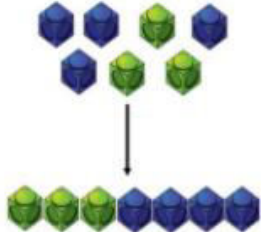
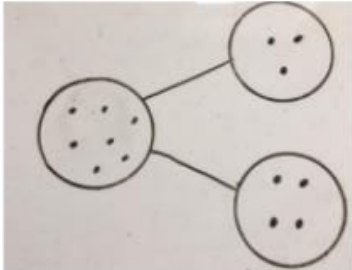
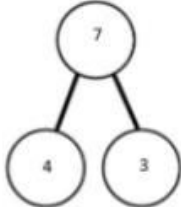
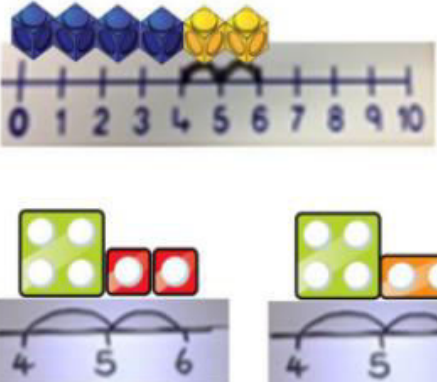



Watercliffe Meadow Calculation Policy

Calculation policy: Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

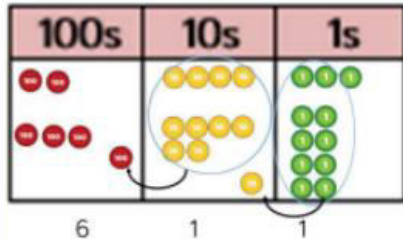
Concrete	Pictorial	Abstract
<p>Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars).</p>  <p>Vocabulary : 7 is the whole. 3 is a part and 4 is a part.</p>	<p>Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.</p>  <p>Vocabulary : 7 is the whole. 3 is a part and 4 is a part.</p>	<p>$4 + 3 = 7$ Four is a part, 3 is a part and the whole is seven.</p> 
<p>Counting on using number lines using cubes or Numicon.</p> 	<p>A bar model which encourages the children to count on, rather than count all.</p> <p>A number line which encourages the children to count on rather than count all.</p>  <p>Vocabulary : 4 plus 2 equals 7.</p>	<p>The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? $4 + 2$</p>

Watercliffe Meadow Calculation Policy

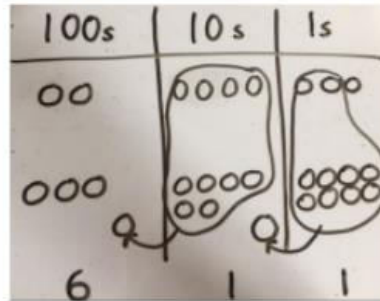
<p>Regrouping to make 10; using ten frames and counters/cubes or using Numicon.</p> <p>6 + 5</p>	<p>Children to draw the ten frame and counters/cubes.</p> <p>Vocabulary: I know that 6 + 4 = 10 I know that 4 + 6 = 10</p>	<p>Children to develop an understanding of equality e.g.</p> $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$
<p>TO + O using base 10. Continue to develop understanding of partitioning and place value.</p> <p>41 + 8</p>	<p>Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.</p>	<p>41 + 8</p> <p>1 + 8 = 9 40 + 9 = 49</p> <p>Vocabulary: First the ones then the tens. 1 one add 8 ones. 4 tens add 0 tens.</p>
<p>TO + TO using base 10. Continue to develop understanding of partitioning and place value.</p> <p>36 + 25</p> <p>Vocabulary: First the ones then the tens. 6 ones add 5 ones = 11 ones. I need to exchange one ten. 3 tens add 2 tens add 1 ten equals 6 tens.</p>	<p>Children to represent the base 10 in a place value chart.</p>	<p>Looking for ways to make 10.</p> <p>36 + 25 = 30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61</p> <p>Formal method:</p> $\begin{array}{r} +25 \\ 36 \\ \hline 61 \\ 1 \end{array}$

Watercliffe Meadow Calculation Policy

Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.



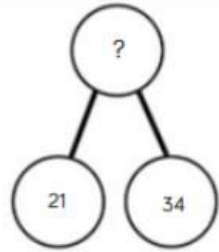
Children to represent the counters in a place value chart, circling when they make an exchange.



$$\begin{array}{r}
 \text{HTO} \\
 243 \\
 +368 \\
 \hline
 611 \\
 \hline
 11
 \end{array}$$

Vocabulary: First the ones. 3 ones add 8 ones equals 11 ones. I need to exchange.....

Conceptual variation; different ways to ask children to solve 21 + 34



?	
21	34

Word problems:
In year 3, there are 21 children and in year 4, there are 34 children. How many children in total?

$21 + 34 = 55$. Prove it

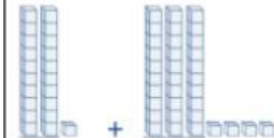
Vocabulary: I need to add these numbers together to find the total. I know my answer will be a bigger value than the two in the word problem. First I can add the ones and then I can add the tens.

$$\begin{array}{r}
 \text{TO} \\
 21 \\
 +34 \\
 \hline
 \hline
 \end{array}$$

$21 + 34 =$

$\square = 21 + 34$

Calculate the sum of twenty-one and thirty-four.



Vocabulary: First the ones and then the tens.

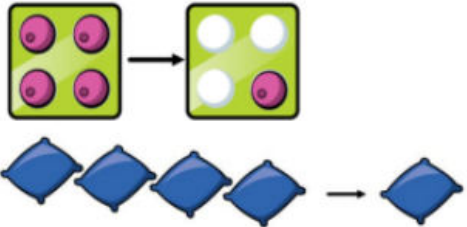

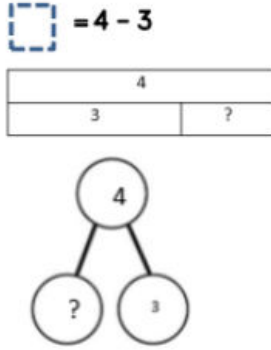
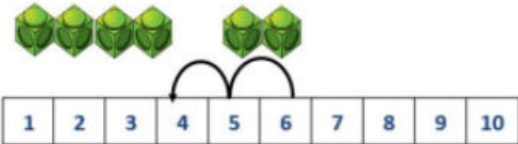
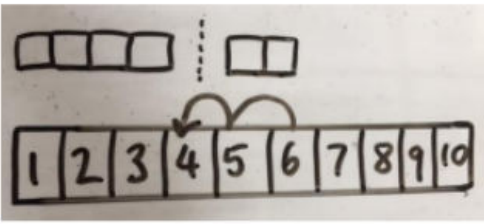

Missing digit problems:

10s	1s
2	1
3	?
?	5

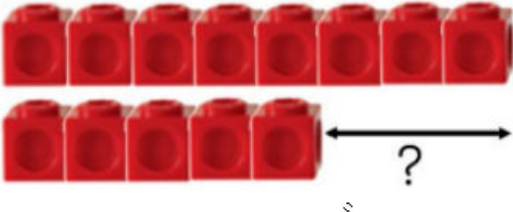
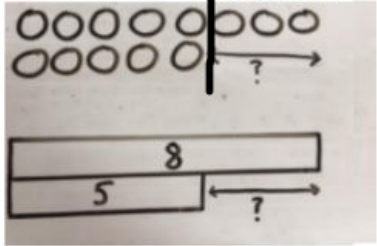
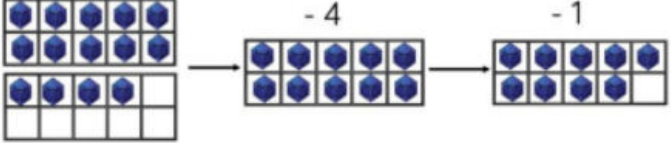
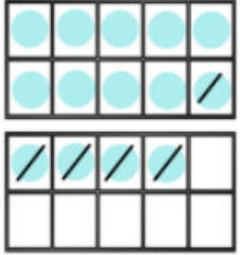

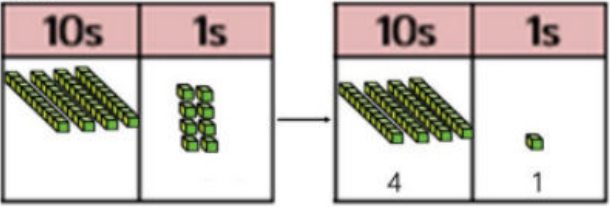
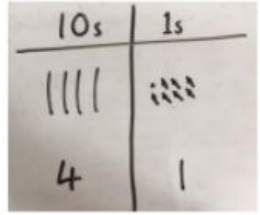
Watercliffe Meadow Calculation Policy

Calculation policy: Subtraction

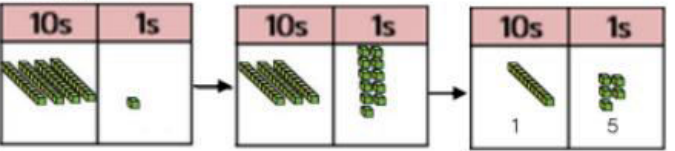
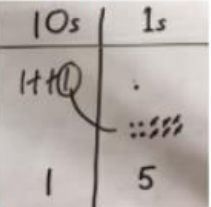
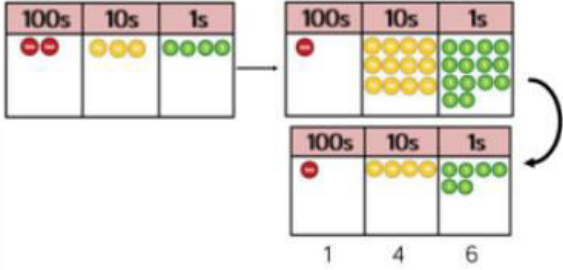
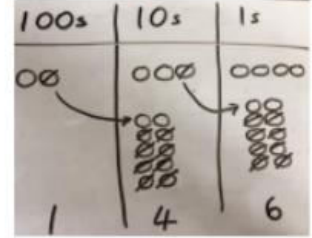
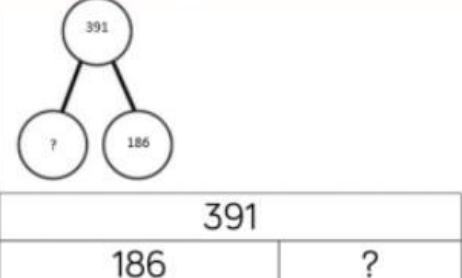
Key language: take away, less than, the difference, subtract, minus, fewer, decrease.

Concrete	Pictorial	Abstract
<p>Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).</p> <p>$4 - 3 = 1$</p> 	<p>Children to draw the concrete resources they are using and cross out the correct amount.</p>  <p>Note : when crossing off work backwards as you would on a number line.</p> <p>Vocabulary :: 4 minus 3 equals 1.</p>	<p>$4 - 3 =$</p> 
<p>Counting back (using number lines or number tracks) children start with 6 and count back 2.</p> <p>$6 - 2 = 4$</p>  <p>Note : children should be using their fingers to calculate too.</p>	<p>Children to represent what they see pictorially e.g.</p> 	<p>Children to represent the calculation on a number line . Move to empty number line.</p> 

Watercliffe Meadow Calculation Policy

<p>Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used).</p> <p>Calculate the difference between 8 and 5.</p> 	<p>Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.</p> <p>Same Difference</p> 	<p>Find the difference between 8 and 5.</p> <p>8 - 5, the difference is <input type="text"/></p> <p>Vocabulary : I know that to find the difference in numbers I can subtract the smallest number from the biggest number.</p>								
<p>Making 10 using ten frames.</p> <p>14 - 5</p> 	<p>Children to present the ten frame pictorially and discuss what they did to make 10.</p> 	<p>Children to show how they can make 10 by partitioning.</p> $14 - 5 = 9$  <p>14 - 4 = 10 10 - 1 = 9</p>								
<p>Column method using base 10.</p> <p>48-7</p> 	<p>Children to represent the base 10 pictorially.</p> 	<p>Column method or children could count back 7.</p> <table border="1" data-bbox="1590 1117 1747 1308"> <tr><td>T</td><td>O</td></tr> <tr><td>4</td><td>8</td></tr> <tr><td>-</td><td>7</td></tr> <tr><td>4</td><td>1</td></tr> </table> <p>Vocabulary : First the ones and then the tens. 8 ones subtract 7 ones equals 1 one. 4 tens subtract 0 tens equals 4 tens.</p>	T	O	4	8	-	7	4	1
T	O									
4	8									
-	7									
4	1									

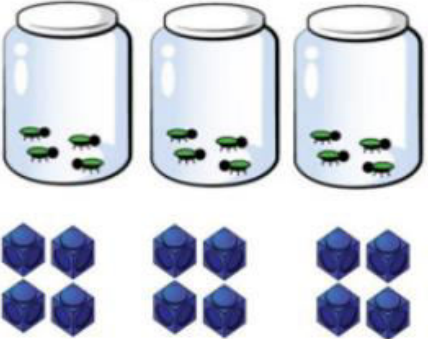
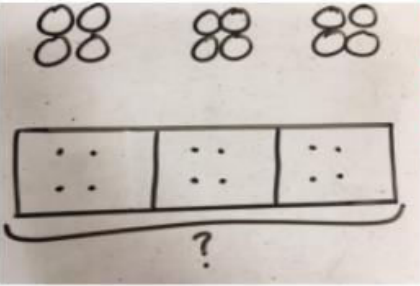
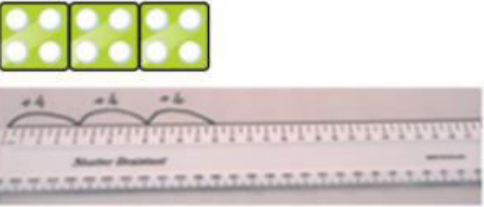
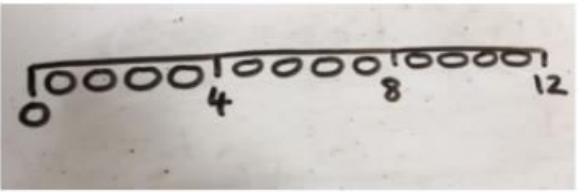

Watercliffe Meadow Calculation Policy

<p>Column method using base 10 and having to exchange. 41 - 26</p> 	<p>Represent the base 10 pictorially, remembering to show the exchange.</p> 	<p>Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because $41 = 30 + 11$.</p> <table border="1" data-bbox="1585 359 1736 534"> <thead> <tr> <th></th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td>3</td> <td>11</td> </tr> <tr> <td>-</td> <td>2</td> <td>6</td> </tr> <tr> <td></td> <td>1</td> <td>5</td> </tr> </tbody> </table> <p>Vocabulary: First the ones and then the tens. 1 one subtract 6 ones I can not do. I need to exchange a ten. I now have 11 ones and 3 tens.</p>		T	O		3	11	-	2	6		1	5														
	T	O																										
	3	11																										
-	2	6																										
	1	5																										
<p>Column method using place value counters. 234 - 88</p> 	<p>Represent the place value counters pictorially; remembering to show what has been exchanged.</p> 	<p>Formal column method. Children must understand what has happened when they have crossed out digits.</p> <table border="1" data-bbox="1601 646 1736 885"> <thead> <tr> <th></th> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>-</td> <td></td> <td>8</td> <td>8</td> </tr> <tr> <td></td> <td>1</td> <td>4</td> <td>6</td> </tr> </tbody> </table> <p>Vocabulary: First the ones and then the tens. 4 ones subtract 8 ones I can not do. I need to exchange a ten. I now have 14 ones and 2 tens.</p>		H	T	O		2	3	4	-		8	8		1	4	6										
	H	T	O																									
	2	3	4																									
-		8	8																									
	1	4	6																									
<h2 style="background-color: #4a7ebb; color: white; padding: 5px;">Conceptual variation; different ways to ask children to solve 391 - 186</h2>																												
	<p>Raj spent £391, Timmy spent £186. How much more did Raj spend?</p> <p>Calculate the difference between 391 and 186.</p> <p>Vocabulary: I know that to find the difference in numbers I can subtract the smallest number from the biggest number.</p>	<p>$\square = 391 - 186$</p> <table border="1" data-bbox="1209 1053 1310 1189"> <tbody> <tr> <td>3</td> <td>9</td> <td>1</td> </tr> <tr> <td>-</td> <td>1</td> <td>8</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>What is 186 less than 391?</p>	3	9	1	-	1	8				<p>Missing digit calculations</p> <table border="1" data-bbox="1601 1013 1803 1236"> <thead> <tr> <th></th> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td>3</td> <td>9</td> <td>\square</td> </tr> <tr> <td>-</td> <td>\square</td> <td>\square</td> <td>6</td> </tr> <tr> <td></td> <td>\square</td> <td>0</td> <td>5</td> </tr> </tbody> </table> <p>Vocabulary: I need to look at the ones first. I know that 11 subtract 6 equals 5. I need to have 1 one in my missing box in my ones column.</p>		H	T	O		3	9	\square	-	\square	\square	6		\square	0	5
3	9	1																										
-	1	8																										
	H	T	O																									
	3	9	\square																									
-	\square	\square	6																									
	\square	0	5																									

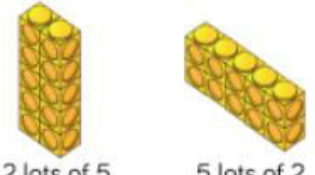
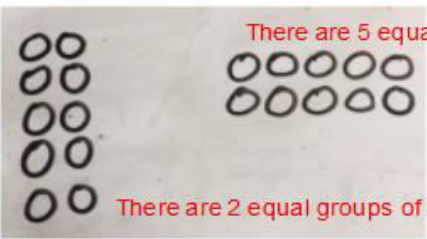
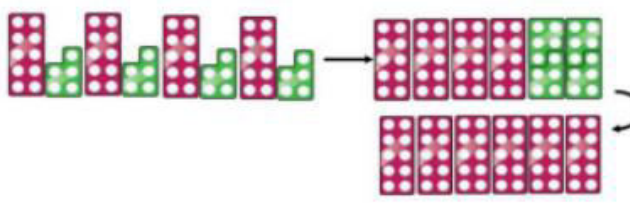
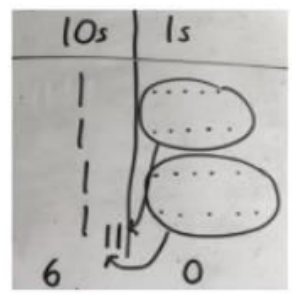
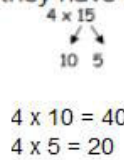

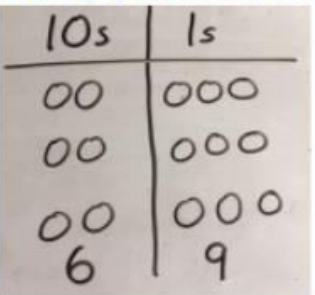

Watercliffe Meadow Calculation Policy

Calculation policy: Multiplication

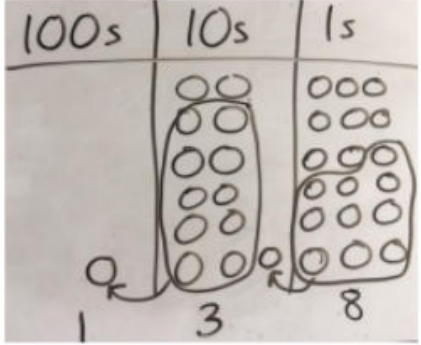
Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

Concrete	Pictorial	Abstract
<p>Repeated grouping/repeated addition 3×4 $4 + 4 + 4$ There are 3 equal groups, with 4 in each group.</p> 	<p>Children to represent the practical resources in a picture and use a bar model.</p>  <p>Vocabulary: There are 3 equal groups with 4 in each group.</p>	<p>$3 \times 4 = 12$ $4 + 4 + 4 = 12$</p> <p>Vocabulary: 3×4 There are 3 equal groups with 4 in each group.</p>
<p>Number lines to show repeated groups- 3×4</p>  <p>Cuisenaire rods can be used too.</p>	<p>Represent this pictorially alongside a number line e.g.:</p> 	<p>Abstract number line showing three jumps of four.</p> <p>$3 \times 4 = 12$</p>  <p>Vocabulary: There are 3 jumps on the numberline. Each jump is 4.</p>

Watercliffe Meadow Calculation Policy

<p>Use arrays to illustrate commutativity counters and other objects can also be used. $2 \times 5 = 5 \times 2$</p>  <p>2 lots of 5 5 lots of 2</p>	<p>Children to represent the arrays pictorially.</p>  <p>There are 5 equal groups of 2. There are 2 equal groups of 5.</p>	<p>Children to be able to use an array to write a range of calculations e.g.</p> <p>$10 = 2 \times 5$ 2 equal groups of 5. $5 \times 2 = 10$ 5 equal groups of 2. $2 + 2 + 2 + 2 + 2 = 10$ Adding together 5 groups of 2. $10 = 5 + 5$ Adding together 2 groups of 5.</p>
<p>Partition to multiply using Numicon, base 10 or Cuisenaire rods. 4×15 4 equal group of 15</p> 	<p>Children to represent the concrete manipulatives pictorially.</p>  <p>There are 4 equal groups of 5 and 4 equal groups of 10.</p>	<p>Children to be encouraged to show the steps they have taken.</p>  <p>There are 4 equal groups of 15.</p> <p>$4 \times 10 = 40$ $4 \times 5 = 20$</p> <p>Note : calculations such as this should be encouraged to be completed mentally</p>
<p>Formal column method with place value counters (base 10 can also be used.) 3×23</p>  <p>There are 3 equal groups of 23.</p> <p>6 tens 9 ones</p>	<p>Children to represent the counters pictorially.</p> 	<p>Children to record what it is they are doing to show understanding.</p> <p>3×23 $3 \times 20 = 60$ $3 \times 3 = 9$ $60 + 9 = 69$</p>  <p>Note : calculations such as this should be encouraged to be completed mentally.</p>

Watercliffe Meadow Calculation Policy

<p>Formal column method with place value counters.</p> <p>6×23</p> <div style="display: flex; align-items: center;"> <table border="1" style="border-collapse: collapse; text-align: center; width: 100px;"> <tr><th style="background-color: #f8d7da;">100s</th><th style="background-color: #fff3cd;">10s</th><th style="background-color: #d4edda;">1s</th></tr> <tr><td> </td><td>●●●●●●</td><td>●●●●●●</td></tr> </table> <div style="margin-left: 10px; color: red; font-size: small;">There are 6 equal groups of 23.</div> </div> <p style="text-align: center; margin: 5px 0;">↓</p> <div style="display: flex; align-items: center;"> <table border="1" style="border-collapse: collapse; text-align: center; width: 100px;"> <tr><th style="background-color: #f8d7da;">100s</th><th style="background-color: #fff3cd;">10s</th><th style="background-color: #d4edda;">1s</th></tr> <tr><td> </td><td>●●●●●●</td><td>●●●●●●</td></tr> </table> <div style="margin-left: 10px; font-size: x-small;"> <table style="border-collapse: collapse;"> <tr><td style="width: 20px; text-align: center;">1</td><td style="width: 20px; text-align: center;">3</td><td style="width: 20px; text-align: center;">8</td></tr> </table> </div> </div>	100s	10s	1s		●●●●●●	●●●●●●	100s	10s	1s		●●●●●●	●●●●●●	1	3	8	<p>Children to represent the counters/base 10, pictorially e.g. the image below.</p> 	<p>Formal written method</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> $6 \times 23 =$ $\begin{array}{r} \text{T O} \\ 23 \\ \times 6 \\ \hline 138 \\ \hline 11 \end{array}$ </div> <div style="font-size: x-small; color: red;"> <p>Vocabulary: we always put the larger number on top as we know multiplication is commutative.</p> <p>6 equal groups of 23 has the same answer as 23 equal groups of 6.</p> <p>I multiply the ones first.</p> <p>3 ones times 6 equals 18 ones</p> </div> </div>
100s	10s	1s															
	●●●●●●	●●●●●●															
100s	10s	1s															
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1	3	8															

<p>When children start to multiply $3d \times 3d$ and $4d \times 2d$ etc., they should be confident with the abstract:</p> <p>To get 744 children have solved 124×6.</p> <p>To get 2480 they have solved 124×20.</p>	<div style="text-align: center; font-size: x-small;"> <table style="border-collapse: collapse; margin: 0 auto;"> <tr><td> </td><td>1</td><td>2</td><td>4</td></tr> <tr><td>×</td><td> </td><td>2</td><td>6</td></tr> <tr><td> </td><td>7</td><td>4</td><td>4</td></tr> <tr><td> </td><td>2</td><td>4</td><td>8</td><td>0</td></tr> <tr><td> </td><td>3</td><td>2</td><td>2</td><td>4</td></tr> <tr><td> </td><td>1</td><td>1</td><td> </td><td> </td></tr> </table> <p>Answer: 3224</p> </div>		1	2	4	×		2	6		7	4	4		2	4	8	0		3	2	2	4		1	1		
	1	2	4																									
×		2	6																									
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	3	2	2	4																								
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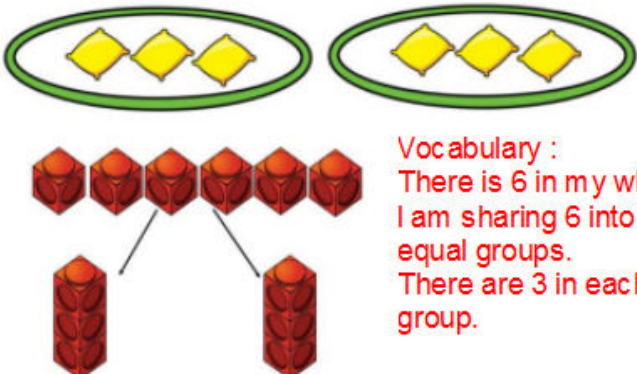
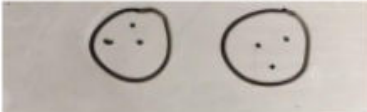
Conceptual variation; different ways to ask children to solve 6×23

<table border="1" style="border-collapse: collapse; text-align: center; width: 100%;"> <tr><td>23</td><td>23</td><td>23</td><td>23</td><td>23</td><td>23</td></tr> <tr><td colspan="6" style="border: none; text-align: center; height: 20px;">?</td></tr> </table>	23	23	23	23	23	23	?						<p>Mai had to swim 23 lengths, 6 times a week.</p> <p>How many lengths did she swim in one week?</p> <p>With the counters, prove that $6 \times 23 = 138$</p>	<p>Find the product of 6 and 23</p> <p>$6 \times 23 =$</p> <p> $= 6 \times 23$</p> <div style="display: flex; justify-content: space-around; font-size: x-small;"> <table style="border-collapse: collapse;"> <tr><td> </td><td>6</td><td> </td><td>23</td></tr> <tr><td>×</td><td>23</td><td>×</td><td>6</td></tr> <tr><td>—</td><td> </td><td>—</td><td> </td></tr> </table> </div>		6		23	×	23	×	6	—		—		<p>What is the calculation?</p> <p>What is the product?</p> <table border="1" style="border-collapse: collapse; text-align: center; width: 100%;"> <tr><th style="background-color: #f8d7da;">100s</th><th style="background-color: #fff3cd;">10s</th><th style="background-color: #d4edda;">1s</th></tr> <tr><td> </td><td>●●●●●●</td><td>●●●●●●</td></tr> </table>	100s	10s	1s		●●●●●●	●●●●●●
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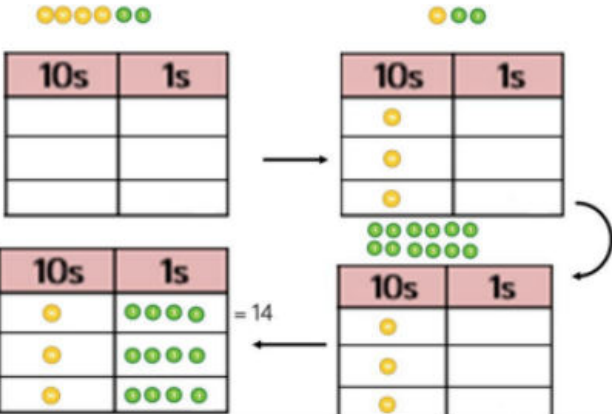
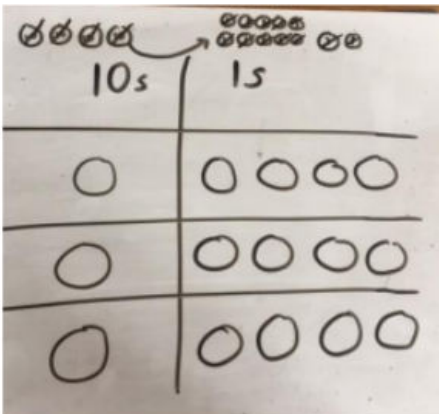
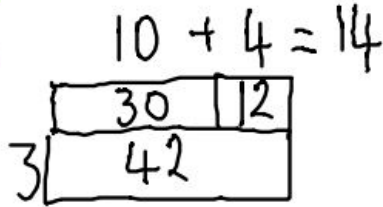
Watercliffe Meadow Calculation Policy

Calculation policy: Division

Key language: share, group, divide, divided by, half.

Concrete	Pictorial	Abstract		
<p>Sharing using a range of objects. $6 \div 2$</p>  <p>Vocabulary : There is 6 in my whole. I am sharing 6 into 2 equal groups. There are 3 in each group.</p>	<p>Represent the sharing pictorially.</p> 	<p>$6 \div 2 = 3$ Vocabulary : I know dividing is sharing my whole into equal parts.</p> <table border="1" data-bbox="1617 646 2038 710"> <tr> <td>3</td> <td>3</td> </tr> </table> <p>Children should also be encouraged to use their 2 times tables facts.</p> <p>Note : make links. Dividing by 2 is the same as finding one half of the number. I know half of 6 is 3.</p>	3	3
3	3			

Watercliffe Meadow Calculation Policy

<p>2d + 1d with remainders using lollipop sticks. Cuisenaire rods, 13 ÷ 4</p> <p>Vocabulary : I need to share 13 into 4 equal groups. Use manipulatives to share into 4 equal groups.</p>  <p>There are 3 in each group and 1 remaining/left over.</p>	<p>Children to draw a representation of the calculation.</p>  <p>Vocabulary : I need to share 13 into 4 equal groups. There are 3 in each group and 1 remaining/left over.</p>	<p>$13 \div 4 = 3$ remainder 1</p> <p>Children should be encouraged to use their times table facts;</p> <p>I need to share 13 into 4 equal groups. I know that 4 groups of 3 equal 12. $4 \times 3 = 12$ There will be 3 in each group and 1 left over. I will have shared out 12 out of the 13 which is why there is 1 left over.</p>
<p>Sharing using place value counters. $42 \div 3 = 14$ I am going to share 42 into 3 equal groups.</p> 	<p>Children to represent the place value counters pictorially.</p> 	<p>Children to be able to make sense of the place value counters and write calculations to show the process.</p> <p>$42 \div 3$ $42 = 30 + 12$ $30 \div 3 = 10$ $12 \div 3 = 4$ $10 + 4 = 14$</p> 

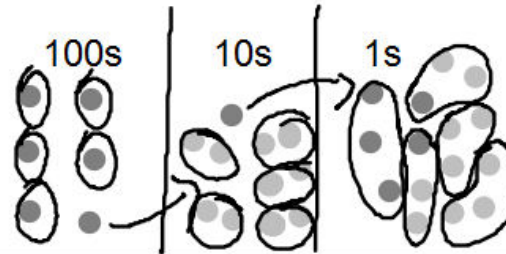
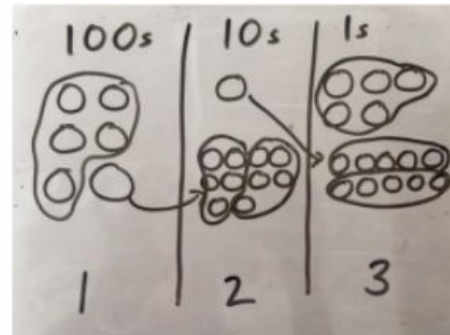
Watercliffe Meadow Calculation Policy

Short division using place value counters to group.
 $615 \div 5$ I need to share 615 into 5 equal groups.

Hundreds	Tens	Ones
		

1. Make 615 with place value counters.
2. I need to share my 6 hundreds into 5 equal groups. There is 1 hundred in each group and 1 hundred left over.
3. I need to exchange one hundred into the tens.
4. I have 11 tens. I need to share my 11 tens into 5 equal groups.
5. There will be 2 tens in each group and 1 ten left over.
6. I have 15 ones. I need to share my 15 ones into 5 equal groups.
7. There will be 3 ones in each group.




Represent the place value counters pictorially.






Children to the calculation using the short division scaffold.

$$5 \overline{) 615} \begin{matrix} 123 \\ \underline{615} \end{matrix}$$

Long division using place value counters
 $2544 \div 12$

1000s	100s	10s	1s
			

We can't group 2 thousands into groups of 12 so will exchange them.

1000s	100s	10s	1s
			

We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$12 \overline{) 2544} \begin{matrix} 02 \\ \underline{24} \\ 1 \end{matrix}$$

$2544 \div 12$

Only move to long division if confident with abstract short division.

Vocabulary : I have 25 hundreds. I need to split them into 12 equal groups. I know there will be 2 in each group and 1 left over.

Watercliffe Meadow Calculation Policy

1000s	100s	10s	1s

1000s	100s	10s	1s

$$\begin{array}{r}
 021 \\
 12 \overline{)2544} \\
 \underline{24} \\
 14 \\
 \underline{12} \\
 2
 \end{array}$$

I will then have 14 tens. I need to split them into 12 equal groups. There will be 1 in each group and 2 left over.

$$\begin{array}{r}
 0212 \\
 12 \overline{)2544} \\
 \underline{24} \\
 14 \\
 \underline{12} \\
 24 \\
 \underline{24} \\
 0
 \end{array}$$

I will then have 24 ones. I need to split them into 12 equal groups. There will be 2 in each group.

Conceptual variation; different ways to ask children to solve $615 \div 5$

<p>Using the part whole model below, how can you divide 615 by 5 without using short division?</p>	<p>I have £615 and share it equally between 5 bank accounts. How much will be in each account? <i>Vocabulary</i> : I need to split £615 into 5 equal groups.</p> <p>615 pupils need to be put into 5 groups. How many will be in each group? <i>Vocabulary</i> : 615 needs to be put into groups of 5. 615 divided by ? = 5. I can use fact families to know that the missing number can be found by solving 615 divided by 5.</p>	$5 \overline{)615}$ <p>$615 \div 5 =$</p> <p>$\square = 615 \div 5$</p>	<p>What is the calculation? What is the answer?</p>
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