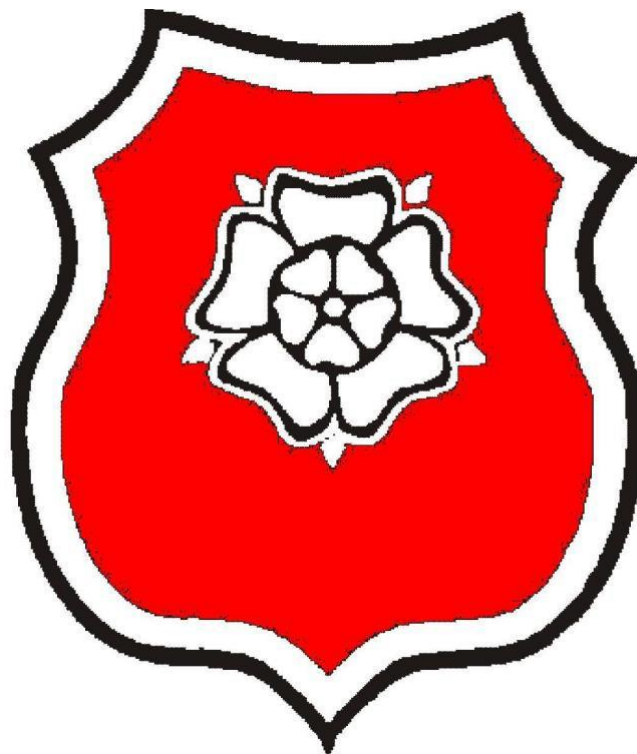


# Calculation Policy

## St Agnes C of E Primary School



**Approved by:** Mr Chris Cartwright

**Date:**

**Last reviewed on:** October 2022

**Next review due by:** September 2023

## **Calculation Policy**

### **Mission Statement**

St Agnes C of E Voluntary Aided Primary School is proud to offer to its pupils an education, which is intellectually, socially, morally, aesthetically, physically and spiritually based on Christian values. We encourage each child to develop a sense of curiosity and excitement about the world, ensuring that the curriculum provides a Christian setting in which children can grow in understanding and the acquisition of skills, attitudes and values.

All members of our School, pupils, teaching staff and non-teaching staff are to be valued and treated with mutual respect, thus promoting a healthy self-esteem.

Our School seeks to create strong links between school, home, Church and parish, providing pupils with the necessary preparation for their entry into the wider community.

We expect everyone at St Agnes Primary School to follow 'The Great Expectations' –

Be Safe

Be in the right place at the right time


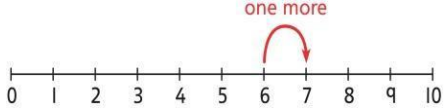
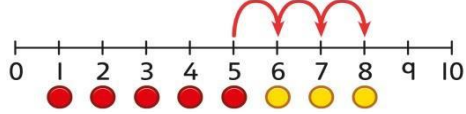

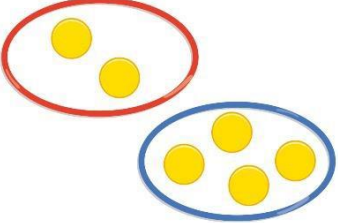
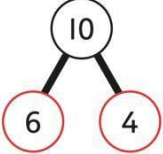
Do your best



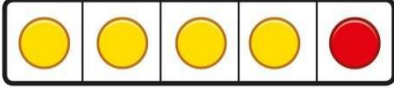
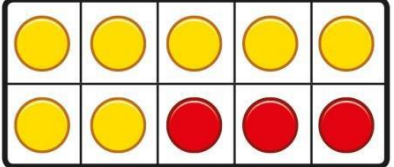
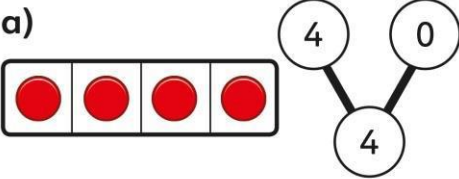
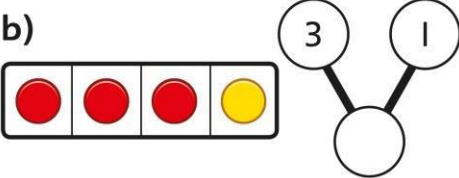
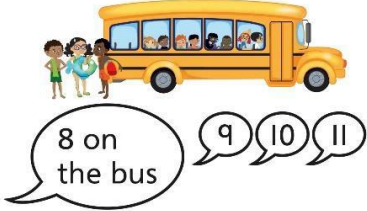
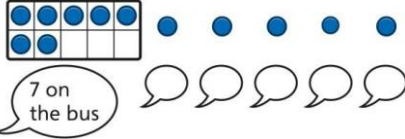
Handle your emotions

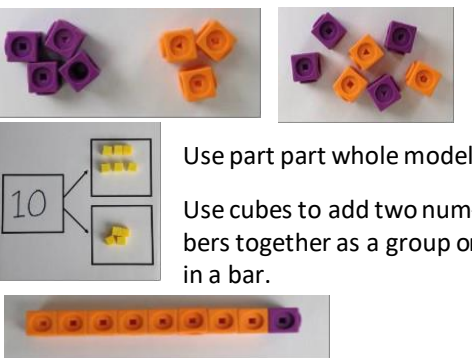
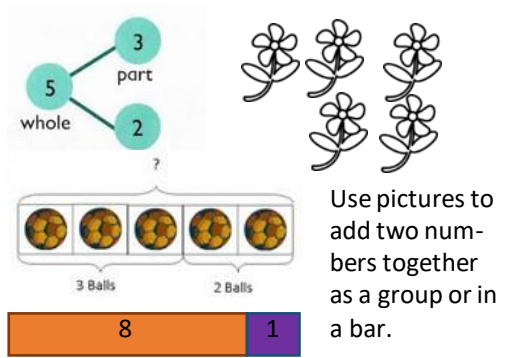
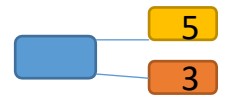

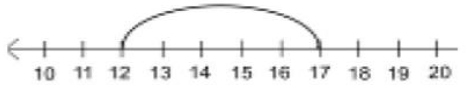
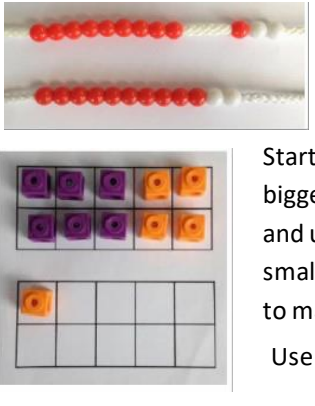
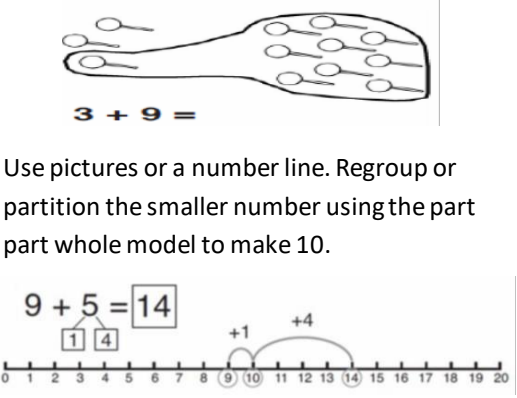

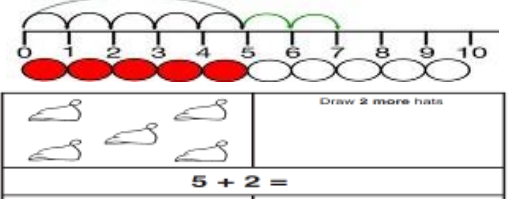
Use appropriate language

Cooperate

Respect everyone and everything


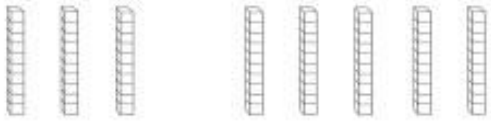
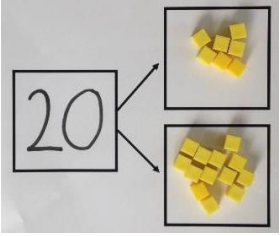
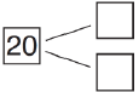
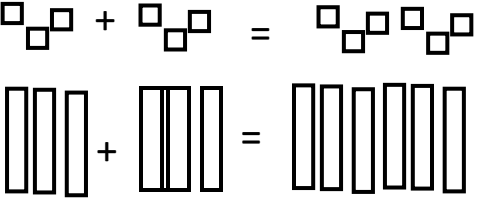
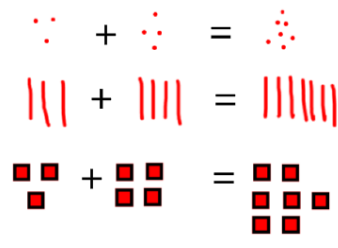


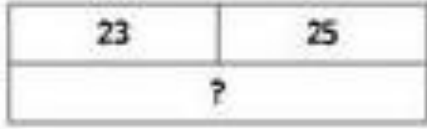
Objective & Strategy	Concrete	Pictorial	Abstract	EYFS
<b>Counting and adding more</b>	Children add one more person or object to a group to find one more.	Children add one more cube or counter to a group to represent one more.    <i>One more than 4 is 5.</i>	Use a number line to understand how to link counting on with finding one more.    <i>One more than 6 is 7. 7 is one more than 6.</i>  Learn to link counting on with adding more than one.    $5 + 3 = 8$	
<b>Understanding part-part-whole relationship</b>	Sort people and objects into parts and understand the relationship with the whole.    <i>The parts are 2 and 4. The whole is 6.</i>	Children draw to represent the parts and understand the relationship with the whole.    <i>The parts are 1 and 5. The whole is 6.</i>	Use a part-whole model to represent the numbers.    $6 + 4 = 10$  $6 + 4 = 10$	

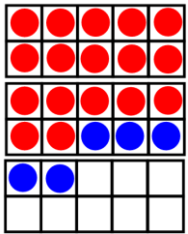
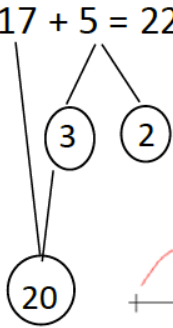
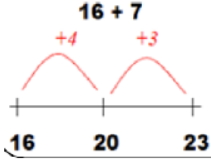
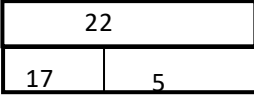
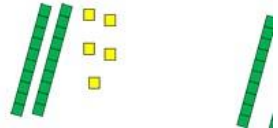
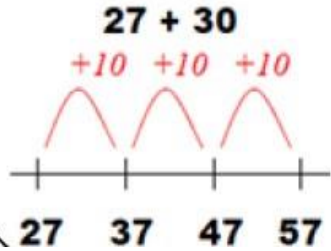
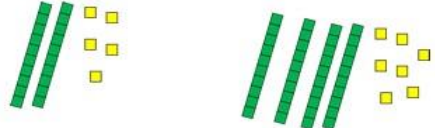
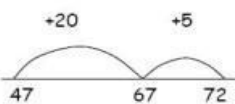
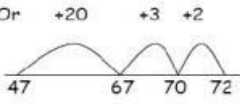
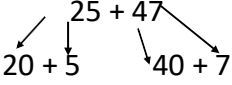

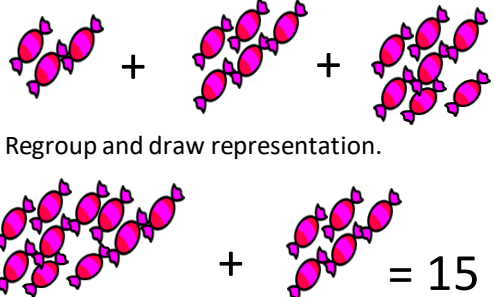
Objective & Strategy	Concrete	Pictorial	Abstract	EYFS
<p><b>Knowing and finding number bonds within 10</b></p>	<p>Break apart a group and put back together to find and form number bonds.</p>  <p><math>3 + 4 = 7</math></p>  <p><math>6 = 2 + 4</math></p>	<p>Use five and ten frames to represent key number bonds.</p>  <p><math>5 = 4 + 1</math></p>  <p><math>10 = 7 + 3</math></p>	<p>Use a part-whole model alongside other representations to find number bonds. Make sure to include examples where one of the parts is zero.</p> <p>a)</p>  <p>b)</p>  <p><math>4 + 0 = 4</math> <math>3 + 1 = 4</math></p>	
<p><b>Adding by counting on</b></p>	<p>Children use knowledge of counting to 20 to find a total by counting on using people or objects.</p> 	<p>Children use counters to support and represent their counting on strategy.</p> 		

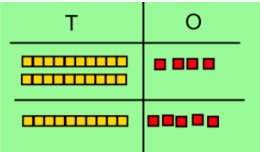
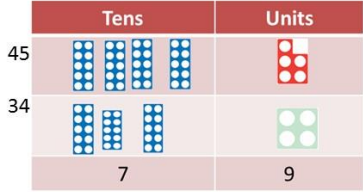
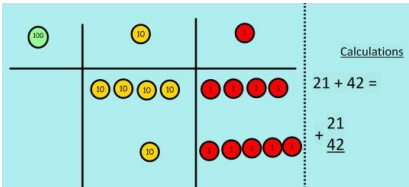
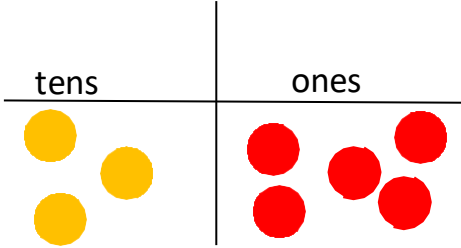
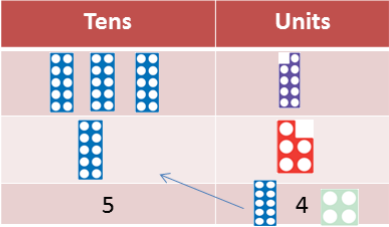
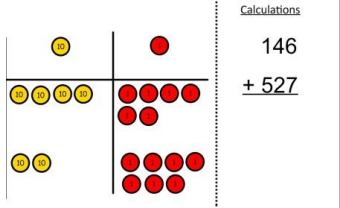
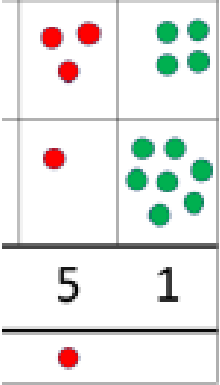
Objective & Strategy	Concrete	Pictorial	Abstract	<h1 style="writing-mode: vertical-rl; text-orientation: mixed;">Y1 Addition</h1>	
<b>Combining two parts to make a whole: part- whole model</b>	 <p>Use part part whole model.</p> <p>Use cubes to add two numbers together as a group or in a bar.</p>	 <p>Use pictures to add two numbers together as a group or in a bar.</p>	$4 + 3 = 7$  $10 = 6 + 4$ Use the part-part whole diagram as shown above to move into the abstract.		
<b>Starting at the bigger number and counting on</b>	 <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>	$12 + 5 = 17$  <p>Start at the larger number on the number line and count on in ones or in one jump to find the answer.</p>	$5 + 12 = 17$ Place the larger number in your head and count on the smaller number to find your answer.		
<b>Regrouping to make 10.</b>  <i>This is an essential skill for column addition later.</i>	 <p>Start with the bigger number and use the smaller number to make 10.</p> <p>Use ten frames.</p>	 <p>Use pictures or a number line. Regroup or partition the smaller number using the part part whole model to make 10.</p>	$7 + 4 = 11$  If I am at seven, how many more do I need to make 10. How many more do I add on now?  		
<b>Represent &amp; use number bonds and related subtraction facts within 20</b>	 <p>2 more than 5.</p>	 <p>Draw 2 more hats.</p> $5 + 2 =$	Emphasis should be on the language <i>'1 more than 5 is equal to 6.'</i> <i>'2 more than 5 is 7.'</i> <i>'8 is 3 more than 5.'</i>		

# Y2

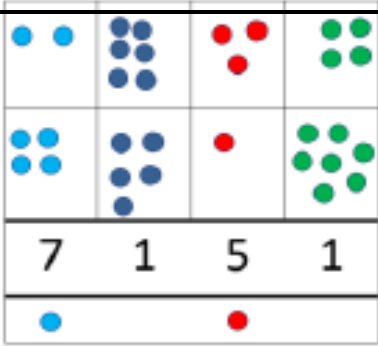
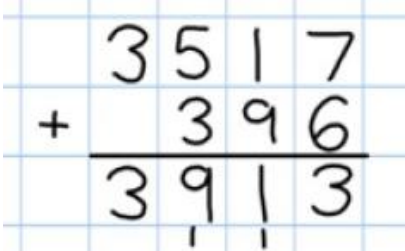
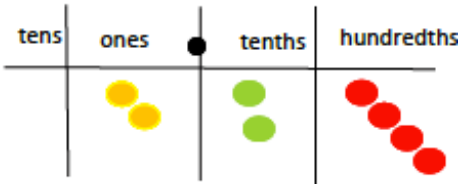
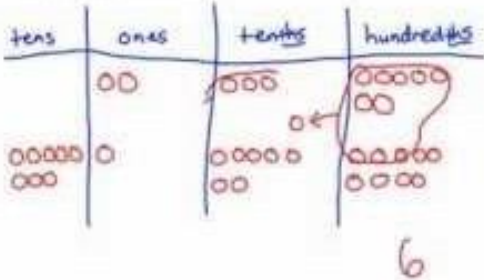
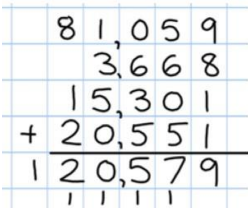
# Addition




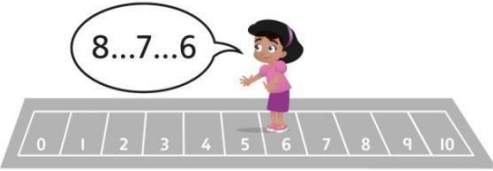
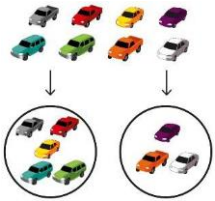
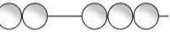
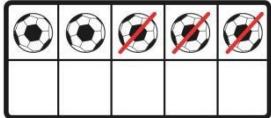
Objective & Strategy	Concrete	Pictorial	Abstract
<b>Adding multiples of ten</b>	$50 = 30 + 20$  Model using dienes and bead strings	 $3 \text{ tens} + 5 \text{ tens} = \text{---} \text{ tens}$ $30 + 50 = \text{---}$ Use representations for base ten.	$20 + 30 = 50$ $70 = 50 + 20$ $40 + \square = 60$
<b>Use known number facts</b> <b>Part part whole</b>	 Children explore ways of making numbers within 20	 $\square + \square = 20$ $20 - \square = \square$ $\square + \square = 20$ $20 - \square = \square$	$\square + 1 = 16$ $16 - 1 = \square$ $1 + \square = 16$ $16 - \square = 1$
<b>Using known facts</b>	 $\square + \square = \square$	 Children draw representations of H,T and O	$3 + 4 = 7$ <i>leads to</i> $30 + 40 = 70$ <i>leads to</i> $300 + 400 = 700$
<b>Bar model</b>	 $3 + 4 = 7$	 $7 + 3 = 10$	 $23 + 25 = 48$

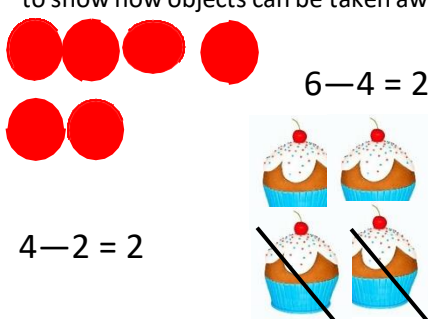
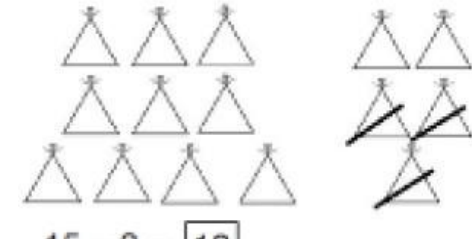
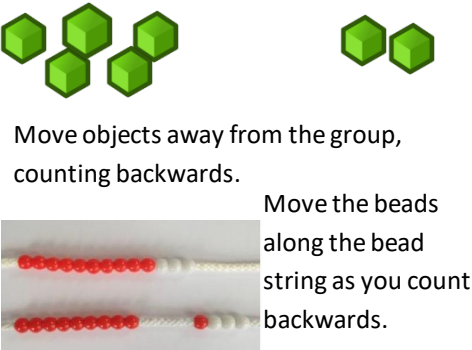
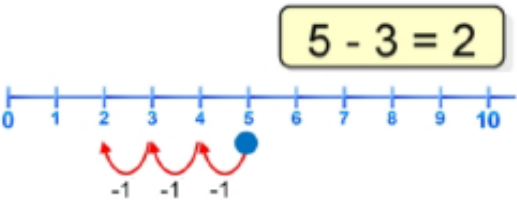
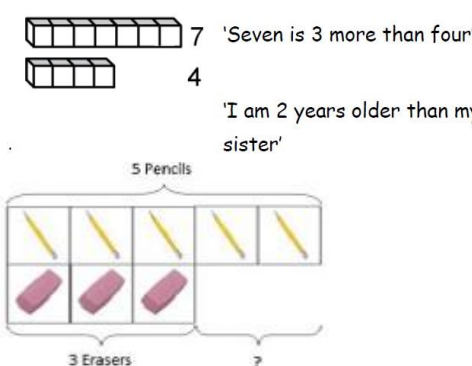
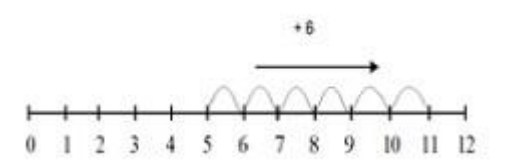
Objective & Strategy	Concrete	Pictorial	Abstract	Y2
<b>Add a two digit number and ones</b>	 <p>17 + 5 = 22</p> <p>Use ten frame to make 'magic ten</p> <p>Children explore the pattern.</p> <p>17 + 5 = 22</p> <p>27 + 5 = 32</p>	<p>Use part part whole and number line to model.</p> <p>17 + 5 = 22</p>  	<p>17 + 5 = 22</p> <p>Explore related facts</p> <p>17 + 5 = 22</p> <p>5 + 17 = 22</p> <p>22 - 17 = 5</p> <p>22 - 5 = 17</p> 	
<b>Add a 2 digit number and tens</b>	 <p>25 + 10 = 35</p> <p>Explore that the ones digit does not change</p>	<p>27 + 30</p> 	<p>27 + 10 = 37</p> <p>27 + 20 = 47</p> <p>27 + □ = 57</p>	
<b>Add two 2-digit numbers</b>	 <p>Model using dienes, place value counters and numicon.</p>	 <p>Or</p>  <p>Use number line and bridge ten using part whole if necessary.</p>	<p>25 + 47</p>  <p>20 + 40 = 60</p> <p>5 + 7 = 12</p> <p>60 + 12 = 72</p>	
<b>Add three 1-digit numbers</b>	 <p>Combine to make 10 first if possible, or bridge 10 then add third digit</p>	<p>Regroup and draw representation.</p>  <p>+ = 15</p>	<p>4 + 7 + 6 = 10 + 7</p> <p>10 = 17</p> <p>Combine the two numbers that make/ bridge ten then add on the third.</p>	

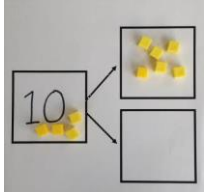
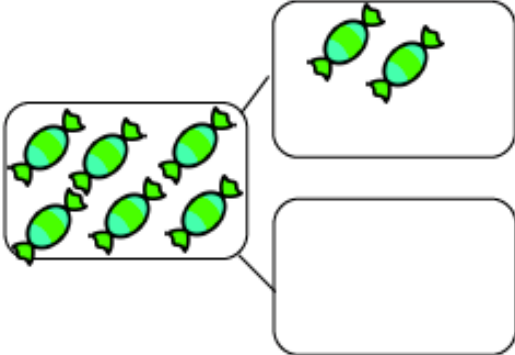
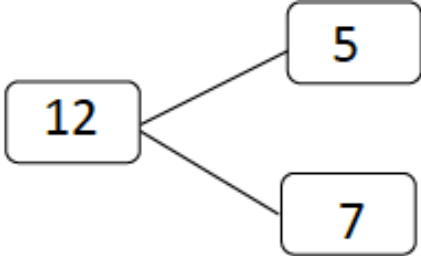
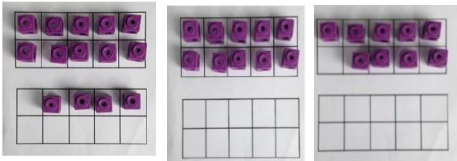
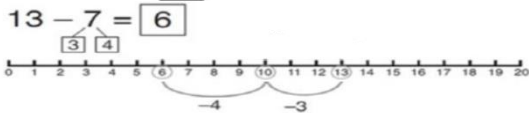
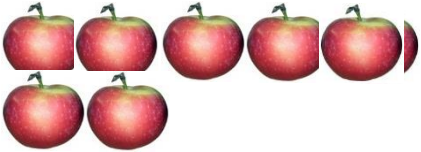


Objective & Strategy	Concrete	Pictorial	Abstract	Y3
<p><b>Column Addition—no regrouping (friendly numbers)</b></p> <p>Add two or three 2 or 3- digit numbers.</p>	<p>Model using Dienes or numicon</p>  <p>Add together the ones first, then the tens.</p>   <p>Move to using place value counters</p>	<p>Children move to drawing the counters using a tens and one frame.</p> 	$\begin{array}{r} 223 \\ + 114 \\ \hline 337 \end{array}$ <p>Add the ones first, then the tens, then the hundreds.</p>	
<p><b>Column Addition with regrouping.</b></p>	 <p>Exchange ten ones for a ten. Model using numicon and pv counters.</p> 	<p>Children can draw a representation of the grid to further support their understanding, carrying the ten <u>underneath</u> the line</p> 	$\begin{array}{r} 20 + 5 \\ 40 + 8 \\ 60 + 13 = 73 \end{array}$ <p>Start by partitioning the numbers before formal column to show the exchange.</p> $\begin{array}{r} 536 \\ + 85 \\ \hline 621 \\ 11 \end{array}$	

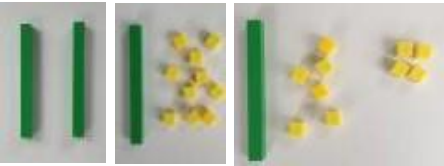

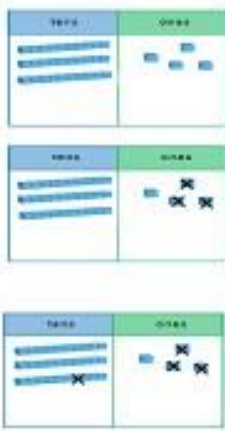
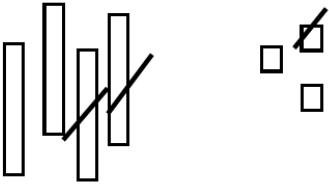
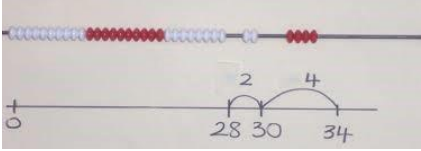
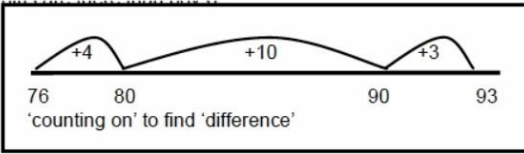


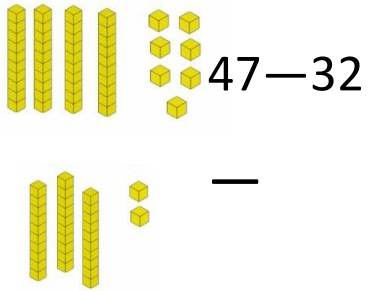
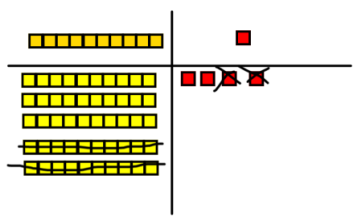
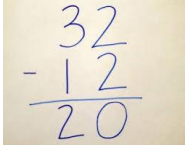
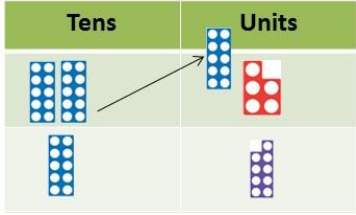
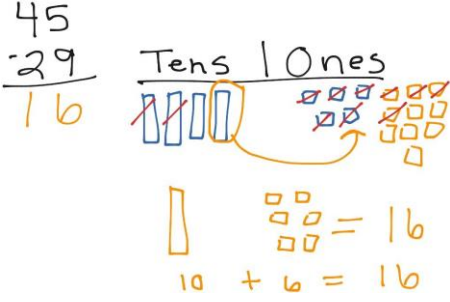
Objective & Strategy	Concrete	Pictorial	Abstract	Y4-6																												
<p><b>Y4—add numbers with up to 4 digits</b></p>	<p>Children continue to use dienes or pv counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.</p> <table border="1" data-bbox="398 437 878 639"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Hundreds	Tens		Ones							 <p>Draw representations using place value grid.</p> <p><math>2.37 + 81.79</math></p>	 <p>Continue from previous work to carry hundreds as well as tens.</p> <p>Relate to money and measures.</p>	Addition																		
Hundreds	Tens	Ones																														
<p><b>Y5—add numbers with more than 4 digits.</b></p> <p>Add decimals with 2 decimal places, including money.</p>	<p>As year 4</p>  <p>Introduce decimal place value counters and model exchange for addition.</p>		<p><math>72.8</math> <math>+ 54.6</math> <u><math>127.4</math></u></p> <p>1 1</p> <table border="1" data-bbox="1630 879 1895 1031"> <tbody> <tr> <td>£</td> <td>23</td> <td>·</td> <td>59</td> </tr> <tr> <td>+</td> <td>£</td> <td>7</td> <td>· 55</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td>£</td> <td>31</td> <td>·</td> <td>14</td> </tr> </tbody> </table>	£	23	·	59	+	£	7	· 55	<hr/>				£	31	·	14	Addition												
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+	£	7	· 55																													
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£	31	·	14																													
<p><b>Y6—add several numbers of increasing complexity</b></p> <p>Including adding money, measure and decimals with different numbers of decimal points.</p>	<p>As Y5</p>	<p>As Y5</p>	 <p>Insert zeros for place holders.</p> <table border="1" data-bbox="1693 1334 1939 1525"> <tbody> <tr> <td></td> <td>23</td> <td>·</td> <td>361</td> </tr> <tr> <td></td> <td></td> <td>·</td> <td>080</td> </tr> <tr> <td></td> <td>59</td> <td>·</td> <td>770</td> </tr> <tr> <td>+</td> <td>1</td> <td>·</td> <td>300</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td></td> <td>93</td> <td>·</td> <td>511</td> </tr> <tr> <td></td> <td>21</td> <td></td> <td>2</td> </tr> </tbody> </table>		23	·	361			·	080		59	·	770	+	1	·	300	<hr/>					93	·	511		21		2	Addition
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Objective & Strategy	Concrete	Pictorial	Abstract	EYFS
<p><b>Counting back and taking away</b></p>	<p>Children arrange objects and remove to find how many are left.</p>  <p>1 less than 6 is 5. 6 subtract 1 is 5.</p>	<p>Children draw and cross out or use counters to represent objects from a problem.</p>   <p><math>9 - \square = \square</math> There are <input type="text"/> children left.</p>	<p>Children count back to take away and use a number line or number track to support the method.</p>  <p><math>9 - 3 = 6</math></p>	
<p><b>Finding a missing part, given a whole and a part</b></p>	<p>Children separate a whole into parts and understand how one part can be found by subtraction.</p>  <p><math>8 - 5 = ?</math></p>			
<p><b>Subtraction within 10</b></p>	<p>Understand when and how to subtract 1s efficiently.</p> <p>Use a bead string to subtract 1s efficiently.</p>  <p><math>5 - 3 = 2</math></p>	<p>Understand when and how to subtract 1s efficiently.</p>  <p><math>5 - 3 = 2</math></p>	<p>Understand how to use knowledge of bonds within 10 to subtract efficiently.</p> <p><math>5 - 3 = 2</math></p>	

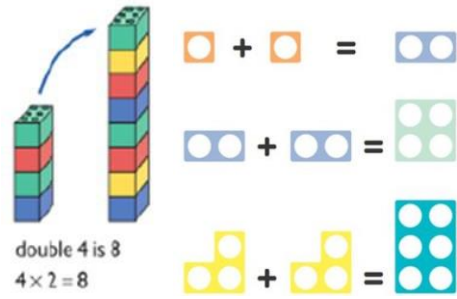

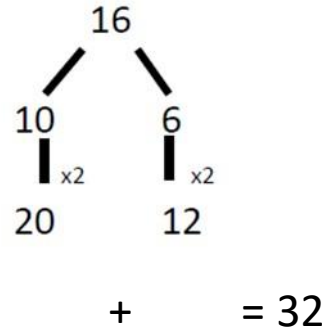
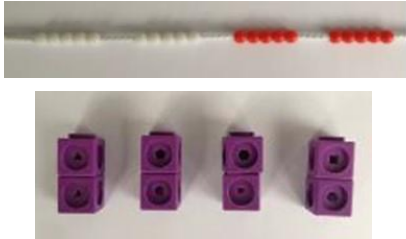
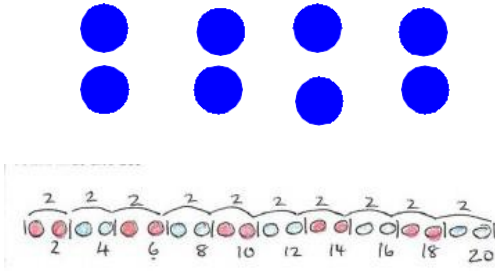


Objective & Strategy	Concrete	Pictorial	Abstract	Y1
<b>Taking away ones.</b>	<p>Use physical objects, counters, cubes etc to show how objects can be taken away.</p> 	 <p>15 - 3 = 12</p> <p>Cross out drawn objects to show what has been taken away.</p>	$7 - 4 = 3$  $16 - 9 = 7$	
<b>Counting back</b>	 <p>Move objects away from the group, counting backwards.</p> <p>Move the beads along the bead string as you count backwards.</p>	 <p>5 - 3 = 2</p> <p>Count back in ones using a number line.</p>	<p>Put 13 in your head, count back 4. What number are you at?</p>	
<b>Find the Difference</b>	<p>Compare objects and amounts</p>  <p>Lay objects to represent bar model.</p>	<p>Count on using a number line to find the difference.</p> 	<p>Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister.?</p>	

Objective & Strategy	Concrete	Pictorial	Abstract	Y1
<p><b>Represent and use number bonds and related subtraction facts within 20</b></p> <p>Part Part Whole model</p>	 <p>Link to addition. Use PPW model to model the inverse.</p> <p>If 10 is the whole and 6 is one of the parts, what is the other part?</p> $10 - 6 = 4$	 <p>Use pictorial representations to show the part.</p>	<p>Move to using numbers within the part whole model.</p> 	
<p>Make 10</p>	<p><math>14 - 9</math></p>  <p>Make 14 on the ten frame. Take 4 away to make ten, then take one more away so that you have taken 5.</p>	<p><math>13 - 7</math></p>  <p>Jump back 3 first, then another 4. Use ten as the stopping point.</p>	<p><math>16 - 8</math></p> <p>How many do we take off first to get to 10? How many left to take off?</p>	
<p>Bar model</p>	 $5 - 2 = 3$		 $10 = 8 + 2$ $10 = 2 + 8$ $10 - 2 = 8$ $10 - 8 = 2$	

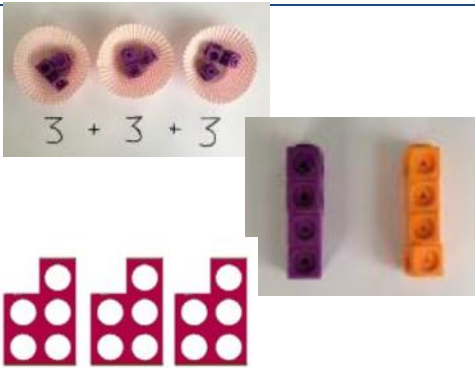
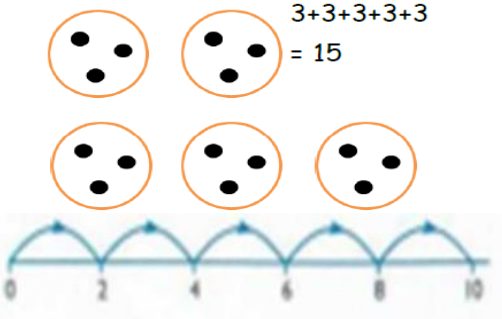

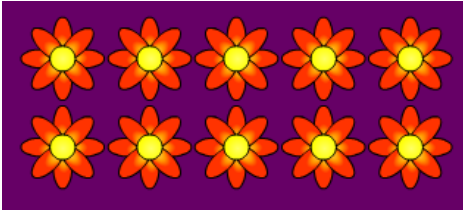
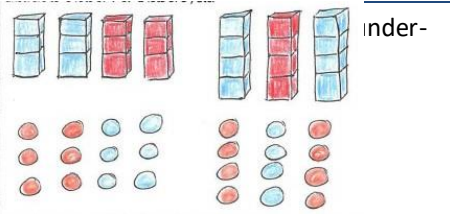
Objective & Strategy	Concrete	Pictorial	Abstract	<h1 style="writing-mode: vertical-rl; text-orientation: mixed;">Y2 Subtraction</h1>
Regroup a ten into ten ones	 <p>Use a PV chart to show how to change a ten into ten ones, use the term 'take and make'</p>	 $20 - 4 =$	$20 - 4 = 16$	
Partitioning to subtract without regrouping. <i>'Friendly numbers'</i>	$34 - 13 = 21$  <p>Use Dienes to show how to partition the number when subtracting without regrouping.</p>	Children draw representations of Dienes and cross off.  $43 - 21 = 22$	$43 - 21 = 22$	
Make ten strategy <i>Progression should be crossing one ten, crossing more than one ten, crossing the hundreds.</i>	 $34 - 28$ <p>Use a bead bar or bead strings to model counting to next ten and the rest.</p>	 <p>Use a number line to count on to next ten and then the rest.</p>	$93 - 76 = 17$	

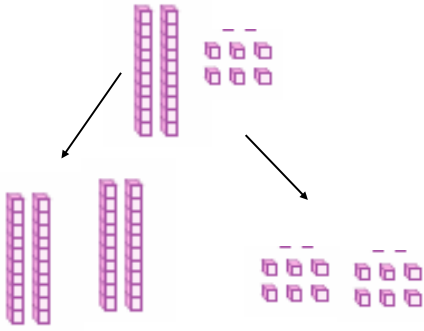
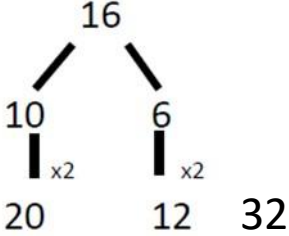
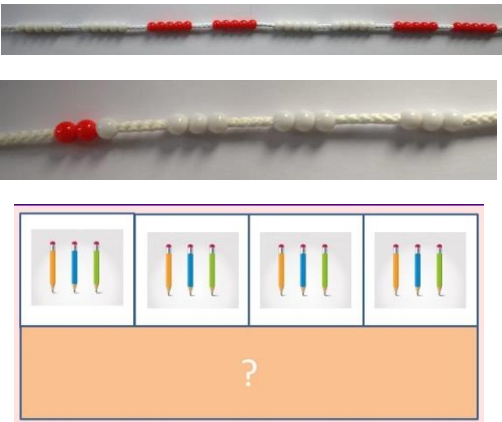
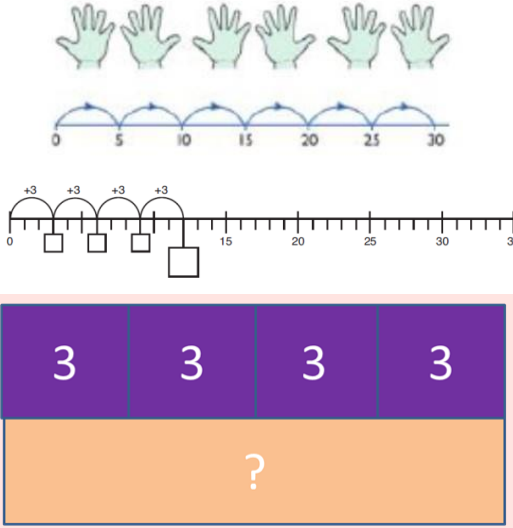
Objective & Strategy	Concrete	Pictorial	Abstract	<h1 style="writing-mode: vertical-rl; text-orientation: mixed;">Y3 Subtraction</h1>																	
Column subtraction without regrouping (friendly numbers)	 <p>Use base 10 or Numicon to model</p>	 <p>Draw representations to support understanding</p>	$47 - 24 = 23$ $\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$ <p>Intermediate step may be needed to lead to clear subtraction understanding.</p> 																		
Column subtraction with regrouping	 <p>Begin with base 10 or Numicon. Move to pv counters, modelling the exchange of a ten into ten ones. Use the phrase 'take and make' for exchange.</p>	 <p>Children may draw base ten or PV counters and cross off.</p>	$836 - 254 = 582$ <table border="1" data-bbox="1444 646 1736 837"> <tr><td>8</td><td>3</td><td>6</td></tr> <tr><td>2</td><td>5</td><td>4</td></tr> <tr><td>5</td><td>8</td><td>2</td></tr> </table> <p>Begin by partitioning into pv columns</p> $728 - 582 = 146$ <table border="1" data-bbox="1444 933 1702 1101"> <tr><td>7</td><td>2</td><td>8</td></tr> <tr><td>5</td><td>8</td><td>2</td></tr> <tr><td>1</td><td>4</td><td>6</td></tr> </table> <p>Then move to formal method.</p>		8	3	6	2	5	4	5	8	2	7	2	8	5	8	2	1	4
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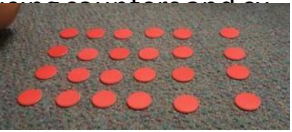

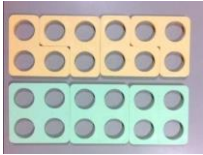

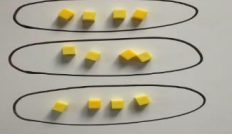
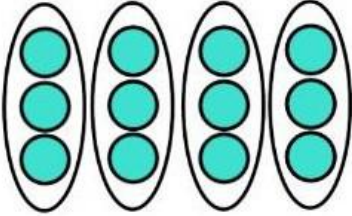
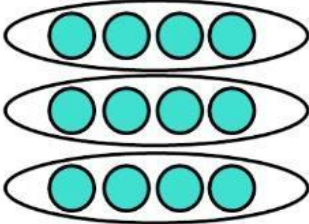


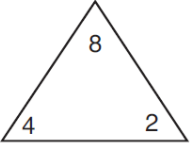
Objective & Strategy	Concrete	Pictorial	Abstract	Y4-6
<p>Subtracting tens and ones</p> <p>Year 4 subtract with up to 4 digits.</p> <p><i>Introduce decimal subtraction through context of money</i></p>	<p style="text-align: center;"><math>221 - 179</math></p> <p>Model process of exchange using Numicon, base ten and then move to PV counters.</p>	<p>Children to draw pv counters and show their exchange—see Y3</p>	<p>Use the phrase 'take and make' for exchange</p>	
<p>Year 5- Subtract with at least 4 digits, including money and measures.</p> <p><i>Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal</i></p>	<p>As Year 4</p>	<p>Children to draw pv counters and show their exchange—see Y3</p>	<p>Use zeros for place-holders</p>	
<p>Year 6—Subtract with increasingly large and more complex numbers and decimal values.</p>				

Objective & Strategy	Concrete	Pictorial	Abstract	Y1
Doubling	<p>Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling</p>  <p>double 4 is 8 <math>4 \times 2 = 8</math></p>	<p>Draw pictures to show how to double numbers</p> <p>Double 4 is 8</p> 	<p>Partition a number and then double each part before recombining it back together.</p>  <p><math>16</math> <math>10</math>   <math>6</math> <math>\downarrow \times 2</math>   <math>\downarrow \times 2</math> <math>20</math>   <math>12</math> <math>+ \quad = 32</math></p>	
Counting in multiples	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting.</p> 	<p>Children make representations to show counting in multiples.</p> 	<p>Count in multiples of a number aloud. Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10 5, 10, 15, 20, 25, 30</p>	
Making equal groups and counting the total	 <p><math>\square \times \square = 8</math></p> <p>Use manipulatives to create equal groups.</p>	<p>Draw  to show <math>2 \times 3 = 6</math></p> <p>Draw and make representations</p>	<p><math>2 \times 4 = 8</math></p>	



Objective & Strategy	Concrete	Pictorial	Abstract	<h1 style="text-align: center;">Y1</h1> <h1 style="writing-mode: vertical-rl; text-orientation: mixed;">Multiplication</h1>
Repeated addition	 <p>Use different objects to add equal groups</p>	<p>Use pictorial including number lines to solve problems</p> <p>There are 3 sweets in one bag. How many sweets are in 5 bags altogether?</p> 	<p>Write addition sentences to describe objects and pictures.</p> 	
Understanding arrays	<p>Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.</p> 	<p>Draw representations</p> 	$3 \times 2 = 6$ $2 \times 5 = 10$	

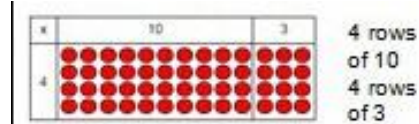
Objective & Strategy	Concrete	Pictorial	Abstract	Y2
Doubling	<p>Model doubling using dienes and PV counters.</p>  $40 + 12 = 52$	<p>Draw pictures and representations to show how to double numbers</p>	<p>Partition a number and then double each part before recombining it back together.</p> 	
<p>Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition)</p>	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models.</p> <p><math>5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40</math></p> 	<p>Number lines, counting sticks and bar models should be used to show representation of counting in multiples.</p> 	<p>Count in multiples of a number aloud. Write sequences with multiples of numbers.</p> <p>0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25, 30</p> $4 \times 3 = \square$ $4 \times 3 = \square$	

Objective & Strategy	Concrete	Pictorial	Abstract	Y2
<p>Multiplication is commutative</p>	<p>Create arrays using counters, cubes and Numicon.</p>    <p>Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.</p>  	<p>Use representations of arrays to show different calculations and explore commutativity.</p>  	<p><math>12 = 3 \times 4</math></p> <p><math>12 = 4 \times 3</math></p> <div style="border: 1px solid black; padding: 5px;"> <p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p><math>5 + 5 + 5 = 15</math></p> <p><math>3 + 3 + 3 + 3 + 3 = 15</math></p> <p><math>5 \times 3 = 15</math></p> <p><math>3 \times 5 = 15</math></p> </div>	
<p>Using the Inverse</p> <p><i>This should be taught alongside division, so pupils learn how they work alongside each other.</i></p>		 <p><input type="text"/> <math>\times</math> <input type="text"/> = <input type="text"/></p> <p><input type="text"/> <math>\times</math> <input type="text"/> = <input type="text"/></p> <p><input type="text"/> <math>\div</math> <input type="text"/> = <input type="text"/></p> <p><input type="text"/> <math>\div</math> <input type="text"/> = <input type="text"/></p>	<p><math>2 \times 4 = 8</math></p> <p><math>4 \times 2 = 8</math></p> <p><math>8 \div 2 = 4</math></p> <p><math>8 \div 4 = 2</math></p> <p><math>8 = 2 \times 4</math></p> <p><math>8 = 4 \times 2</math></p> <p><math>2 = 8 \div 4</math></p> <p><math>4 = 8 \div 2</math></p> <p>Show all 8 related fact family sentences.</p>	

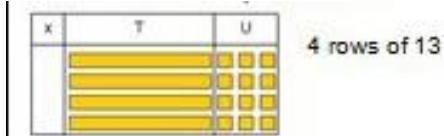
## Objective & Strategy

### Grid method

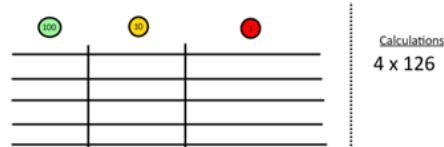
Show the links with arrays to first introduce the grid method.



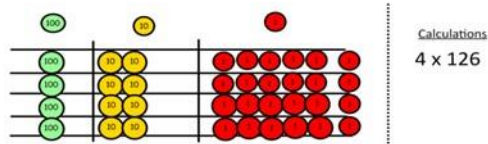
Move onto base ten to move towards a more compact method.



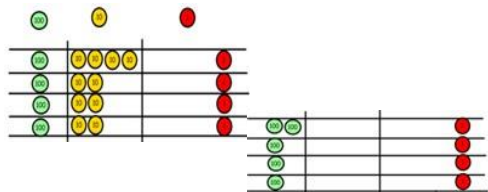
Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows



Fill each row with 126



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



Then you have your answer.

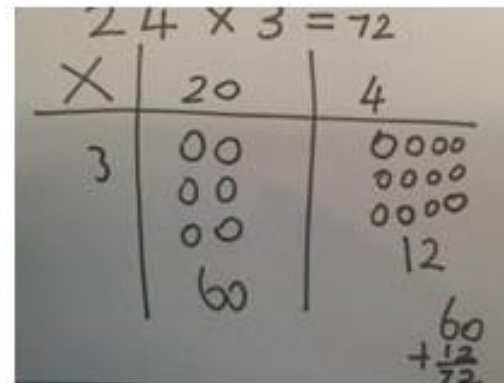
## Concrete

## Pictorial

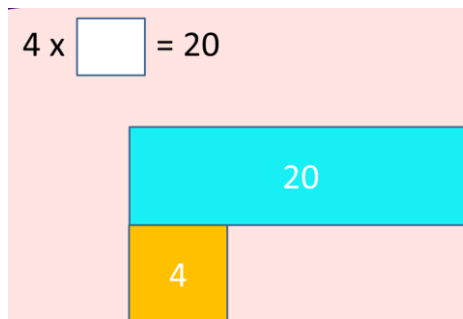
## Abstract

Children can represent their work with place value counters in a way that they understand.

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



Bar model are used to explore missing numbers



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

# Y3

# Multiplication

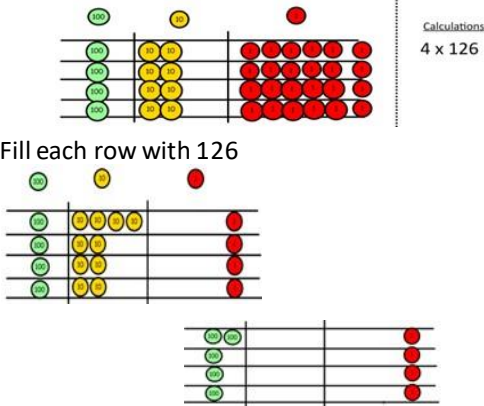
**Objective & Strategy**

Grid method recap from year 3 for 2 digits x 1 digit

Move to multiplying 3 digit numbers by 1 digit. (year 4 expectation)

**Concrete**

Use place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows



Calculations  
 $4 \times 126$

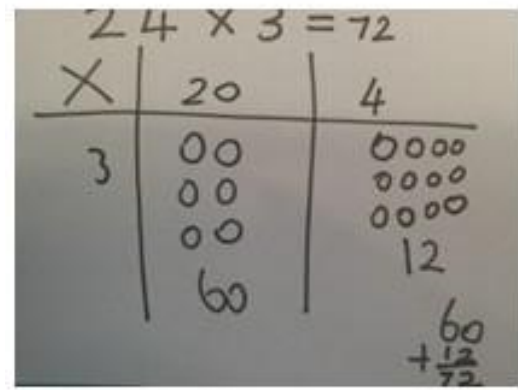
Fill each row with 126

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

**Pictorial**

Children can represent their work with place value counters in a way that they understand.

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



**Abstract**

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

x	30	5
7	210	35

$210 + 35 = 245$

Column multiplication

Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping.  $321 \times 2 = 642$

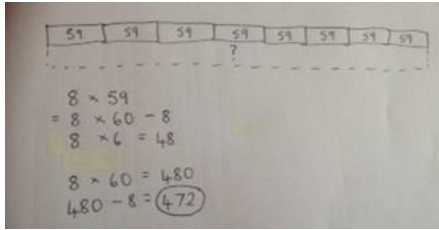
Hundreds	Tens	Ones

It is important at this stage that they always multiply the ones first.

The corresponding long multiplication is modelled alongside

x	300	20	7
4	1200	80	28

The grid method may be used to show how this relates to a formal written method.



Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.

327
x 4
28
80
1200
1308

This may lead to a compact method.

	3	2	7
x			4
	1	3	0
		1	2
			8

**Y4**

**Multiplication**

### Objective & Strategy

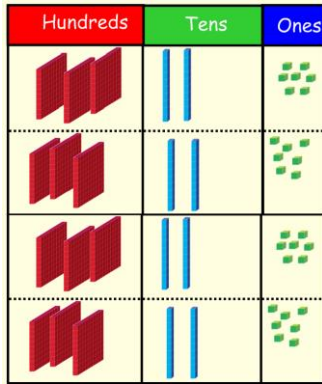
### Concrete

### Pictorial

### Abstract

Y5-6

Column Multiplication for 3 and 4 digits x 1 digit.



It is important at this stage that they always multiply the ones first.

Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping.  $321 \times 2 = 642$

x	300	20	7
4	1200	80	28



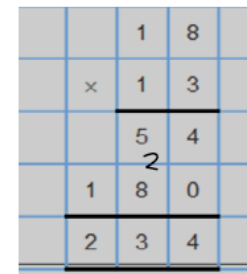
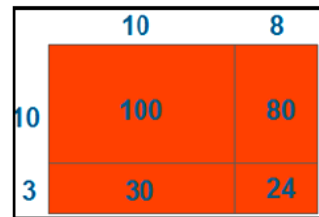
$$\begin{array}{r}
 327 \\
 \times 4 \\
 \hline
 28 \\
 80 \\
 1200 \\
 \hline
 1308
 \end{array}$$

$$\begin{array}{r}
 327 \\
 \times \quad 4 \\
 \hline
 1308
 \end{array}$$

This will lead to a compact method.

Column multiplication

Manipulatives may still be used with the corresponding long multiplication modelled alongside.



18 x 3 on the first row  
( $8 \times 3 = 24$ , carrying the 2 for 20, then  $1 \times 3$ )


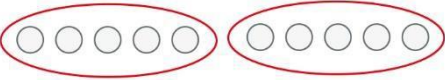
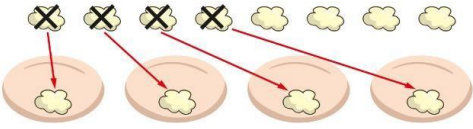
18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in units first

$$\begin{array}{r}
 1234 \\
 \times \quad 16 \\
 \hline
 7404 \quad (1234 \times 6) \\
 12340 \quad (1234 \times 10) \\
 \hline
 19744
 \end{array}$$


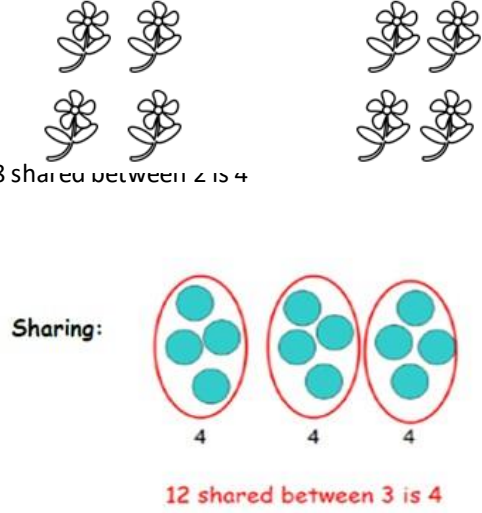
Continue to use bar modelling to support problem solving

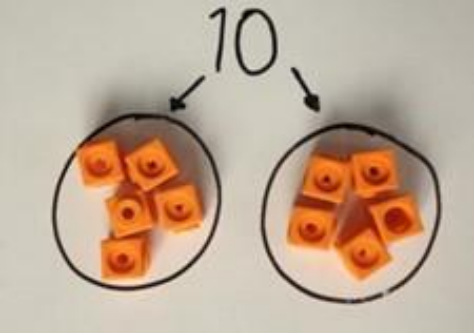
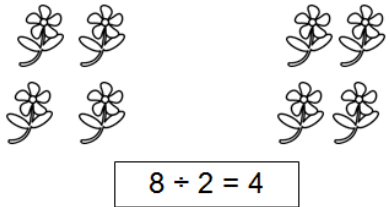
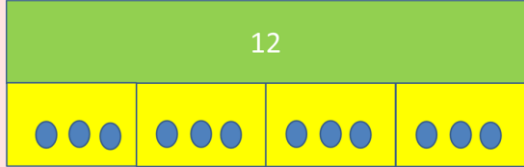
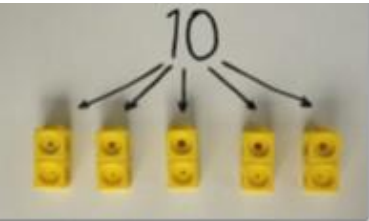
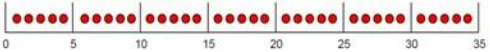
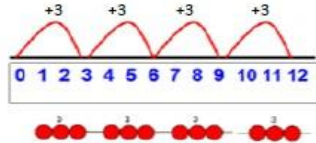
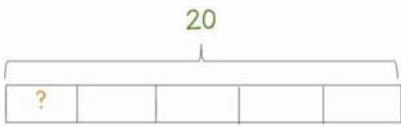
# Multiplication



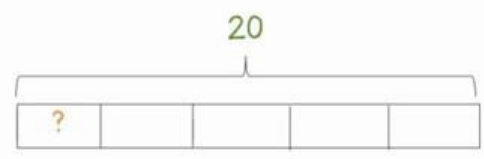
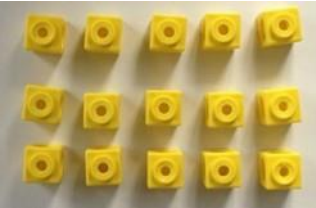
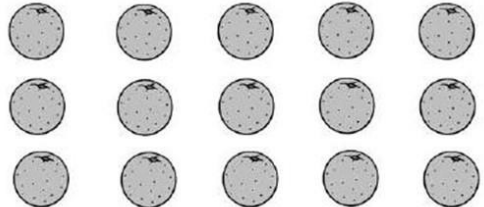
Objective & Strategy	Concrete	Pictorial	Abstract	Y6
Multiplying decimals up to 2 decimal places by a single digit.			<p>Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.</p> $  \begin{array}{r}  3.19 \\  \times 8 \\  \hline  25.52 \\  \begin{array}{l}  \phantom{2}1 \\  \phantom{25}7  \end{array}  \end{array}  $	

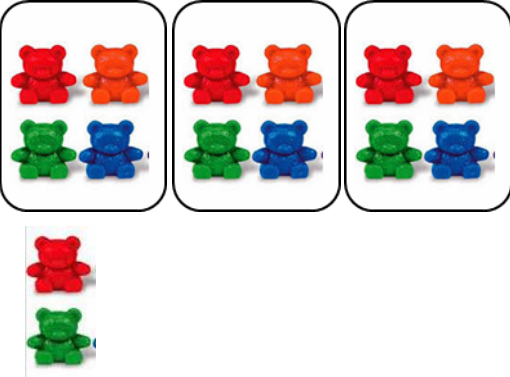
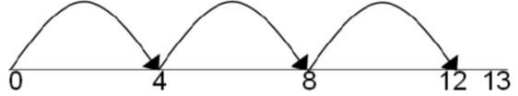

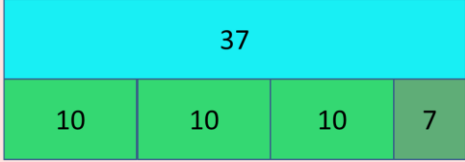
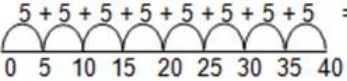
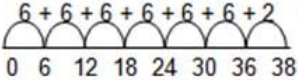
Objective & Strategy	Concrete	Pictorial	Abstract	EYFS
<b>Double and halving</b> <b>Grouping</b>	<p>Learn to make equal groups from a whole and find how many equal groups of a certain size can be made.</p> <p>Sort a whole set people and objects into equal groups.</p> 	<p>Represent a whole and work out how many equal groups.</p>  <p><i>There are 10 in total. There are 5 in each group. There are 2 groups.</i></p>		
<b>Double and halving</b> <b>Sharing</b>	<p>Share a set of objects into equal parts and work out how many are in each part.</p> 			Division

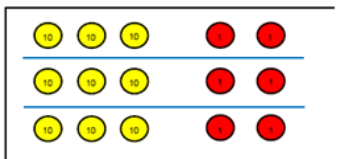
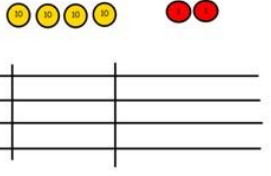

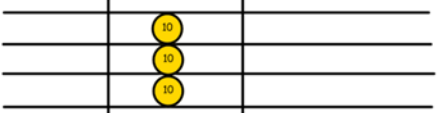
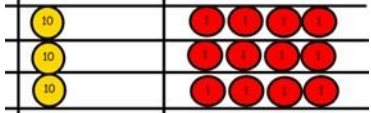
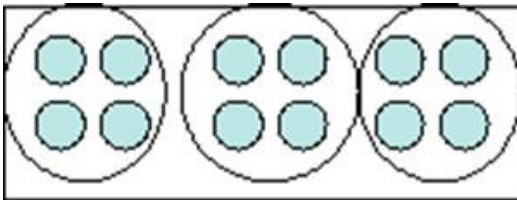
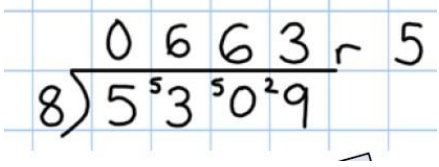


Objective & Strategy	Concrete	Pictorial	Abstract	Y1
<p><b>Division as sharing</b></p> <p><i>Use Gordon ITPs for modelling</i></p>	 <p>I have 10 cubes, can you share them equally in 2 groups?</p>	<p>Children use pictures or shapes to share quantities.</p>  <p>8 shared between 2 is 4</p> <p>Sharing:</p> <p>12 shared between 3 is 4</p>	<p>12 shared between 3 is 4</p>	

Objective & Strategy	Concrete	Pictorial	Abstract	Y2
Division as sharing	 <p>I have 10 cubes, can you share them equally in 2 groups?</p>	<p>Children use pictures or shapes to share quantities.</p>  <p><math>8 \div 2 = 4</math></p> <p>Children use bar modelling to show and support understanding.</p>  <p><math>12 \div 4 = 3</math></p>	$12 \div 3 = 4$	
Division as grouping	<p>Divide quantities into equal groups.</p> <p>Use cubes, counters, objects or place value counters to aid understanding.</p>  	<p>Use number lines for grouping</p>  <p><math>12 \div 3 = 4</math></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>  <p><math>20 \div 5 = ?</math>  <math>5 \times ? = 20</math></p>	$28 \div 7 = 4$ <p>Divide 28 into 7 groups. How many are in each group?</p>	Division

Objective & Strategy	Concrete	Pictorial	Abstract	Y3
Division as grouping	<p>Use cubes, counters, objects or place value counters to aid understanding.</p>  <p>24 divided into groups of 6 = 4</p> $96 \div 3 = 32$ 	<p>Continue to use bar modelling to aid solving division problems.</p>  $20 \div 5 = ?$ $5 \times ? = 20$	<p>How many groups of 6 in 24?</p> $24 \div 6 = 4$	
Division with arrays	 <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></p> <p><math>15 \div 5 = 3</math>   <math>3 \times 5 = 15</math></p>	<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 eight linking number sentences.</p> $7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$	

Objective & Strategy	Concrete	Pictorial	Abstract	Y4-6
Division with remainders.	<p><math>14 \div 3 =</math></p> <p>Divide objects between groups and see how much is left over</p>  <p>Example without remainder:  <math>40 \div 5</math>            Ask "How many 5s in 40?"</p> <p>Example with remainder:  <math>38 \div 6</math></p> <p>For larger numbers, when it becomes inefficient to count in single multiples, bigger jumps can be recorded using known facts.</p>	<p>Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.</p>  <p>Draw dots and group them to divide an amount and clearly show a remainder.</p>  <p>Use bar models to show division with remainders.</p>  <p><math>5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 8 \text{ fives}</math></p>  <p><math>6 + 6 + 6 + 6 + 6 + 6 + 2 = 6 \text{ sixes with a remainder of } 2</math></p> 	<p>Complete written divisions and show the remainder using r.</p> $29 \div 8 = 3 \text{ REMAINDER } 5$ <p> <math>\uparrow \quad \uparrow \quad \uparrow \quad \uparrow</math>        dividend divisor quotient remainder     </p>	

Objective & Strategy	Concrete	Pictorial	Abstract	Y4-6				
Divide at least 3 digit numbers by 1 digit.  Short Division	<p><math>96 \div 3</math></p> <table border="0" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Tens</td> <td style="text-align: center;">Units</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> </tr> </table>  <p>Use place value counters to divide using the bus stop method alongside</p>  <p style="text-align: right; font-size: small;">Calculations <math>42 \div 3</math></p> <p><math>42 \div 3 =</math></p> <p>Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.</p>   <p>We exchange this ten for ten ones and then share the ones equally among the groups.</p>  <p>We look how much in 1 group so the answer is 14.</p>	Tens	Units		3	2	<p>Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.</p>  <p>Encourage them to move towards counting in multiples to divide more efficiently.</p>	<p>Begin with divisions that divide equally with no remainder.</p> $\begin{array}{r} 218 \\ 3 \overline{) 872} \end{array}$ <p>Move onto divisions with a remainder.</p> $\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \end{array}$ <p>Finally move into decimal places to divide the total accurately.</p> $\begin{array}{r} 14.6 \\ 35 \overline{) 511.0} \end{array}$ 
Tens	Units							
3	2							

## Long Division

Y6

Division

Step 1—a remainder in the ones.

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

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

4 goes into 16 four times.

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

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

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

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

8 goes into 0 zero times (tens).

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

## Long Division

Y6

Division

Step 1— continued.

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

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

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

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

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

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

## Long Division

# Y6

# Division

Step 2— a remainder in the tens.

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

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



# Long Division

# Y6

# Division

Step 2— A remainder in any of the place values.

<p><b>1. Divide.</b></p>	<p><b>2. Multiply &amp; subtract.</b></p>	<p><b>3. Drop down the next digit.</b></p>
$\begin{array}{r} \text{h to} \\ 1 \\ 2 \overline{)278} \end{array}$ <p>Two goes into 2 one time, or 2 hundreds <math>\div 2 = 1</math> hundred.</p>	$\begin{array}{r} \text{h to} \\ 1 \\ 2 \overline{)278} \\ -2 \\ \hline 0 \end{array}$ <p>Multiply <math>1 \times 2 = 2</math>, write that 2 under the two, and subtract to find the remainder of zero.</p>	$\begin{array}{r} \text{h to} \\ 18 \\ 2 \overline{)278} \\ -2 \\ \hline 07 \end{array}$ <p>Next, drop down the 7 of the tens next to the zero.</p>
<p><b>Divide.</b></p>	<p><b>Multiply &amp; subtract.</b></p>	<p><b>Drop down the next digit.</b></p>
$\begin{array}{r} \text{h to} \\ 13 \\ 2 \overline{)278} \\ -2 \\ \hline 07 \end{array}$ <p>Divide 2 into 7. Place 3 into the quotient.</p>	$\begin{array}{r} \text{h to} \\ 13 \\ 2 \overline{)278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 1 \end{array}$ <p>Multiply <math>3 \times 2 = 6</math>, write that 6 under the 7, and subtract to find the remainder of 1 ten.</p>	$\begin{array}{r} \text{h to} \\ 13 \\ 2 \overline{)278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 18 \end{array}$ <p>Next, drop down the 8 of the ones next to the 1 leftover ten.</p>
<p><b>1. Divide.</b></p>	<p><b>2. Multiply &amp; subtract.</b></p>	<p><b>3. Drop down the next digit.</b></p>
$\begin{array}{r} \text{h to} \\ 139 \\ 2 \overline{)278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 18 \end{array}$ <p>Divide 2 into 18. Place 9 into the quotient.</p>	$\begin{array}{r} \text{h to} \\ 139 \\ 2 \overline{)278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>Multiply <math>9 \times 2 = 18</math>, write that 18 under the 18, and subtract to find the remainder of zero.</p>	$\begin{array}{r} \text{h to} \\ 139 \\ 2 \overline{)278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>There are no more digits to drop down. The quotient is 139.</p>



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

**Data Protection Statement**

The procedures and practice created by this policy have been reviewed in the light of our Data Protection Policy.

All data will be handled in accordance with the school's Data Protection Policy.

<b>Data Audit For This Policy</b>					
<b>What ?</b>	<b>Probable Content</b>	<b>Why ?</b>	<b>Who ?</b>	<b>Where ?</b>	<b>When ?</b>
Child's Name	Name	Log-in Information	All Staff (Where Necessary) Parents Children	Kept in children's file or shredded.	Kept in children's file or sent home.

As such, our assessment is that this policy :

<b>Has Few / No Data Compliance Requirements</b>	<b>Has A Moderate Level of Data Compliance Requirements</b>	<b>Has a High Level Of Data Compliance Requirements</b>
✓		