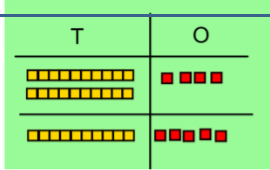
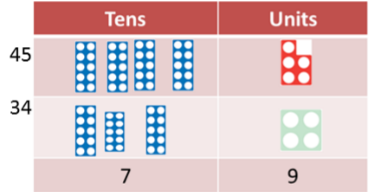
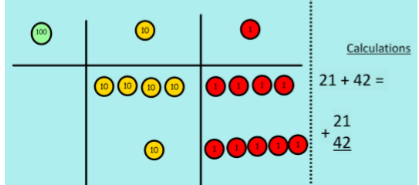
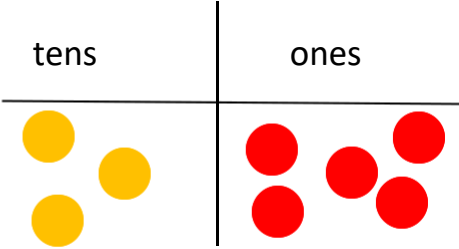
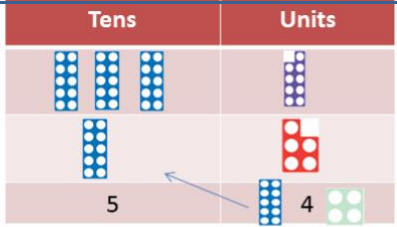
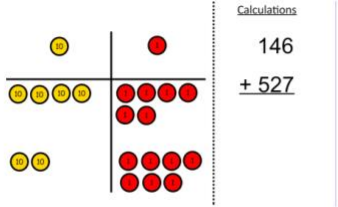
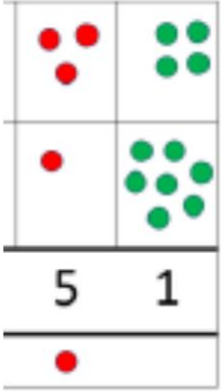


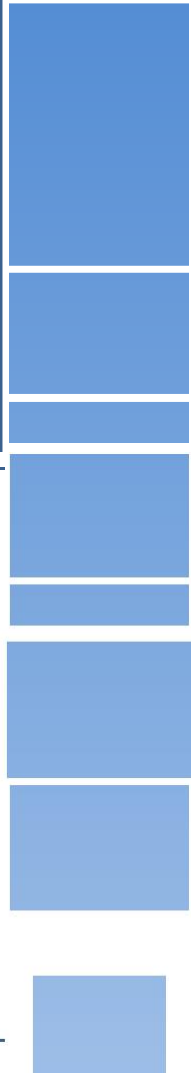


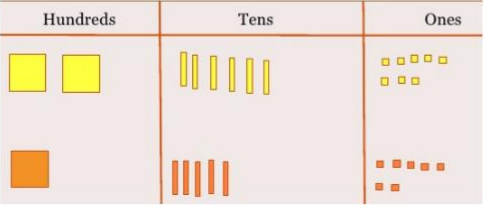
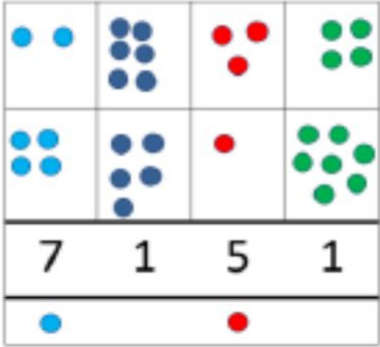
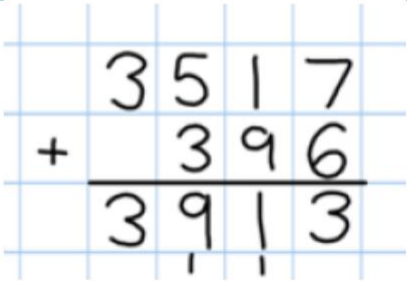
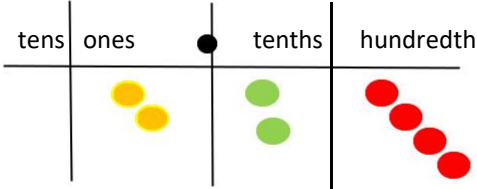
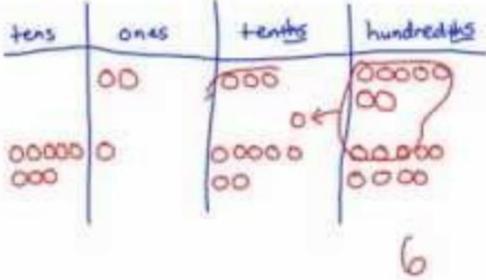
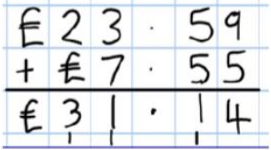
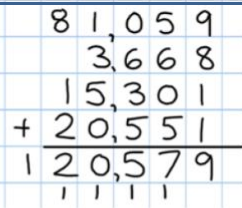
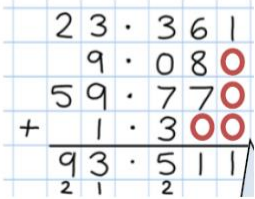
# s C of E Primary School Calculation Policy



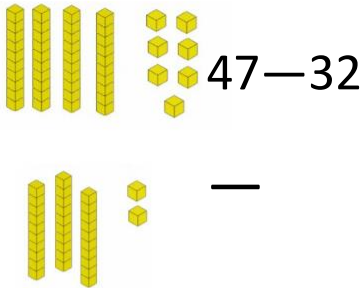
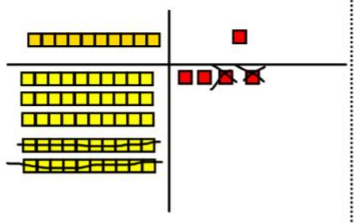
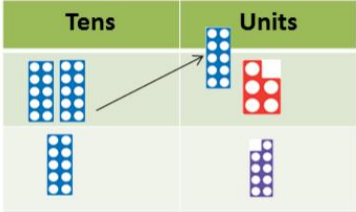
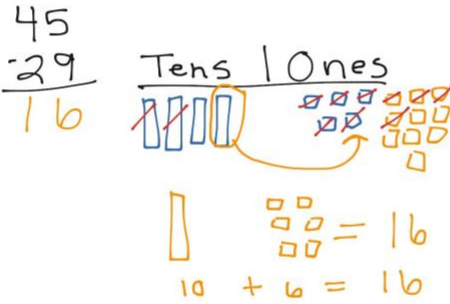
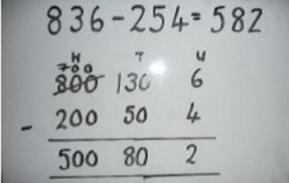
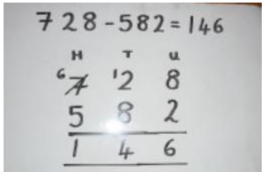
This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added.  
It is a working document and will be revised and amended as necessary.

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Column Addition—no regrouping (friendly numbers)</p> <p>Add two or three 2 or 3-digit numbers.</p>	<p>Model using Dienes or Numicon</p>  <p>Add together the ones first, then the tens.</p>   <p>Move to using place value counters</p>	<p>Children move to drawing the counters using a tens and one frame.</p> 	$\begin{array}{r} 223 \\ +114 \\ \hline 337 \end{array}$ <p>Add the ones first, then the tens, then the hundreds.</p>
<p>Column Addition with regrouping.</p>	 <p>Exchange ten ones for a ten. Model using Numicon and pv counters.</p> 	<p>Children can draw a representation of the grid to further support their understanding, carrying the ten <b>underneath</b> the line</p> 	$\begin{array}{r} 34 \\ +19 \\ \hline 13 \\ \underline{40} \\ 53 \end{array}$ <p>13 (4 + 9) ones 40 (30 + 10) tens 53</p> <p>Start by using the expanded column method, first partitioning the ones, then the tens. then add them together.</p> <p>Then move onto compact column method.</p> $\begin{array}{r} 34 \\ +19 \\ \hline 13 \\ \underline{40} \\ 53 \end{array} \quad \text{then} \quad \begin{array}{r} 34 \\ +19 \\ \hline 53 \\ 1 \end{array}$

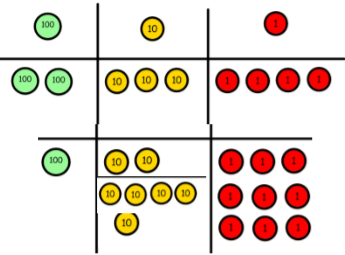
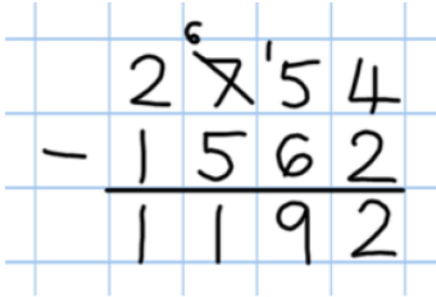
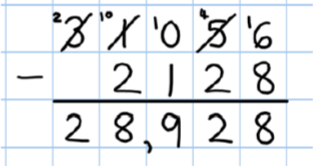
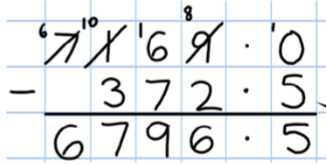
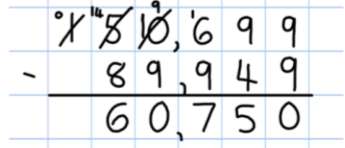
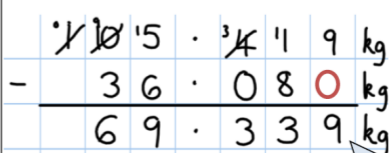


Objective & Strategy	Concrete	Pictorial	Abstract
<p>Y4—add numbers with up to 4 digits</p>	<p>Children continue to use dienes or pv counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.</p> 	 <p>Draw representations using pv grid.</p>	 <p>Continue from previous work to carry hundreds as well as tens. Relate to money and measures.</p>
<p>Y5—add numbers with more than 4 digits.</p> <p>Add decimals with 2 decimal places, including money.</p>	<p>As year 4</p>  <p>Introduce decimal place value counters and model exchange for addition.</p>	<p>2.37 + 81.79</p> 	<p>72.8</p> $\begin{array}{r} + 54.6 \\ \hline 127.4 \\ 11 \end{array}$ 
<p>Y6—add several numbers of increasing complexity</p> <p>Including adding money, measure and decimals with different numbers of decimal points.</p>	<p>As Y5</p>	<p>As Y5</p>	 <p>Insert zeros for place holders.</p> 



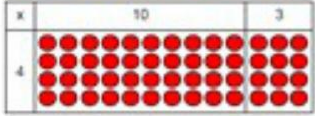
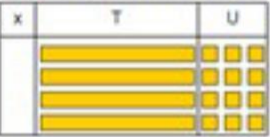
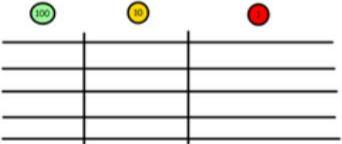
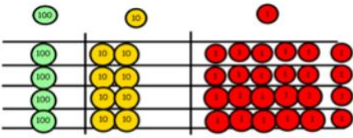
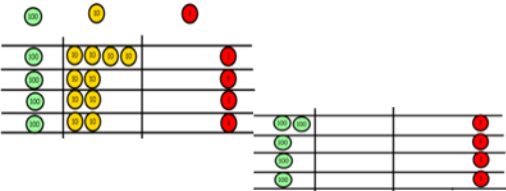
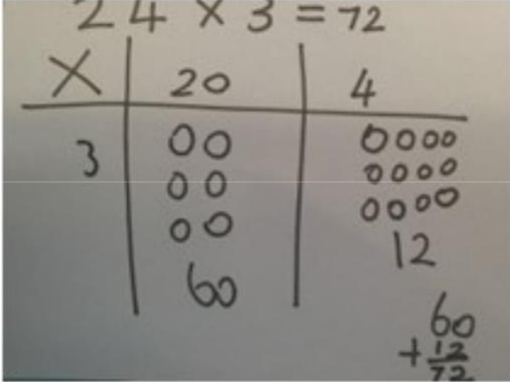
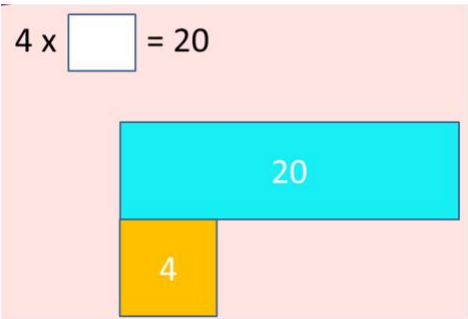
Objective & Strategy	Concrete	Pictorial	Abstract
<p>Column subtraction without regrouping (friendly numbers)</p>	 <p>47—32</p> <p>Use base 10 or Numicon to model</p>	 <p>Calculations</p> $\begin{array}{r} 54 \\ - 22 \\ \hline 32 \end{array}$ <p>Darw representations to support understanding</p>	$\begin{array}{r} 47 \\ - 32 \\ \hline 15 \end{array}$ <p>5 (7 - 2) ones 10 (40 - 30) tens 15</p> <p>Start by using the expanded column method, partition and subtract the ones, then the tens.</p> <p>Then move onto compact column method.</p> $\begin{array}{r} 47 \\ - 32 \\ \hline 15 \end{array} \quad \text{then} \quad \begin{array}{r} 47 \\ - 32 \\ \hline 15 \end{array}$
<p>Column subtraction with regrouping</p>	 <p>Begin with base 10 or Numicon. Move to pv counters, modelling the exchange of a ten into tten ones. Use the phrase 'take and make' for exchange.</p>	 <p>Children may draw base ten or PV counters and cross off.</p>	 <p>Begin by partitioning into pv columns</p>  <p>Then move to formal method.</p>

# Y3 SUBTRACTION -

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Subtracting tens and ones</p> <p>Year 4 subtract with up to 4 digits.</p> <p><i>Introduce decimal subtraction through context of money</i></p>	<p>234 - 179</p>  <p>Model process of exchange using Numicon, base ten and then move to PV counters.</p>	<p>Children to draw pv counters and show their exchange—see Y3</p>	 <p>Use the phrase 'take and make' for exchange</p>
<p>Year 5- Subtract with at least 4 digits, including money and measures.</p> <p><i>Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal</i></p>	<p>As Year 4</p>	<p>Children to draw pv counters and show their exchange—see Y3</p>	 <p>Use zeros for place-holders.</p> 
<p>Year 6—Subtract with increasingly large and more complex numbers and decimal values.</p>			 

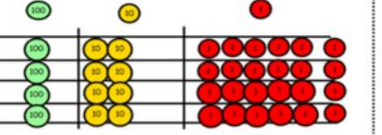
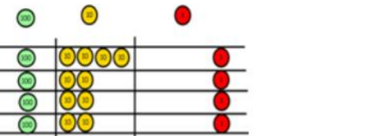
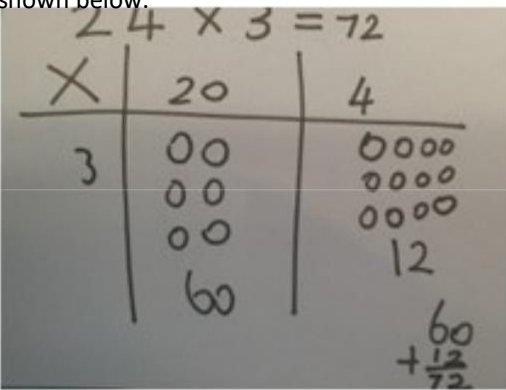
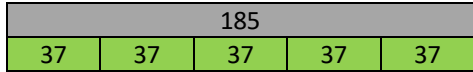
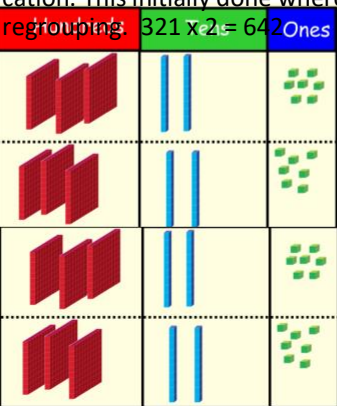
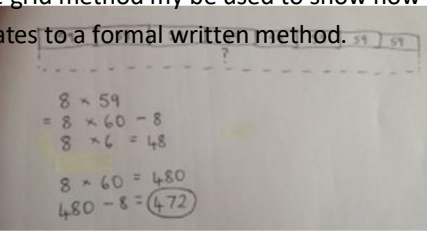

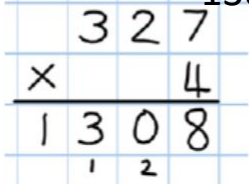
Y4-6  
SUBTRACTION -

# Y3 MULTIPLICATION X

Objective & Strategy	Concrete	Pictorial	Abstract						
<p>Grid method</p>	<p>Show the links with arrays to first introduce the grid method.</p>  <p>4 rows of 10 4 rows of 3</p> <p>Move onto base ten to move towards a more compact method.</p>  <p>4 rows of 13</p> <p>Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows</p>  <p>Calculations 4 x 126</p> <p>Fill each row with 126</p>  <p>Calculations 4 x 126</p> <p>Add up each column, starting with the ones making any exchanges needed</p>  <p>Then you have your answer.</p>	<p>Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below.</p>  <p>Bar model are used to explore missing numbers</p> 	<p>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <table border="1" data-bbox="1552 368 1883 467"> <tr> <td>x</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>210</td> <td>35</td> </tr> </table> <p>use the expanded column method</p> $\begin{array}{r} 37 \\ \times 5 \\ \hline 185 \end{array}$ <p>37 (5 x 7) first, multiply the ones by 5 150 (5 x 30) then, multiply the tens by 5 185</p> <p>Then compact column method</p> $\begin{array}{r} 37 \\ \times 5 \\ \hline 150 \\ \hline 185 \end{array}$ <p>Finally</p> $\begin{array}{r} 37 \\ \times 5 \\ \hline 185 \\ 3 \end{array}$	x	30	5	7	210	35
x	30	5							
7	210	35							



# Y4 MULTIPLICATION X

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Grid method recap from year 3 for 2 digits x 1 digit</p> <p>Move to multiplying 3 digit numbers by 1 digit. (year 4 expectation)</p>	<p>Use place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows</p>  <p>Calculations 4 x 126</p> <p>Fill each row with 126</p>  <p>Add up each column, starting with the ones making any exchanges needed</p>	<p>Children can represent their work with place value counters in a way that they understand.</p> <p>They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below.</p> 	<p>Use the compact column method</p> $\begin{array}{r} 37 \\ \times 5 \\ \hline 185 \end{array}$ <p>Then</p> $\begin{array}{r} 37 \\ \times 5 \\ \hline 185 \end{array}$ <p><b>PICTORIAL – BAR MODEL</b></p> 
<p>Column multiplication</p>	<p>Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. <math>321 \times 2 = 642</math> Ones</p>  <p>It is important at this stage that they always multiply the ones first.</p>	<p>The grid method may be used to show how this relates to a formal written method.</p>  <p>Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.</p>	 $\begin{array}{r} 327 \\ \times 4 \\ \hline 1308 \end{array}$ <p>This may lead to a compact method.</p> 

# Y5-6 MULTIPLICATION X

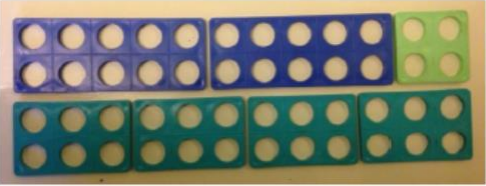

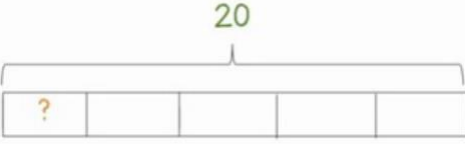
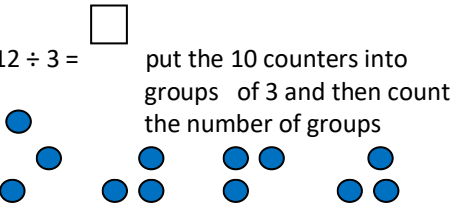
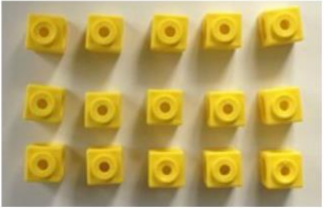
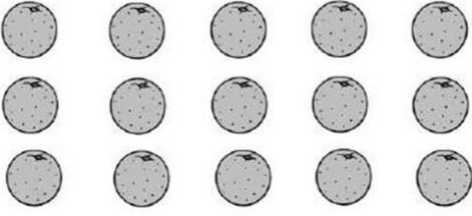
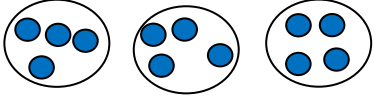
Objective & Strategy	Concrete	Pictorial	Abstract																																															
<p>Column Multiplication for 3 and 4 digits x 1 digit.</p>	<div style="display: flex; align-items: center;"> <table border="1" style="margin-right: 10px;"> <tr> <th style="background-color: #ff0000; color: white;">Hundreds</th> <th style="background-color: #00ff00; color: white;">Tens</th> <th style="background-color: #0000ff; color: white;">Ones</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <div style="font-size: small;"> <p>It is important at this stage that they always multiply the ones first.</p> <p>Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. <math>321 \times 2 = 642</math></p> </div> </div>	Hundreds	Tens	Ones													<div style="display: flex; align-items: center; margin-bottom: 10px;"> <table border="1" style="margin-right: 10px;"> <tr> <td>x</td> <td>300</td> <td>20</td> <td>7</td> </tr> <tr> <td>4</td> <td>1200</td> <td>80</td> <td>28</td> </tr> </table> <span style="font-size: 2em; color: red;">→</span> </div> <p><b>Bar Model</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="4" style="background-color: #cccccc; text-align: center;">1308</td> </tr> <tr> <td style="background-color: #00ff00;">327</td> <td style="background-color: #00ff00;">327</td> <td style="background-color: #00ff00;">327</td> <td style="background-color: #00ff00;">327</td> </tr> </table>	x	300	20	7	4	1200	80	28	1308				327	327	327	327	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Use the expanded column method with brackets</p> <math display="block">\begin{array}{r} 327 \\ \times 4 \\ \hline 28(7 \times 4) \\ 80(20 \times 4) \\ \underline{1200(300 \times 4)} \\ 1308 \end{array}</math> <p style="text-align: center; color: red;">↓</p> <p>then do without the brackets</p> </div> <div style="width: 45%;"> <p>Finally compact method</p> <math display="block">\begin{array}{r} 327 \\ \times 4 \\ \hline 1308 \\ 12 \end{array}</math> </div> </div>																
Hundreds	Tens	Ones																																																
x	300	20	7																																															
4	1200	80	28																																															
1308																																																		
327	327	327	327																																															
<p>Column multiplication</p>	<p>Manipulatives may still be used with the corresponding long multiplication modelled alongside.</p>	<div style="display: flex; align-items: center; margin-bottom: 10px;"> <table border="1" style="margin-right: 10px;"> <tr> <td></td> <td style="text-align: center;">10</td> <td style="text-align: center;">8</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="background-color: #ff0000; color: white; text-align: center;">100</td> <td style="background-color: #ff0000; color: white; text-align: center;">80</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="background-color: #ff0000; color: white; text-align: center;">30</td> <td style="background-color: #ff0000; color: white; text-align: center;">24</td> </tr> </table> <span style="font-size: 2em; color: red;">→</span> </div> <p>Continue to use bar modelling to support problem solving</p>		10	8	10	100	80	3	30	24	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">8</td> </tr> <tr> <td style="text-align: center;">x</td> <td style="text-align: center;">1</td> <td style="text-align: center;">3</td> </tr> <tr> <td></td> <td style="text-align: center;">5</td> <td style="text-align: center;">4</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">8</td> </tr> <tr> <td></td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> </tr> <tr> <td></td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> </tr> </table> </div> <div style="width: 45%;"> <p>18 x 3 on the first row</p> <p>(8 x 3 = 24, carrying the 2 for 20, then 1 x 3)</p> <p>18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in units first</p> </div> </div> <div style="margin-top: 10px;"> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> <tr> <td>x</td> <td></td> <td>1</td> <td>6</td> </tr> <tr> <td></td> <td>7</td> <td>4</td> <td>0</td> </tr> <tr> <td></td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td>1</td> <td>9</td> <td>7</td> </tr> </table> <p style="font-size: small; margin-left: 100px;">(1234 x 6)</p> <p style="font-size: small; margin-left: 100px;">(1234 x 10)</p> </div>		1	8	x	1	3		5	4		1	8		2	3		2	3	1	2	3	4	x		1	6		7	4	0		1	2	3		1	9	7
	10	8																																																
10	100	80																																																
3	30	24																																																
	1	8																																																
x	1	3																																																
	5	4																																																
	1	8																																																
	2	3																																																
	2	3																																																
1	2	3	4																																															
x		1	6																																															
	7	4	0																																															
	1	2	3																																															
	1	9	7																																															



Objective & Strategy	Concrete	Pictorial	Abstract
<p>Multiplying decimals up to 2 decimal places by a single digit.</p>			<p>Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.</p> $  \begin{array}{r}  3.19 \\  \times 8 \\  \hline  25.52  \end{array}  $

# Y6 MULTIPLICATION X

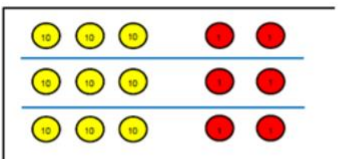
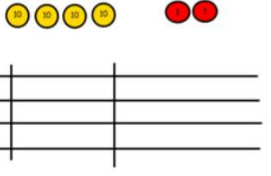

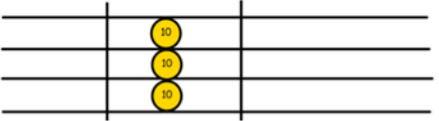
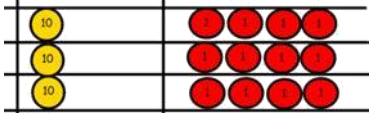
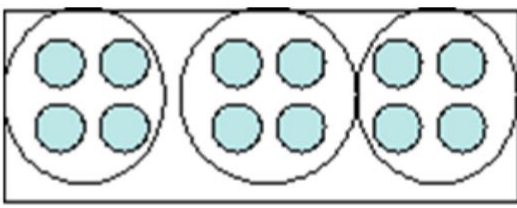
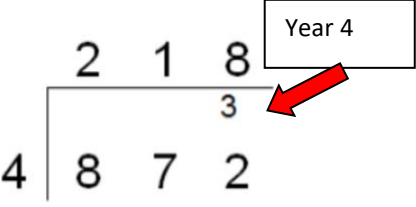
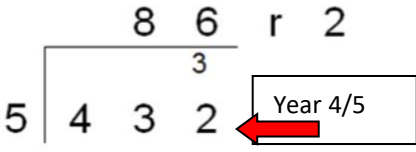
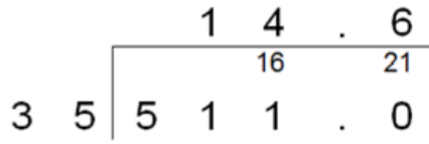
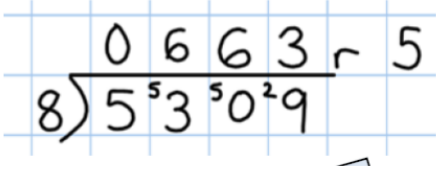
**Y3**  
**23**  
**DIVISION**  
**÷**

Objective & Strategy	Concrete	Pictorial	Abstract
Division as grouping	Use cubes, counters, objects or place value counters to aid understanding.  24 divided into groups of 6 = 4 $96 \div 3 = 32$ 	Continue to use bar modelling to aid solving division problems.  $20 \div 5 = ?$ $5 \times ? = 20$ $12 \div 3 = \square$ put the 10 counters into groups of 3 and then count the number of groups 	How many groups of 6 in 24? $24 \div 6 = 4$
Division with arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$	Draw an array and use lines to split the array into groups to make multiplication and division sentences  Division by sharing – make 3 equal groups $12 \div 3 = \square$ 	Find the inverse of multiplication and division sentences by creating eight linking number sentences. $7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$ <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <u>Bus stop method</u>  <math display="block">4 \overline{) 24} \begin{array}{r} 6 \\ 24 \\ \underline{24} \\ 0 \end{array}</math> </div>

Y4-6

Y4-6

# DIVISION

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Divide at least 3 digit numbers by 1 digit.</p> <p>Short Division</p>	<p>96÷3</p> <p>Tens      Units</p> <p>3            2</p>  <p>Use place value counters to divide using the bus stop method alongside</p>  <p>Calculations 42 ÷ 3</p> <p>42÷3=</p> <p>Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.</p>   <p>We exchange this ten for ten ones and then share the ones equally among the groups.</p>  <p>We look how much in 1 group so the answer is 14.</p>	<p>Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.</p>  <p>Encourage them to move towards counting in multiples to divide more efficiently.</p>	<p>Begin with divisions that divide equally with no remainder.</p>  <p>Move onto divisions with a remainder.</p>  <p>Finally move into decimal places to divide the total accurately.</p>  

## Long Division

Step 1—a remainder in the ones

$$\begin{array}{r} \text{h t o} \\ 041\text{R}1 \\ \hline 4 \overline{) 165} \end{array}$$

4 does not go into 1 (hundred). So combine the 1 hundred with the 6 tens (160).

4 goes into 16 four times.

4 goes into 5 once, leaving a remainder of 1.

$$\begin{array}{r} \text{th h t o} \\ 0400\text{R}7 \\ \hline 8 \overline{) 3207} \end{array}$$

8 does not go into 3 of the thousands. So combine the 3 thousands with the 2 hundreds (3,200).

8 goes into 32 four times ( $3,200 \div 8 = 400$ )

8 goes into 0 zero times (tens).

8 goes into 7 zero times, and leaves a remainder of 7.

Y6  
18

**DIVISION** ÷

## Long Division

Step 1 continued...

$$\begin{array}{r}
 \text{h t o} \\
 061 \\
 4 \overline{) 247} \\
 \underline{-4} \\
 3
 \end{array}$$

When dividing the ones, 4 goes into 7 one time. Multiply  $1 \times 4 = 4$ , write that four under the 7, and subtract. This finds us the remainder of 3.

Check:  $4 \times 61 + 3 = 247$

$$\begin{array}{r}
 \text{th h t o} \\
 0402 \\
 4 \overline{) 1609} \\
 \underline{-8} \\
 1
 \end{array}$$

When dividing the ones, 4 goes into 9 two times. Multiply  $2 \times 4 = 8$ , write that eight under the 9, and subtract. This finds us the remainder of 1.

Check:  $4 \times 402 + 1 = 1,609$

# Y6

# 9

# DIVISION

# ÷

# Long Division

# Y6 DIVISION ÷

Step 2—a remainder in the tens

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
$\begin{array}{r} \text{t o} \\ 2 \phantom{0} \\ 2 \overline{)58} \end{array}$ <p>Two goes into 5 two times, or 5 tens <math>\div 2 = 2</math> whole tens -- but there is a remainder!</p>	$\begin{array}{r} \text{t o} \\ 2 \phantom{0} \\ 2 \overline{)58} \\ -4 \phantom{0} \\ \hline 1 \phantom{0} \end{array}$ <p>To find it, multiply <math>2 \times 2 = 4</math>, write that 4 under the five, and subtract to find the remainder of 1 ten.</p>	$\begin{array}{r} \text{t o} \\ 29 \phantom{0} \\ 2 \overline{)58} \\ -4 \phantom{0} \downarrow \\ \hline 18 \end{array}$ <p>Next, drop down the 8 of the ones next to the leftover 1 ten. You combine the remainder ten with 8 ones, and get 18.</p>

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
$\begin{array}{r} \text{t o} \\ 29 \phantom{0} \\ 2 \overline{)58} \\ -4 \phantom{0} \\ \hline 18 \end{array}$ <p>Divide 2 into 18. Place 9 into the quotient.</p>	$\begin{array}{r} \text{t o} \\ 29 \phantom{0} \\ 2 \overline{)58} \\ -4 \phantom{0} \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>Multiply <math>9 \times 2 = 18</math>, write that 18 under the 18, and subtract.</p>	$\begin{array}{r} \text{t o} \\ 29 \phantom{0} \\ 2 \overline{)58} \\ -4 \phantom{0} \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>The division is over since there are no more digits in the dividend. The quotient is 29.</p>



## Long Division

Step 2—a remainder in any of the place values

Y6

9

DIVISION

