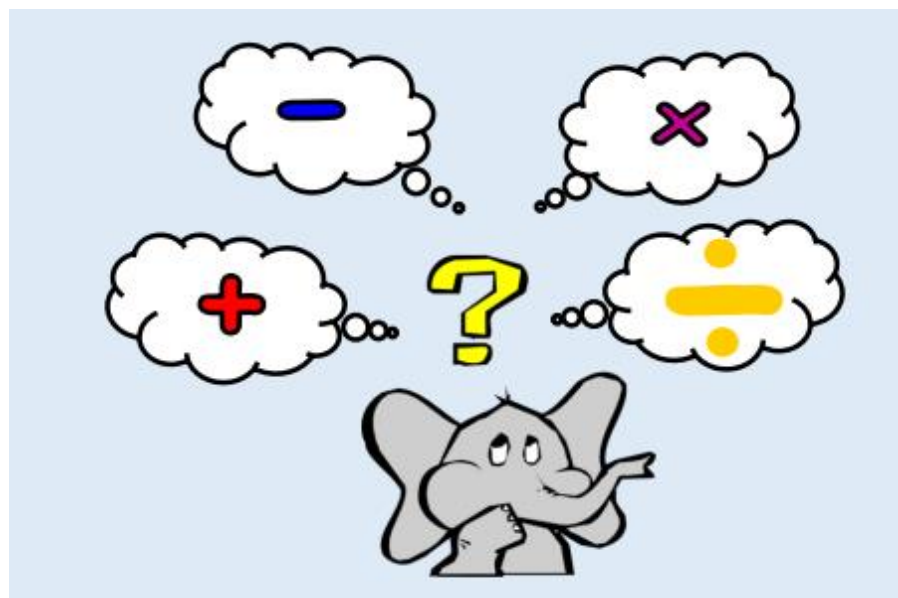




# Calculation Policy

Updated June 2023



This policy serves as a reference point for anyone - teachers, learning support staff and parents - supporting children's mathematics. It is vital children learn new methods using the 'Concrete-Pictorial-Abstract' approach which provides learners with multiple visual strategies for understanding a concept.

**Maths Calculation Policy:**

Here at Sherwell Primary we are committed to providing 'Excellence in all we do!' providing the children with a lively and engaging maths curriculum across the key stages. For children to access the majority of their learning in maths, and to be able to apply it across the curriculum, a strong and confident grasp of methods for the four number operations is important. In order to achieve this, concrete and pictorial representations must be used alongside the abstract in order to promote deeper understanding.

This policy concentrates on the introduction of standard symbols, the use of number lines to aid mental calculations and on the introduction of other pencil and paper procedures. It is important that children do not abandon jottings and mental methods once other pencil and paper procedures are introduced. Therefore children will always be encouraged to look at a calculation/problem and then decide which is the best method to choose - pictures, mental calculation with or without jottings, structured recording or a calculator. It is also important to reinforce learning with place value supports such as base-10 and place value counters in order for them to recognise the true value of the numbers. The long-term aim is for children to be able to select an efficient method of their choice (whether this be mental, written or in upper Key Stage 2 using a calculator) that is appropriate for a given task. It is important that any type of calculation is given a real life context or problem solving approach. This helps to develop children's understanding of the purpose of calculation and helps them to decide what operations and what methods are most efficient to use when solving problems.

In Nursery and Reception, we aim for the children to achieve the Early Learning Goal in Numbers by the end of The Foundation Stage. The strategies and methods learnt within this phase and within Year 2 as part of the mastering number programme are then built upon and added to as they progress through the key stages and develop their calculation skills in accordance with this policy. Strategies for abstract calculations need to be represented through the use of concrete or pictorial representations or models to support, develop and secure understanding. When teaching a new strategy it is important to start with numbers that the children can easily manipulate so they can understand the methodology. The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school. The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014 and the method(s) shown for each year group should be modelled to the vast majority of pupils. However, it is vital that pupils are taught according to the pathway that they are currently working at. Before pupils opt for a written method they should first consider these steps and always ask themselves:

**'Can I do this in my head?'**

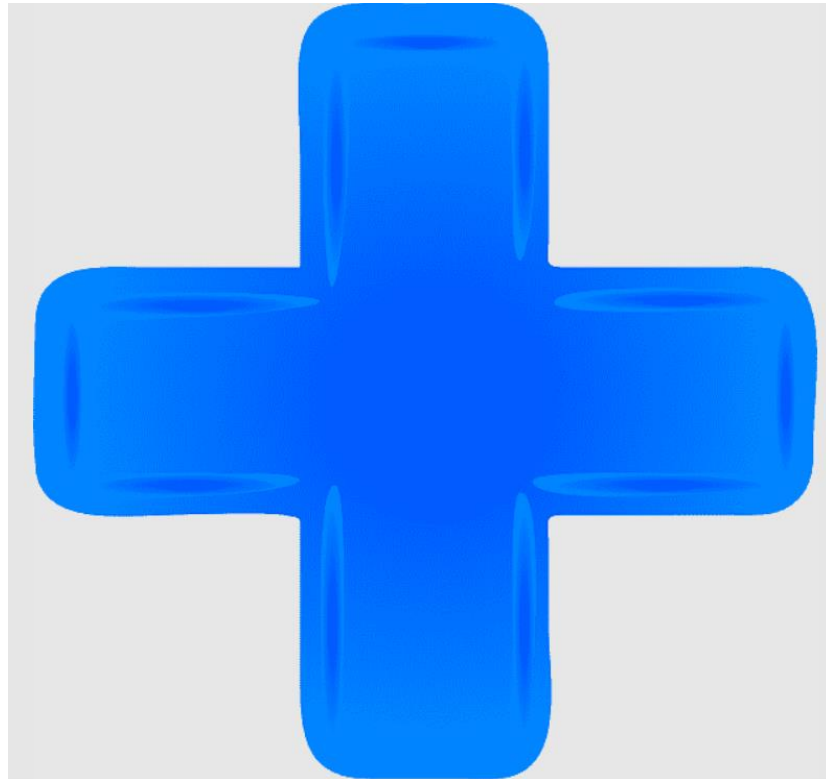
**'Can I do this in my head using drawings or jottings?'**

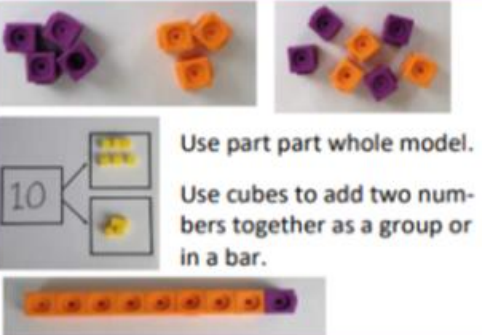
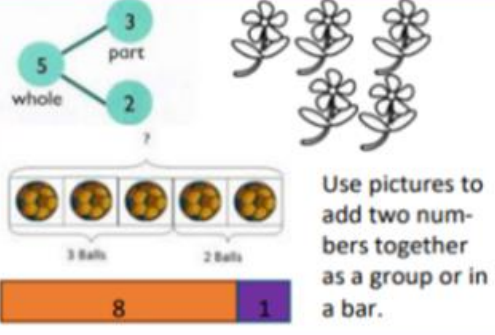


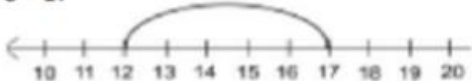
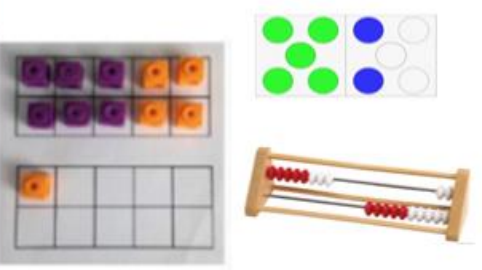

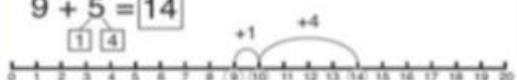
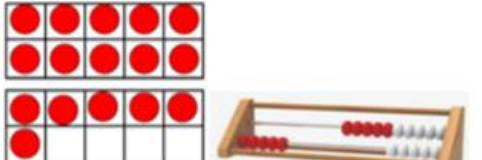


**'Do I need to use a pencil and paper procedure?'**

**'How can I check my answer?'**

**'Do I need a calculator?'**

# Addition



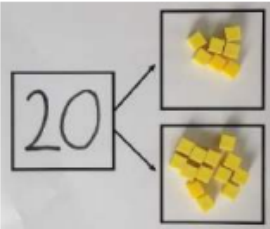
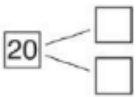
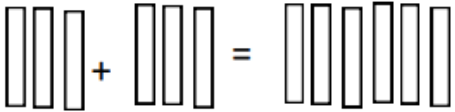
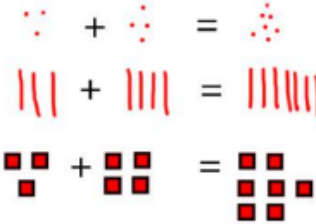


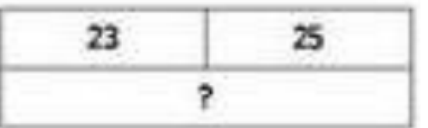


Objective & Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part- whole model	 <p>Use part part whole model.</p> <p>Use cubes to add two numbers together as a group or in a bar.</p>	 <p>Use pictures to add two numbers together as a group or in a bar.</p>	$4 + 3 = 7$  <p>Use the part-part whole diagram as shown above to move into the abstract.</p> $10 = 6 + 4$
Starting at the bigger number and counting on	 <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>	$5 + 12 = 17$ <p>Place the larger number in your head and count on the smaller number to find your answer.</p>
Regrouping to make 10.  <i>This is an essential skill for column addition later.</i>	<p>Using the rekenrek, tens frames and Hungarian number frames to recognise '5 and a bit'.</p> 	 <p><math>3 + 9 =</math></p> <p>Use pictures or a number line. Regroup or partition the smaller number using the part part whole model to make 10.</p> $9 + 5 = 14$ 	$7 + 4 = 11$ <p>If I am at seven, how many more do I need to make 10. How many more do I add on now?</p>
Represent & use number bonds and related subtraction facts within 20	<p>Use of double sided counters with tens frames.</p> 	  <p><math>5 + 2 =</math></p>	<p>Emphasis should be on the language</p> <p>'1 more than 5 is equal to 6.'</p> <p>'2 more than 5 is 7.'</p> <p>'8 is 3 more than 5.'</p>

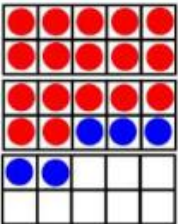
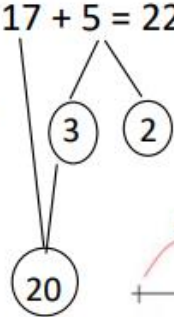
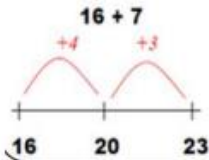
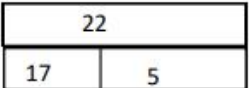

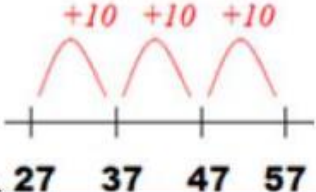

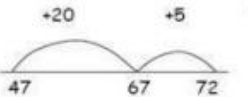
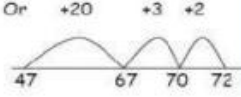
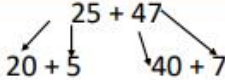

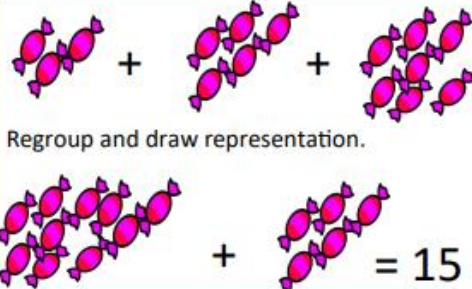
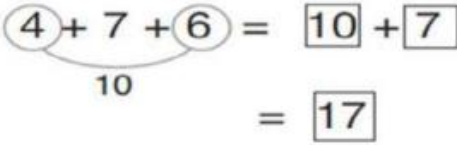
# Y1

# ADDITION

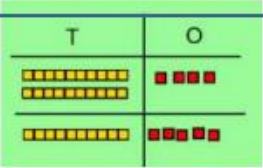
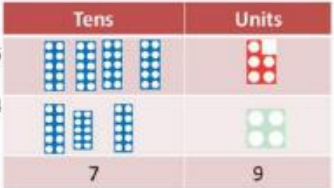
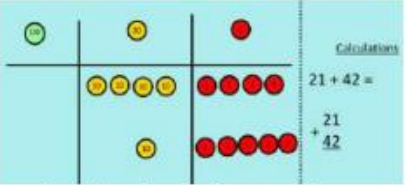
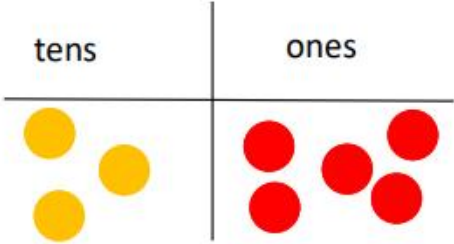
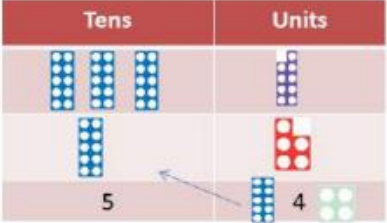
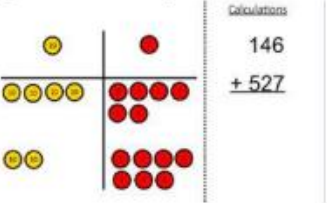
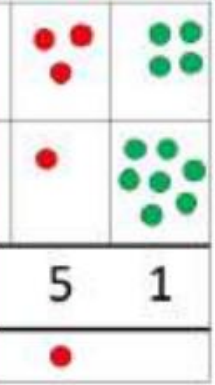
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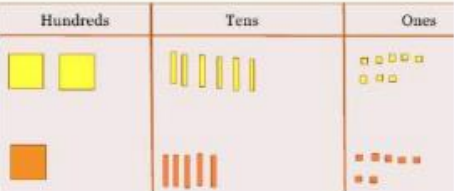
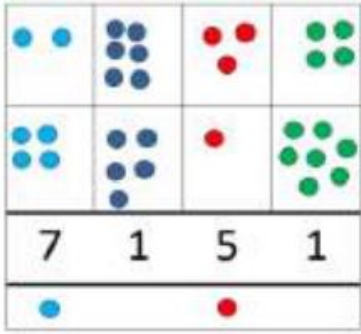
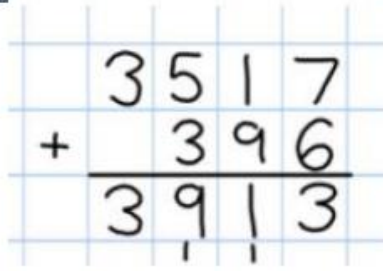

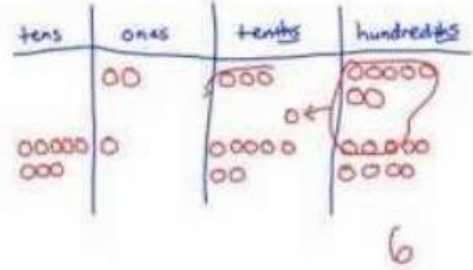
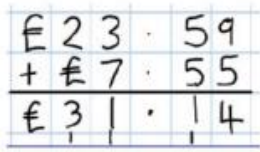
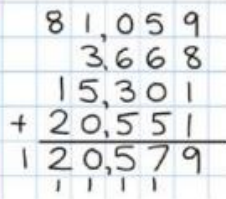
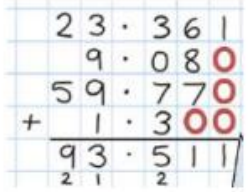
Objective & Strategy	Concrete	Pictorial	Abstract
Adding multiples of ten	$50 = 30 + 20$  Model using dienes and bead strings	 $3 \text{ tens} + 5 \text{ tens} = \underline{\hspace{2cm}} \text{ tens}$ $30 + 50 = \underline{\hspace{2cm}}$ Use representations for base ten.	$20 + 30 = 50$ $70 = 50 + 20$ $40 + \square = 60$
Use known number facts <i>Part part whole</i>	 Children explore ways of making numbers within 20	 $\square + \square = 20$ $20 - \square = \square$ $\square + \square = 20$ $20 - \square = \square$	$\square + 1 = 16$ $16 - 1 = \square$ $1 + \square = 16$ $16 - \square = 1$
Using known facts	$\square\square + \square\square = \square\square\square\square$ 	 Children draw representations of H, T and O	$3 + 4 = 7$ <i>leads to</i> $30 + 40 = 70$ <i>leads to</i> $300 + 400 = 700$
Bar model	 $3 + 4 = 7$	 $7 + 3 = 10$	 $23 + 25 = 48$

# Y2 ADDITION

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

# Y3 ADDITION

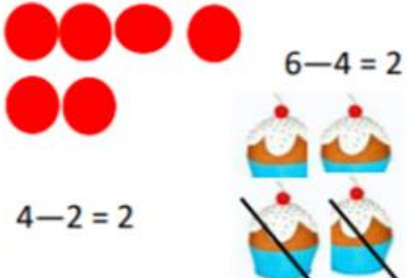
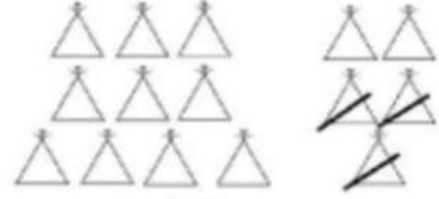

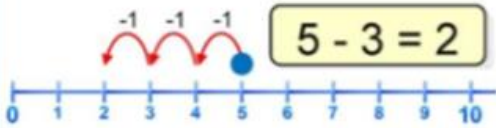
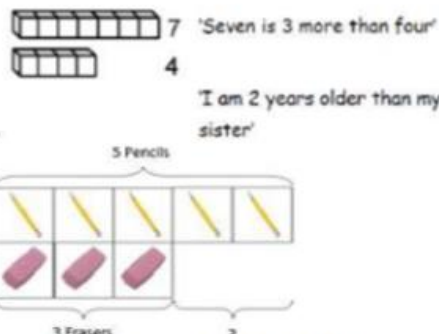
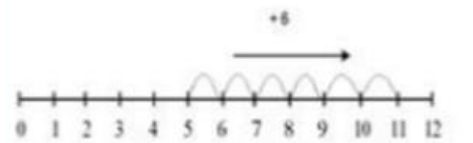
Objective & Strategy	Concrete	Pictorial	Abstract
<p>Column Addition—no regrouping (friendly numbers)</p> <p>Add two or three 2 or 3-digit numbers.</p>	<p>Model using Dienes or numicon</p>  <p>Add together the ones first, then the tens.</p>   <p>Move to using place value counters</p>	<p>Children move 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>Column Addition with regrouping.</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
<p>Y4—add numbers with up to 4 digits</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> 	 <p>Draw representations using pv grid.</p>	 <p>Continue from previous work to carry hundreds as well as tens.</p> <p>Relate to money and measures.</p>
<p>Y5—add numbers with more than 4 digits.</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>2.37 + 81.79</p> 	$\begin{array}{r} 72.8 \\ + 54.6 \\ \hline 127.4 \end{array}$ $\begin{array}{r} 11 \\ \hline \end{array}$ 
<p>Y6—add several numbers of increasing complexity</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> 

# Y4-6 ADDITION

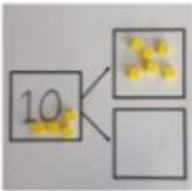
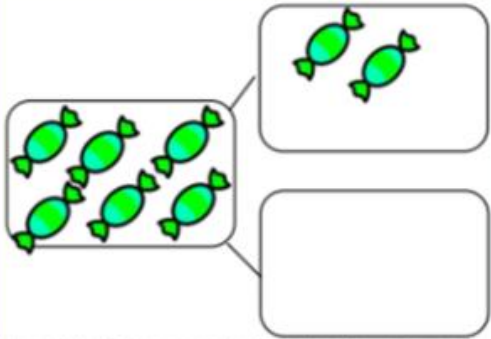
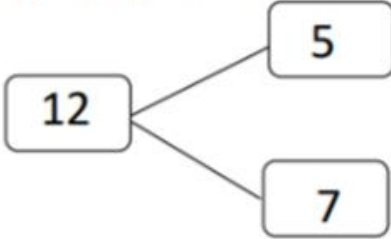




# Subtraction



Objective & Strategy	Concrete	Pictorial	Abstract
Taking away ones.	<p>Use physical objects, counters, cubes etc to show how objects can be taken away.</p>  <p><math>6 - 4 = 2</math></p> <p><math>4 - 2 = 2</math></p>	 <p><math>15 - 3 = 12</math></p> <p>Cross out drawn objects to show what has been taken away.</p>	<p><math>7 - 4 = 3</math></p> <p><math>16 - 9 = 7</math></p>
Counting back	 <p>Move objects away from the group, counting backwards.</p> <p>Using rekenreks to move beads along as you count backwards.</p>	 <p><math>5 - 3 = 2</math></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>
Find the Difference	<p>Compare objects and amounts</p>  <p>'Seven is 3 more than four'</p> <p>4</p> <p>'I am 2 years older than my sister'</p> <p>5 Pencils</p> <p>3 Erasers</p> <p>?</p> <p>Lay objects to represent bar model.</p>	<p>Count on using a number line to find the difference.</p>  <p><math>+8</math></p>	<p>Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister.?</p>

# Y1

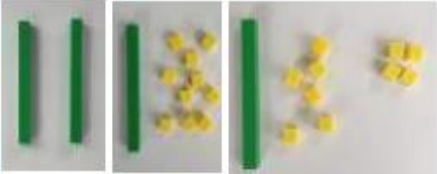
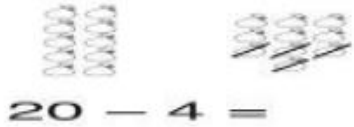

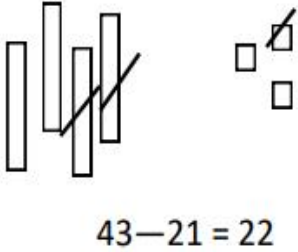
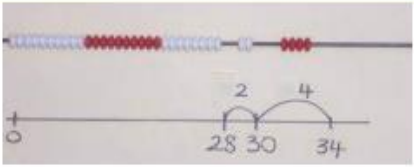
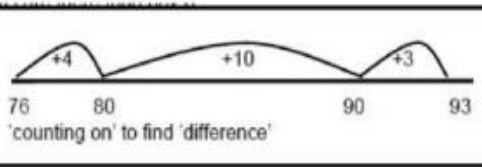
# SUBTRACTION

Objective & Strategy	Concrete	Pictorial	Abstract
<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><math>13 - 7 = 6</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>	 $5 - 2 = 3$		

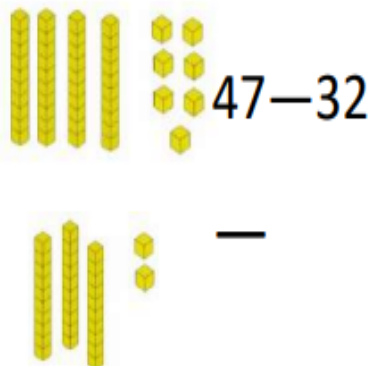
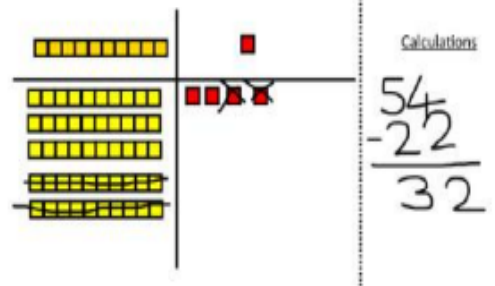
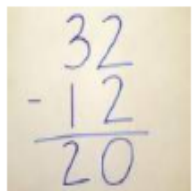
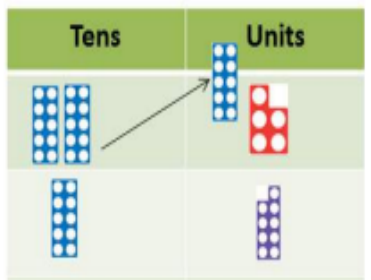
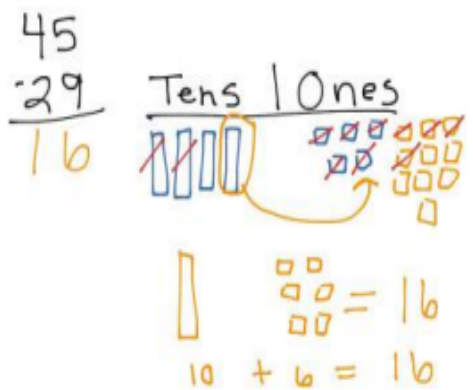
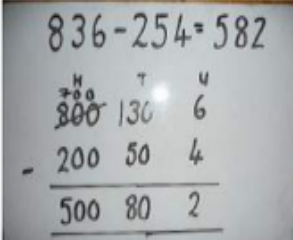
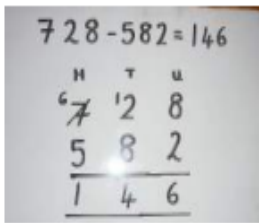
# Y1

# SUBTRACTION

# Y2 SUBTRACTION

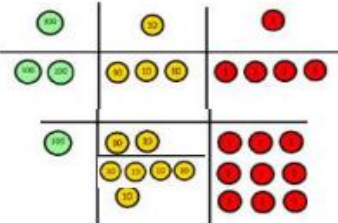
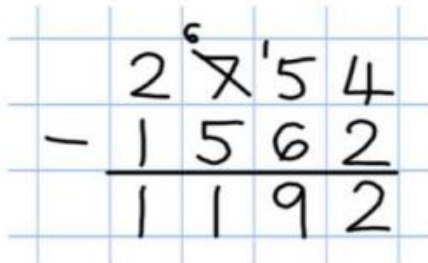
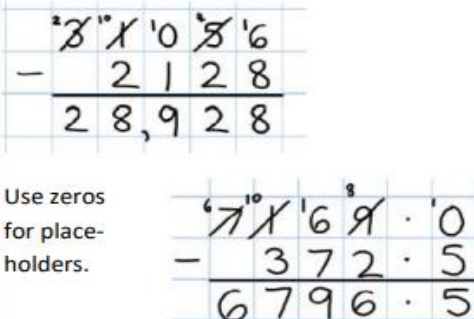

Objective & Strategy	Concrete	Pictorial	Abstract
Regroup a ten into ten ones	 <p>Use a PV chart to show how to change a ten into ten ones, use the term 'take and make'</p>		$20 - 4 = 16$
Partitioning to subtract without regrouping.  <i>'Friendly numbers'</i>	$34 - 13 = 21$  <p>Use Dienes to show how to partition the number when subtracting without regrouping.</p>	Children draw representations of Dienes and cross off.  	$43 - 21 = 22$
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>	$93 - 76 = 17$

# Y3 SUBTRACTION

Objective & Strategy	Concrete	Pictorial	Abstract
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>	 <p>Begin by partitioning into pv columns</p>  <p>Then move to formal method.</p>

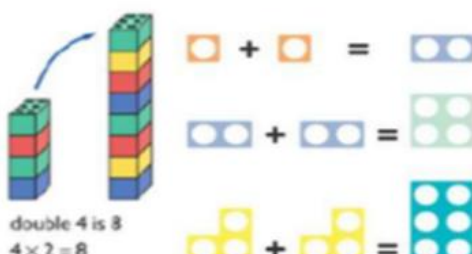


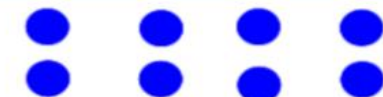
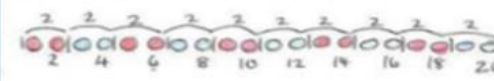
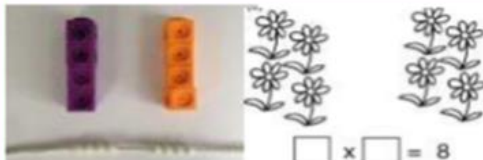

# Y4-6

# SUBTRACTION

Objective & Strategy	Concrete	Pictorial	Abstract
<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>234 - 179</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>			

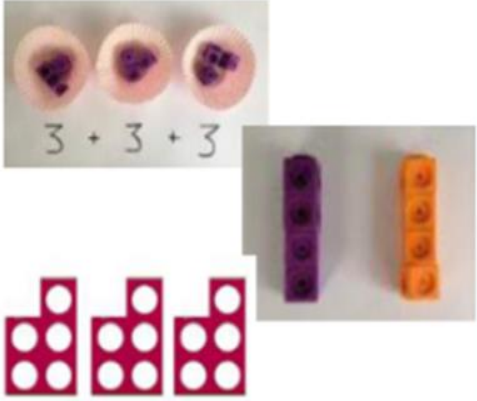
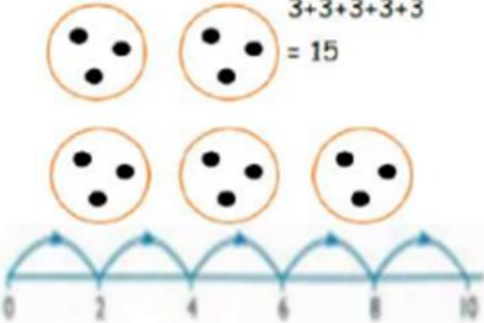

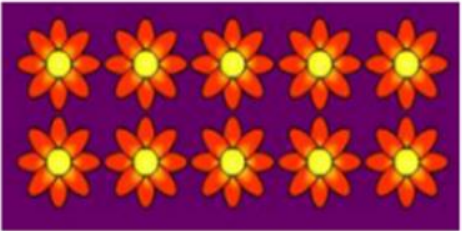
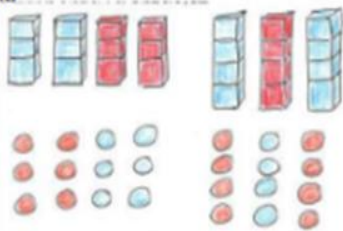
# Multiplication



Objective & Strategy	Concrete	Pictorial	Abstract
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> 	
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</p> <p>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>Drawing pictures and making representations to show repeated addition.</p>  <p><math>3 + 3 + 3 + 3 + 3</math></p>	

# Y1

# MULTIPLICATION

Objective & Strategy	Concrete	Pictorial	Abstract
Repeated addition	 <p>Use different objects to add equal groups</p>	<p>Use pictorial including number lines to solve prob</p> <p>There are 3 sweets in one bag. How many sweets are in 5 bags altogether?</p>  $3+3+3+3+3 = 15$	<p>Write addition sentences to describe objects and pictures.</p>  $2+2+2+2+2 = 10$
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 of arrays to show understanding</p> 	<p>'3 groups of 2' written on card - children need to make arrays to represent it.</p>

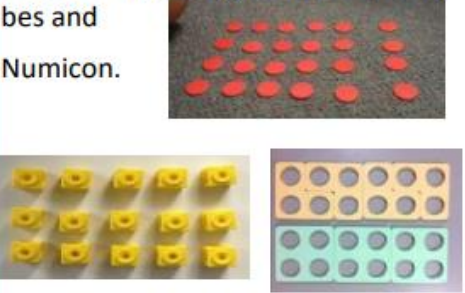
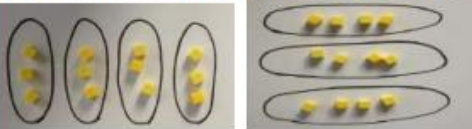
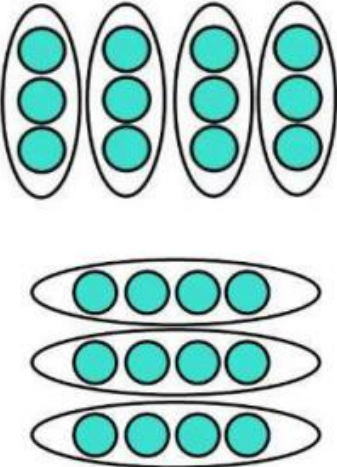


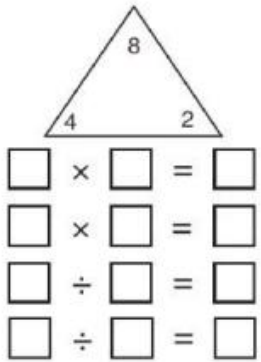
# Y1

# MULTIPLICATION

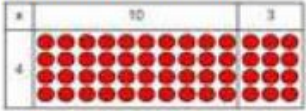
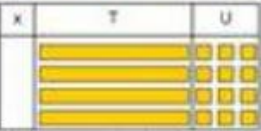
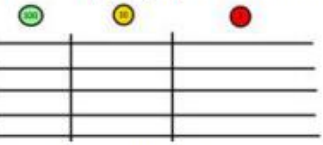
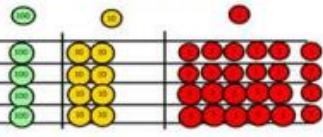
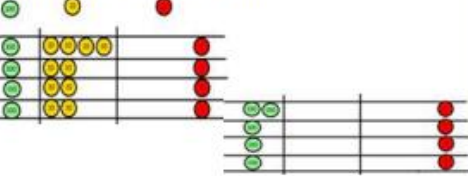
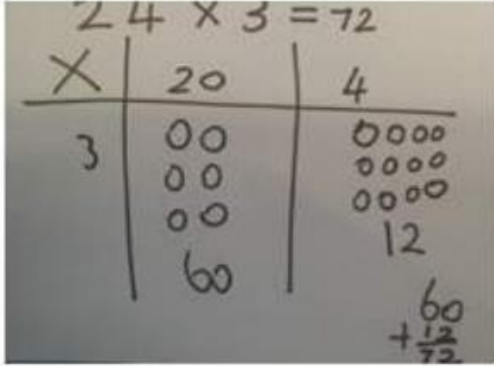
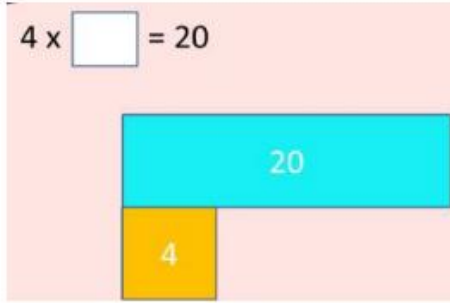
# Y2 MULTIPLICATION


# Y2

# MULTIPLICATION


Objective & Strategy	Concrete	Pictorial	Abstract
<p>Multiplication is commutative</p>	<p>Create arrays using counters and 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> <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>
<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><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>

# Y3 MULTIPLICATION

Objective & Strategy	Concrete	Pictorial	Abstract															
<p>Grid method</p>	<p>Show the links with arrays to first introduce the grid method</p>  <p>4 rows of 10 4 rows of 3</p> <p>Move onto base ten to move towards a more compact method.</p>  <p>4 rows of 13</p> <p>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</p>  <p>Calculations <math>4 \times 126</math></p> <p>Fill each row with 126</p>  <p>Calculations <math>4 \times 126</math></p> <p>Add up each column, starting with the ones making any exchanges needed</p>  <p>Then you have your answer.</p>	<p>Children can represent their work with place value counters in a way that they understand.</p> <p>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.</p>  <p>Bar model are used to explore missing numbers</p> 	<p>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <table border="1" data-bbox="1512 399 1825 494"> <tr> <td>X</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>210</td> <td>35</td> </tr> </table> <p><math>210 + 35 = 245</math></p> <p>Moving forward, multiply by a 2 digit number showing the different rows within the grid method.</p> <table border="1" data-bbox="1512 782 1825 981"> <tr> <td></td> <td>10</td> <td>8</td> </tr> <tr> <td>10</td> <td>100</td> <td>80</td> </tr> <tr> <td>3</td> <td>30</td> <td>24</td> </tr> </table>	X	30	5	7	210	35		10	8	10	100	80	3	30	24
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Objective & Strategy	Concrete	Pictorial	Abstract																															
<p>Column multiplication</p>	<p>Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. <math>321 \times 2 = 642</math></p> <table border="1" data-bbox="376 943 705 1382"> <thead> <tr> <th data-bbox="376 943 517 991">Hundreds</th> <th data-bbox="517 943 636 991">Tens</th> <th data-bbox="636 943 705 991">Ones</th> </tr> </thead> <tbody> <tr> <td data-bbox="376 991 517 1091"></td> <td data-bbox="517 991 636 1091"></td> <td data-bbox="636 991 705 1091"></td> </tr> <tr> <td data-bbox="376 1091 517 1192"></td> <td data-bbox="517 1091 636 1192"></td> <td data-bbox="636 1091 705 1192"></td> </tr> <tr> <td data-bbox="376 1192 517 1292"></td> <td data-bbox="517 1192 636 1292"></td> <td data-bbox="636 1192 705 1292"></td> </tr> <tr> <td data-bbox="376 1292 517 1382"></td> <td data-bbox="517 1292 636 1382"></td> <td data-bbox="636 1292 705 1382"></td> </tr> </tbody> </table> <p>It is important at this stage that they always multiply the ones first.</p> <p>The corresponding long multiplication is modelled alongside</p>	Hundreds	Tens	Ones														$\begin{array}{r} 327 \\ \times 4 \\ \hline 28 \quad (7 \times 4) \\ 80 \quad (20 \times 4) \\ 1200 \quad (300 \times 4) \\ \hline 1308 \end{array}$  <table border="1" data-bbox="1435 1241 1668 1449"> <tbody> <tr> <td></td> <td>3</td> <td>2</td> <td>7</td> </tr> <tr> <td>x</td> <td></td> <td></td> <td>4</td> </tr> <tr> <td></td> <td>1</td> <td>3</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>8</td> </tr> </tbody> </table> <p>This may lead to a compact method.</p>		3	2	7	x			4		1	3	0			2	8
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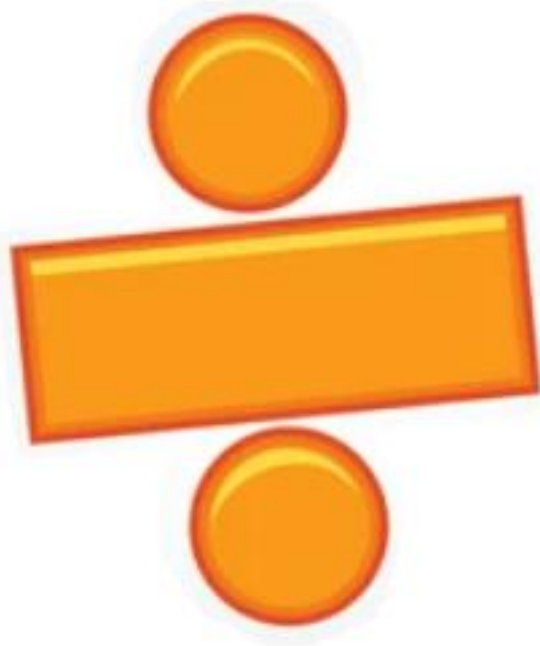
# Y5-6 MULTIPLICATION

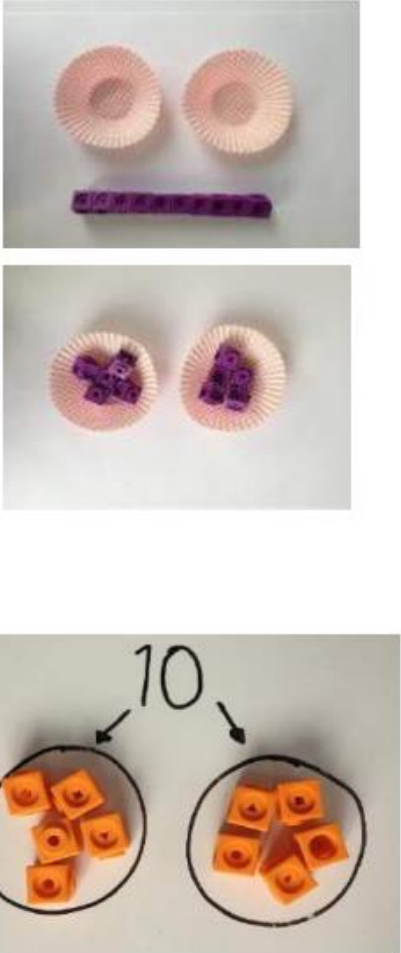
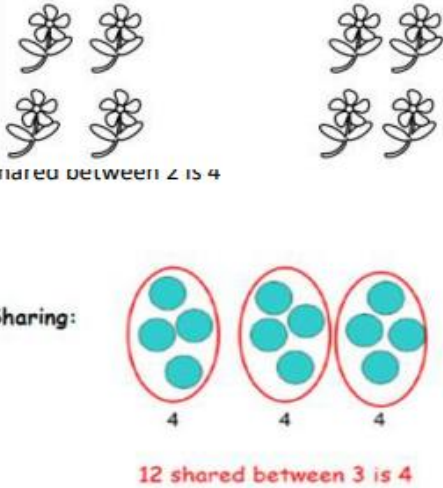
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Objective & Strategy	Concrete	Pictorial	Abstract
<p>Multiplying decimals up to 2 decimal places by a single digit.</p>			<p>Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.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

# Y6 MULTIPLICATION

# Division

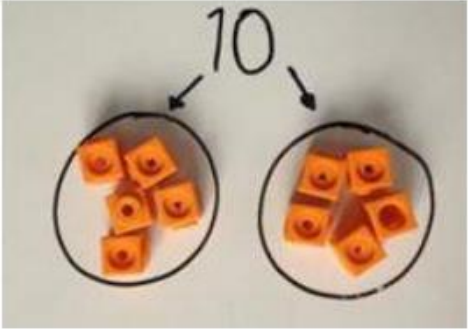
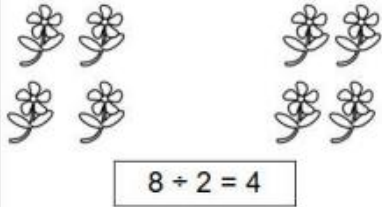
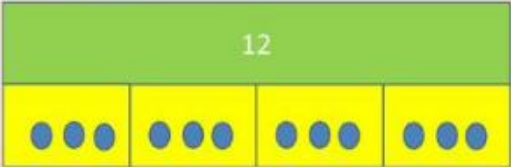
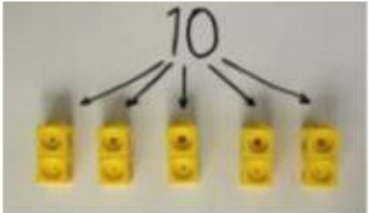

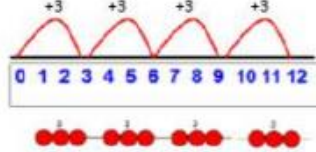



Objective & Strategy	Concrete	Pictorial	Abstract
<p>Division as sharing</p> <p><i>Use Gordon ITPs for modelling</i></p>	 <p>I have 10 cubes, can you share them equally in 2 groups?</p>	<p>Children use pictures or shapes to share quantities.</p> 	<p>12 shared between 3 is 4</p>

# Y1

# DIVISION

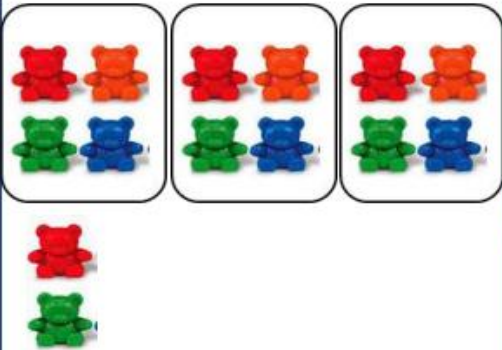

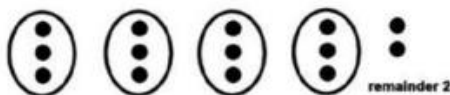
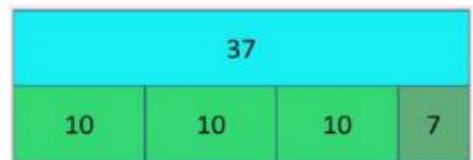
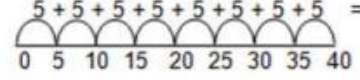
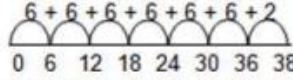
# Y2 DIVISION

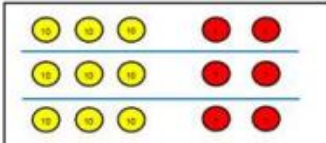

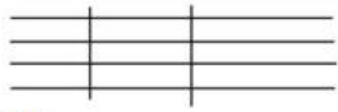

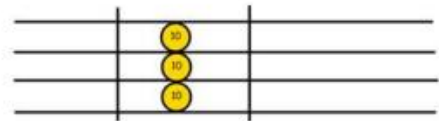
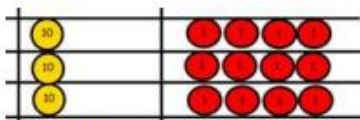
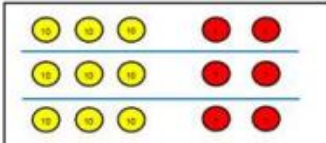
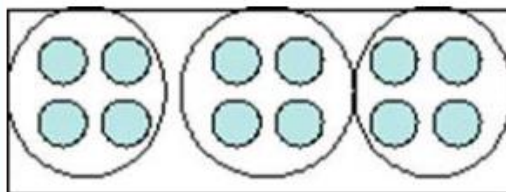
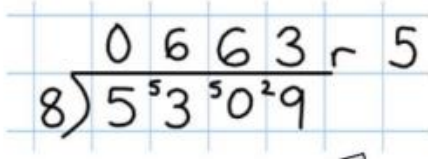
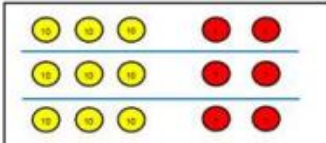
Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing	 <p>I have 10 cubes, can you share them equally in 2 groups?</p>	<p>Children use pictures or shapes to share quantities.</p>  <p>Children use bar modelling to show and support understanding.</p>  <p><math>12 \div 4 = 3</math></p>	$12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

# Y3 DIVISION

# Y3

# DIVISION

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Division with remainders.</p>	<p><math>14 \div 3 =</math></p> <p>Divide objects between groups and see how much is left over</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><b>Example without remainder:</b>  <math>40 \div 5</math>            Ask "How many 5s in 40?"  <math>5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 8 \text{ fives}</math></p>  <p><b>Example with remainder:</b>  <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>Complete written divisions and show the remainder using r.</p> $29 \div 8 = 3 \text{ REMAINDER } 5$ <p>↑   ↑   ↑   ↑            dividend   divisor   quotient   remainder</p>

Objective & Strategy	Concrete	Pictorial	Abstract									
<p>Divide at least 3 digit numbers by 1 digit.</p> <p>Short Division</p>	<p><math>96 \div 3</math></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">Tens</td> <td style="text-align: center;">Units</td> </tr> <tr> <td></td> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">  </td> <td></td> </tr> </table> <p>Use place value counters to divide using the bus stop method alongside</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Calculations</p> <math>42 \div 3</math> </div> </div>  <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> <div style="display: flex; align-items: center; justify-content: center;">  </div>  <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	3			<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> $\begin{array}{r} 218 \\ 3 \overline{) 654} \end{array}$ <p>Move onto divisions with a remainder.</p> $\begin{array}{r} 86 \text{ r } 2 \\ 3 \overline{) 258} \end{array}$ <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										
3												

# Y4-6 DIVISION

## Long 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.

# Y6

# DIVISION

## Long 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:  $4 \times 402 + 1 = 1,609$

# Y6

# DIVISION

## Long Division

Step 2—a remainder in the tens

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \end{array}$ <p>Two goes into 5 two times, or 5 tens <math>\div 2 = 2</math> whole tens -- but there is a remainder!</p>	$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \\ -4 \phantom{0} \\ \hline 1 \phantom{0} \end{array}$ <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>	$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \\ -4 \phantom{0} \downarrow \\ \hline 18 \end{array}$ <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.
$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \\ -4 \phantom{0} \\ \hline 18 \end{array}$ <p>Divide 2 into 18. Place 9 into the quotient.</p>	$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \\ -4 \phantom{0} \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>Multiply <math>9 \times 2 = 18</math>, write that 18 under the 18, and subtract.</p>	$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \\ -4 \phantom{0} \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>The division is over since there are no more digits in the dividend. The quotient is 29.</p>

# Y6

# DIVISION

## Long Division

Step 2—a remainder in any of the place values

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

Y6  
DIVISION

# Y6 DIVISION

\* Convert remainders to decimals when dividing.

Handwritten long division showing the division of 847.0 by 22, resulting in a quotient of 38.5. The steps are as follows:

$$\begin{array}{r} 38.5 \\ 22 \overline{) 847.0} \\ \underline{-66} \phantom{0} \\ 187 \phantom{0} \\ \underline{-176} \phantom{0} \\ 110 \\ \underline{-110} \\ 0 \end{array}$$