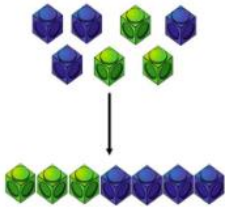
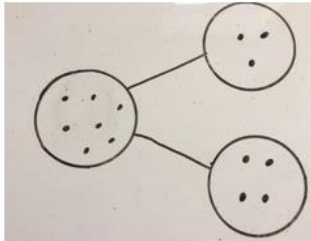
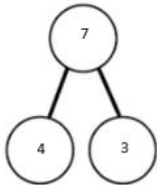
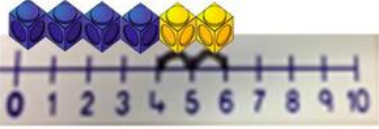
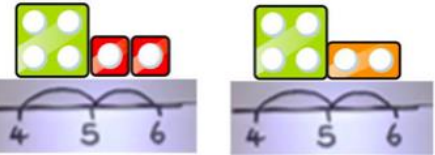
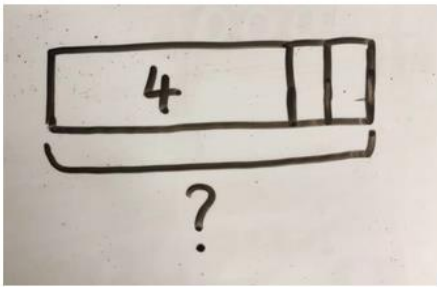
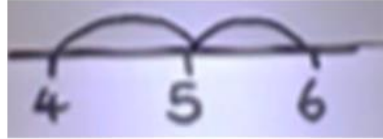




**Hanwell Fields Community School Calculation Policy 2018**

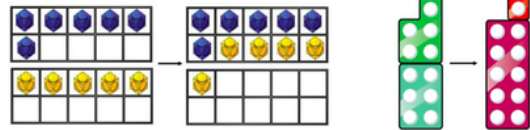
Addition	
<b>Key vocabulary</b>	<b>Sum, total, parts and whole, plus, add, altogether, more, is equal to, is the same as Whole, make, increase</b>
Year 1	

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

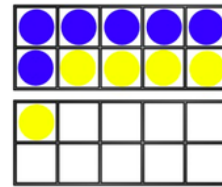


**Regrouping to make 10;** using tenframes and counters/cubes or using Numicon.

6 + 5



Children to draw the ten frame and counters/cubes.



Children to develop an understanding of equality e.g.

$$6 + \square = 11$$

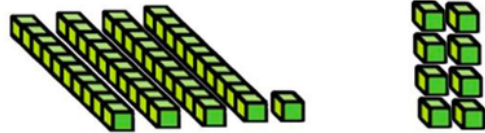
$$6 + 5 = 5 + \square$$

$$6 + 5 = \square + 4$$

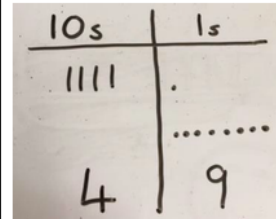
**Year 2**

**TO + 0 using base 10.** Continue to develop understanding of partitioning and place value.

41 + 8

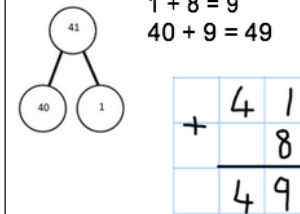


Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.



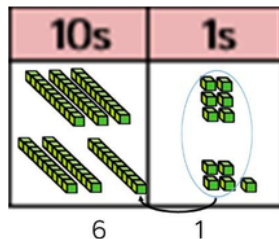
41 + 8

1 + 8 = 9  
 40 + 9 = 49

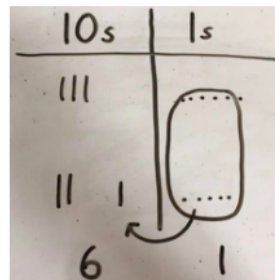


**TO + TO using base 10.** Continue to develop understanding of partitioning and place value.

36 + 25



Children to represent the base 10 in a place value chart.



Looking for ways to make 10.

36 + 25 = 30 + 20 = 50  
 5 + 5 = 10  
 50 + 10 + 1 = 61

1      5      36

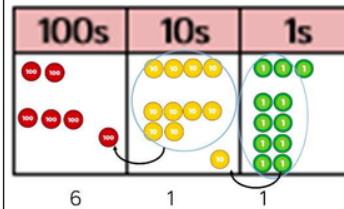
Formal method:

$$\begin{array}{r} +25 \\ 36 \\ \hline 61 \\ 1 \end{array}$$

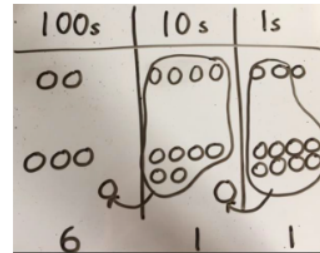


**Year 3 onwards ...**

**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.



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

**Developing deep understanding – solving 21 + 34**

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

 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 50px; text-align: center;">?</td> </tr> <tr> <td style="text-align: center;">21      34</td> </tr> </table>	?	21      34	<p><b>Word problems:</b>          In year 3, there are 21 children and in year 4, there are 34 children.          How many children in total?</p> <p>21 + 34 = 55. Prove it</p>	$\begin{array}{r} 21 \\ +34 \\ \hline \end{array}$ <p><b>21 + 34 =</b></p> <div style="border: 1px dashed black; width: 30px; height: 30px; display: inline-block; margin-right: 5px;"></div> = 21 + 34 <p>Calculate the sum of twenty-one and thirty-four.</p>	 <p><b>Missing digit problems:</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>10s</th> <th>1s</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">10   10</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">10   10   10</td> <td style="text-align: center;">?</td> </tr> <tr> <td style="text-align: center;">?</td> <td style="text-align: center;">5</td> </tr> </tbody> </table>	10s	1s	10   10	1	10   10   10	?	?	5
?													
21      34													
10s	1s												
10   10	1												
10   10   10	?												
?	5												

**Years 5-6 greater emphasis upon column method for regrouping, using place counters for decimals.**



### Subtraction

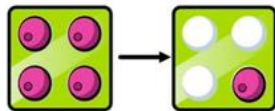
Key vocabulary

Take-away, less than, the difference (between), subtract, minus, fewer, decrease

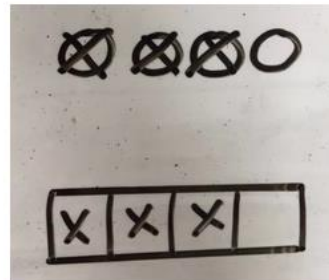
### Year 1

**Physically taking away and removing objects from a whole** (ten frames, Numicon, cubes and other items such as beanbags could be used).

$$4 - 3 = 1$$

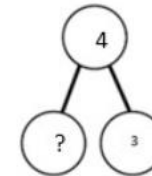
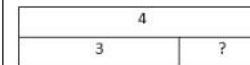


Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.



$$4 - 3 =$$

$$\square = 4 - 3$$

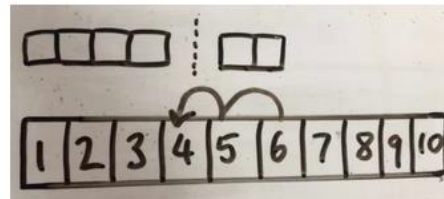


**Counting back** (using number lines or number tracks) children start with 6 and count back 2.

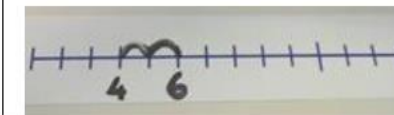
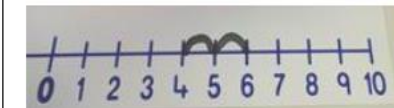
$$6 - 2 = 4$$



Children to represent what they see pictorially e.g.



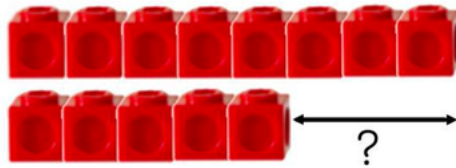
Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line



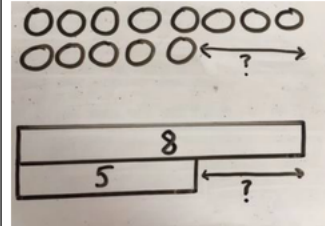


**Finding the difference** (using cubes, Numicon or Cuisenaire rods, other objects can also be used).

Calculate the difference between 8 and 5.



Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.



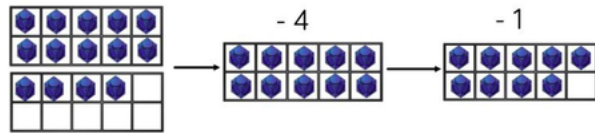
Find the difference between 8 and 5.

8 - 5, the difference is

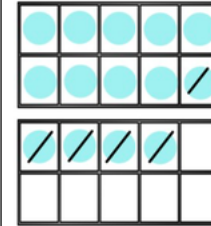
Children to explore why  
 $9 - 6 = 8 - 5 = 7 - 4$  have the same difference.

**Making 10** using ten frames.

14 - 5



Children to present the ten frame pictorially and discuss what they did to make 10.



Children to show how they can make 10 by partitioning the subtrahend.

$$14 - 5 = 9$$

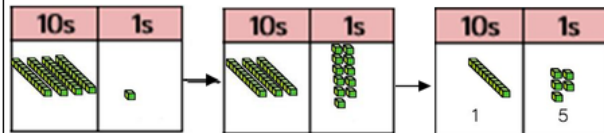
$$14 - 4 = 10$$

$$10 - 1 = 9$$

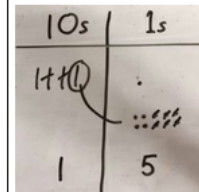
## Year 2

**Column method** using base 10 and having to exchange.

41 - 26



Represent the base 10 pictorially, remembering to show the exchange.



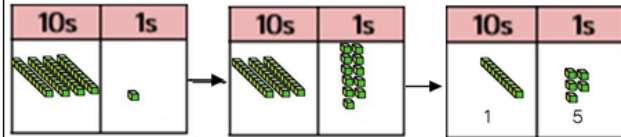
Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because  $41 = 30 + 11$ .

	3	4	1
-		2	6
		1	5

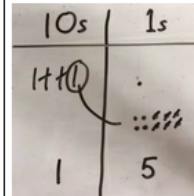




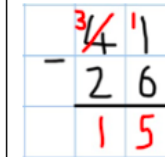
**Column method** using base 10 and having to exchange.  
41 – 26



Represent the base 10 pictorially, remembering to show the exchange.

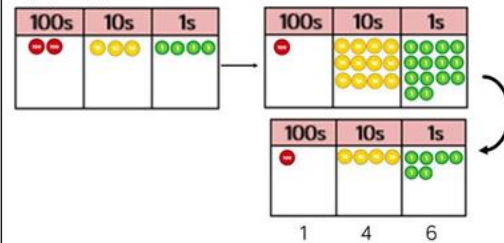


Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because  $41 = 30 + 11$ .

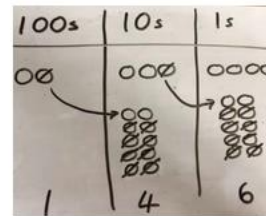


**Year 3**

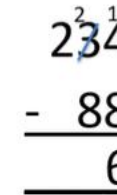
**Column method** using place value counters.  
234 – 88



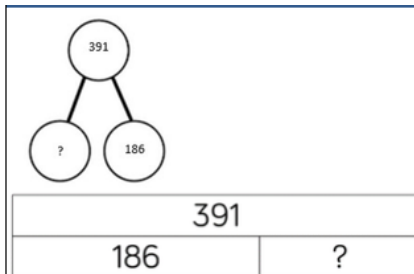
Represent the place value counters pictorially; remembering to show what has been exchanged.



Formal column method. Children must understand what has happened when they have crossed out digits.



**Developing deep understanding – different ways to solve 391 – 186**



Raj spent £391, Timmy spent £186.  
How much more did Raj spend?  
  
Calculate the difference between 391 and 186.

$\square = 391 - 186$   
 $\begin{array}{r} 391 \\ -186 \\ \hline \end{array}$   
What is 186 less than 391?

Missing digit calculations  
 $\begin{array}{r} 39\square \\ -\square\square6 \\ \hline \square05 \end{array}$

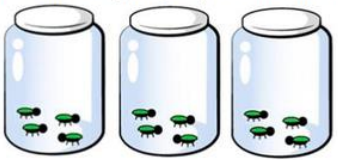

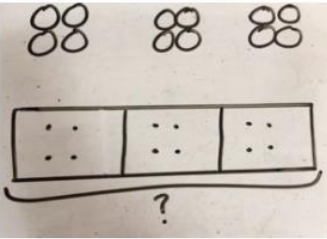


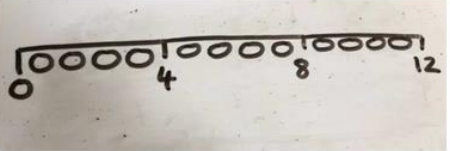
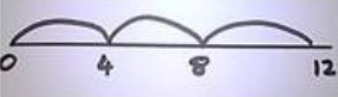


**Years 5-6 greater emphasis upon column method for regrouping, using place counters for decimals with different amounts of decimal places.**

**Multiplication**

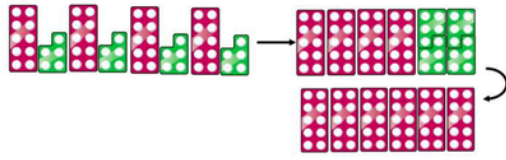
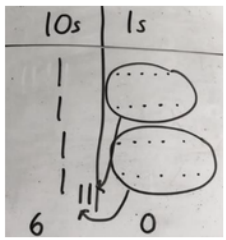
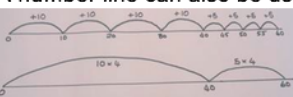




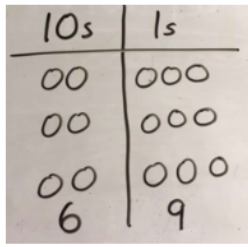


<b>Key vocabulary</b>	<b>Double, times, multiplied by, the product of, groups of, lots of, equal groups, multiples, commutative</b>
-----------------------	---

**Year 1**

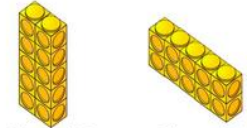
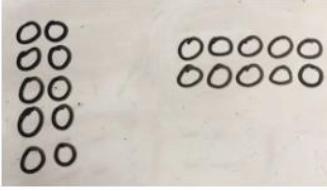
<p><u>Repeated grouping/repeated addition</u> <math>3 \times 4</math> <math>4 + 4 + 4</math> There are 3 equal groups, with 4 in each group.</p>  	<p>Children to represent the practical resources in a picture and use a bar model.</p> 	<p><math>3 \times 4 = 12</math> <math>4 + 4 + 4 = 12</math></p>
<p><u>Number lines to show repeated groups-</u> <math>3 \times 4</math></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><math>3 \times 4 = 12</math></p> 



**Year 2**

<p><b>Partition to multiply</b> using Numicon, base 10 or Cuisenaire rods. <math>4 \times 15</math></p> 	<p>Children to represent the concrete manipulatives pictorially.</p> 	<p>Children to be encouraged to show the steps they have taken.</p> <p style="text-align: center;"><math>4 \times 15</math> 10 5</p> <p><math>10 \times 4 = 40</math> <math>5 \times 4 = 20</math> <math>40 + 20 = 60</math></p> <p>A number line can also be used</p> 						
<p><b>Formal column method</b> with place value counters (base 10 can also be used.) <math>3 \times 23</math></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th style="background-color: #f8d7da;">10s</th> <th style="background-color: #f8d7da;">1s</th> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">9</td> </tr> </table>	10s	1s			6	9	<p>Children to represent the counters pictorially.</p> 	<p>Children to record what it is they are doing to show understanding.</p> <p><math>3 \times 23</math>     <math>3 \times 20 = 60</math>  <math>20 \quad 3</math>     <math>3 \times 3 = 9</math>  <math>60 + 9 = 69</math></p> <p style="text-align: center;">23  <math>\times 3</math>  <u>69</u></p>
10s	1s							
								
6	9							

**Year 3**

<p><b>Use arrays to illustrate commutativity</b> counters and other objects can also be used. <math>2 \times 5 = 5 \times 2</math></p>  <p style="text-align: center;">2 lots of 5     5 lots of 2</p>	<p>Children to represent the arrays pictorially.</p> 	<p>Children to be able to use an array to write a range of calculations e.g.</p> <p><math>10 = 2 \times 5</math>  <math>5 \times 2 = 10</math>  <math>2 + 2 + 2 + 2 + 2 = 10</math>  <math>10 = 5 + 5</math></p>
---	---	--





**Year 4 moving to Year 5**

<p><b>Formal column method with place value counters.</b>  <math>6 \times 23</math></p>	<p>Children to represent the counters/base 10, pictorially e.g. the image below.</p>	<p><b>Formal written method</b></p> $6 \times 23 =$ $\begin{array}{r} 23 \\ \times 6 \\ \hline 138 \\ \hline 11 \end{array}$
<p>When children start to multiply <math>3d \times 3d</math> and <math>4d \times 2d</math> etc., they should be confident with the abstract:</p> <p>To get 744 children have solved <math>6 \times 124</math>.        To get 2480 they have solved <math>20 \times 124</math>.</p>		$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ \phantom{7}44 \\ \hline 2480 \\ \phantom{2}480 \\ \hline 3224 \\ \hline 11 \end{array}$ <p>Answer: 3224</p>

**Developing deep understanding – different ways to solve  $391 - 186$**

	<p>Mai had to swim 23 lengths, 6 times a week.        How many lengths did she swim in one week?</p> <p>With the counters, prove that <math>6 \times 23 = 138</math></p>	<p>Find the product of 6 and 23</p> $6 \times 23 =$ $\square = 6 \times 23$ $\begin{array}{r} 6 \quad 23 \\ \times 23 \quad \times 6 \\ \hline \quad \quad \end{array}$	<p>What is the calculation?        What is the product?</p>
--	--	---	---

**Years 5-6 column multiplication- multi-digit upto 4 digits by 2 digits**



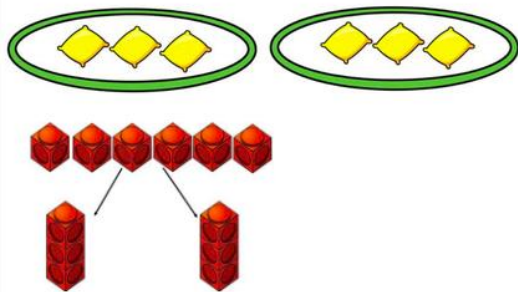
## Division

Key vocabulary

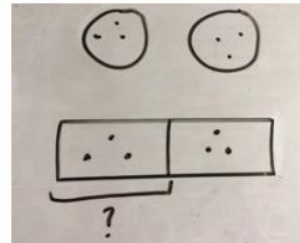
Share, group, divide, divided by, half, equal groups, left over, inverse

## Year 1

Sharing using a range of objects.  
 $6 \div 2$



Represent the sharing pictorially.



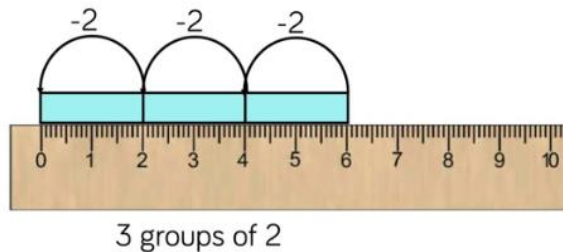
$$6 \div 2 = 3$$

3	3
---	---

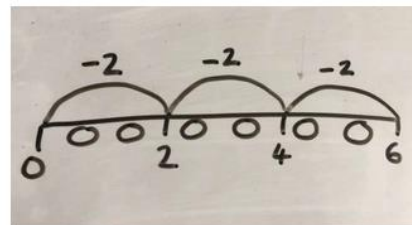
Children should also be encouraged to use their 2 times tables facts.

## Year 2

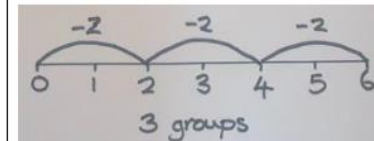
Repeated subtraction using Cuisenaire rods above a ruler.  
 $6 \div 2$



Children to represent repeated subtraction pictorially.


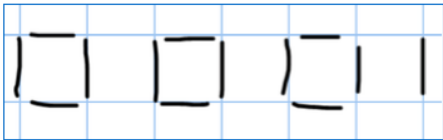
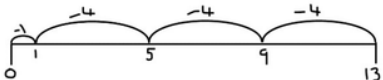
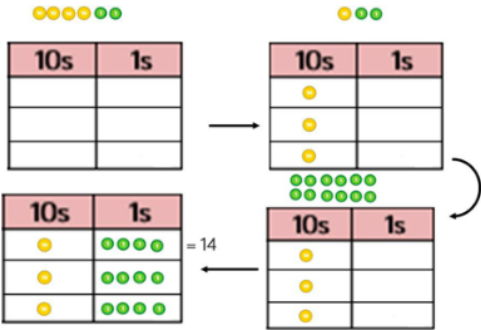
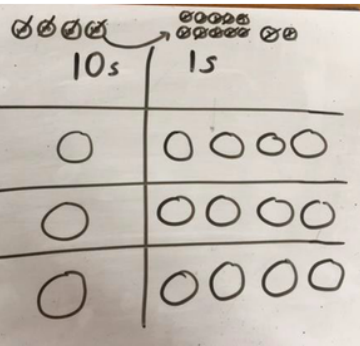


Abstract number line to represent the equal groups that have been subtracted.





**Year 3**

<p><b>2d ÷ 1d with remainders</b> using lollipop sticks. Cuisenaire rods, above a ruler can also be used.  <math>13 \div 4</math></p> <p>Use of lollipop sticks to form wholes - squares are made because we are dividing by 4.</p>  <p>There are 3 whole squares, with 1 left over.</p>	<p>Children to represent the lollipop sticks pictorially.</p>  <p>There are 3 whole squares, with 1 left over.</p>	<p><math>13 \div 4 = 3</math> remainder 1</p> <p>Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.</p> <p>'3 groups of 4, with 1 left over'</p> 
<p><b>Sharing using place value counters.</b>  <math>42 \div 3 = 14</math></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><math>42 \div 3</math>  <math>42 = 30 + 12</math>  <math>30 \div 3 = 10</math>  <math>12 \div 3 = 4</math>  <math>10 + 4 = 14</math></p>



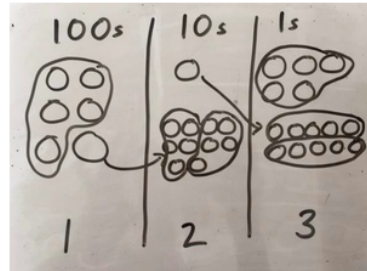
**Year 4 – moving to Year 5**

**Short division** using place value counters to group.  
 $615 \div 5$

100s	10s	1s
1	2	3

1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Represent the place value counters pictorially.



short division

$$5 \overline{) 615} \begin{matrix} 123 \\ \underline{615} \\ 0 \end{matrix}$$

**Year 6**

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

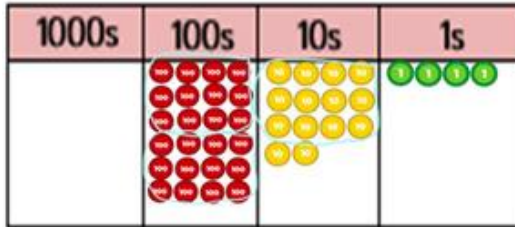
1000s	100s	10s	1s

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

1000s	100s	10s	1s

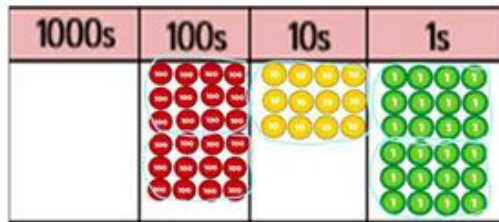
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

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



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

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

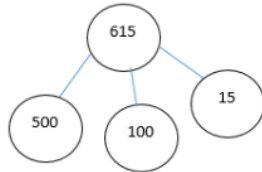


After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 groups of 12, which leaves no remainder.

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

### Developing deep understanding

Using the part whole model below, how can you divide 615 by 5 without using short division?



I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

$$5 \overline{) 615}$$

$$615 \div 5 =$$

$$\square = 615 \div 5$$

What is the calculation?  
What is the answer?



**Years 5-6 – short division upto 4 digits by 1 digits including remainders. Children should exchange into the tenths and hundredths**





**Hanwell Fields Community School**

The best in everyone™

Part of United Learning