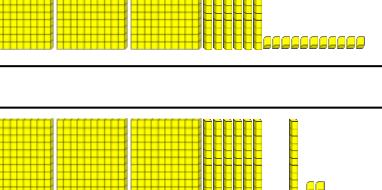
<p><b>Concrete</b> – pupils will use objects to represent the different numbers and move these to represent the steps of each calculation</p> 	<p><b>Pictorial</b> – pupils will learn to represent numbers by using drawings and create jottings to support them</p> 	<p><b>Abstract</b> – pupils will already have a good understanding of the values of different digits and will be completing the steps of calculations in their heads</p> 
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Year 1 Addition	Method	Model/ Examples
Objective		
<p>Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs</p> <p>Represent and use number bonds and related subtraction facts within 20</p> <p>Add and subtract one-digit and two-digit numbers to 20, including zero</p> <p>Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as <math>7 = \underline{\quad} - 9</math>.</p>	<p><b>Introduction to + = signs and missing number calculations</b></p> <p>Pupils will learn the concept of equality before using the = sign. (using balance scales)</p> <p>Missing numbers will be presented to pupils in all possible places.</p> $3 + 4 = \underline{\quad} \quad \underline{\quad} = 3 + 4$ $3 + \underline{\quad} = 7 \quad 7 = \underline{\quad} + 3$ <p><i>*Pupils will be taught that addition is commutative, so if we know <math>3 + 4 = 7</math> we also know <math>4 + 3 = 7</math></i></p> <p>2 sets of objects will be combined (aggregation) before pupils progress to adding on from the larger number (augmentation).</p> <p><b>Mental calculations</b></p> <p>Children will be given plenty of opportunities to embed knowledge of complements to 10 and doubles of numbers to 10.</p> <p>They will be expected to count on and back to increasingly large numbers and know what one more/1 less than a given number is.</p>	<p>1+2=3 3 =1+2 1+4 = 3+2 Combine 2 sets of numbers</p>  <p>Use numicon and visual images to support the visualisation of number facts</p>  <p>A number track will be used to help pupils to count on in sequence.</p>  <p>A number line (with models and images as necessary) will be used to develop the concept of augmentation.</p> 

Year 2 Addition		
Objective	Method	Model/ Examples
<p>Solve problems with addition and subtraction:</p> <ul style="list-style-type: none"> <li>using concrete objects and pictorial representations, including those involving numbers, quantities and measures</li> <li>applying their increasing knowledge of mental and written methods</li> </ul> <p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p> <p>Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> <li>a two-digit number and ones</li> <li>a two-digit number and tens</li> <li>two two-digit numbers</li> <li>adding three one-digit numbers</li> </ul> <p>Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot</p> <p>Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</p>	<p><b>Missing number problems</b>  e.g. <math>13 + 6 = 10 + \underline{\hspace{1cm}}</math>  <math>24 + \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = 100</math>  <math>42 = \underline{\hspace{1cm}} + 12</math></p> <p>Use base 10 and balance scales to ensure concept of equality is fully embedded.</p> <p><b>Count on in tens and ones</b>  <math>24 + 13 = 24 + 10 + 3</math>  <math>= 34 + 3</math>  <math>= 37</math></p> <p><b>Partitioning and bridging through tens</b>  Children should use their knowledge of the <b>complements to 10</b> to count on to the next tens number then add remaining ones. <math>8 + 7 = 15</math></p> <p><b>Adding 9 or 11 by adding 10 then adjusting by 1</b>  <math>23 + 9 = 32</math>  <math>23 + 10 = 33</math> then take away 1</p> <p><b>Towards a written method for TU plus TU</b>  <math>24 + 37 =</math>  Add the ones first then exchange the ten ones for a 10 stick.</p> <p><b>Expanded written method</b>  <math>24 + 37 =</math>  <math>20 + 4 + 30 + 7 =</math>  <math>20 + 30 + 7 + 4 =</math>  <math>50 + 11 = 61</math></p>	<p>Continue to use numicon, images and models to support the visualisation of number facts and calculations.</p> <p>Use 1 digit per square for fractions</p> <p><math>24 + 10 + 3 = 37</math></p> <p><math>8 + 2 + 5 = 15</math></p> <p><math>23 + 10 - 1 = 33</math></p> <p><math>20 + 4 + 30 + 7 = 50 + 11</math></p> <p>Link made to column format</p>

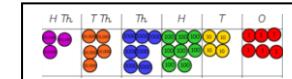
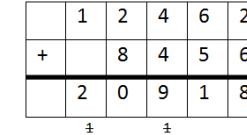
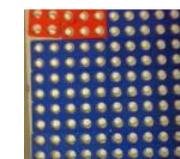
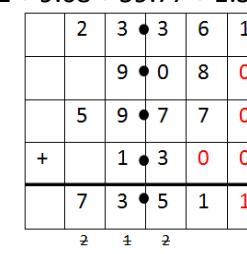
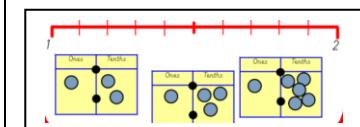
KS1 Mastery/ exceeding performance descriptors

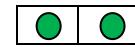
- All aspects of number - addition and subtraction at the national standard are embedded.
- Recall and use addition and subtraction facts to 20 fluently; derive and use related facts to 100 and beyond.
- Add and subtract numbers mentally using appropriate strategies, including:
  - 2 2-digit numbers
  - adding /subtracting several single-digit numbers.
- Add and subtract numbers using objects, pictorial representations and the written columnar method including:
  - adding several 2-digit numbers
  - subtracting 2-digit numbers
  - adding a 2-digit number to a 3-digit number
  - adding 3-digit numbers.
- Solve missing number problems involving a wider range of numbers.
- Use addition and subtraction facts to solve more complex problems, such as 3 step problems.

Year 3 Addition		
Objective	Method	Model/ Examples
<p>Add and subtract numbers mentally, including: a three-digit number and ones a three-digit number and tens a three-digit number and hundreds</p> <p>Add and subtract <b>numbers with up to three digits</b>, using formal written methods of columnar addition and subtraction</p> <p><b>Estimate</b> the answer to a calculation and use inverse operations to check answers</p> <p>Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</p>	<p><b>Missing number problems</b> Continue to provide equations with 3 digit numbers, that feature missing digits in each possible location and introduce images to represent numbers. <math>35 + \star = 67</math></p> <p><b>Partitioning for addition</b> Partition into hundreds, tens and ones then add each set and recombine. Move on to retaining the first number and only partitioning the second number.</p> <p><b>Introducing a more formal written method</b> Introduce expanded column addition modelled with base 10 apparatus. Model the exchange of 1s for tens and show this on a written sum. When children understand the exchange between tens and ones they may begin to form the columnar method shown, which should be discussed and recognised as a more efficient method than the first expanded calculation.</p> <p>224  <math display="block">  \begin{array}{r}  +148 \\  \hline  372  \end{array}  </math> </p> <p>The exchanged 10 should be carried below the sum and crossed through when it has been added.</p>	<p>73 + 64 = 200 - <math>\square</math>  <math>210 + \square + \square = 340</math>  <math>42 = 76 - \square</math></p> <p>324 + 248 =  <math>300 + 20 + 4</math>  <math>200 + 40 + 8</math>  <math>500 + 60 + 12 = 572</math></p> <p>324 + 200 + 40 + 8  <math>= 524 + 40 + 8</math>  <math>= 564 + 8</math>  <math>= 572</math></p> <p>Bar models are used to represent numbers and find missing numbers</p> <p>Children need to be secure in the addition of multiples of 10 and 100 to any number</p> <p>Add the units first in preparation for the compact method.</p> <p>224  <math>+148</math>  <math>\hline</math> <math>12</math>  <math>60</math>  <math>300</math>  <math>372</math></p>  <p>move on to</p> 

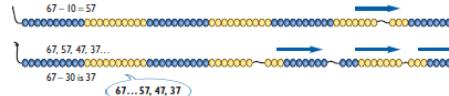
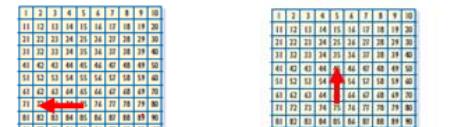
Year 4 Addition		
Objective	Method	Model/ Examples
Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	<b>Missing number problems</b> Equations with larger numbers up to 4 digits, that feature missing digits in each possible location and expand on the use of balanced equations, where more than one type of calculation is used.	$73 + 64 = 200$ $210 + \underline{\quad} + \underline{\quad} = 340$ $64 \div 8 = 2 + \underline{\quad}$
Estimate and use inverse operations to check answers to a calculation	<b>Partitioning for addition</b> Continue with the expanded form of addition modelled using base 10 cubes, introducing the thousands cube when pupils are ready.	
Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.	<b>Compact (formal) written addition</b> Children should be working with numbers up to 4 digits, but should be able to revert back to expanded addition if they are experiencing difficulty with the compact method.  Extend addition calculations to include numbers with up to 2 decimal places.  Use the written method with decimals in the context of money and measure to solve problems. Provide manipulatives to support the understanding of calculations.  The addition of unit fractions can be modelled using Cuisenaire rods.	$\begin{array}{r} 3426 \\ +1715 \\ \hline 5141 \end{array}$ <p>The exchanged digits should be carried below the calculation and crossed through when they have been added</p> <p>Only use numbers with the same number of decimal places at this stage.</p> <p>Decimal point on the line – <u>not</u> in a square of its own.</p>

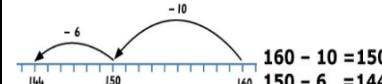
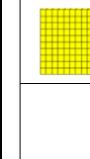
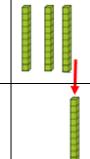
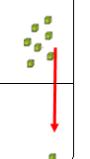
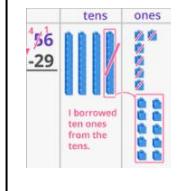
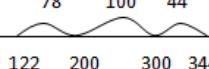
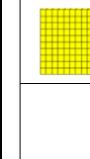
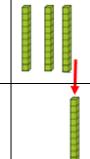
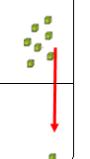
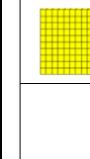
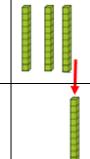
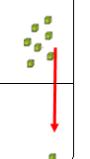
Year 5 Addition	Method	Model/ Examples
<p><b>Objective</b> Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)</p> <p>Add and subtract numbers mentally with increasingly large numbers</p> <p>Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</p>	<p><b>Method</b></p> <p><b>Missing number problems</b> Equations with larger numbers up to 4 digits. Use of algebraic formulae may become more formal in appearance. <b>Example:</b> <math>33 = 3N</math> so what must N be?</p> <p><b>Mental Methods</b> Children should continue to develop the use of different methods for addition. They should be given opportunities to explore and discuss 'which' are the most efficient strategies and 'why'- justifying their own points of view and explaining their reasoning.</p> <p><b>Formal written addition</b> Children should now be secure in the use of the compact addition method for whole numbers, working beyond 4 digits.</p> <p>Base 10 blocks and decimal place value counters can again be used alongside the columnar algorithm to provide a visual representation of decimal numbers.</p> <p>Children should be using rounding to support them in estimating an answer and should be encouraged to consider how sensible their answer is, particularly when solving problems.</p> <p>Addition of non-unit fractions using Cuisenaire rods to see relationship between the denominators.</p>	<p><b>Model/ Examples</b></p> <p><b>3464 + 1998 =</b>  <math>3464 + 2000 = 5464</math>  <math>5464 - 2 = 5462</math></p> <p><b>14376 + 2400 =</b>  <math>14367 + 2000 = 16367</math>  <math>16367 + 400 = 16767</math></p> <p></p> <p></p> <p></p> <p></p> <p><b>25.356 + 346.28 becomes an estimate of <math>25 + 350 = 375</math> and this is used to <u>check</u> whether the answer is sensible, once the calculation has been completed.</b></p> <p></p>

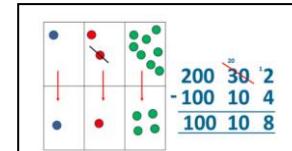
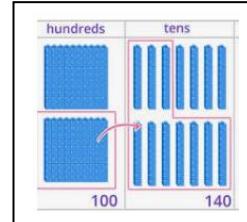
Year 6 Addition	Method	Model/ Examples
<p>Objective</p> <p>Perform mental calculations, including with mixed operations and large numbers</p> <p>Use their knowledge of the order of operations to carry out calculations involving the four operations</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</p> <p>Solve problems involving addition, subtraction, multiplication and division .</p> <p>Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.</p> <p>Recognise the equivalence of decimals, fractions and percentages</p>	<p><b>Missing number problems</b> Equations with larger numbers up to 4 digits. Use of algebraic formulae will be more formal in appearance.</p> <p><b>Mental methods</b> Children should continue to develop methods, supported by a range of models and images. Calculations need to be presented in a wide variety of ways, with mixed operations and children should continue to reason and explain their choices of strategy, looking for efficiency.</p> <p><b>Formal written addition</b> As in year 5 but progressing to larger numbers including those with up to three decimal places. The aim should be for conceptual understanding and procedural fluency with column addition secure with both whole numbers and decimal calculations. Integers should have different numbers of digits so that pupils secure their knowledge of place value when calculating.</p> <p>Pupils should continue to have opportunities to apply their knowledge in a variety of contexts. Addition calculations should be provided with different numbers of decimal places (including money and measures)</p>	<p><math>33 = 3N + 15</math> so what must N be? <math>(\star + \star) \times \star = 10</math> (where the answer is no longer a whole number)</p> <p><math>149 + 137 - 158 = \square</math></p> <p><math>12462 + 8456</math> Estimate: <math>12500 + 8500 = 21000</math></p> <p></p> <p></p> <p></p> <p><math>23.361 + 9.08 + 59.77 + 1.3</math></p> <p></p> <p>Empty decimal places should be filled with a zero to show that there is no value to add and to retain place value for all other digits.</p> <p></p> <p>Place value of decimal numbers reinforced with number lines</p>

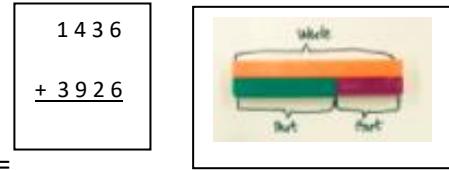
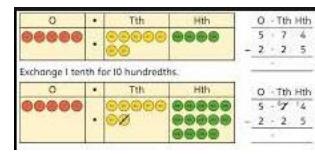
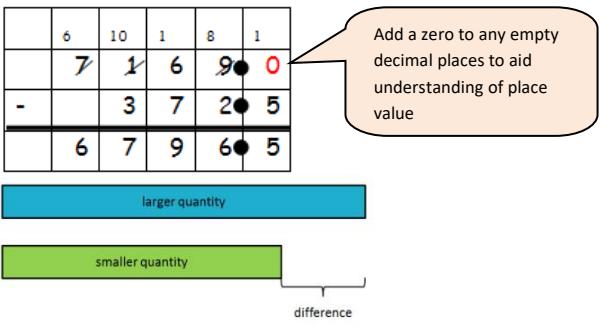
Year 1 Subtraction		
Objective	Method	Model/ Example
<p>Represent and use number bonds and related subtraction facts within 20</p> <p>Add and subtract one-digit and two-digit numbers to 20, including zero</p> <p>Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as <math>7 = - 9</math>.</p> <p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs</p>	<p>Images and practical apparatus, such as numicon, multilink cubes and Deins cubes among others, will be used to model the process of subtraction.</p> <p><b>Subtraction is the inverse of addition</b> As pupils begin to build on their knowledge of number bonds to 10/20, they will be taught that this knowledge enables them to solve subtraction calculations too.  <math>6 + 4 = 10</math> so <math>10 - 6 = 4</math> They will be taught that subtraction is <i>not commutative</i>.  <math>(10 - 6 = 4</math> but <math>6 - 10</math> is not 4)</p> <p><b>Missing number problems</b> Pupils will be shown that they can work out missing numbers using knowledge of bonds.  <math>10 - \underline{\hspace{1cm}} = 3</math>  <math>10 - \underline{\hspace{1cm}} = 3</math> because <math>7 + 3 = 10</math></p> <p><b>Manipulatives</b> and, later, number lines, will be provided to enable pupils to 'count back'. The language of 'find the difference' and 'how many more/less than' will be experienced in a range of practical contexts.</p>	  <p>9-2</p>  <p>Count back in 1s on a numbered line to take away with numbers up to 20</p>  <p><math>\underline{\hspace{1cm}} = 8 - 3</math>      <math>8 - 3 = \underline{\hspace{1cm}}</math>  <math>5 = \underline{\hspace{1cm}} - 2</math>      <math>\underline{\hspace{1cm}} - 2 = 8</math></p>  <p>The difference between 7 And 3 is 4</p> 

## Year 2 Subtraction

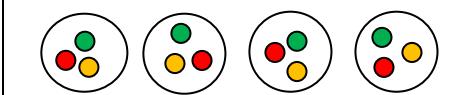
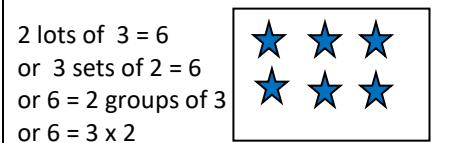
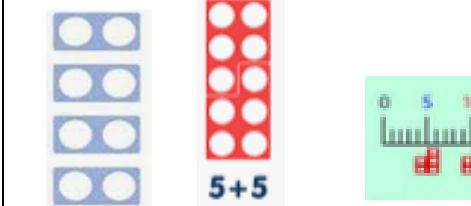
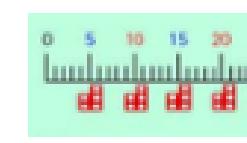
Objective	Method	Model/ Example
<p>Solve problems with addition and subtraction:</p> <ul style="list-style-type: none"> <li>using concrete objects and pictorial representations, including those involving numbers, quantities and measures</li> <li>applying their increasing knowledge of mental and written methods</li> <li>•</li> </ul> <p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p> <p>Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> <li>a two-digit number and ones</li> <li>a two-digit number and tens</li> <li>two two-digit numbers</li> <li>adding three one-digit numbers</li> </ul> <p>Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot</p> <p>Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</p>	<p>Pupils will be taught first to count back in 1s, then in 10s, then in a combination of 10s and 1s, using practical apparatus e.g. Deins, the 100 number line or 100 square as a guide, before counting back in near 10s such as counting back 9 or 11 by using 'adjusting'. A wider range of - vocabulary will be investigated.</p> <p><b><u>Subtraction is the inverse of addition</u></b></p> <p>The 2 rules will continue to be taught together, with children using practical apparatus to investigate related addition and subtraction facts. 4</p> $4 + 6 = 12 \text{ so } 12 - 6 = 4$ <p>* <i>The calculation can come both before and after the = symbol.</i></p> $12 - 4 = 6 \text{ so } 6 = 12 - 4$ <p>* <i>Subtraction is not commutative</i></p> <p><b><u>Missing number problems</u></b></p> <p>Calculations will now be presented in different ways, using numbers up to, and beyond, 100 as appropriate. <b>Manipulatives continue to be used.</b> <math>45 = 56 - \underline{\quad}</math> Or <math>48 - \underline{\quad} = 23</math></p> <p><b><u>Towards written methods</u></b></p> <p>Expanded columns (initially without decomposition) will be used to support understanding of place value, in preparation for more efficient written calculations.</p>	 <p><math>67 - 10 = 57</math>  <math>67, 57, 47, 37, \dots</math>  <math>67 - 30 = 37</math></p>  <p><math>75 - 3 = 72</math>  <math>75 - 30 = 45</math></p> <p>Ensure pupils can count on and back in 1s and 10s confidently.</p> <p>54p in the purse. Take 10p out, another 10p and so on</p> <p>54p  44p, 34p...</p> <p><math>3 + 2 = 5</math>  <math>5 - 3 = 2</math>  <math>5 - 2 = 3</math></p> <p>Tens ones</p> <p><math>40 \quad 8</math>  <math>-10 \quad 1</math></p> <p>What do you have to take away from 10 to get 3?  <math>3 \quad 10</math>  <math>3 \quad 10</math>  <math>3 = 10 -</math></p> <p>Introduce this method before introducing exchanging</p>

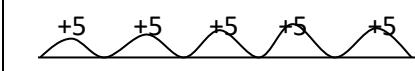
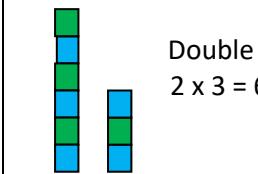
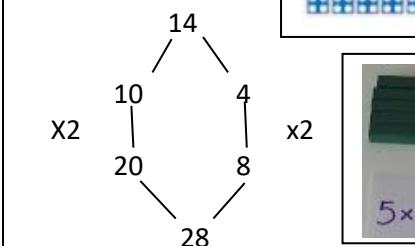
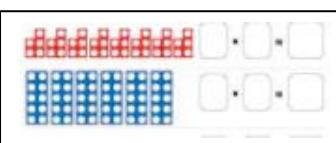
Year 3 Subtraction																										
Objective	Method	Model/ Example																								
<p>Add and subtract numbers mentally, including:</p> <p>a three-digit number and ones</p> <p>a three-digit number and tens</p> <p>a three-digit number and hundreds</p> <p>Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction</p> <p>Estimate the answer to a calculation and use inverse operations to check answers</p> <p>Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</p> <p>Reason about calculations and the value of numbers within these calculations. Explain their thinking orally using      'we think...'      'we agree...'      'we disagree...'      'If we know... then we know...'</p>	<p><b>Subtraction is the inverse of addition</b></p> <p>Pupils will be taught +/- at the same time and will be encouraged to use addition to check the answers to their subtraction calculations.</p> <p><b>Mental calculations</b></p> <p>Pupils will be reminded to use partitioning to count back/on in hundreds, then tens, then in 1s or vice versa. Models and images will support their understanding. They may choose to use complimentary addition or counting back and should be given opportunities to discuss 'efficiency'.</p> <p><b>Missing number problems</b></p> <p>As for Year 2 but with progressing to larger numbers.</p> <p><b>Written methods (progressing to 3 digits)</b></p> <p>Pupils will revise expanded column addition (from Year 2) with no decomposition, then begin to investigate decomposition using Dienes, numicon and other manipulatives. When children are secure with the above method they should create jottings or pictorial representations, using H T and 1s, then compare these with written method.</p> <p><b>Solving problems</b></p> <p>Children will practise the different methods learnt, in problem solving contexts, and discuss 'efficiency' by comparing their chosen methods.</p>	 $160 - 10 = 150$ $150 - 6 = 144$ <table border="1"> <tr> <td>H</td> <td>T</td> <td>1s</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <table border="1"> <tr> <td>100</td> <td>40</td> <td>8</td> </tr> <tr> <td>-</td> <td>10</td> <td>1</td> </tr> <tr> <td>100</td> <td>30</td> <td>7</td> </tr> </table> <p>When introducing 'exchange' ensure pupils explore different ways to partition so the value remains the same. <math>84 = 80 + 4 = 70 + 14 = 60 + 24</math> etc. emphasise the value doesn't change,</p> <p><b>Model decomposition</b></p> <table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <p>300 30 7 becomes 200 130 7</p> <p></p> <p><math display="block">  \begin{array}{r}  6 \ 1 \\  7 \ 2 \\  - 3 \ 4 \\  \hline  3 \ 8  \end{array}  \quad  \begin{array}{r}  2 \ 1 \\  3 \ 3 \ 7 \\  - 1 \ 4 \ 2 \\  \hline  1 \ 9 \ 5  \end{array}  </math></p> <p>The school has 344 children, 122 are on a trip      How many children are left in school?</p> <p></p> <p><math display="block">122 + 222 = 344 \text{ or } 334 - 122 = 222</math></p>	H	T	1s							100	40	8	-	10	1	100	30	7						
H	T	1s																								
																										
																										
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Year 4 Subtraction		
Objective	Method	Model/ Example
<p>Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate</p> <p>Estimate and use inverse operations to check answers to a calculation</p> <p>Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.</p> <p>Reason about calculations and the value of numbers within these calculations. Explain their thinking orally using      'we think...'      'we agree...'      'we disagree...'      'If we know... then we know...'</p>	<p><b>Subtraction is the inverse of addition</b>      Use addition to check the answers to subtraction calculations.</p> <p><b>Mental calculations</b>      Children should continue to develop methods for subtraction of larger numbers and use jottings to record parts of calculations. They may again choose to do complimentary addition or subtraction of near tens/hundreds among other methods and should be given opportunities to look at efficiency.</p> <p><b>Missing number calculations</b>      Problem solving, reasoning and fluency is developed through the continued use of manipulatives to model these calculations. Children should now be confident in explaining the strategies they have used.</p> <p><b>Written methods (progressing to 4 digits)</b>      Column subtraction with decomposition or regrouping should be secured in Year 4, modelled to begin with by the use of Dienes cubes. Children should estimate answers using their rounding knowledge.</p>	<p>Use <math>319 + 137</math> to check if the calculation <math>456 - 137 = 319</math> is correct.</p> <p><math>947 - 198</math> is best completed by taking away 200, then adjusting rather than a formal calculation.</p> <p><math>5362 - 1436 = 3926</math></p> <p><math>+64 +500 +3362</math></p> <p><math>1436 1500 2000 5362</math></p> <p>A 4x4 grid of Dienes blocks representing 100s and 10s. The top row has 2 blue 100s and 3 green 10s. The bottom row has 1 blue 100 and 1 green 10. To the right, a subtraction calculation is shown: <math>200 \ 30 \ 2</math> minus <math>100 \ 10 \ 4</math> equals <math>100 \ 10 \ 8</math>.</p> <p><math>563 + \underline{\quad} = 724</math>   <math>34 + 56 + \underline{\quad} = 243</math></p> <p><math>450 - 30 - 65 - \underline{\quad} = 160</math></p> <p><math>\underline{\quad} - 570 = 1000</math>   <math>458 - 56 = 540 - \underline{\quad}</math></p> <p>They should estimate answers before completing calculations. (<math>5300 - 1500 = 3800</math>)</p> <p>A 4x4 grid of Dienes blocks. The top row has 4 blue 100s and 1 green 10. The bottom row has 1 blue 100 and 4 green 10s. A red arrow points from the top row to the bottom row, indicating the decomposition of 100 into 10s for subtraction.</p> <p>Pupils should be given opportunities to compare different methods and discuss which are the most efficient.</p>

Year 5 Subtraction		
Objective	Method	Model/ Example
Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	<b>Subtraction is the inverse of addition</b> Consistently use addition to check the answers to subtraction calculations.	
Add and subtract numbers mentally with increasingly large numbers	<b>Mental calculations</b> Use jottings as standard to record parts of mental calculations. They may again choose to do complimentary addition or subtraction of near tens/hundreds (with adjusting) among other methods and should explain their methods and the reasons for their choices.	$1342 - 1290 =$ could be completed by doing $1342 - 1300 = \underline{\hspace{2cm}}$ then adjusting by 10 or by counting on from 1290 to 1342 – which is the better method?
Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy		
Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.	<b>Missing number calculations</b> Problem solving, reasoning and fluency is developed through the continued use of these calculations as represented by part whole or bar models. Children should now be confident in explaining, and in justifying, the strategies they have used.	$6.45 = 6 + 0.4 + \underline{\hspace{2cm}}$ $119 - \underline{\hspace{2cm}} = 86$ $100000 - \underline{\hspace{2cm}} = 99,999$ $12463 - 2300 = \underline{\hspace{2cm}}$ $1345 - 274 = 1450 - \underline{\hspace{2cm}}$
Reason about calculations and the value of numbers within these calculations. Explain their thinking orally using 'we think...' 'we agree...' 'we disagree...' 'If we know... then we know...'	<b>Written methods (progressing to more than 4 digits)</b> Calculations should now begin to include decimal numbers, including those with a mixture of integers. Pupils should align the decimal point, recognising it as a 'place holder'. Children will be given lots of opportunities to subtract and find differences with money and a variety of measures.	<p>If we buy three items at £2.99 each how much change could we get from a £20 note? <math>3 \times £3 = £9.00</math> then adjust by taking away 3p £8.97 before calculating the change.</p> 

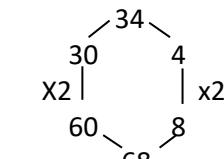
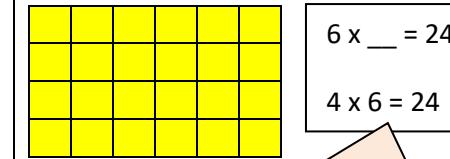
Year 6 Subtraction		
Objective	Method	Model/ Example
<p>Perform mental calculations, including with mixed operations and large numbers</p> <p>Use their knowledge of the order of operations to carry out calculations involving the four operations</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</p> <p>Solve problems involving addition, subtraction, multiplication and division .</p> <p>Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.</p>	<p><b>Subtraction is the inverse of addition</b> Consistently use addition to check the answers to subtraction calculations.</p> <p><b>Mental calculations</b> Use jottings (and/or pictorial representations) as standard, to record parts of mental calculations. Explain their methods and fully justify the reasons for their choices.</p> <p><b>Missing number calculations/algebra</b> Children in Year 6 should be using calculations with mixed operations.</p> <p><b>Written methods</b> Calculations should continue to include decimal numbers, including those with a mixture of integers. Pupils should align the decimal point, recognising it as a 'place holder'. Place value counters should be used to make the link between larger numbers and those skills taught in previous years. Cuisenaire rods may be used to represent parts of a whole number or to support the understanding of problems with more than one part.</p> <p><b>Solving problems</b> Children should use estimation and use inverse calculations to check validity of answers. They will continue to be given lots of opportunities to subtract and find differences in multistep problems.</p>	<p><math>\triangle</math> and <math>\star</math> each stand for a different number  <math>\triangle = 42</math>  <math>\triangle + \triangle = \star + \star + \triangle</math>  What is the value of <math>\star</math> ?  What if <math>\triangle = 74</math>? Or <math>\triangle = 126</math>  What if <math>\triangle</math> is 57? (where the answer will be a decimal number)</p> <p>10 000 000 = 9 000 100 + <u>        </u></p> <p><math>7 - 2 \times 3 = \underline{\hspace{2cm}}</math>  <math>(7 - 2) \times 3 = \underline{\hspace{2cm}}</math>  <math>(\underline{\hspace{2cm}} - 2) \times 3 = 15</math></p> <p>Add a zero to empty decimal places to aid understanding of place value.</p> <p></p> <p>In an election 32736 people vote. 14485 vote for the winner and 13726 for the candidate in second place. How many people vote for the other candidate?  </p> <p>Cuisenaire rods to support the visualisation of a problem</p>

Year 1 Multiplication		
Objective	Method	Model/ Example
Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	<p><b><u>Multiplication is the same as repeated addition</u></b></p> <p>Use repeated addition to show how multiplication is related to doubling.</p> <p>Count on in steps of the same size using practical resources such as washing line, numicon, bead strings, and later number lines.</p> <p><b><u>Introduction to vocabulary</u></b></p> <p>Learn the vocabulary of 'times' 'lots of' 'groups of' 'sets of' in very practical ways to develop conceptual understanding.</p> <p>Begin to use arrays to understand that multiplication can be done in any order (commutative)</p> <p>Pupils to practise counting on in 2s, 10s then begin to use 5s.</p>	<p>How many legs will three people have?</p>  <p>There are three sweets on one plate, how many sweets would be on four plates. <math>3 + 3 + 3 + 3 = 12</math></p>  <p>2 lots of 3 = 6 or 3 sets of 2 = 6 or 6 = 2 groups of 3 or 6 = 3 x 2</p>   

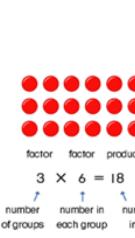
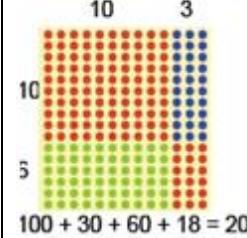
Year 2 Multiplication		
Objective	Method	Model/ Example
Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	<b>Arrays and number lines</b> Develop understanding of multiplication, by making the links with repeated addition and discussing efficiency. Make use of practical apparatus and visual images. Investigate the link between 2's 5's and 10's and other tables. A range of vocabulary should be used to ensure pupils are familiar with common terms related to $\times$ . (pupils should know how to count on and back in steps of 2x, 5x and 10x by the end of Year 2)	$5 \times 2 = \underline{\quad} \quad \underline{\quad} = 5 \times 2$ $5 \times \underline{\quad} = 10 \quad 10 = 2 \times \underline{\quad}$ $10 = \underline{\quad} \times 5 \quad 2 \times \underline{\quad} = 10$   $3 \times 4 = 12$
Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals ( $=$ ) signs	<b>Express multiplication using the symbol <math>\times</math></b> Look at arrays and begin to record what they show, using simple written format. Record different ways of explaining the same array, noting that the calculation can come both before and after the $=$ symbol (and investigate commutative law). Use this knowledge to solve missing number problems.	$3 \times 4 = 4 + 4 + 4$ $4 \times 3 = 3 + 3 + 3 + 3$   $\text{Double 3 is 6}$ $2 \times 3 = 6$
Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	<b>Towards written methods</b> They should use pictures and jottings to develop understanding of doubling of Ts and 1s by partitioning of 2 digit numbers.  Investigate and learn $2 \times 50 = 4 \times 25 = 5 \times 20 = 10 \times 10 = 100$	  $5 \times 6 = 6 \times 5$

**Mastery/ exceeding in Number - multiplication and division**

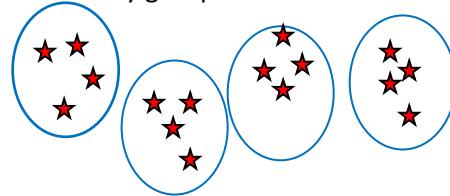
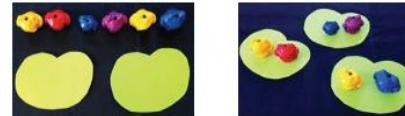
- All aspects of number – multiplication and division at the national standard are embedded.
- Rapidly recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables and write mathematical statements using the multiplication ( $\times$ ), division ( $\div$ ) and equals (=) signs.
- Count in 3s to solve multiplication and division problems for the 3 multiplication table.
- Solve more complex problems involving multiplication and division in a range of contexts including measures.
- Make connections between place value and multiplication/division by 10 and use known multiplication and division facts to derive others.

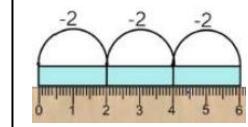
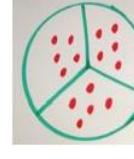
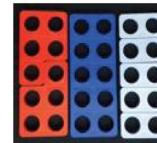
Year 3 Multiplication		
Objective	Method	Model/ Example
<p>Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</p> <p>Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods</p> <p>Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which <math>n</math> objects are connected to <math>m</math> objects.</p> <p>.</p>	<p><b>Mental Methods</b></p> <p>Pupils should know and use 2x, 5x and 10x table in a range of contexts. Double TU by partitioning, recording the steps using jottings as necessary.</p> <p>Initially they should use their knowledge of 2x tables to find 4x and 8x table quickly. <b>(Pupils should have instant or rapid recall of 2x, 3x, 4x, 5x, 8x and 10 x tables by the end of Year 3).</b></p> <p><b>Missing number problems</b></p> <p>These should be used to develop pupils' fluency reasoning and problem solving skills.</p> <p><b>Written methods (TU x U)</b></p> <p>Develop understanding of written methods by using arrays to model the partitioning and multiplication of T then U.</p> <p>Introduce the grid method alongside the array to represent the calculation. Children should discuss efficiency and recognise the link between the image and the grid written method.</p>	 <p>5 set of 5 = 25</p>  <p>Compare different factors pairs and recognise relationships between times tables using Cuisenaire</p>  <p>6 x ___ = 24</p> <p>4 x 6 = 24</p> <p>Remind pupils that multiplication is commutative – the numbers in the calculation can be reversed.</p> <p>So <math>13 \times 4 = 10 \times 4 + 3 \times 4</math></p>   <p><math>6+6+6=18</math></p> <p><math>3 \times 6=18</math></p>  <p><math>40 + 12 = 52</math></p>

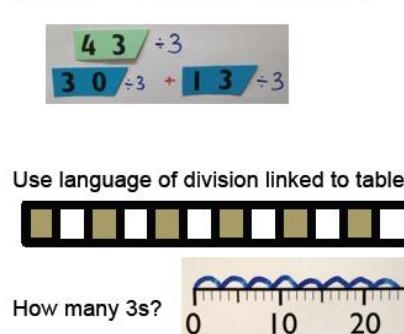
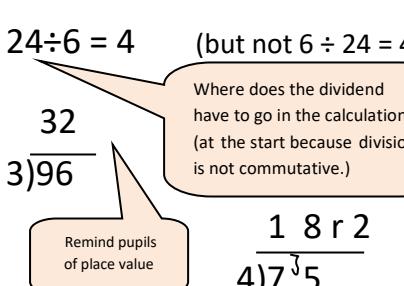
Year 4 Multiplication	Method	Model/ Example																						
Objective																								
<p>Recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math></p> <p>Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers</p> <p>Recognise and use factor pairs and commutativity in mental calculations</p> <p>Multiply two-digit and three-digit numbers by a one-digit number using formal written layout</p> <p>Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as <math>n</math> objects are connected to <math>m</math> objects.</p>	<p><b>Mental Methods</b></p> <p>Count on in steps of 6, 7, 9, 25 and 50. Use knowledge of <math>3 \times</math> to find <math>6 \times</math> by doubling.</p> <p>Solve practical problems using jottings of known number facts to find others.</p> <p><b>By the end of Year 4 pupils are expected to know all tables facts to <math>12 \times 12</math>.</b> Investigate factors and multiples. Investigate and begin to explain what happens when numbers are <math>\times</math> by 10/100/1000</p> <p><b>Missing number problems.</b></p> <p>Presented in a variety of different ways with pupils being encouraged to rearrange calculations so they can use known facts to find missing digits and integers.</p> <p><b>Written methods (progressing to TU and HTU x U)</b></p> <p>Children to continue to use grid method (with arrays to show visual representation if still needed). When ready children to move to expanded method multiplying unit first.</p> <p><b>Compact method</b></p> <p>When confident, move to the use of formal method for TU x U then HTU x U. Unit column also to be referred to as 'ones' column.</p>	<p><math>\underline{\quad} \times 5 = 160</math>   <math>18 \times \underline{\quad} = 72</math></p> <p><math>120 = \underline{\quad} \times 20</math>   <math>120 = 20 \times \underline{\quad}</math></p> <p>Use commutativity and other strategies.</p> <p><math>4 \times 6 = 6 \times \underline{\quad}</math></p> <p><math>2 \times 6 \times 5 = 10 \times \underline{\quad}</math></p> <p><math>\underline{\quad} \times 7 = (30 \times 7) + (9 \times 7)</math></p> <p>6 x 23</p> <table border="1"> <tr> <td>100s</td> <td>10s</td> <td>1s</td> </tr> <tr> <td>6</td> <td>2</td> <td>3</td> </tr> </table> <p>43 x 6 by partitioning</p> <table border="1"> <tr> <td>X</td> <td>40</td> <td>3</td> </tr> <tr> <td>6</td> <td>240</td> <td>18</td> </tr> </table> <p><math>4 \ 3 \times 6</math>   <math>40 \times 6 = 240</math>  <math>4 \ 0 \times 6 + 3 \times 6</math>   <math>3 \times 6 = 18</math>  <math>43 \times 6 = 258</math></p> <p>If I know <math>4 \times 6 = 24</math>  then <math>40 \times 6</math> is ten times bigger,  <math>40 \times 60</math> is one hundred times bigger.</p> <table border="1"> <tr> <td>3 4</td> <td>H T U</td> </tr> <tr> <td>6 x</td> <td>3 4</td> </tr> <tr> <td>2 4 (6 x 4)</td> <td>6 x</td> </tr> <tr> <td>1 8 0 (6 x 30)</td> <td>2 0 4</td> </tr> <tr> <td>2 0 4</td> <td>-2</td> </tr> </table> <p>Move to short multiplication when children confident with carrying</p>	100s	10s	1s	6	2	3	X	40	3	6	240	18	3 4	H T U	6 x	3 4	2 4 (6 x 4)	6 x	1 8 0 (6 x 30)	2 0 4	2 0 4	-2
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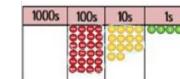
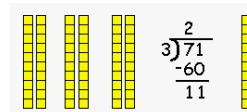
Year 5 Multiplication																																		
Objective	Method	Model/ Example																																
Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers  Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers  Establish whether a number up to 100 is prime and recall prime numbers up to 19  Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers  Multiply and divide numbers mentally drawing upon known facts  Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context  Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	<p><b><u>Mental methods</u></b>  Pupils to solve problems involving scaling up/down. 'Class Discussions' to ensure pupils are relating each calculation to known number facts and making links. <b>Pupils should : know prime numbers to 19 and be able to work out if another number o 100 is/is not prime; Know what happens to numbers when they are x by 10/100/1000.</b>  Investigate and become familiar with square and cubed numbers.</p> <p><b><u>Written methods (beginning to calculate TU x TU)</u></b>  Continue to use grid method until pupils are ready to move to compact method.</p> <p><b><u>Missing number problems</u></b>  As for Year 4 but with increasingly large numbers.</p> <p><b><u>Long multiplication</u></b>  When children fully understand place value and are confident with carrying over in HTU x U calculations, they may move on to formal long multiplication.</p>	$4 \times 35 = 2 \times 2 \times 35, 8 \times 35 = 2 \times 2 \times 2 \times 35$  $1 \times 1 = 1$ $1 \times 1 = 1^2$ $2 \times 2 = 2^2$ $1 \times 1 \times 1 = 1^3$ $2 \times 2 \times 2 = 2^3$ $613 \times 5 =$ We partition 613 into 600 and 10 and 3 and put it in a table. <table border="1" data-bbox="1471 674 1785 738"> <tr> <td>x</td> <td>600</td> <td>10</td> <td>3</td> <td></td> <td>8</td> <td>x</td> </tr> <tr> <td>5</td> <td>3000</td> <td>50</td> <td>15</td> <td></td> <td>2</td> <td>9</td> <td>2</td> <td>1</td> <td>6</td> </tr> </table> Add up 3000, 50 and 15 to make 3065. $613 \times 5 = 3065$ $13 \times 16$ by partitioning  $100 + 30 + 60 + 18 = 208$ <table border="1" data-bbox="1830 897 2055 1151"> <tr> <td>1</td> <td>3</td> <td></td> </tr> <tr> <td>1</td> <td>5</td> <td>X</td> </tr> <tr> <td>6</td> <td>5</td> <td></td> </tr> <tr> <td>1</td> <td>3</td> <td>0</td> </tr> <tr> <td>1</td> <td>9</td> <td>5</td> </tr> </table>	x	600	10	3		8	x	5	3000	50	15		2	9	2	1	6	1	3		1	5	X	6	5		1	3	0	1	9	5
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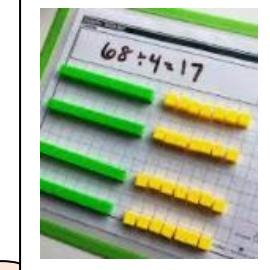
Year 6 Multiplication	Method	Model/ Example																																																																					
Objective																																																																							
Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	<b>Mental Methods</b> Children continue to solve practical problems involving scaling up or down. They explore the order of operations and the use of brackets, investigating whether the position affects the answer.	A bag of 4 oranges cost 37 pence. How much do 12 oranges cost? A bag of four apples cost 36 pence how much would 6 apples be?																																																																					
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	<b>Written methods</b> Some pupils may continue to use grid method for calculation until confident. Others will continue to practise and refine skills of formal multiplication and long multiplication.	$2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$ children to discuss and explain how both calculations could be correct.																																																																					
Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context	<b>Short multiplication for decimals</b> Use short multiplication to $\times$ a decimal number with up to 3 DP by a single digit number. Complete problems involving units of measure.	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>x</td><td>1000</td><td>300</td><td>40</td><td>2</td></tr> <tr><td>10</td><td>10000</td><td>3000</td><td>400</td><td>20</td></tr> <tr><td>8</td><td>8000</td><td>2400</td><td>320</td><td>16</td></tr> </table> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td>1</td><td>3</td><td>4</td><td>2</td><td></td></tr> <tr><td></td><td></td><td></td><td>1</td><td>8</td><td>x</td></tr> <tr><td>1</td><td>0</td><td>7</td><td>3</td><td>6</td><td></td></tr> <tr><td>1</td><td>3</td><td>4</td><td>2</td><td>0</td><td></td></tr> <tr><td>2</td><td>4</td><td>1</td><td>5</td><td>6</td><td></td></tr> </table> <div style="border: 1px solid orange; padding: 5px; display: inline-block; margin-left: 20px;"> <p>The decimal point does not have a value and therefore doesn't sit in a square on its own.</p> </div> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td>3</td><td>•</td><td>1</td><td>9</td><td></td></tr> <tr><td></td><td></td><td></td><td>8</td><td>x</td><td></td></tr> <tr><td>2</td><td>5</td><td>•</td><td>5</td><td>2</td><td></td></tr> <tr><td></td><td></td><td>1</td><td>7</td><td></td><td></td></tr> </table>	x	1000	300	40	2	10	10000	3000	400	20	8	8000	2400	320	16		1	3	4	2					1	8	x	1	0	7	3	6		1	3	4	2	0		2	4	1	5	6			3	•	1	9					8	x		2	5	•	5	2				1	7		
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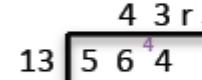
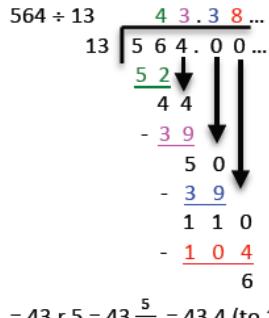
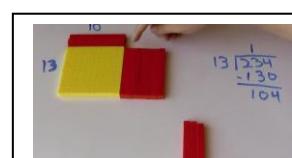
Year 1 Division		
Objective	Method	Model/ Example
<p>Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.</p>	<p><b>Make direct links to multiplication when teaching division.</b></p> <p>Introduction to grouping and sharing should involve practical activities using small numbers to support pupils in developing an understanding of the difference between the 2 concepts.</p> <p><b>Grouping</b> Children should use practical apparatus and arrays as pictorial representations for division.</p> $12 \div 2 = 6$ $\text{So } 12 \div 6 = 2$ <p>They should investigate halves and quarters finding simple fractions of objects, quantities and numbers.</p> <p>Half of 10 is 5</p> $10 \div 2 = 5$ <p>Pupils may have the <math>\div</math> symbol modelled and HA pupils may begin to use it in their recording of the results of practical activities.</p> <p><b>Sharing</b> Use concrete apparatus to share items equally, developing the concept of 1:1 correspondence.</p> <p>6 shared into 2s is 3</p> <p>8 shared between 2 is 4</p>	<p>How many groups of 4 can be made with 16 stars?</p>  <p><math>6 \div 2 = 3</math> by sharing into 2 groups and by grabbing groups of 2</p>     <p>How many 2s?</p> 

Year 2 Division		
Objective	Method	Model/ Example
Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	The direct link between $\times$ and $\div$ should always be made with the two skills being taught in conjunction with one another. Investigate how $\times$ is commutative but $\div$ is not.	$6 \div 2 = \underline{\quad}$ $\underline{\quad} = 6 \div 2$ $6 \div \underline{\quad} = 2$ $3 = 6 \div \underline{\quad}$ $\underline{\quad} \div 2 = 3$ $3 = \underline{\quad} \div 2$ $\underline{\quad} \div \underline{\quad} = 3$ $3 = \underline{\quad} \div \underline{\quad}$ 
Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals ( $=$ ) signs	<p><b>Introduction to the <math>\div</math> symbol</b>  Once children are confident in their understanding of sharing and grouping they may begin to use the <math>\div</math> symbol in formal written calculations.</p> <p>Children should continue to use grouping and sharing for division using practical activities, arrays and pictorial representations.</p>	$15 \div 3 = 5$ in each group (sharing)    <p>Link to fractions</p> 
Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot		$15 \div 3 = 5$ groups of 3 (grouping)  $10 \div 2 = 5$ 
Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	<p><b>Arrays</b>  Support children to see how an array can give both <math>\times</math> and <math>\div</math> facts and explore these related facts.</p> <p><b>Grouping using a number line</b>  Group from 0 in equal jumps of 2 or 5 or 10 using the divisor as a guide to the size of each group. Make links to visual representations (then begin to investigate groups of 3 and 4).</p>	<p>Use language of division linked to tables</p>  <p>How many 2s?</p> 

Year 3 Division		
Objective	Method	Model/ Example
<p>Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</p> <p>Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods</p> <p>Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which <math>n</math> objects are connected to <math>m</math> objects.</p>	<p><b><u><math>\times</math> and <math>\div</math> symbols and missing number problems</u></b></p> <p>Continue to present children with a range of equations so that they are developing their fluency and reasoning skills.</p> <p><b>Grouping</b></p> <p>Use small numbers initially. How many 4s are in 16? How can children work this out practically/visually? Show different ways to record their findings.</p> <p><b>Arrays leading to short division</b></p> <p>Look at an array and ask what it shows. Investigate the different horizontal calculations it can represent (both <math>\times</math> and <math>\div</math>). Begin to investigate bigger numbers in the same way. Introduce the layout of short division alongside an array and show pupils the correct layout focussing on place value when recording answers.</p> <p><b>Remainders</b></p> <p>Use sharing to find the answer to increasingly large numbers. <math>49 \div 4 = 12</math> but 1 is left over. How do we record this? Use counters and arrays to support children to apply their knowledge of grouping.</p>	<p>Grouping using partitioning  <math>43 \div 3</math> If I know <math>10 \times 3 \dots</math></p>  <p>Use language of division linked to tables</p>  <p>Dividing by 4 to find a remainder</p> <p><math>24 \div 6 = 4</math> (but not <math>6 \div 24 = 4</math>)</p> <p>Where does the dividend have to go in the calculation? (at the start because division is not commutative.)</p> <p>Remind pupils of place value</p> 

Year 4 Division	Method	Model/ Example
Objective		
<p>Recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math></p> <p>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</p> <p>Recognise and use factor pairs and commutativity in mental calculations</p> <p>Multiply two-digit and three-digit numbers by a one-digit number using formal written layout</p> <p>Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as <math>n</math> objects are connected to <math>m</math> objects.</p>	<p><b>Missing number problems</b> Continue to use a range of equations as in lower years but with appropriate numbers that challenge their knowledge of all tables facts. Introduce the concept of balanced equations to ensure the concept of equivalence is embedded.</p> <p><b>Chunking for division of larger numbers</b> Continue to explore division as grouping and sharing. They will now be encouraged to scale up numbers to help them to solve more complex division calculations. They may record chunks for division in informal jottings and use these to support them in their calculations.</p> <p><b>They will need to be able to recognise what happens when a number is <math>x \div</math> by 10/100</b></p> <p><b>Formal written method of division</b> Children should be shown how to record these 'chunks' in more formal column divisions so they become increasingly familiar with column layout. When ready, they should be shown how to complete formal division calculations progressing to HTU <math>\div</math> U. Calculations should continue to include both those without remainders and those with. Explore rounding up/down after division through practical tasks.</p>	<p><math>\underline{\quad} = 60 \div 5</math>   <math>36 \div 9 = \underline{\quad}</math>   <math>\underline{\quad} = 360 \div 90</math>  <math>12 = \underline{\quad} \div 5</math>   <math>\underline{\quad} \div 4 = 9</math>   <math>4 = \underline{\quad} \div 90</math></p> <p><math>54 \div 9 = 3 \times \underline{\quad}</math>  <math>36 \div 9 = 63 \div \underline{\quad}</math></p>  <p>After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.</p> <p><math>12 \overline{) 2544}</math>  <math>24</math>  <math>14</math>  <math>12</math>  <math>2</math></p> <p>Grouping using partitioning  <math>196 \div 6</math> If I know <math>3 \times 6 \dots</math> then <math>30 \times 6 \dots</math></p>   <p>'Chunking up' on a number line  <math>196 \div 6 = 32 \text{ r } 4</math></p>  <p><math>86 \div 6 = \underline{\quad}</math></p> <p><math display="block">\begin{array}{r} 6 \overline{) 86} \\ - 6 \ 0 \\ \hline 2 \ 6 \\ - 2 \ 4 \\ \hline 0 \ 2 \end{array}</math></p> <p><math>(10 \times 6)</math>  <math>(4 \times 6)</math>  <math>14 \text{ r } 2</math></p> <p>What you have <math>x</math> by goes on the left and is underlined, so the child knows what to add together at the end of the working out.</p>

Year 5 Division		
Objective	Method	Model/ Example
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  Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers  Multiply and divide numbers mentally drawing upon known facts  Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context  Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	<p><b><u>÷ x and = signs and missing numbers</u></b> Continue to provide a range of equations with appropriate numbers.</p> <p>Formal written method for division Continue as for Year 4 until pupils are efficient in their use of either chunking or more standard method. <b>Pupils should be confident when x÷ by 10/100/1000</b></p> <p><b><u>Remainders (quotient) expressed in different ways</u></b> Provide calculations that have remainders and ask pupils to discuss the way in which the remainder is recorded. What does it mean? Show that it can also be written as a fraction or a decimal. Work through examples of each. Through practical problems solving tasks look at how the remainder may lead to rounding up/down depending on the context of the question. Explore how the quotient could also be divided to give a decimal (and more accurate) answer.</p> <p><b><u>Division using chunking</u></b> As children become more confident with HTU ÷ u they will be introduced to HTU ÷ TU for which they may again use chunking.</p>	<p><math>630 \div \underline{\quad} = 9</math> <math>\underline{\quad} \div 9 = 0.7</math> <math>\underline{\quad} \div \underline{\quad} = 63</math>  <math>\underline{\quad} \div 90 = 70</math> <math>100 \div \underline{\quad} = \underline{\quad} \div 2</math></p> <p><math>5309 \div 8</math>  <math>0 \ 6 \ 6 \ 3 \ r \ 5</math>  <math>\underline{\quad} \ 5 \ 3 \ 0 \ 9</math></p> <p>The remainder could be expressed as five eighths, r5, as a decimal number, or rounded up or down as appropriate for the problem.</p> <p><math>864 \div 36 = 24</math></p> <p><math>\begin{array}{r} 2 \ 4 \\ \hline 36 \ 8 \ 6 \ 4 \\ \underline{\quad} \ 7 \ 2 \ 0 \quad (20 \times 36) \\ 1 \ 4 \ 4 \\ \underline{\quad} \ 1 \ 4 \ 4 \quad (4 \times 36) \\ 0 \ 0 \ 0 \end{array}</math></p> <p>Thousands      Hundreds      Tens      Ones</p> <p>What you have x by goes on the left and is underlined, so the child knows what to add together at the end of the working out.</p> 

Year 6 Division		
Objective	Method	Model/ Example
Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	<b><u><math>\div</math> x and = signs and missing numbers</u></b> Use a range of appropriate equations and begin to include those with decimal numbers. Multiplication should be used as a check for division accuracy.	$630 \div 0.7 =$ $2.75 \div 5 =$ _____   _____ $\div 0.4 =$ _____ $\div 0.25$
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	<b><u>Short division with remainders</u></b> Children should develop their confidence when expressing remainders as whole numbers, fractions, decimals or rounded numbers depending on the contexts.	$564 \div 13$ Using known multiplication facts  $564 \div 13 = 43 \text{ r } 5 = 43 \frac{5}{13} = 43.38\ldots$
Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context	<b><u>Chunking leading to long division.</u></b> As children become increasingly confident with HTU $\div$ TU they may move to Th HTU $\div$ TU. They may then explore the link between chunking and long division and discuss the efficiency of each method. At all times a range of calculations should be provided with remainders as well as those without. Remainders should be interpreted according to the context.	$564 \div 13$  $= 43 \text{ r } 5 = 43 \frac{5}{13} = 43.4 \text{ (to 1dp)}$
Perform mental calculations, including with mixed operations and large numbers		
Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.		<p>Paul and David hire a car together at a cost of £297.50. Paul pays 6 times more than David. How much does David pay?</p> 