



Maths Written Calculation Policy

This document maps Fawbert and Barnard Infant School's and Reedings Junior School's pathway to the required written formal calculation methods as outlined in the National Curriculum (2013) Mathematics Appendix 1: Examples of formal written methods for addition, subtraction, multiplication and division.

It links the key concrete experiences with pictorial and abstract representations and focusses on the vocabulary used at each stage. This supports pupils to move with confidence and deep conceptual understanding through each strand of calculation.

While this policy focuses on written calculation in mathematics, we recognise the importance of mental strategies and known facts that form the basis of all calculations. A range of mental strategies are developed throughout ESSENTIALmaths: the program both schools use to teach maths.

Pupils are provided with frequent opportunities to compare and evaluate different calculation strategies. This helps them develop an understanding that efficiency is personal and based on the numbers involved.

Concrete, Pictorial and Abstract

Concrete manipulatives

Concrete manipulatives are objects that can be touched and moved by pupils to introduce, explore or reinforce a mathematical concept. They provide a vehicle to help pupils make sense of complex, symbolic and abstract ideas through exploration and manipulation. Furthermore, they support the development of internal models and help build stronger memory pathways.

Pictorial (including jottings)

The act of translating the concrete experience into a pictorial representation helps focus attention on what has happened and why. This supports deeper understanding and a stronger imprint on memory. Pictorial representations are more malleable than concrete resources and, once understanding is secured, allow exploration of complex problems that may be challenging to reproduce with manipulatives.

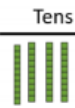




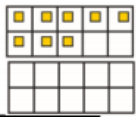
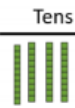




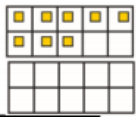






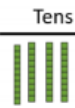




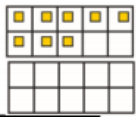



Abstract

The aim, within this policy, is for compacted forms of notation. These have developed through the history of mathematics. Explicit individual steps in procedure are hidden or they have been shortcut. The informal and expanded methods expose all the intermediate steps, replicating thought processes more closely and support understanding prior to compaction.

Vocabulary

Learning to use the correct mathematical vocabulary is vital for the development of mathematical proficiency. The ability to articulate accurately allows pupils to communicate and build meaning. Ideas become more permanent. This can be scaffolded effectively using speaking frames.



<p>Year 2</p>	<p>NC Statement: Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones - a two-digit number and tens - two, two-digit numbers. No regrouping.</p>																													
<p>Concrete e.g. $43 + 35 =$</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%;">Tens</th> <th style="width: 50%;">Ones</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"></td> </tr> <tr> <td style="text-align: center;">$3 \text{ ones} + 5 \text{ ones} = 8 \text{ ones}$</td> <td></td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"></td> </tr> <tr> <td style="text-align: center;">$4 \text{ tens} + 3 \text{ tens} = 7 \text{ tens}$</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: center;"><hr/></td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"></td> </tr> <tr> <td colspan="2" style="text-align: center;">$The \text{ sum is } 7 \text{ tens and } 8 \text{ ones which is equal to } 78$</td> </tr> </tbody> </table>	Tens	Ones			$3 \text{ ones} + 5 \text{ ones} = 8 \text{ ones}$				$4 \text{ tens} + 3 \text{ tens} = 7 \text{ tens}$		<hr/>				$The \text{ sum is } 7 \text{ tens and } 8 \text{ ones which is equal to } 78$		<p>Pictorial e.g. $43 + 35 =$</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%;">Tens</th> <th style="width: 50%;">Ones</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">\dots</td> </tr> <tr> <td style="text-align: center;">$+$ </td> <td style="text-align: center;">$\dots\dots\dots$</td> </tr> <tr> <td colspan="2" style="text-align: center;"><hr/></td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">$\dots\dots\dots$ \dots</td> </tr> <tr> <td colspan="2" style="text-align: center;"><hr/></td> </tr> </tbody> </table>	Tens	Ones		\dots	$+$ 	$\dots\dots\dots$	<hr/>			$\dots\dots\dots$ \dots	<hr/>		<p>Abstract e.g. $43 + 35 =$</p> $\begin{array}{r} 43 \\ + 35 \\ \hline 78 \\ \hline \end{array}$
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Addition



Year 2 NC Statement: Add numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones - a two-digit number and tens - two, two-digit numbers.
With regrouping.

Concrete
 e.g. $57 + 25 =$

7 ones + 5 ones = 12 ones

I need to regroup 12 ones into 1 ten and 2

7 tens + 1 ten + 2 ones

The total is 82

Pictorial
 e.g. $57 + 25 =$

Abstract
 e.g. $57 + 25 =$

$$\begin{array}{r} 57 \\ + 25 \\ \hline 82 \\ \hline 1 \end{array}$$

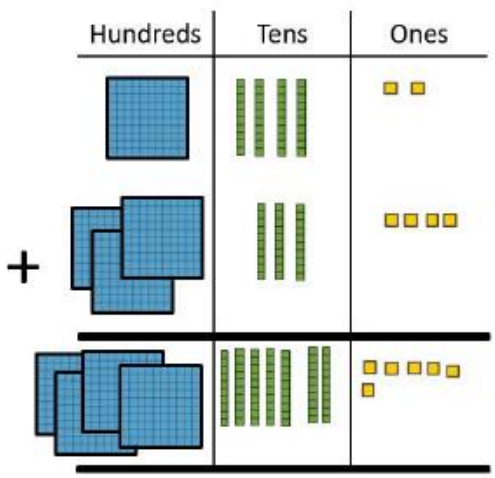
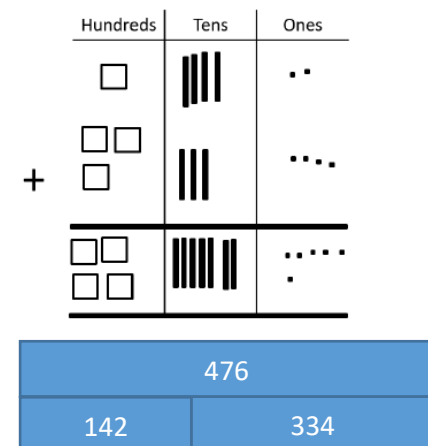
Where the regrouping happens, the children are taught to 'carry' it underneath the next column, e.g. here 12 is shown with 1 ten underneath and 2 ones in the answer line.

Vocabulary

Addition, add, more, and, make, sum, total, equal, altogether, double, near double, half, halve, one more/two more/ten more/one hundred more, how many more to make ...? how many more is ... than ...? how much more is ...?

Addition



<p>Year 3</p>	<p>NC Statement: Add numbers with up to three digits, using formal written methods of columnar addition with no regrouping.</p>		Addition
<p>Concrete e.g. $142 + 334 =$</p> 	<p>Pictorial e.g. $142 + 334 =$</p>  <p>Other pictorial models, such as bar models, can support understanding of the concept.</p>	<p>Abstract e.g. $142 + 334 =$</p> $\begin{array}{r} 142 \\ + 334 \\ \hline 476 \end{array}$ <div style="border: 1px solid #e91e63; border-radius: 10px; background-color: #fce4ec; padding: 10px; text-align: center; margin-top: 10px;"> $142 + 334 = 476$ </div>	
<p>Vocabulary Addition, add, more, and, make, sum, total, equal, altogether, double, near double, half, halve, one more/two more/ten more/one hundred more, how many more to make ...? how many more is ... than ...? how much more is ...?</p>			



Year 3	NC Statement: Add numbers with up to three digits, using formal written methods of columnar addition with regrouping of ones.
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Concrete
e.g. $247 + 135 =$

12 ones is regrouped into 1 ten and 2 ones

Pictorial
e.g. $247 + 135 =$

Other pictorial models, such as bar models, can support understanding of the concept.

382	
247	135

Abstract
e.g. $247 + 135 =$

$$\begin{array}{r}
 247 \\
 + 135 \\
 \hline
 382 \\
 \hline
 1
 \end{array}$$

$247 + 135 = 382$

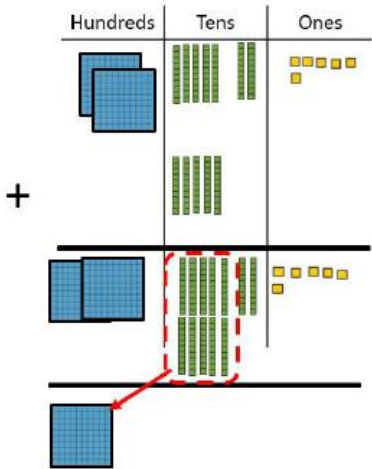
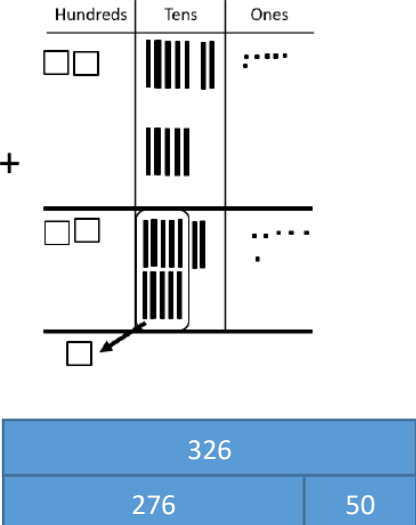
NB: children may cross out the regrouped numbers underneath once they have been added.

Vocabulary
Addition, add, more, and, make, sum, total, equal, altogether, double, near double, half, halve, one more/two more/ten more/one hundred more, how many more to make ...? how many more is ... than ...? how much more is ...?

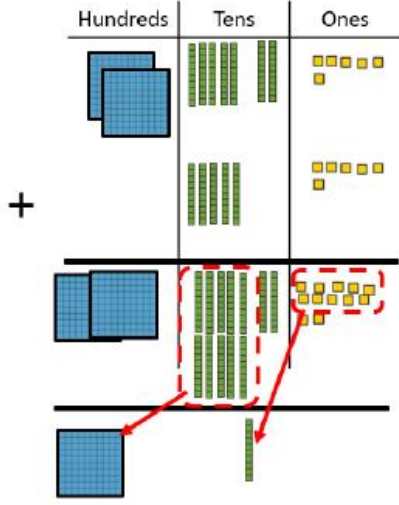
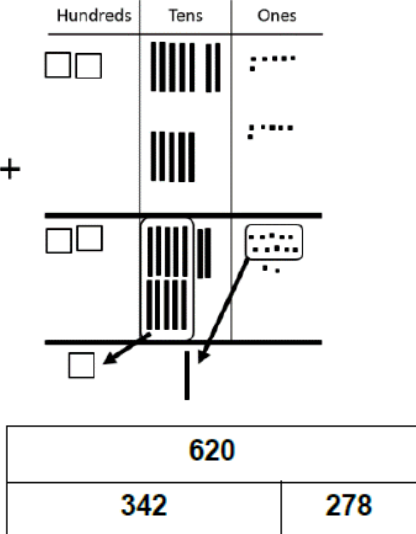
The sum of ... ones and ... ones is ... ones.
 The sum of ... tens and ... tens is ...tens.
 The sum of ... hundreds and ... hundreds is ... hundreds.
 So, ... + ... is equal to ... hundreds, ... tens and ... ones, which is

Addition



<p>Year 3</p>	<p>NC Statement: Add numbers with up to three digits, using formal written methods of columnar addition with regrouping tens.</p>	<p style="writing-mode: vertical-rl; text-orientation: mixed; background-color: #e91e63; color: white; padding: 10px; font-weight: bold; font-size: 24px;">Addition</p>	
<p>Concrete e.g. $247 + 135 =$</p>  <p><i>12 tens needs to be regrouped into 1 hundred and 2 tens</i></p>	<p>Pictorial e.g. $247 + 135 =$</p> 		<p>Abstract e.g. $247 + 135 =$</p> $\begin{array}{r} 247 \\ + 135 \\ \hline 382 \end{array}$ <p style="text-align: center; border: 1px solid #e91e63; border-radius: 10px; padding: 5px; background-color: #fce4ec; font-weight: bold; font-size: 24px; margin: 10px 0;">$276 + 50 = 326$</p> <p>NB: children may cross out the regrouped numbers once they have been added.</p>
<p>Vocabulary Addition, add, more, and, make, sum, total, equal, altogether, double, near double, half, halve, one more/two more/ten more/one hundred more, how many more to make ...? how many more is ... than ...? how much more is ...?</p> <p>The sum of ... ones and ... ones is ... ones. This is regrouped into ... tens and ... ones. The sum of ... tens and ... tens is ...tens. The sum of ... hundreds and ... hundreds is ... hundreds. So, ... + ... is equal to ... hundreds, ... tens and ... ones, which is</p>			

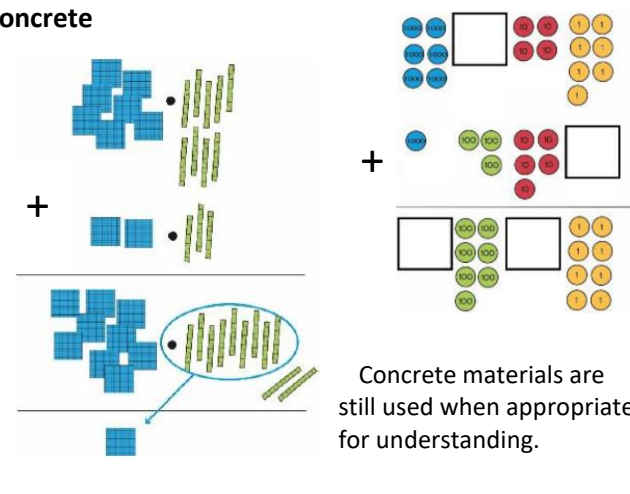
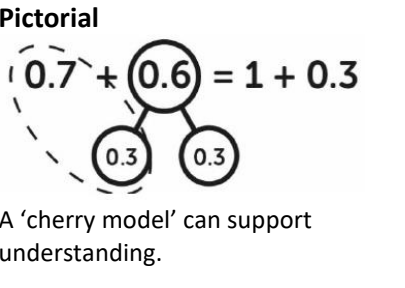


<p>Year 3</p>	<p>NC Statement: Add numbers with up to three digits, using formal written methods of columnar addition with regrouping of tens and ones.</p>		Addition
<p>Concrete e.g. $276 + 56 =$</p> 	<p>Pictorial e.g. $276 + 56 =$</p>  <p>$342 + 278 = 620$</p>	<p>Abstract e.g. $276 + 56 =$</p> $\begin{array}{r} 276 \\ + 56 \\ \hline 332 \\ \hline 11 \end{array}$ <div style="border: 1px solid #e91e63; border-radius: 15px; background-color: #fce4ec; padding: 10px; text-align: center; margin: 10px 0;"> <p>$276 + 56 = 332$</p> </div> <p>NB: children may cross out the regrouped numbers once they have been added.</p>	
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Maths Written Calculation Policy

Once pupils have fully understood and rehearsed regrouping within formal column addition of 3-digit numbers, this learning continues to be rehearsed and applied throughout Years 4, 5 and 6, including to 4-digit numbers, larger numbers, decimal numbers, money and measures and problem solving with missing numbers.

<p>Year 4 onwards</p>	<p>NC Statement: Add increasingly larger numbers, using formal written methods of columnar addition with regrouping.</p>		Addition																																																								
<p>Concrete</p>  <p>Concrete materials are still used when appropriate for understanding.</p>	<p>Pictorial</p>  <p>A 'cherry model' can support understanding.</p> <table border="1" data-bbox="896 734 1299 845"> <tr> <td style="width: 50px; text-align: center;">3914</td> <td style="width: 50px; text-align: center;">86</td> </tr> <tr> <td colspan="2" style="text-align: center;">?</td> </tr> </table> <p>A bar model example</p>	3914		86	?		<p>Abstract</p> <p>2486 + 4853 =</p> $ \begin{array}{r} 2486 \\ +4853 \\ \hline 7339 \\ 11 \end{array} $ <table data-bbox="1657 558 1993 925"> <tr> <td>6</td><td>□</td><td>4</td><td>7</td> </tr> <tr> <td>1</td><td>3</td><td>5</td><td>□</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td>□</td><td>7</td><td>□</td><td>8</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td>10s</td><td>1s</td><td>.</td><td>0.1s</td> </tr> <tr> <td></td><td>7</td><td>.</td><td>9</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td>+</td><td>2</td><td>.</td><td>3</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td>1</td><td>0</td><td>.</td><td>2</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td></td><td>1</td><td></td><td></td> </tr> </table>	6	□	4	7	1	3	5	□	<hr/>				□	7	□	8	<hr/>				10s	1s	.	0.1s		7	.	9	<hr/>				+	2	.	3	<hr/>				1	0	.	2	<hr/>					1		
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Year 2 NC Statement: Subtract numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones - a two-digit number and tens - two, two-digit numbers.
No regrouping.

Concrete
 e.g. $87 - 34 =$

Tens	Ones

Subtraction is shown by removing the number of pieces.

Pictorial
 e.g. $87 - 34 =$

Tens	Ones

*7 ones take away 4 ones leaves 3 ones.
 8 tens take away 3 tens leaves 5 tens.
 So, $87 - 34$ is equal to 5 tens and 3 ones, which is 53.*

Abstract
 e.g. $87 - 34 =$

$$\begin{array}{r} 87 \\ - 34 \\ \hline 53 \end{array}$$

The children rehearse subtracting the ones first, then to move to the tens.

Vocabulary
 How many are left/left over? How many have gone? One less/two less/ten less/one hundred less, how many fewer is ... than ...? How much less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, tens boundary.

Subtraction



Year 2 NC Statement: Subtract numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones - a two-digit number and tens - two, two-digit numbers. **With regrouping.**

Concrete

Concrete

Pictorial

"I can see that there aren't enough ones for me to take away 6 ones without regrouping. Regroup one ten into ten ones. There are now 6 tens and 13 ones."

Abstract

$$\begin{array}{r} 6 \\ \cancel{7}3 \\ - 46 \\ \hline 27 \end{array}$$

Where a regroup is necessary, the children rehearse crossing out and recording as shown.

E.g. 7 tens and 3 ones becomes 6 tens and 13 ones.

Subtraction

Vocabulary
 How many are left/left over? How many have gone? One less/two less/ten less/one hundred less, how many fewer is ... than ...? How much less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, tens boundary.



Year 3 NC Statement: Subtract numbers with up to three digits, using formal written methods of columnar subtraction.
No regrouping.

Concrete
 e.g. $345 - 124 =$

Hundreds	Tens	Ones

Pictorial
 e.g. $345 - 124 =$

Hundreds	Tens	Ones

Other pictorial models, such as bar and cherry models, can support understanding of the concept.

$345 - 124 =$

Abstract
 e.g. $345 - 124 =$

$$\begin{array}{r} 345 \\ - 124 \\ \hline 221 \end{array}$$

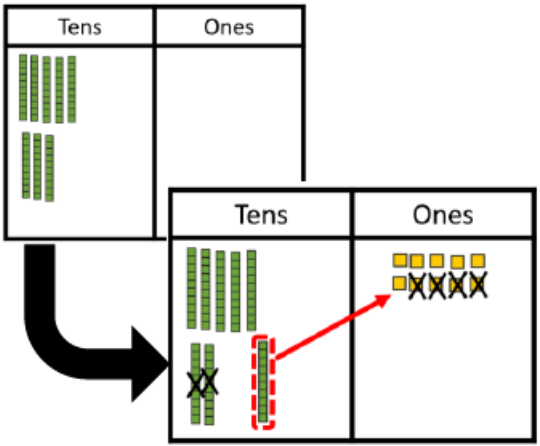
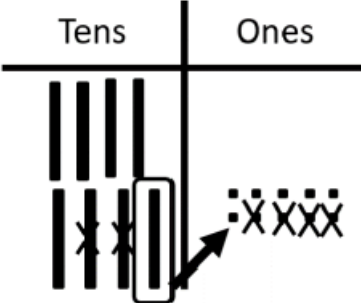
345 - 124 = 221

Subtraction

Vocabulary
 How many are left/left over? How many have gone? One less/two less/ten less/one hundred less, how many fewer is ... than ...? How much less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, tens boundary.

... ones take away ... ones leaves ... ones.
 ... tens take away ... tens leaves ... tens.
 ... hundreds take away ... hundreds leaves ... hundreds.
 So, ... - ... is equal to ... hundreds, ... tens and ... ones, which is ...



<p>Year 3</p>	<p>NC Statement: Subtract numbers with up to three digits, using formal written methods of columnar subtraction with regrouping tens into ones.</p>		<p>Subtraction</p>
<p>Concrete e.g. $345 - 124 =$</p> 	<p>Pictorial e.g. $345 - 124 =$</p>  <p><i>"I can see that there aren't enough ones for me to take away 4 ones without regrouping. Regroup one ten into ten ones. There are now ten ones and zero ones. 10 ones take away 4 ones leaves six ones. 7 tens take away 2 tens leaves 5 tens. So, $80 - 24$ is equal to 5 tens and 6 ones, which is 56."</i></p>	<p>Abstract e.g. $345 - 124 =$</p> $\begin{array}{r} 7 \cancel{8} 10 \\ - 24 \\ \hline 56 \end{array}$ <div style="background-color: #90EE90; border-radius: 15px; padding: 10px; text-align: center; margin-top: 10px;"> <p>$80 - 24 = 56$</p> </div>	
<p>Vocabulary How many are left/left over? How many have gone? One less/two less/ten less/one hundred less, how many fewer is ... than ...? How much less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, tens boundary.</p> <p>I can see that there aren't enough ones for me to take away ... ones without regrouping. Regroup one ten into ten ones. There are now ... tens and ... ones. ... ones take away ... ones leaves ... ones. ... tens take away ... tens leaves ... tens. So, ... - ... is equal to... tens and ... ones, which is</p>			



Year 3 NC Statement: Subtract numbers with up to three digits, using formal written methods of columnar subtraction **with regrouping hundreds into tens.**

Concrete
e.g. $323 - 141 =$

Pictorial
e.g. $323 - 141 =$

Abstract
e.g. $323 - 141 =$

$$\begin{array}{r}
 \cancel{2}^1 \cancel{2}^1 3 \\
 - 141 \\
 \hline
 182
 \end{array}$$

$323 - 141 = 182$

Subtraction

Vocabulary
How many are left/left over? How many have gone? One less/two less/ten less/one hundred less, how many fewer is ... than ...? How much less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, tens boundary.

... ones take away ... ones leaves ... ones.
I can see that there aren't enough tens for me to take away ... tens without regrouping.
Regroup one hundred into ten hundreds.
There are now ... hundreds and ... tens.
... tens take away ... tens leaves ... tens.
... hundreds take away ... hundreds leaves ... hundreds
So, ... - ... is equal to ... hundreds, ... tens and ... ones, which is



Year 3 NC Statement: Subtract numbers with up to three digits, using formal written methods of columnar subtraction **with regrouping hundreds and tens.**

Concrete
e.g. $404 - 226 =$

Pictorial
e.g. $404 - 226 =$

Abstract
e.g. $404 - 226 =$

$$\begin{array}{r}
 3\cancel{4} \overset{9}{0} \overset{1}{4} \\
 - 226 \\
 \hline
 178
 \end{array}$$

$404 - 226 = 178$

Children are encouraged to keep workings clear to ensure accurate answers.

Subtraction

Vocabulary
How many are left/left over? How many have gone? One less/two less/ten less/one hundred less, how many fewer is ... than ...? How much less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, tens boundary.

I will need to regroup...

- one hundred into ten tens. I now have ... hundreds and ... tens.
- one ten into ten ones. I now have ... tens and ... ones.



Maths Written Calculation Policy

Once pupils have fully understood and rehearsed regrouping within formal subtraction, this learning continues to be rehearsed and applied throughout Years 4, 5 and 6, including to multi-digit, decimal numbers, money and measures.

Year 4 onwards
 NC Statement: Subtract increasingly larger numbers, including those with decimals, using formal written methods of columnar subtraction.

Concrete
 $3.44 - 1.25$

$1.7 - 0.8$

Pictorial

$3.7 - 0.8 = 2.2 + 0.7$

$8002 - 1456$

Abstract

$8.85 - 4.38 = \text{£}4.57$

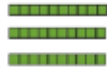

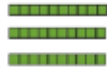

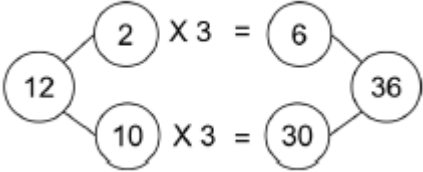
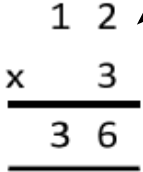
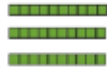

$6467 - 2684 = 3783$

				1		
	1	4	5	•	10	
-	1	3	4	•	1	9
	0	1	1	•	0	1

Subtraction

Vocabulary
 How many are left/left over? How many have gone? One less/two less/ten less/one hundred less, how many fewer is ... than ...? How much less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, tens boundary.



<p>Year 3</p>	<p>NC Statement: Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. Short multiplication – no regrouping.</p>		Multiplication				
<p>Concrete e.g. 12×3</p> <table border="1" data-bbox="210 523 562 775"> <thead> <tr> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </tbody> </table> <p>This would also be discussed as repeat addition of 12 ($12 + 12 + 12$) or 12 three times.</p>	Tens	Ones				<p>Pictorial e.g. 12×3</p>  <p>Pictorial methods, such as this informal cherry model, allow children to break the strategy into smaller, more manageable parts.</p>	<p>Abstract e.g. 12×3</p> <div style="text-align: center;">  </div> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> $12 \times 3 = 36$ </div> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>The children rehearse multiplying the ones first, then to move to the tens.</p> </div> <p><i>“3 groups of 2 ones is 6 ones. 3 groups of 1 ten is 3 tens. 3 tens added 6 ones is 36. The product of 12 and 3 is 36.”</i></p>
Tens	Ones						
							
<p>Vocabulary multiply/times # by #, # lots of # equals..., # groups of # equals..., repeated addition, product, multiplied by, array</p> <p>... groups of ... ones is ... ones. ... groups of ... tens is ... tens. ... tens added to ... ones is The product of ... and ... is</p>							



Maths Written Calculation Policy

Year 3

NC Statement: Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
Short multiplication – regrouping ones into tens.

Concrete
e.g. 24×3

Pictorial
e.g. 24×3

Abstract
e.g. 24×3

Where a regroup is required, children are encouraged to 'carry' underneath.
E.g. $4 \times 3 = 12$ so 1 ten is shown underneath.

$24 \times 3 = 72$

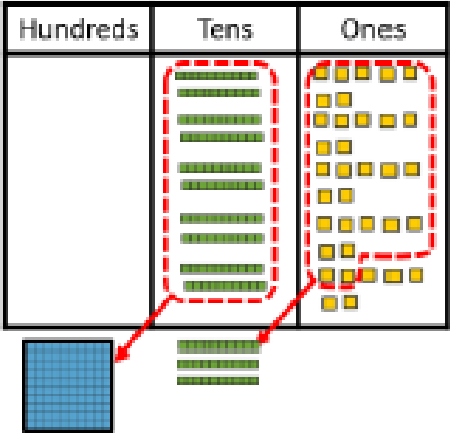
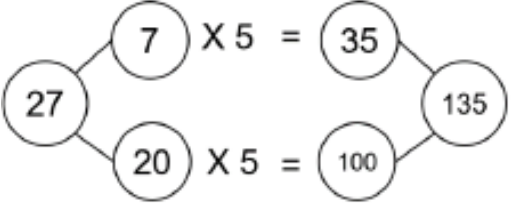
"3 groups of 4 ones is 12 ones. I can regroup the 12 ones into 1 ten and 2 ones. 3 groups of 2 tens is 6 tens. 1 ten added to 6 tens is 7 tens. The product of 24×3 is 72."

Vocabulary
multiply/times # by #, # lots of # equals..., # groups of # equals..., repeated addition, product, multiplied by, array, regrouping


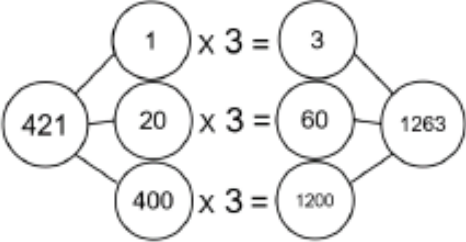
... groups of ... ones is ... ones.
I can regroup the ... ones into ... ten(s) and ... one(s).
... groups of ... tens is ... tens.
... ten(s) added to ... is
The product of ... and ... is

Multiplication

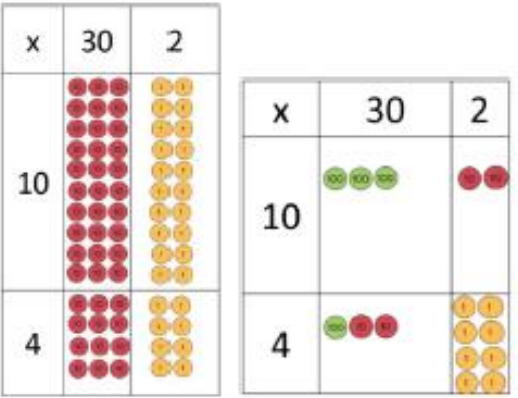
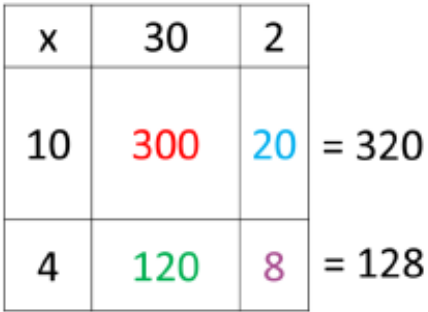


<p>Year 3</p>	<p>NC Statement: Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.</p> <p>Short multiplication – regrouping of tens and ones.</p>		Multiplication
<p>Concrete e.g. 27x5</p> 	<p>Pictorial e.g. 27x5</p> 	<p>Abstract e.g. 27x5</p> $ \begin{array}{r} 27 \\ \times 5 \\ \hline 135 \\ \hline 3 \end{array} $ <div style="background-color: #f4a460; border-radius: 10px; padding: 5px; text-align: center; margin: 10px 0;"> $27 \times 5 = 135$ </div> <p><i>“5 groups of 7 ones is 35 ones. I can regroup the 35 ones into 3 tens and 5 ones. 5 groups of 2 tens is 10 tens. 3 tens added to 10 tens is 13 tens. I can regroup the 13 tens into 1 hundred and 3 tens. The product of 27 x 5 is 135.”</i></p>	
<p>Vocabulary multiply/times # by #, # lots of # equals..., # groups of # equals..., repeated addition, product, multiplied by, array, regrouping</p> <p>... groups of ... ones is ... ones. I can regroup the ... ones into ... ten(s) and ... one(s). ... groups of ... tens is ... tens. ... ten(s) added to ... ten(s) is .. I can regroup the ... tens into ... hundred(s) and ... ten(s) The product of ... and ... is</p>			



<p>Year 4</p>	<p>NC Statement: Multiply 2-digit and 3-digit numbers by a one-digit number using formal written layout (short multiplication) Formal written multiplication with regrouping which generates a new column.</p>		Multiplication
<p>Concrete e.g. 421×3</p>  <p>...12 hundreds can be regrouped to one thousands and 2 hundreds...</p>	<p>Pictorial e.g. 421×3</p> 	<p>Abstract e.g. 421×3</p> $\begin{array}{r} 421 \\ \times \quad 3 \\ \hline 1263 \end{array}$ <div style="border: 1px solid #f4a460; border-radius: 10px; padding: 5px; display: inline-block; margin-top: 10px;"> $421 \times 3 = 1263$ </div>	
<p>Vocabulary multiply/times # by #, # lots of # equals..., # groups of # equals..., repeated addition, product, multiplied by, array, regrouping</p> <p>... groups of ... ones is ... ones. (Do I need to regroup?) ... groups of ... tens is ... tens. (Do I need to regroup?) ... groups of ... hundreds is ... hundreds. (Do I need to regroup?) (... hundreds can be regrouped to ... thousands and ... hundreds) The product of ... and ... is</p>			



<p>Year 5</p>	<p>NC Statement: 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. Expanded vertical multiplication 2-digit by 2-digit.</p>		Multiplication
<p>Concrete e.g. 32×14</p> 	<p>Pictorial e.g. 32×14</p>  <p>This grid method is another way to build the understanding of each part that needs multiplying in order to reach an answer.</p>	<p>Abstract e.g. 32×14</p> $ \begin{array}{r} 32 \\ \times 14 \\ \hline 8 \\ 120 \\ 300 \\ \hline 448 \end{array} $ <div style="border: 1px solid #f4a460; border-radius: 10px; padding: 5px; display: inline-block; margin: 10px 0;"> $32 \times 14 = 448$ </div> <p>E.g. 2 groups of 4 is 8, 30 groups of 4 (or 4 groups of 30) is 120 and so on...</p>	
<p>Vocabulary multiply/times # by #, # lots of # equals..., # groups of # equals..., repeated addition, product, multiplied by, array, regrouping, multiplier</p> <p>First, I need to consider the ones in the multiplier. ... groups of ... ones is ones. ... groups of ... tens is tens. (Do I need to regroup?) Then, tens in the multiplier. ... groups of ... ones is ones. (Do I need to regroup?) ... groups of ... tens is tens. (Do I need to regroup?) The total of all the partial products is The product of ... and ... is</p>			



<p>Year 5</p>	<p>NC Statement: 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</p> <p>Long multiplication 2-digit by 2-digit, focusing on regroup in first partial product</p>	Multiplication													
<p>Concrete e.g. 32×16</p>	<p>Pictorial</p> <table border="1" style="margin-bottom: 10px;"> <tr> <td>x</td> <td>30</td> <td>2</td> <td></td> </tr> <tr> <td>10</td> <td style="color: red;">300</td> <td style="color: red;">20</td> <td>= 320</td> </tr> <tr> <td>6</td> <td style="color: green;">180</td> <td style="color: green;">12</td> <td>= 192</td> </tr> </table> <div style="border: 1px solid black; background-color: #fff9c4; padding: 5px;"> <p>Where a regroup is required, children are encouraged to 'carry' on the line of the current calculation, as shown with $2 \times 6 = 12$.</p> <p>The addition regrouping is noted beneath as shown with $9 + 2 = 11$.</p> </div>		x	30	2		10	300	20	= 320	6	180	12	= 192	<p>Abstract</p> $ \begin{array}{r} 32 \\ \times 16 \\ \hline 192 \\ \underline{+ 320} \\ 512 \end{array} $ <p style="text-align: center; margin-top: 10px;"> $32 \times 16 = 512$ </p> <p>Children may identify the 0 as a 'place holder' on the red calculation line.</p>
x	30		2												
10	300	20	= 320												
6	180	12	= 192												
<p>Vocabulary multiply/times # by #, # lots of # equals..., # groups of # equals..., repeated addition, product, multiplied by, array, regrouping, multiplier</p> <p>First, I need to consider the ones in the multiplier. ... groups of ... ones is ... ones. (Do I need to regroup?) ... groups of ... tens is ... tens. (Any regroups to add? Do I need to regroup?) Then, considering tens in the multiplier. ... groups of ... ones is ... ones. (Do I need to regroup?) ... groups of ... tens is ... tens. (Do I need to regroup?) The total of all the partial products is The product of ... and ... is</p>															



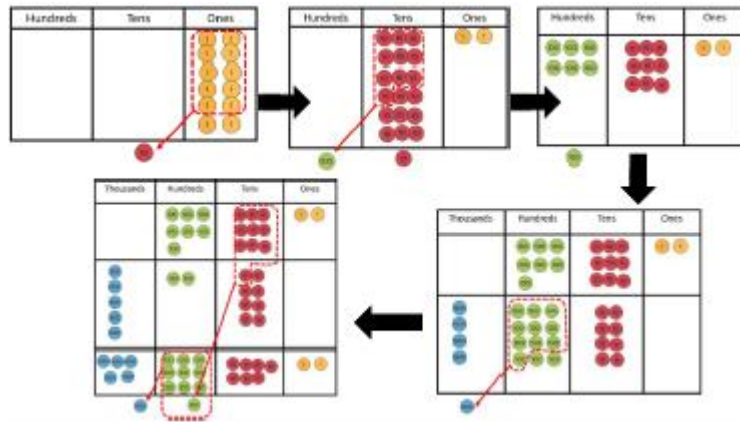
Year 5

NC Statement: 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

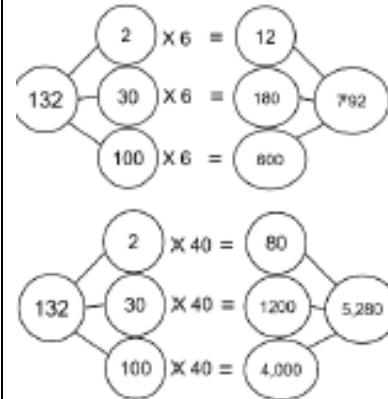
Long multiplication 3 or 4-digit by 2-digit regrouping in first and second stage

Concrete

e.g. 132×16



Pictorial



A grid method could also be used to support before the full abstract model is adopted.

Abstract

$$\begin{array}{r}
 132 \\
 \times 46 \\
 \hline
 792 \\
 \underline{5280} \\
 6072 \\
 \hline
 1 \quad 1
 \end{array}$$

$132 \times 46 = 6,072$

Multiplication

Vocabulary

multiply/times # by #, # lots of # equals..., # groups of # equals..., repeated addition, product, multiplied by, array, regrouping, multiplier

First, I need to consider the ones in the multiplier.
 ... groups of ... ones is ... ones. (Do I need to regroup?)
 ... groups of ... tens is ... tens. (Any regroups to add? Do I need to regroup?)
 Then, considering tens in the multiplier.
 ... groups of ... ones is ... ones. (Do I need to regroup?)
 ... groups of ... tens is ... tens. (Do I need to regroup?)
 The total of all the partial products is
 The product of ... and ... is



<p>Year 6</p>	<p>NC Statement: 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</p> <p>Formal written multiplication involving numbers with up to 2 decimal places multiplied by a 1-digit number</p>	Multiplication	
<p>Concrete e.g. 34.2×6</p> <p>Begin with the tenths: $2 \times 6 = 12$, then regroup 10 tenths into 1 one...</p>	<p>Pictorial Jottings: multiples of tricky multipliers</p> <p>6 12 18 24 30 36 42 48 54 60 66 72</p> <p>A 'Box of Knowledge' is a tool children use in multiplication and division.</p>		<p>Abstract</p> $\begin{array}{r} 34.2 \\ \times \quad 6 \\ \hline 205.2 \\ \underline{ 1} \end{array}$ <p>As with short division of whole numbers, the regroup is shown below.</p> <p>Children rehearse ensuring the decimal places in the multiplicand (top) and product (answer) line up, but the multiplier can be anywhere on the second line.</p>
<p>Vocabulary multiply/times # by #, # lots of # equals..., # groups of # equals..., repeated addition, product, multiplied by, array, regrouping, multiplier</p> <p>... groups of ... tenths is ... tenths. (Do I need to regroup?) ... groups of ... ones is ... ones. (Any regroup to add? Do I need to regroup?) ... groups of ... tens is ... tens. (Any regroup to add? Do I need to regroup?) The product of ... and ... is</p>			



Year 3

NC Statement: Write and calculate mathematical statements for division using the multiplication tables that they know, using mental and progressing to formal written methods.
Introducing the long division method (sharing ones)

Concrete
e.g. $13 \div 4 = 3 \text{ r}1$

Concrete

The remainder in this case is shown as 1 left out of the groups.

Pictorial
e.g. $13 \div 4 = 3 \text{ r}1$

Abstract
e.g. $13 \div 4 = 3 \text{ r}1$

In order for this abstract calculation strategy to be used effectively, children must first understand the concept of division as repeated subtraction, sharing and grouping (see Y2/Y3 Mental Maths Progression)

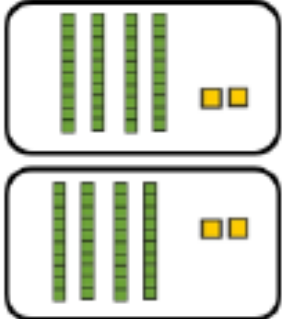
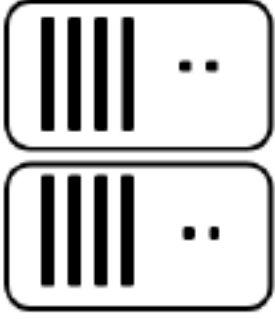
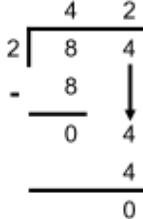
Vocabulary
divide, share, group, divided by, equal sharing, divisible by, remainder

I am sharing ... ones into ... equal groups.
There are ... ones in each group.
I have ... one(s) remaining.
The quotient is ... with ... remainders.

Division

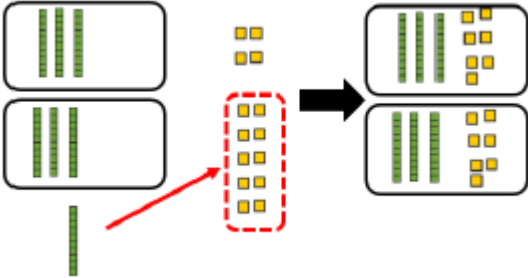
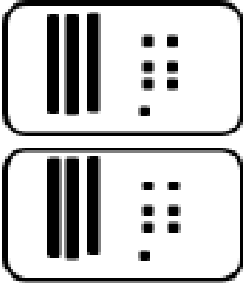
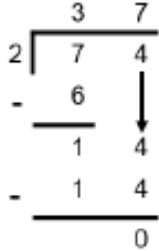


Maths Written Calculation Policy

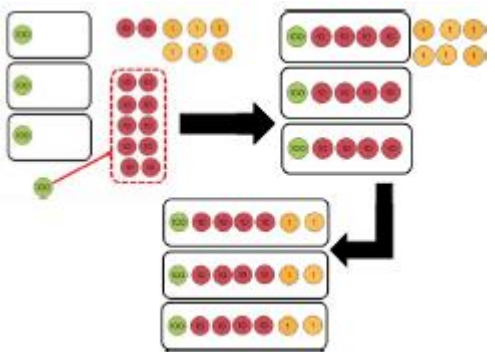
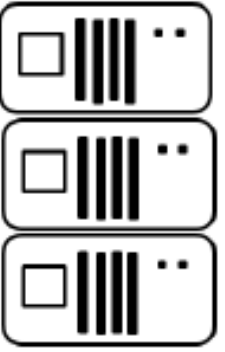
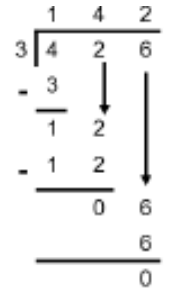
<p>Year 3</p>	<p>NC Statement: Write and calculate mathematical statements for division using the multiplication tables that they know, using mental and progressing to formal written methods. Long division of tens and ones with no regrouping (sharing structure)</p>		Division
<p>Concrete e.g. $84 \div 2$</p>  <p>84 shared into 2 equal groups</p>	<p>Pictorial e.g. $84 \div 2$</p> 	<p>Abstract e.g. $84 \div 2$</p>  <p style="background-color: #f0e6e6; padding: 5px; display: inline-block;">$84 \div 2 = 42$</p> <p><i>“First, I am sharing 8 tens into 2 equal groups. There are 4 tens in each group. I have zero tens remaining. Then, I am sharing 4 ones into 2 equal groups. There are 2 ones in each group. I have zero ones remaining. The quotient is 42 with no remainders.”</i></p>	
<p>Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient</p> <p>First, I am sharing ... tens into ... equal groups. There are ... tens in each group. I have ... ten(s) remaining. Then, I am sharing ... ones into ... equal groups. There are ... ones in each group. I have ... one(s) remaining. The quotient is ... with ... remainders.</p>			



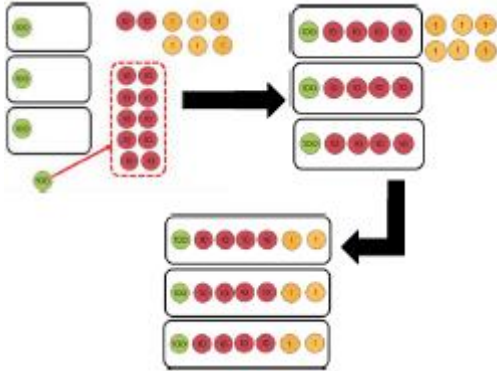
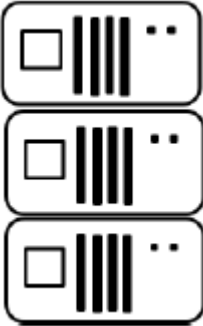
Maths Written Calculation Policy

<p>Year 3</p>	<p>NC Statement: Write and calculate mathematical statements for division using the multiplication tables that they know, using mental and progressing to formal written methods. Long division of tens and ones with regrouping (sharing structure)</p>		Division
<p>Concrete e.g. $74 \div 2$</p>  <p>74 shared into 2 equal groups requires regrouping the tens into 10 ones and then sharing equally.</p>	<p>Pictorial e.g. $74 \div 2$</p> 	<p>Abstract e.g. $74 \div 2$</p>  <p>... I have 1 ten remaining. I need to regroup the remaining 1 ten into 10 ones. I now have 14 ones in total..."</p> <div style="background-color: #f08080; padding: 5px; border-radius: 10px; display: inline-block; font-weight: bold; font-size: 1.2em;"> $74 \div 2 = 37$ </div>	
<p>Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient</p> <p>First, I am sharing ... tens into ... equal groups. There are ... tens in each group. I have ... ten(s) remaining. I need to regroup the remaining ... ten(s) into ... ones. I now have ... ones in total. Then, I am sharing ... ones into ... equal groups. There are ... ones in each group. I have ... one(s) remaining. The quotient is ... with ... remainders.</p>			

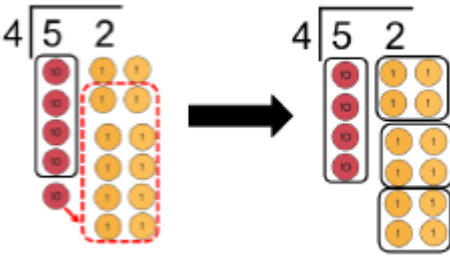
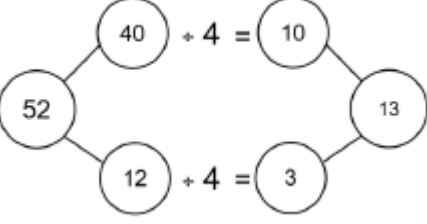
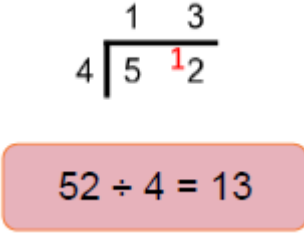


<p>Year 4</p>	<p>NC Statement: Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers (non-statutory guidance) Long division with regrouping hundreds into tens (sharing structure)</p>		Division
<p>Concrete e.g. $426 \div 3$</p>  <p>4 hundreds shared into 3 equal groups requires 1 hundred to be regrouped into 10 tens.</p>	<p>Pictorial e.g. $426 \div 3$</p> 	<p>Abstract e.g. $426 \div 3$</p>  <div style="background-color: #f08080; padding: 5px; border: 1px solid #ccc; display: inline-block; margin-top: 10px;"> $426 \div 3 = 142$ </div> <p><i>“First, I am sharing 4 hundreds into 3 equal groups. There is 1 hundred in each group. There is 1 hundred left over. I regroup 1 hundred into 10 tens. I now have 12 tens in total. I share 12 tens into 3 equal groups. There are 4 in each group...”</i></p>	
<p>Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient</p> <p>First, I am sharing ... hundreds into ... equal groups. There are ... hundreds in each group. I have ... hundred(s) remaining. I need to regroup the remaining ... hundreds into ...tens. I now have ... tens in total. Next, I am sharing ... tens into .. equal groups.</p>			



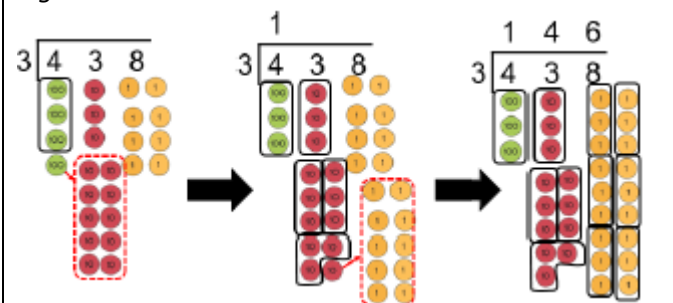
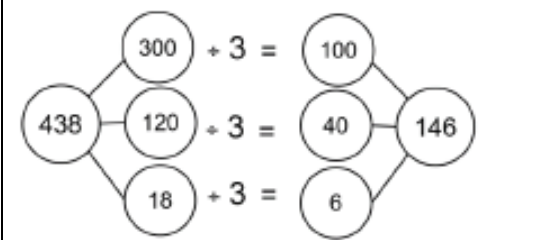
<p>Year 4</p>	<p>NC Statement: Pupils practise to become fluent in the formal written method of short division with exact answers (non-statutory guidance). Introducing formal short division (sharing structure)</p>		Division
<p>Concrete e.g. $426 \div 3$</p>  <p>1 hundred is regrouped into 10 tens.</p>	<p>Pictorial e.g. $426 \div 3$</p> 	<p>Abstract e.g. $426 \div 3$</p> $\begin{array}{r} 142 \\ 3 \overline{) 426} \\ \underline{3} \\ 12 \\ \underline{12} \\ 6 \\ \underline{6} \\ 0 \end{array}$ <div style="border: 1px solid black; background-color: #f08080; padding: 5px; display: inline-block; margin: 10px 0;"> $426 \div 3 = 142$ </div> <div style="border: 1px solid black; background-color: #fff9c4; padding: 5px; margin-top: 10px;"> <p>When the short division strategy is introduced, the children insert any regroupings as shown.</p> <p>The answer sits on top of the calculation.</p> </div> <p>“... 1 hundred is regrouped into 10 tens (shown in green) so that there are 12 tens in total. 12 tens shared into 3 groups gives 4 in each group (shown on top)...”</p>	
<p>Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient</p> <p>First, I am sharing ... hundreds into ... equal groups. There are ... hundreds in each group. I have ... hundred(s) remaining. I need to regroup the remaining ... hundreds into ... tens. I now have ... tens in total. Next, I am sharing ... tens into .. equal groups.</p>			



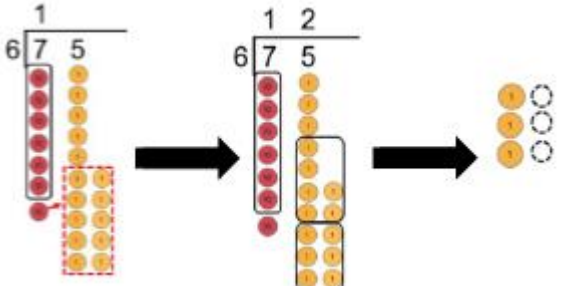
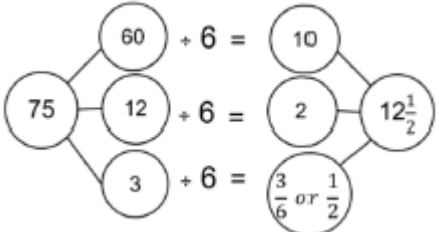
Year 5	NC Statement: Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context. Introducing formal short division regroup from tens to ones (grouping structure)	
Concrete e.g. $52 \div 4$  <i>“How many groups of 4 are in 52? By regrouping a ten, we can see there is one group of tens and 3 groups of ones, so our answer is 13.”</i>	Pictorial e.g. $52 \div 4$ 	Abstract e.g. $52 \div 4$  $52 \div 4 = 13$ This thinking progresses to “How many 4s in 52?”
Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient, divisor, dividend How many ... are in ...?		

Division

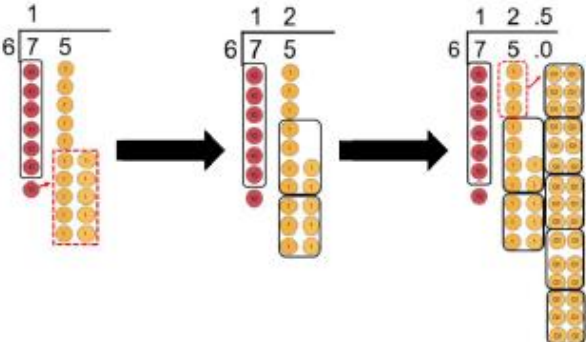
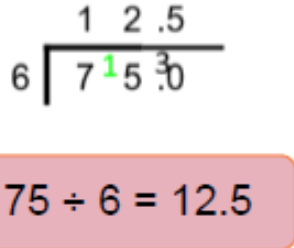


<p>Year 5</p>	<p>NC Statement: Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context. Short division for numbers up to 4-digits (grouping structure)</p>		Division
<p>Concrete e.g. $438 \div 3$</p>  <p><i>“There is 1 group of hundreds without regrouping, 4 groups of tens and 6 groups of ones with no remainder”</i></p>	<p>Pictorial e.g. $438 \div 3$</p> 	<p>Abstract e.g. $438 \div 3$</p> $\begin{array}{r} 146 \\ 3 \overline{) 438} \end{array}$ <div style="border: 1px solid black; border-radius: 10px; padding: 5px; display: inline-block; margin: 10px 0;"> $438 \div 3 = 146$ </div> <p>This progresses to “How many 3s are in 438?”</p>	
<p>Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient, divisor, dividend</p> <p>How many ... are in ...</p>			

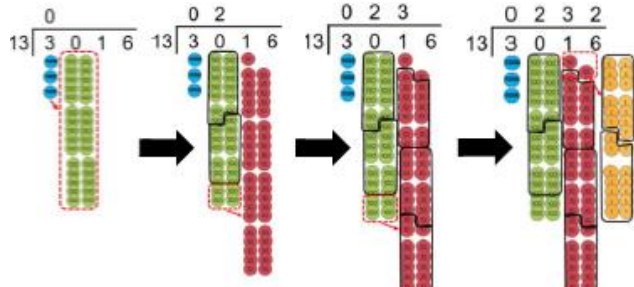
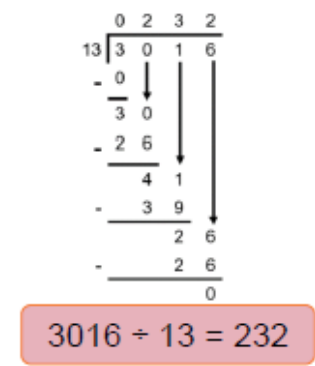


<p>Year 5</p>	<p>NC Statement: Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context. Short division (grouping structure) - expressing quotients with fractions</p>		Division
<p>Concrete e.g. $75 \div 6$</p> 	<p>Pictorial e.g. $75 \div 6$</p> 	<p>Abstract e.g. $75 \div 6$</p> $6 \overline{) 75} \begin{matrix} 12 \\ \underline{72} \\ 3 \end{matrix} \frac{1}{2}$ <div style="background-color: #f08080; padding: 5px; display: inline-block; border-radius: 10px;"> $75 \div 6 = 12\frac{1}{2}$ </div> <p><i>"I have a remainder of 3. This is 3 out of 6 which I need for another group. This can be written as a fraction $\frac{3}{6}$. This can be simplified to $\frac{1}{2}$."</i></p>	
<p>Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient, divisor, dividend</p> <p>I have a remainder of This is ... (remainder) out of ... (divisor) which I need for another group. This can be written as a fraction... . This can be simplified to... .</p>			



<p>Year 5</p>	<p>NC Statement: 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. Short division (grouping structure) - expressing quotients with decimals</p>		Division
<p>Concrete e.g. $75 \div 6$</p>  <p><i>"I have a remainder of 3. I need to regroup the 3 ones into 30 tenths. How many groups of 6 tenths are in 30 tenths, without regrouping? I can make 5 groups of 6 tenths. There are 12.5 groups of 6 in 75."</i></p>	<p>Pictorial e.g. $75 \div 6$</p> <p><i>Jottings: multiples of the divisor</i></p> <ul style="list-style-type: none"> 6 12 18 24 30 36 42 48 54 60 	<p>Abstract e.g. $75 \div 6$</p>  <p><i>"How many 6s in 75?"</i></p>	
<p>Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient, divisor, dividend</p> <p>I have a remainder of I need to regroup the ... ones into ... tenths. How many groups of ... tenths are in ... tenths, without regrouping? I can make ... group(s) of ... tenths. There are ... groups of ... in</p>			



Year 6	NC Statement: 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 Long division for numbers up to 4 digits		Division								
<p>Concrete e.g. $3016 \div 13$</p>  <p><i>“How many groups of 13 thousands are in 3 thousand, without regrouping?” I can make zero groups of 13 thousand. There are 3 thousand remaining. I need to regroup the 3 thousands into 30 hundreds.”</i></p>	<p>Pictorial e.g. $3016 \div 13$</p> <p><i>Jottings: multiples of the divisor</i></p> <table style="margin-left: 20px;"> <tr><td>13</td></tr> <tr><td>26</td></tr> <tr><td>39</td></tr> <tr><td>52</td></tr> <tr><td>65</td></tr> <tr><td>78</td></tr> <tr><td>91</td></tr> <tr><td>104</td></tr> </table>	13		26	39	52	65	78	91	104	<p>Abstract e.g. $3016 \div 13$</p>  <p><i>“How many 13s in 3016?”</i></p>
13											
26											
39											
52											
65											
78											
91											
104											
<p>Vocabulary divide, share, group, divided by, equal sharing, equal groups, divisible by, remainder, quotient, divisor, dividend</p> <p>How many ... are in ...</p>											



Maths Written Calculation Policy

Appendix A: Strategies for four operations (in children's planners)

Examples of formal written methods for addition, subtraction, multiplication and division.

Addition and Subtraction

789 + 642 becomes

$$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \hline 1 \quad 1 \end{array}$$

Answer: 1431

874 - 523 becomes

$$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \end{array}$$

Answer: 351

932 - 457 becomes

$$\begin{array}{r} \overset{8}{9} \overset{12}{3} \overset{1}{2} \\ - 457 \\ \hline 475 \end{array}$$

Answer: 475

Short Division

98 ÷ 7 becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 86 \text{ r}2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$\begin{array}{r} 45 \text{ r}1 \\ 11 \overline{) 496} \\ \underline{44} \\ 56 \\ \underline{55} \\ 1 \end{array}$$

Answer: 45 $\frac{1}{11}$

Short multiplication

24 × 6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ \hline 2 \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ \hline 2 \quad 1 \end{array}$$

Answer: 2394

2741 × 6 becomes

$$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ \hline 4 \quad 2 \end{array}$$

Answer: 16 446

Long Division

432 ÷ 15 becomes

$$\begin{array}{r} 28 \text{ r}12 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r} 28 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

$$\frac{12}{15} = \frac{4}{5}$$

Answer: 28 $\frac{4}{5}$

432 ÷ 15 becomes

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

Answer: 28.8

Long Multiplication

24 × 16 becomes

$$\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ 240 \\ \hline 384 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$$

Answer: 3224

		6	3	2	1
x				1	5
	3	1	6	0	5
+	6	3	2	1	0
	9	4	8	1	5

A Box of Knowledge can be written including the 1x,2x,5x,10x facts to help each step.