
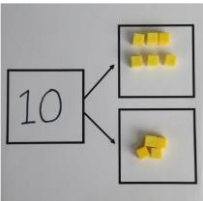


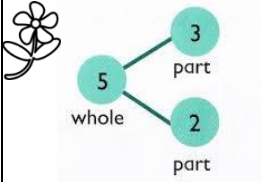
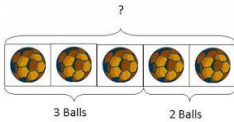

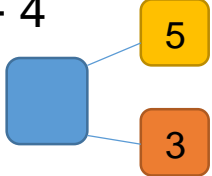

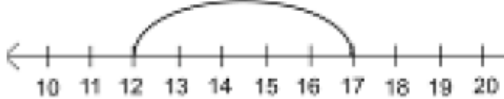

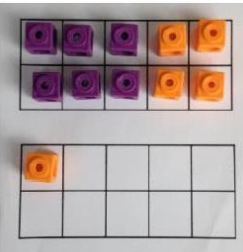
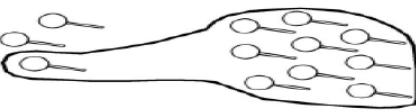
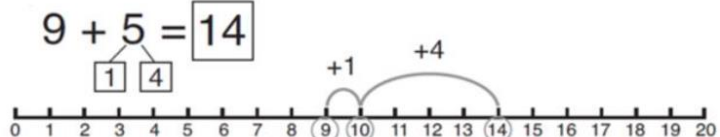

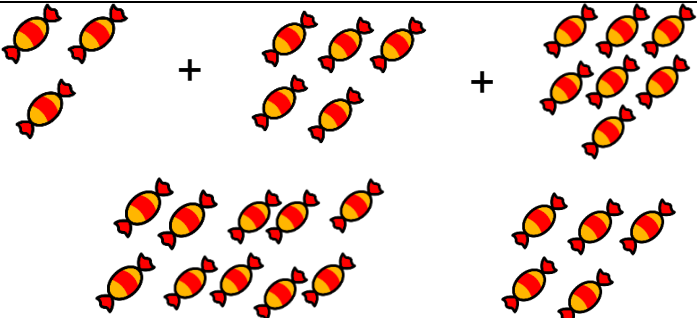


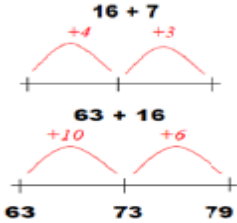
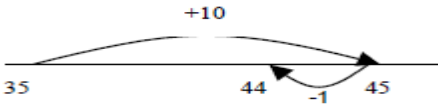
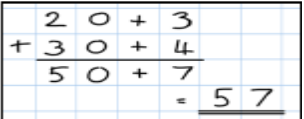
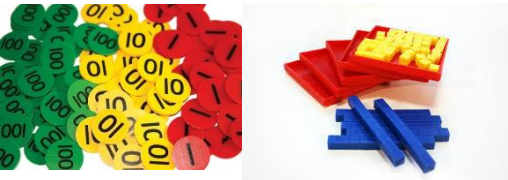
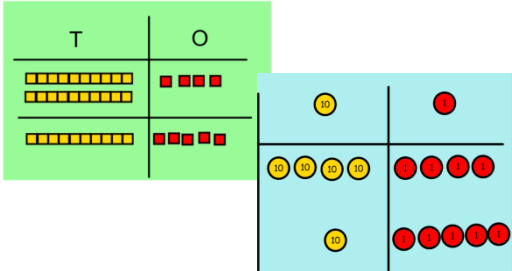
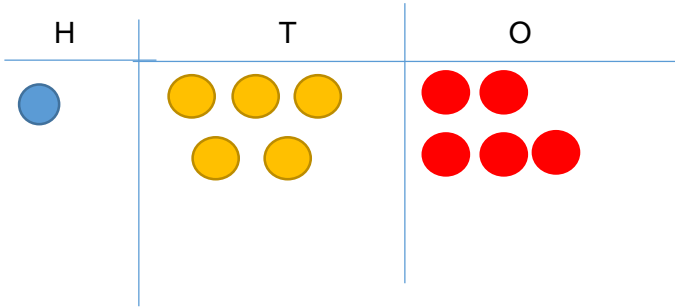
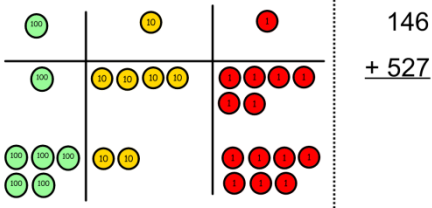
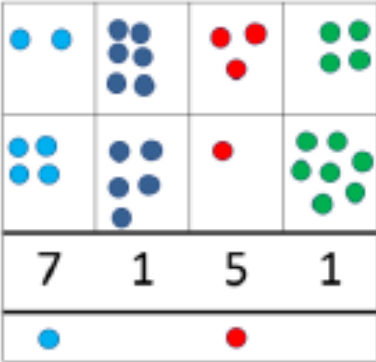
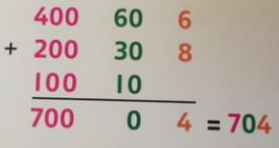
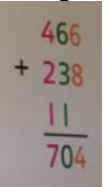


Progression in Calculations

Addition

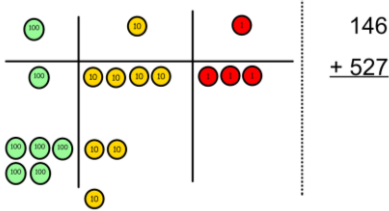
Objective and Strategies	Concrete	Pictorial	Abstract
<p><b>R/Y1</b></p> <p>Combining two parts to make a whole: part-whole model</p>	<div></div> <div></div> <div><p>Use cubes to add two numbers together as a group or in a bar.</p></div> <div></div> <div></div>	<div></div> <div></div> <div><p>Use pictures to add two numbers together as a group or in a bar.</p></div> <div></div>	<p><math>4 + 3 = 7</math></p> <p><math>10 = 6 + 4</math></p> <div></div> <div><p>Use the part-part whole diagram as shown above to move into the abstract.</p></div>
<p><b>Y1</b></p> <p>Starting at the bigger number and counting on</p>	<div></div> <div><p>Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.</p></div>	<p><math>12 + 5 = 17</math></p> <div></div> <div><p>Start at the larger number on the number line and count on in ones or in one jump to find the answer.</p></div>	<p><math>5 + 12 = 17</math></p> <div><p>Place the larger number in your head and count on the smaller number to find your answer.</p></div>

<p><b>Y1</b></p> <p>Regrouping to make 10.</p>	 <p><math>6 + 5 = 11</math></p>  <p>Start with the bigger number and use the smaller number to make 10.</p>	 <p>Use pictures or a number line. Regroup or partition the smaller number to make 10.</p> <p><math>3 + 9 =</math></p> <p><math>9 + 5 = 14</math></p> 	<p><math>7 + 4 = 11</math></p> <p>If I am at seven, how many more do I need to make 10. How many more do I add on now?</p>
<p><b>Y1</b></p> <p>Adding three single digits</p>	<p><math>4 + 7 + 6 = 17</math></p> <p>Put 4 and 6 together to make 10. Add on 7.</p>  <p>Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.</p>	 <p>Add together three groups of objects. Draw a picture to recombine the groups to make 10.</p>	<p><math>4 + 7 + 6 = 10 + 7</math></p> <p><math>= 17</math></p> <p>Combine the two numbers that make 10 and then add on the remainder.</p>
<p><b>Y2</b></p> <p>Adding 2 digit numbers</p>	 <p>Counting on in 10's and 1's</p> 	<p>Empty number line</p> <p>Bridging to next 10 number</p> <p>Jumping 10's and 1's</p> <p>Adjusting</p>  	<p>Partitioning</p> 

<p><b>Y3</b></p> <p>Adding 3 digit numbers</p>	<p>Dienne and Place value counters</p>  <p>Combining 100's, 10's and 1's</p>	<p>Same as above with 3 digits.</p>	<p>Same as above with 3 digits.</p>
<p><b>Y3</b></p> <p>Column method- no regrouping (2digits and 3 digits)</p>	<p>24 + 15=</p> <p>Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.</p> 	<p>After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.</p> 	<p><u>Calculations</u></p> $21 + 42 =$ $\begin{array}{r} 21 \\ + 42 \\ \hline \end{array}$ <p>Children to start with ones and then move to the left.</p>
<p><b>Y3/Y4</b></p> <p>Column method- regrouping</p> <p>Method taught in Year 3 and consolidated in Year 4 with 4 digits.</p>	<p>Make both numbers on a place value grid.</p>  <p>Add up the ones and <b>regroup</b> 10 ones for one 10.</p>	<p>Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.</p>  <p>Regrouped counters to be <b>placed at the bottom</b> and included in adding of counters.</p>	 <p>Start by partitioning the numbers using regrouping method before moving on to</p>  <p>clearly show the exchange below number sentences.</p>

Y5/6

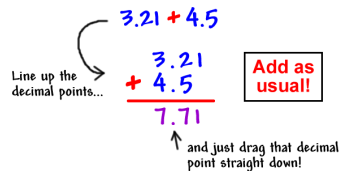
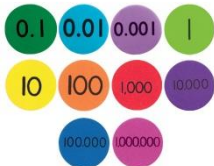
Year 5 and 6 consolidate method with decimals.



Add up the rest of the columns, regrouping the 10 counters from one column for the next place value column until every column has been added.

This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.

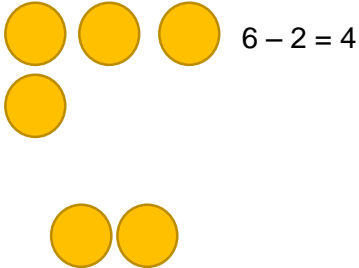

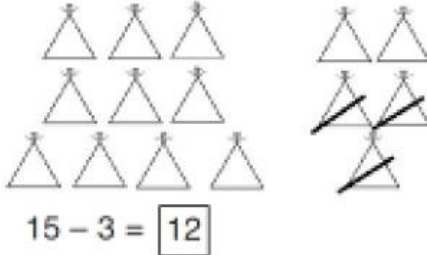


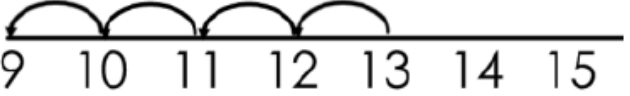
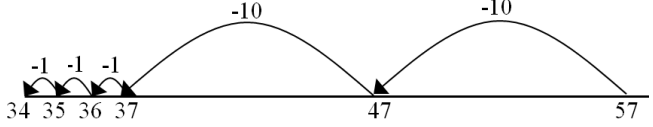
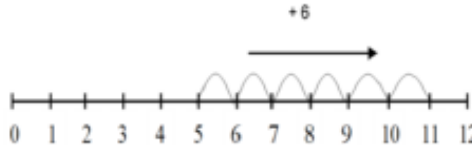
As children move on to decimals, money and decimal place value counters can be used to support learning.

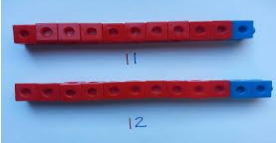
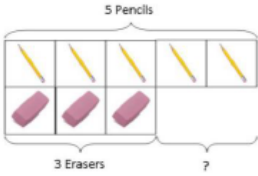

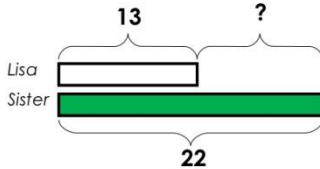
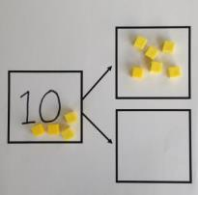
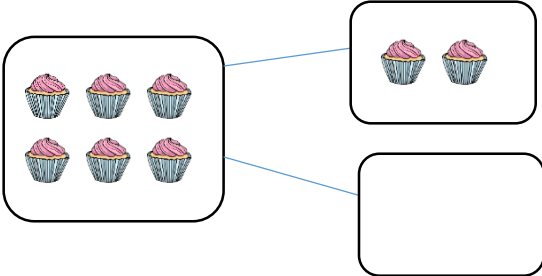
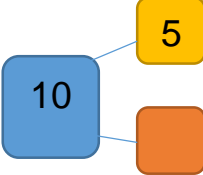

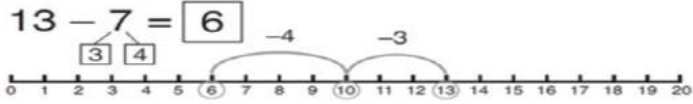


As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.

Subtraction

Objective and Strategies	Concrete	Pictorial	Abstract
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<p><b>R</b></p> <p>Taking away ones</p>	<p>Use physical objects, counters, cubes etc to show how objects can be taken away.</p>  <p>6 - 2 = 4</p> 	<p>Cross out drawn objects to show what has been taken away.</p>  <p>15 - 3 = 12</p>	<p>18 - 1 = 17</p> <p>8 - 1 = 7</p>
<p><b>R/Y1</b></p> <p>Counting back</p>	<p>Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.</p>  <p>13 - 4</p> <p>Use counters and move them away from the group as you take them away counting backwards as you go.</p> 	<p>Count back on a number line or number track</p>  <p>9 10 11 12 13 14 15</p> <p>Start at the bigger number and count back the smaller number showing the jumps on the number line.</p>  <p>34 35 36 37 47 57</p> <p>This can progress all the way to counting back using two 2 digit numbers.</p>	<p>Put 13 in your head, count back 4. What number are you at? Use your fingers to help.</p> <p>13 - 4 = 9</p>
<p><b>Y1</b></p> <p>Find the difference</p>	<p>Compare amounts and objects to find the difference.</p>	 <p>0 1 2 3 4 5 6 7 8 9 10 11 12</p> <p>Count on to find the difference.</p>	<p>Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.</p>

	<p>Use cubes to build towers or make bars to find the difference</p>  <p>Use basic bar models with items to find the difference</p>  	<p><b>Comparison Bar Models</b></p> <p>Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.</p>  <p>Draw bars to find the difference between 2 numbers.</p>	
<p><b>Y1</b></p> <p>Part Part Whole Model</p>	<p>Link to addition- use the part whole model to help explain the inverse between addition and subtraction.</p>  <p>If 10 is the whole and 6 is one of the parts. What is the other part?</p> <p><math>10 - 6 =</math></p>	<p>Use a pictorial representation of objects to show the part part whole model.</p> 	 <p>Move to using numbers within the part whole model.</p>
<p><b>Y1</b></p> <p>Make 10</p>	<p><math>14 - 9 =</math></p>  <p>Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.</p>	<p><math>13 - 7 = 6</math></p>  <p>Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.</p>	<p><math>16 - 8 =</math></p> <p>How many do we take off to reach the next 10?</p> <p>How many do we have left to take off?</p>



## Subtracting 2 digit numbers


$$55 - 23 = 32$$

Number line showing the subtraction  $55 - 23 = 32$ . The number line starts at 32 and ends at 55. There are jumps of 10 from 32 to 42, 10 from 42 to 52, and 3 from 52 to 55. The total distance is 23.

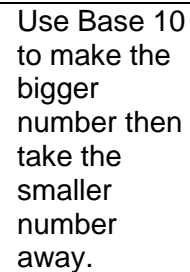
### Comparison Bar Models

$$\begin{array}{r} 80 + 9 \\ + 30 + 5 \\ \hline 50 + 4 \end{array}$$

## Adjusting

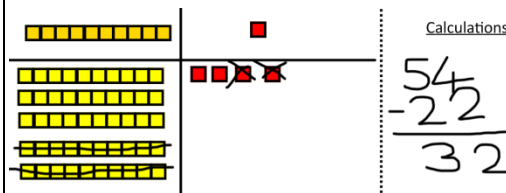
- 49  
Subtract 50 then adjust the  
+1 at the end.

Column  
method  
without  
regrouping

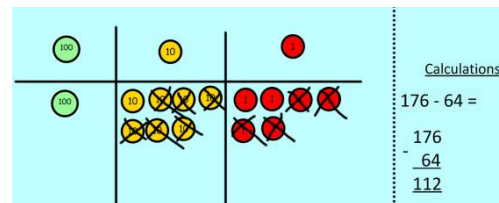


$36 - 14 = 22$

T	U
30	6
10	4
20	2



Draw the Base 10 or place value counters alongside the written calculation to help to show working.



This will lead to a clear written column subtraction.

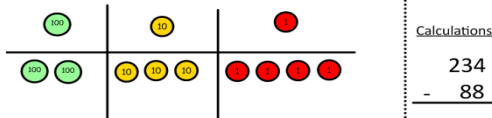
$$\begin{array}{r} 32 \\ - 12 \\ \hline 20 \end{array}$$

Y3/Y4

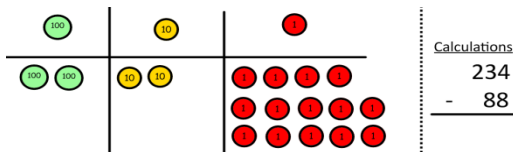
## Column method with regrouping

Use Base 10 to start with before moving on to place value counters. Start with one regroup before moving onto subtractions with 2 regroupings.

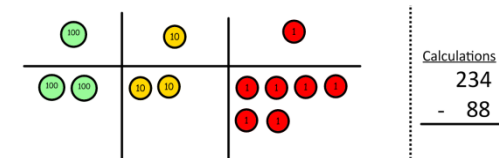
Make the larger number with the place value counters



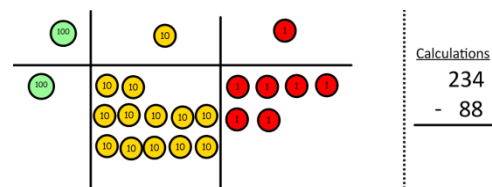
Start with the ones, can I take away 8 from 4 easily? I need to regroup one of my tens for ten ones.



Now I can subtract my ones.

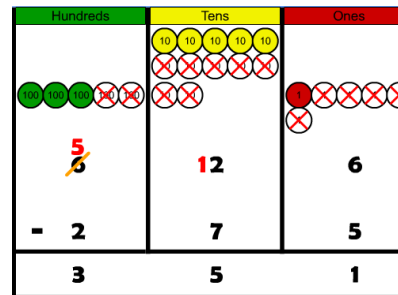
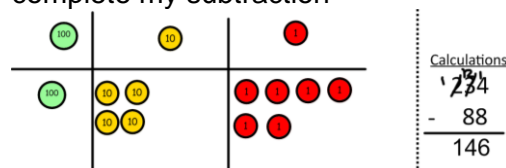


Now look at the tens, can I take away 8 tens easily? I need to regroup one

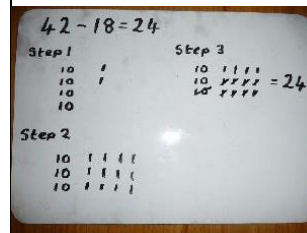


hundred for ten tens.

Now I can take away eight tens and complete my subtraction



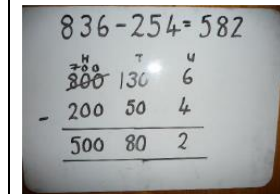
Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the regroupings you make.



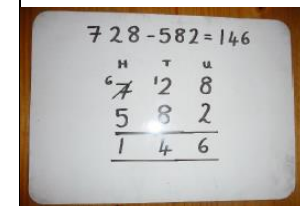
When confident, children can find their own way to record the regrouping.

Just writing the numbers as shown here shows that the child understands the method and knows when to regroup.

Show children how the concrete method links to the written method alongside your working. Cross out the numbers when regrouping and show where we write our new amount.

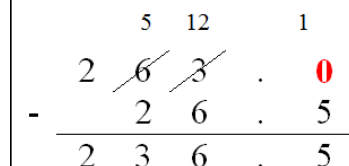


Children can start their formal written method by partitioning the number into clear place value columns.



Moving forward the children use a more compact method.

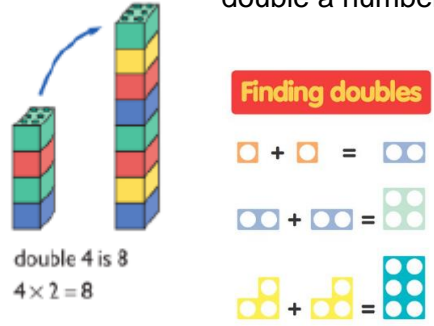

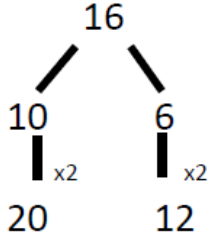
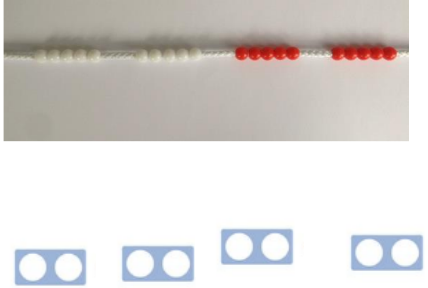
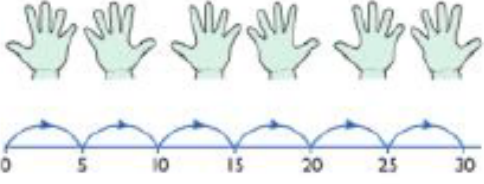
This will lead to an understanding of subtracting any number including decimals.

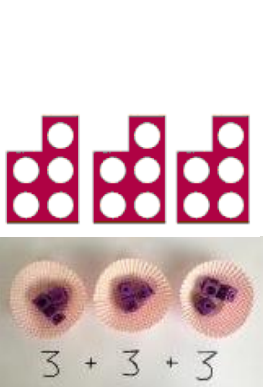


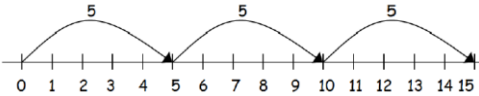





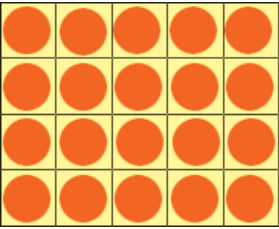


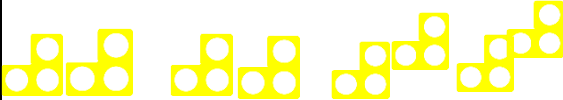


Y5/6



## Multiplication

Objective and Strategies	Concrete	Pictorial	Abstract
<b>R/Y1</b>  <b>Doubling</b>	<p>Use practical activities to show how to double a number.</p>  <p>double 4 is 8 <math>4 \times 2 = 8</math></p> <p><b>Finding doubles</b></p> <p><math>2 + 2 = 4</math> <math>4 + 4 = 8</math> <math>2 + 2 = 4</math></p>	<p>Draw pictures to show how to double a number.</p> <p>Double 4 is 8</p> 	 <p>Partition a number and then double each part before recombining it back together.</p>
<b>Y1</b>  <b>Counting in multiples</b>	 <p>Count in multiples supported by concrete objects in equal groups.</p>	 <p>Use a number line or pictures to continue support in counting in multiples.</p>	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20, 25, 30</p>



<p><b>Y2</b></p> <p>Repeated addition</p>	  <div data-bbox="696 339 925 475"> <p>Use different objects to add equal groups.</p> </div>	<p>There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?</p>  <p>2 add 2 add 2 equals 6</p>  <p>5 + 5 + 5 = 15</p>	<p>Write addition sentences to describe objects and pictures.</p>  <p>2 + 2 + 2 + 2 + 2 = 10</p>
<p><b>Y2</b></p> <p>Arrays- showing commutative multiplication</p>	<p>Create arrays using counters/ cubes to show multiplication sentences.</p>  	<p>Draw arrays in different rotations to find <b>commutative</b> multiplication sentences.</p>  <p>4 × 2 = 8</p> <p>2 × 4 = 8</p>  <p>2 × 4 = 8</p> <p>4 × 2 = 8</p>  <p>Link arrays to area of rectangles.</p>	<p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p>5 + 5 + 5 = 15</p> <p>3 + 3 + 3 + 3 + 3 = 15</p> <p>5 × 3 = 15</p> <p>3 × 5 = 15</p>
<p><b>Y3</b></p> <p>Multiplying 3 numbers</p>	<p>2 × 4 × 3</p>  <p>Children to investigate whether order of the number change the answer.</p> 	<p>Draw images that will support two step process.</p> <p>Arrays Draw around numicon</p>	<p>Create two step problems.</p> <p>2 × 4 = 8      8 × 3 = 24</p> <p>Try another way....</p> <p>4 × 3 = 12      12 × 2 = 12</p> <p>Move to children being able to justify order they find easiest. (look for x2s, x10)</p>

# Y3

## Grid Method



Teach in Y3 but continue to use through Y4, 5, 6

Show the link with arrays to first introduce the grid method.

x	10	3
4		




4 rows of 10  
4 rows of 3

Move on to using Base 10 to move towards a more compact method.

x	T	U
4		


4 rows of 13

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.
















Calculations  
4 x 126

Fill each row with 126.

Calculations  
4 x 126

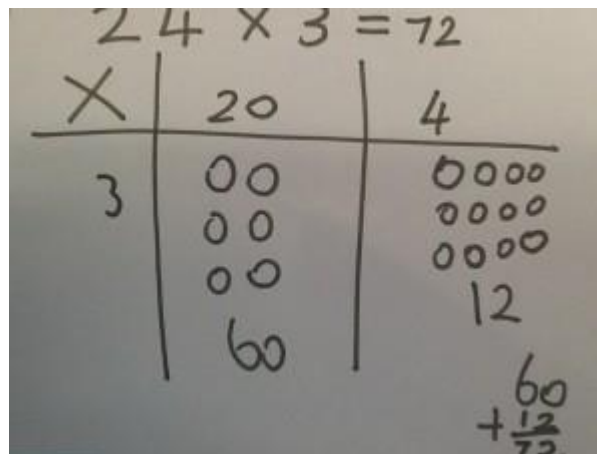
Add up each column, starting with the ones making any exchanges needed.

Then you have your answer.

Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.



Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

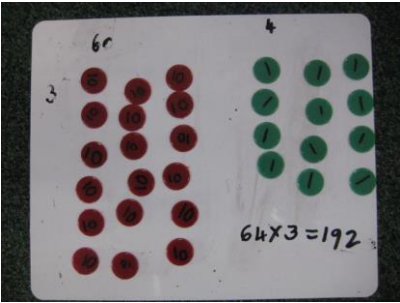
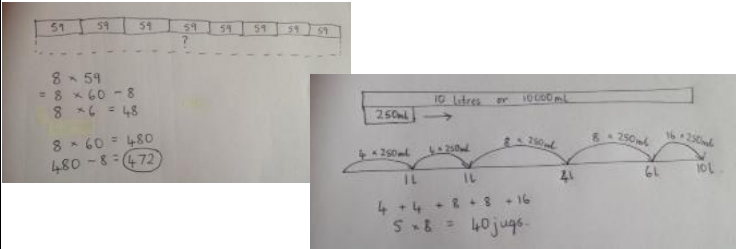

x	30	5
7	210	35

$$210 + 35 = 245$$


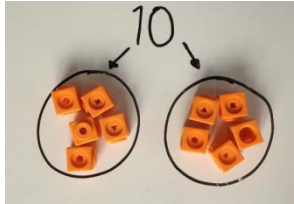
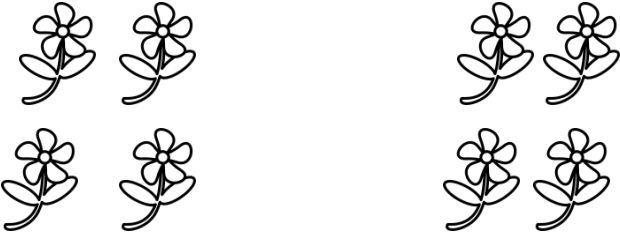
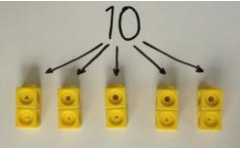
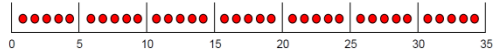

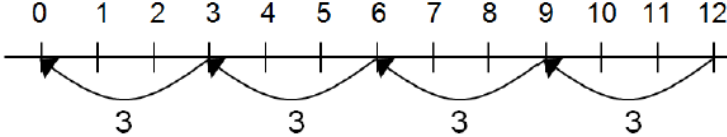
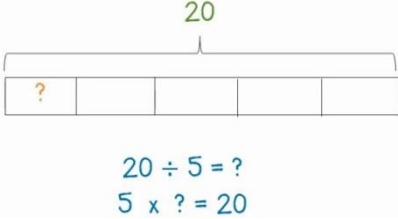
Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

	10	8
10	100	80
3	30	24

x	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

<p><b>Y4</b></p> <p>Expanded Column multiplication</p>	<p>Children can continue to be supported by place value counters at the stage of multiplication.</p>  <p>It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.</p>	<p>Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.</p> 	<p>Start with long multiplication, reminding the children about lining up their numbers clearly in columns.</p> <p>If it helps, children can write out what they are solving next to their answer.</p> <p>Children to start with one's column and then move over to the tens.</p> $  \begin{array}{r}  32 \\  \times 24 \\  \hline  8 \quad (4 \times 2) \\  120 \quad (4 \times 30) \\  600 \quad (20 \times 2) \\  768 \quad (20 \times 30)  \end{array}  $
<p><b>Y5/6</b></p> <p>Compact Column multiplication</p>	<p>Use place value counters to support multiplication.</p> 		<p>This moves to the more compact method.</p> <p>Multiply decimals by ignoring decimal, calculating, counting decimal places and replacing point at the end.</p> $  \begin{array}{r}  134 \\  \times 32 \\  \hline  268 \\  4020 \\  \hline  4288  \end{array}  $ $  \begin{array}{r}  25.35 \quad \leftarrow 2 \text{ decimal places} \\  + \\  0.12 \quad \leftarrow 2 \text{ decimal places} \\  \hline  5070 \quad \leftarrow 4 \text{ total decimal places} \\  25350 \\  \hline  30420  \end{array}  $ <p>Now the decimal according to the total places in the factors.</p>

Division

Objective and Strategies	Concrete	Pictorial	Abstract
<b>R/Y1</b> Sharing objects into groups	 <p>I have 10 cubes, can you share them equally in 2 groups?</p> 	Children use pictures or shapes to share quantities.  <div>8 ÷ 2 = 4</div>	Share 9 buns between three people.  9 ÷ 3 = 3
<b>Y1</b> Division as grouping	<p>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.</p>   	<p>Use a number line to show jumps in groups. The number of jumps equals the number of groups.</p>  <p>Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.</p> 	14 ÷ 2 = 7  Divide 14 into 2 groups. How many are in each group?

<p><b>Y2</b></p> <p>Division within arrays</p>	<div data-bbox="421 132 741 339"> </div> <p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p> <p>Eg <math>15 \div 3 = 5</math>    <math>5 \times 3 = 15</math>  <math>15 \div 5 = 3</math>    <math>3 \times 5 = 15</math></p>	<div data-bbox="969 124 1630 355"> </div> <p>Draw an array and use lines to split the array into groups to make multiplication and division sentences.</p>	<p>Find the inverse of multiplication and division sentences by creating four linking number sentences.</p> <p><math>7 \times 4 = 28</math>  <math>4 \times 7 = 28</math>  <math>28 \div 7 = 4</math>  <math>28 \div 4 = 7</math></p>
<p><b>Y2</b></p> <p>Division with a whole number remainder</p> <p>To be continued in Year 3 and 4</p>	<p><math>14 \div 3 =</math>          Divide objects between groups and see how much is left over</p> <div data-bbox="421 707 947 1082"> </div>	<p>Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.</p> <div data-bbox="969 627 1686 754"> </div> <p>Draw dots and group them to divide an amount and clearly show a remainder.</p> <div data-bbox="1070 930 1529 1026"> </div>	<p>Complete written divisions and show the remainder using r.</p> <div data-bbox="1742 699 2089 770"> <math display="block">\begin{array}{ccccccc} 29 &amp; \div &amp; 8 &amp; = &amp; 3 &amp; \text{REMAINDER} &amp; 5 \\ \uparrow &amp; &amp; \uparrow &amp; &amp; \uparrow &amp; &amp; \uparrow \\ \text{dividend} &amp; &amp; \text{divisor} &amp; &amp; \text{quotient} &amp; &amp; \text{remainder} \end{array}</math> </div>

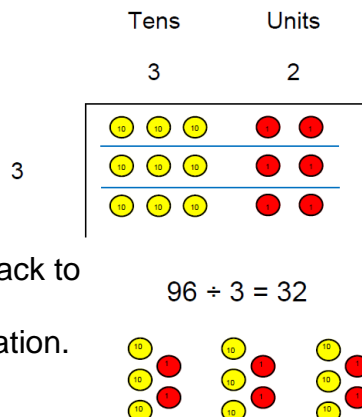


**Y3**

## Short division in grid method

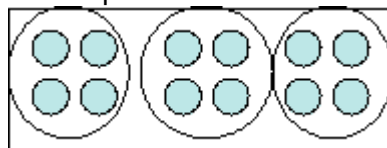
Choose number that will not need exchanging.

$$96 \div 3 =$$



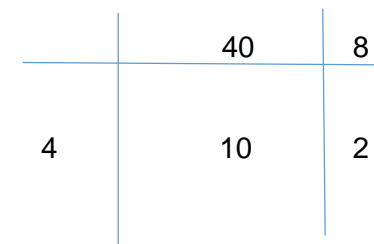
Relate back to array in multiplication.

Use drawings of grouping, arrays, numicon to help count in multiples to use the inverse to calculate division.



Encourage children to move towards counting in multiples to divide more efficiently.

$$48 \div 4 =$$

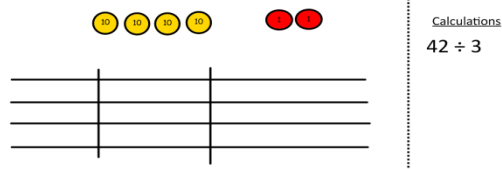


$$10 + 8 = 12$$

**Y4, 5**

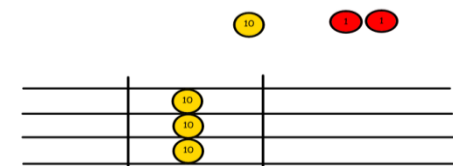
## Short division

Use place value counters to divide using the bus stop method alongside

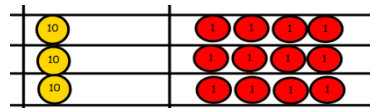


$$42 \div 3 =$$

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.

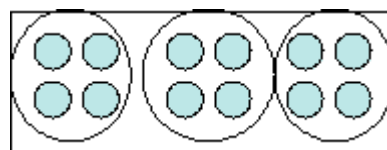


We regroup this ten for ten ones and then share the ones equally among the groups.



We look how much in 1 group so the answer is 14.

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.



Encourage them to move towards counting in multiples to divide more efficiently.

Begin with divisions that divide equally with no remainder.

$$\begin{array}{r} 2 \ 1 \ 8 \\ 3 \overline{) 8 \ 7 \ 2} \end{array}$$

Move onto divisions with a remainder.

$$\begin{array}{r} 8 \ 6 \ r \ 2 \\ 3 \overline{) 4 \ 3 \ 2} \end{array}$$

Y6

Short division  
decimals

Long division

Finally move into decimal places to divide the total accurately.

$$\begin{array}{r} 14.6 \\ 35 \overline{) 511.0} \end{array}$$

Teach long division method.

15 into 3 doesn't go, so look at the next digit.  
15 goes into 36 two times, so put a 2 above the 6.  
 $15 \times 2 = 30$   
Take that 30 away from the 36 to get your remainder.  
 $36 - 30 = 6$

Next, carry the 4 down to make 64.  
15 goes into 64 four times, so put a 4 above the 4.  
 $15 \times 4 = 60$   
Take 60 from the 64 to get your remainder.  
 $64 - 60 = 4$

Carry the 0 down to make 40.  
15 goes into 40 two times, so put a 2 above the 0.  
 $15 \times 2 = 30$   
Take 30 from the 40 to get your remainder.  
 $40 - 30 = 10$

$$\begin{array}{r} 24.2 \\ 15 \overline{) 3640} \\ - 30 \phantom{0} \\ \hline 64 \phantom{0} \\ - 60 \phantom{0} \\ \hline 40 \phantom{0} \\ - 30 \phantom{0} \\ \hline 10 \end{array}$$

Resource checklist:

These are some of the resources you will need to use to follow this calculation policy. This is NOT an exhaustive list – please use everything from Y1-6.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Number fans Unifix cubes Numicon Cuisenaire rods Number lines Bead strings 20 10 frames Diennes Dice Money Clocks 2D shapes 3D shapes	Number fans Place Value counters Place Value arrow card Diennes 100 square Multiplication grid Beadstring 20/100 Empty number line Numicon Dice Money Clocks 2D shapes 3D shapes	Number fans Place Value counters Place Value arrow card Diennes 100 square Multiplication grid Numicon Dice Money Clocks 2D shapes 3D shapes	Number fans Place Value counters Place Value arrow card Diennes Multiplication grid Numicon Dice Money Clocks 2D shapes 3D shapes	Number fans Place Value counters Place Value arrow card Diennes Multiplication grid Numicon Dice Money Clocks 2D shapes 3D shapes	Number fans Place Value counters Place Value arrow card Diennes Multiplication grid Numicon Dice Money Clocks 2D shapes 3D shapes