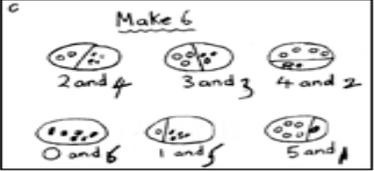
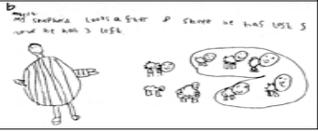
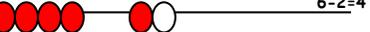
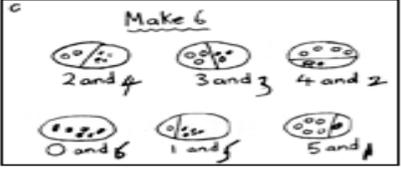
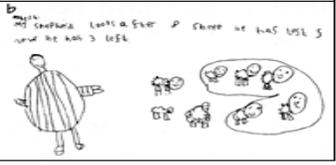


**Caversham Primary School  
Mathematics Calculation Policy  
2018**

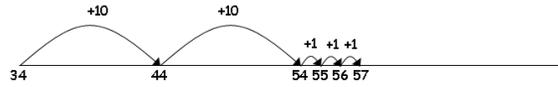
	Addition	Subtraction	Multiplication	Division
Reception	<p>Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc.</p>  <p>Bead strings or bead bars can be used to illustrate addition</p>  <p><math>8 + 2 = 10</math></p> <p>They use numberlines and practical resources to support calculation and teachers demonstrate the use of the numberline.</p>	<p>Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures etc.</p>  <p>Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.</p>  <p><math>6 - 2 = 4</math></p> <p>They use numberlines and practical resources to support calculation. Teachers demonstrate the use of the numberline.</p>	<p>Children will experience equal groups of objects.</p> <p>They will count in 2s and 10s and begin to count in 5s.</p> <p>They will work on practical problem solving activities involving equal sets or groups.</p> 	<p>Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.</p> 
Year 1	<p>Using pictures</p>  <p>Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.</p>  <p><math>8 + 5 = 13</math></p> <p>They use numberlines and practical resources to support calculation and teachers demonstrate the use of the numberline.</p> <p>Children then begin to use numbered lines to support their own calculations using a numbered line to count on in ones.</p> <p>Pupils to use the 100 square to +10/20 etc</p>	<p>Using pictures</p>  <p>Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.</p>  <p><math>13 - 5 = 8</math></p> <p>Children then begin to use numbered lines to support their own calculations - using a numbered line to count back in ones.</p> <p>The number line should also be used to show that 6 - 3 means the 'difference between 6 and 3' or 'the difference between 3 and 6' and how many jumps they are apart.</p> <p>Pupils to recognise MIND THE GAP SUMS e.g 54-49= (count on from 49 to 54) and SPIDER SUMS 54-3= (count back 3).</p> <p>Pupils to use the 100 square to -10/20 etc</p>	<p>Children will experience equal groups of objects.</p> <p>They will count in 2s and 10s and begin to count in 5s.</p> <p>They will work on practical problem solving activities involving equal sets or groups.</p> 	<p>Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.</p> 

### Addition

Children will begin to use 'empty number lines' themselves starting with the larger number and counting on.

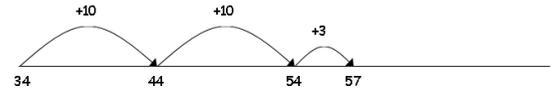
- ✓ First counting on in tens and ones.

$34 + 23 = 57$



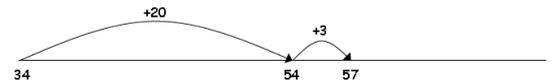
- ✓ Then helping children to become more efficient by adding the units in one jump (by using the known fact  $4 + 3 = 7$ ).

$34 + 23 = 57$



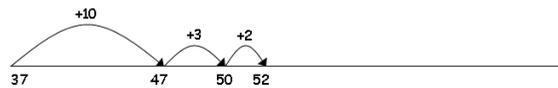
- ✓ Followed by adding the tens in one jump and the units in one jump.

$34 + 23 = 57$



- ✓ Bridging through ten can help children become more efficient.

$37 + 15 = 52$



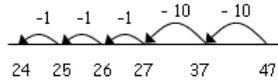
Use of the 100 square to +11 +21 etc by moving down and then along.

### Subtraction

Children will begin to use empty number lines to support calculations.

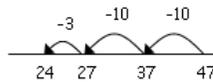
- Counting back:  
✓ First counting back in tens and ones.

$47 - 23 = 24$



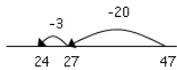
- ✓ Then helping children to become more efficient by subtracting the units in one jump (by using the known fact  $7 - 3 = 4$ ).

$47 - 23 = 24$



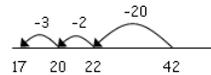
- ✓ Subtracting the tens in one jump and the units in one jump.

$47 - 23 = 24$



- ✓ Bridging through ten can help children become more efficient.

$42 - 25 = 17$



Counting on:

The number line should still show 0 so children can cross out the section from 0 to the smallest number. They then associate this method with 'taking away'.

Use of the 100 square to -11 -21 etc by moving up and then along.

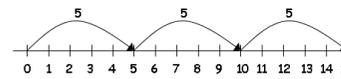
### Multiplication

Children will develop their understanding of multiplication and use jottings to support calculation:

- ✓ Repeated addition  
3 times 5 is  $5 + 5 + 5 = 15$  or 3 lots of 5 or  $5 \times 3$

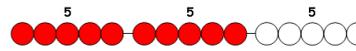
Repeated addition can be shown easily on a number line:

$5 \times 3 = 5 + 5 + 5$

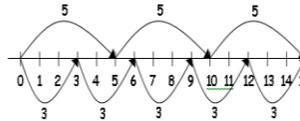


and on a bead bar:

$5 \times 3 = 5 + 5 + 5$



- ✓ Commutativity  
Children should know that  $3 \times 5$  has the same answer as  $5 \times 3$ . This can also be shown on the number line.



- ✓ Arrays  
Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.

$0 \ 0 \ 0 \ 0 \ 0$

$0 \ 0 \ 0 \ 0 \ 0 \quad 5 \times 3 = 15$

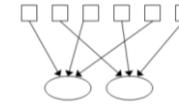
$0 \ 0 \ 0 \ 0 \ 0$

$3 \times 5 = 15$

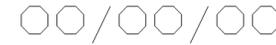
### Division

Children will develop their understanding of division and use jottings to support calculation

- ✓ Sharing equally  
6 sweets shared between 2 people, how many do they each get?

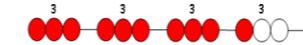
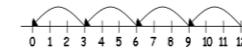


- ✓ Grouping or repeated subtraction  
There are 6 sweets, how many people can have 2 sweets each?



- ✓ Repeated subtraction using a number line or bead bar

$12 \div 3 = 4$



The bead bar will help children with interpreting division calculations such as  $10 \div 5$  as 'how many 5s make 10?'

- ✓ Using symbols to stand for unknown numbers to complete equations using inverse operations

$\square \div 2 = 4$

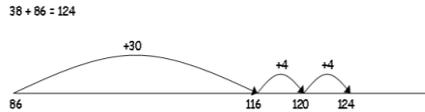
$20 \div \triangle = 4$

$\square \div \triangle = 4$

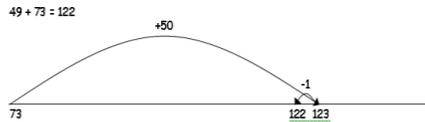
### Addition

Children will continue to use empty number lines with increasingly large numbers, including compensation where appropriate.

- ✓ Count on from the largest number irrespective of the order of the calculation.



- ✓ Compensation



Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies.

Adding the least significant digits first

$\begin{array}{r} 67 \\ + 24 \\ \hline 11 \text{ (7 + 4)} \\ 80 \text{ (60 + 20)} \\ \hline 91 \end{array}$	$\begin{array}{r} 267 \\ + 85 \\ \hline 12 \text{ (7 + 5)} \\ 140 \text{ (60 + 80)} \\ \hline 200 \\ \hline 352 \end{array}$
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### Subtraction

Children will continue to use empty number lines with increasingly large numbers.

Children will begin to use informal pencil and paper methods (jottings).

- ✓ **Partitioning and decomposition**
- Partitioning - demonstrated using arrow cards
- Decomposition - base 10 materials

$$\begin{array}{r} 89 \\ - 57 \\ \hline 30 + 2 = 32 \end{array}$$

- ✓ **Begin to exchange.**

$$\begin{array}{r} 71 \\ - 46 \\ \hline \end{array}$$

Step 1

$$\begin{array}{r} 70 + 1 \\ - 40 + 6 \\ \hline \end{array}$$

Step 2

$$\begin{array}{r} 60 + 11 \\ - 40 + 6 \\ \hline 20 + 5 = 25 \end{array}$$

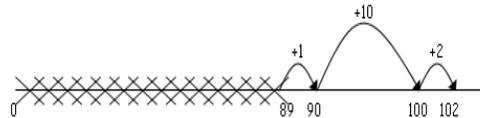
The calculation should be read as e.g. take 6 from 1.

This would be recorded by the children as

$$\begin{array}{r} 70 + 1 \\ - 40 + 6 \\ \hline 20 + 5 = 25 \end{array}$$

Where the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, counting on using a number line should be used.

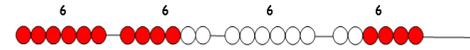
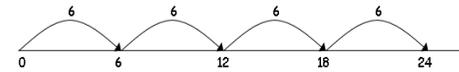
102 - 89 = 13



### Multiplication

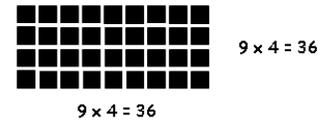
Children will continue to use:

- ✓ **Repeated addition**
- 4 times 6 is 6 + 6 + 6 + 6 = 24 or 4 lots of 6 or 6 x 4
- Children should use number lines or bead bars to support their understanding.



- ✓ **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.



- ✓ **Scaling**

e.g. Find a ribbon that is 4 times as long as the blue ribbon



- ✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

$\square \times 5 = 20$        $3 \times \triangle = 18$        $\square \times \circ = 32$

- ✓ **Partitioning**

$$\begin{aligned} 38 \times 5 &= (30 \times 5) + (8 \times 5) \\ &= 150 + 40 \\ &= 190 \end{aligned}$$

### Division

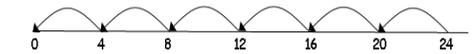
Ensure that the emphasis in Y3 is on grouping rather than sharing.

Children will continue to use:

- ✓ **Repeated subtraction using a number line**

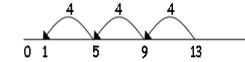
Children will use an empty number line to support their calculation.

24 ÷ 4 = 6



Children should also move onto calculations involving remainders.

13 ÷ 4 = 3 r 1



- ✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

26 ÷ 2 =  $\square$       24 ÷  $\triangle$  = 12       $\square$  ÷ 10 = 8

### Addition

✓ Carry below the line.

$$\begin{array}{r} 625 \\ + 48 \\ \hline 673 \\ 1 \end{array} \qquad \begin{array}{r} 783 \\ + 42 \\ \hline 825 \\ 1 \end{array} \qquad \begin{array}{r} 367 \\ + 85 \\ \hline 452 \\ 11 \end{array}$$

Using similar methods, children will:

- ✓ add several numbers with different numbers of digits;
- ✓ begin to add two or more three-digit sums of money, with or without adjustment from the pence to the pounds;
- ✓ know that the decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. £3.59 + 78p.

### Subtraction

✓ **Partitioning and decomposition**

$$754 =$$

$$\begin{array}{r} 754 \\ - 86 \\ \hline \end{array}$$

Step 1  $700 + 50 + 4$   
 $\begin{array}{r} 700 + 50 + 4 \\ - 80 + 6 \\ \hline \end{array}$

Step 2  $700 + 40 + 14$  (adjust from T to U)  
 $\begin{array}{r} 700 + 40 + 14 \\ - 80 + 6 \\ \hline \end{array}$

Step 3  $600 + 140 + 14$  (adjust from H to T)  
 $\begin{array}{r} 600 + 140 + 14 \\ - 80 + 6 \\ \hline 600 + 60 + 8 = 668 \end{array}$

This would be recorded by the children as

$$\begin{array}{r} 600 + 140 + 14 \\ - 80 + 6 \\ \hline 600 + 60 + 8 = 668 \end{array}$$

✓ **Decomposition**

$$\begin{array}{r} 6141 \\ 784 \\ - 86 \\ \hline 668 \end{array}$$

Children should:

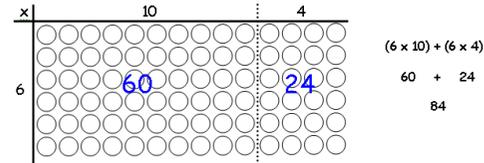
- ✓ be able to subtract numbers with different numbers of digits;
- ✓ using this method, children should also begin to find the difference between two three-digit sums of money, with or without 'adjustment' from the pence to the pounds;
- ✓ know that decimal points should line up under each other.

$$\begin{array}{r} \text{£}8.95 = 8 + 0.9 + 0.05 \\ - \text{£}4.38 = 4 + 0.3 + 0.08 \\ \hline \end{array} \qquad \begin{array}{r} 8.95 \\ - 4.38 \\ \hline 4.57 \end{array} \qquad \begin{array}{r} 8.95 \\ - 4.38 \\ \hline 4.57 \end{array}$$

leading to

### Multiplication

Children will continue to use arrays where appropriate leading into the grid method of multiplication.



✓ **Grid method**

**TU x U**

(Short multiplication - multiplication by a single digit)

$23 \times 8$

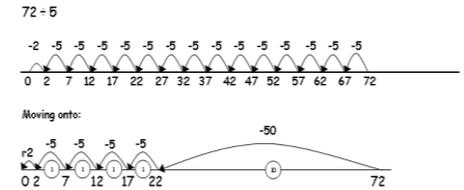
Children will approximate first

$23 \times 8$  is approximately  $25 \times 8 = 200$

$$\begin{array}{r} \times 20 \quad 3 \\ 8 \quad \boxed{160} \quad \boxed{24} \\ \hline 160 \\ + 24 \\ \hline 184 \end{array}$$

### Division

Children will develop their use of repeated subtraction to be able to subtract multiples of the divisor. Initially, these should be multiples of 10s, 5s, 2s and 1s - numbers with which the children are more familiar.



Then onto the vertical method:

**Short division TU ÷ U**

$72 \div 3$

$$\begin{array}{r} 3 \overline{) 72} \\ - 30 \\ \hline 42 \\ - 30 \\ \hline 12 \\ - 6 \\ \hline 6 \\ - 6 \\ \hline 0 \end{array} \qquad \begin{array}{l} 10x \\ 10x \\ 2x \\ 2x \\ \hline 24 \end{array}$$

Answer: 24

Leading to subtraction of other multiples.

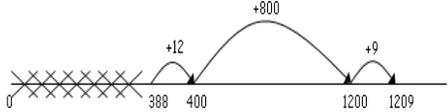
$96 \div 6$

$$\begin{array}{r} 16 \\ 6 \overline{) 96} \\ - 60 \\ \hline 36 \\ - 36 \\ \hline 0 \end{array} \qquad \begin{array}{l} 10x \\ 6x \\ \hline 16 \end{array}$$

Answer: 16

Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.

Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division.

	Addition	Subtraction	Multiplication	Division
Year 5	<p>Children should extend the carrying method to numbers with at least four digits.</p> $\begin{array}{r} 587 \\ + 475 \\ \hline 1062 \\ 11 \end{array} \qquad \begin{array}{r} 3587 \\ + 675 \\ \hline 4262 \\ 111 \end{array}$ <p>Using similar methods, children will:</p> <ul style="list-style-type: none"> <li>✓ add several numbers with different numbers of digits;</li> <li>✓ begin to add two or more decimal fractions with up to three digits and the same number of decimal places;</li> <li>✓ know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 3.2 m - 280 cm.</li> </ul>	<p><b>Partitioning and decomposition</b></p> <p>Step 1 <math>754 = 700 + 50 + 4</math>  <math>- 286 \quad - 200 + 80 + 6</math></p> <p>Step 2 <math>700 + 40 + 14</math> (adjust from T to U)  <math>- 200 + 80 + 6</math></p> <p>Step 3 <math>600 + 140 + 14</math> (adjust from H to T)  <math>- 200 + 80 + 6</math>  <math>400 + 60 + 8 = 468</math></p> <p>This would be recorded by the children as</p> $\begin{array}{r} 600 + 50 + 14 \\ - 200 + 80 + 6 \\ \hline 400 + 60 + 8 = 468 \end{array}$ <p><b>Decomposition</b></p> $\begin{array}{r} 6141 \\ - 286 \\ \hline 468 \end{array}$ <p>Children should:</p> <ul style="list-style-type: none"> <li>✓ be able to subtract numbers with different numbers of digits;</li> <li>✓ begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places;</li> </ul> <p>know that decimal points should line up under each other</p> <p>Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.</p> <p><math>1209 - 388 = 821</math></p> 	<p><b>Grid method</b></p> <p><b>HTU x U</b>  (Short multiplication - multiplication by a single digit)  <math>346 \times 9</math>  Children will approximate first  <math>346 \times 9</math> is approximately <math>350 \times 10 = 3500</math></p> $\begin{array}{r} \times \quad 300 \quad 40 \quad 6 \\ 9 \quad \boxed{2700} \quad \boxed{360} \quad \boxed{54} \\ \hline 2700 \\ + 360 \\ + 54 \\ \hline 3114 \\ 11 \end{array}$ <p><b>TU x TU</b>  (Long multiplication - multiplication by more than a single digit)  <math>72 \times 38</math>  Children will approximate first  <math>72 \times 38</math> is approximately <math>70 \times 40 = 2800</math></p> $\begin{array}{r} \times \quad 70 \quad 2 \\ 30 \quad \boxed{2100} \quad \boxed{60} \\ 8 \quad \boxed{560} \quad \boxed{16} \\ \hline 2100 \\ + 560 \\ + 60 \\ + 16 \\ \hline 2736 \\ 11 \end{array}$ <p>Using similar methods, they will be able to multiply decimals with one decimal place by a single digit number, approximating first. They should know that the decimal points line up under each other.  e.g. <math>4.9 \times 3</math>  Children will approximate first  <math>4.9 \times 3</math> is approximately <math>5 \times 3 = 15</math></p> $\begin{array}{r} \times \quad 4 \quad 0.9 \\ 3 \quad \boxed{12} \quad \boxed{2.7} \\ \hline 12 \\ + 2.7 \\ \hline 14.7 \end{array}$	<p>Children will continue to use written methods to solve short division TU ÷ U.</p> <p>Children can start to subtract larger multiples of the divisor, e.g. 30x</p> <p><b>Short division HTU ÷ U</b></p> <p><math>196 \div 6</math></p> $\begin{array}{r} 32 \text{ r } 4 \\ 6 \overline{) 196} \\ - 180 \\ \hline 16 \\ - 12 \\ \hline 4 \end{array}$ <p>Answer: 32 remainder 4 or 32 r 4</p> <p>Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.</p> <p>Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division.</p>

	Addition	Subtraction	Multiplication	Division																																																																	
Year 6	<p>Children should extend the carrying method to number with any number of digits.</p> $\begin{array}{r} 7648 \\ + 1486 \\ \hline 9134 \\ 111 \end{array}$ $\begin{array}{r} 6584 \\ + 5848 \\ \hline 12432 \\ 111 \end{array}$ $\begin{array}{r} 42 \\ 6432 \\ 786 \\ 3 \\ + 4681 \\ \hline 11944 \\ 121 \end{array}$ <p>Using similar methods, children will</p> <ul style="list-style-type: none"> <li>✓ add several numbers with different numbers of digits;</li> <li>✓ begin to add two or more decimal fractions with up to four digits and either one or two decimal places;</li> <li>✓ know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. <math>401.2 + 26.85 + 0.71</math>.</li> </ul>	<p><b>Decomposition</b></p> $\begin{array}{r} 3131 \\ 6467 \\ - 2684 \\ \hline 3783 \end{array}$ <p>Children should:</p> <ul style="list-style-type: none"> <li>✓ be able to subtract numbers with different numbers of digits;</li> <li>✓ be able to subtract two or more decimal fractions with up to three digits and either one or two decimal places;</li> <li>✓ know that decimal points should line up under each other.</li> </ul> <p>Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.</p> <p><math>3002 - 1997 = 1005</math></p>	<p><b>HTU x TU</b> (Long multiplication - multiplication by more than a single digit) <math>372 \times 24</math> Children will approximate first <math>372 \times 24</math> is approximately <math>400 \times 25 = 10000</math></p> <table border="1"> <tr> <td>x</td> <td>300</td> <td>70</td> <td>2</td> <td></td> </tr> <tr> <td>20</td> <td>6000</td> <td>1400</td> <td>40</td> <td>6000</td> </tr> <tr> <td>4</td> <td>1200</td> <td>280</td> <td>8</td> <td>+ 1400</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>+ 1200</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>+ 280</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>+ 40</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>+ 8</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td><u>8928</u></td> </tr> </table> <p>Expanded method</p> $\begin{array}{r} 372 \\ \times 24 \\ \hline 6000 \\ 1400 \\ 40 \\ 1200 \\ 280 \\ \hline 8 \\ \hline 8928 \end{array}$ <p>Using similar methods, they will be able to multiply decimals with up to two decimal places by a single digit number and then two digit numbers, approximating first. They should know that the decimal points line up under each other.</p> <p>For example: <math>4.92 \times 3</math> Children will approximate first <math>4.92 \times 3</math> is approximately <math>5 \times 3 = 15</math></p> <table border="1"> <tr> <td>x</td> <td>4</td> <td>0.9</td> <td>0.02</td> <td></td> </tr> <tr> <td>3</td> <td>12</td> <td>2.7</td> <td>0.06</td> <td>12</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>+ 0.7</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>+ 0.06</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td><u>12.76</u></td> </tr> </table>	x	300	70	2		20	6000	1400	40	6000	4	1200	280	8	+ 1400					+ 1200					+ 280					+ 40					+ 8					<u>8928</u>	x	4	0.9	0.02		3	12	2.7	0.06	12					+ 0.7					+ 0.06					<u>12.76</u>	<p>Children will continue to use written methods to solve short division TU ÷ U and HTU ÷ U.</p> <p><b>Long division HTU ÷ TU</b></p> <p><math>972 \div 36</math></p> $\begin{array}{r} 27 \\ 36 \overline{) 972} \\ - 720 \\ \hline 252 \\ - 252 \\ \hline 0 \end{array}$ <p>Answer: 27</p> <p>Any remainders should be shown as fractions, i.e. if the children were dividing 32 by 10, the answer should be shown as <math>3 \frac{2}{10}</math> which could then be written as <math>3 \frac{1}{5}</math> in its lowest terms.</p> <p>Extend to decimals with up to two decimal places. Children should know that decimal points line up under each other.</p> <p><math>87.5 \div 7</math></p> $\begin{array}{r} 12.5 \\ 7 \overline{) 87.5} \\ - 70.0 \\ \hline 17.5 \\ - 14.0 \\ \hline 3.5 \\ - 3.5 \\ \hline 0 \end{array}$ <p>Answer: 12.5</p>
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	<p>By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved. Children should not be made to go onto the next stage if:</p> <ul style="list-style-type: none"> <li>• they are not ready.</li> <li>• they are not confident.</li> </ul> <p>Children should be encouraged to approximate their answers before calculating. Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.</p>																																																																				