



Coughton C of E Primary School

Mathematics Calculation Policy

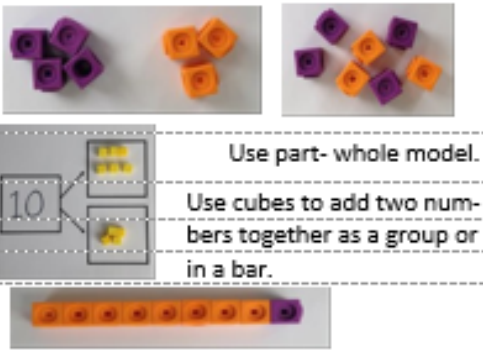
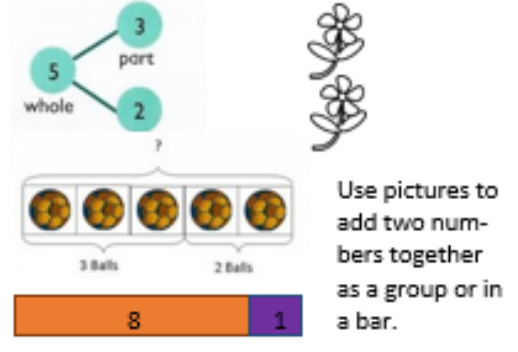
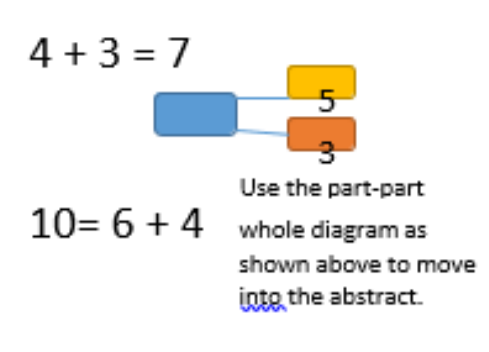
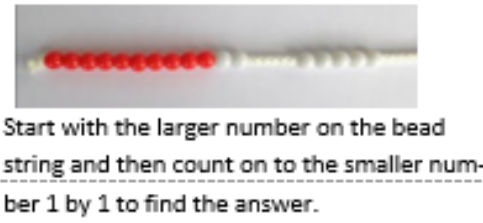
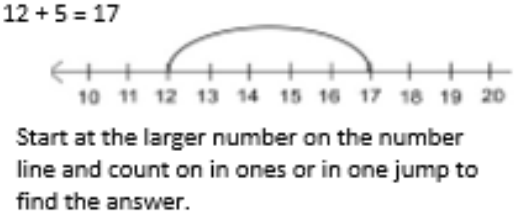
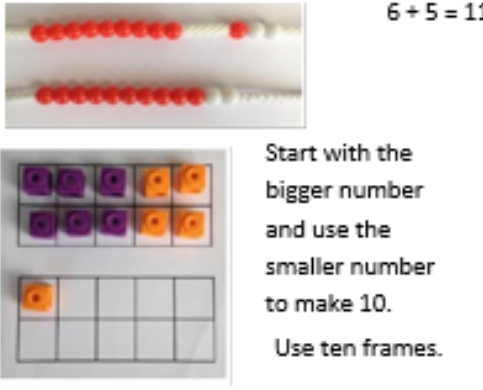
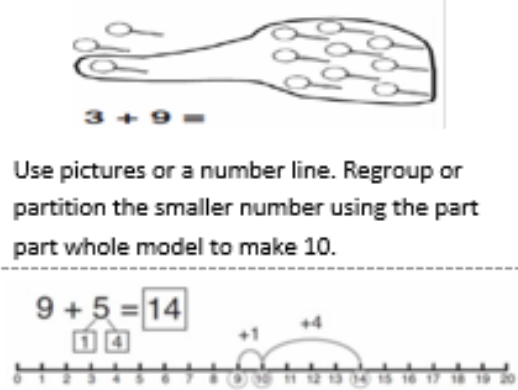
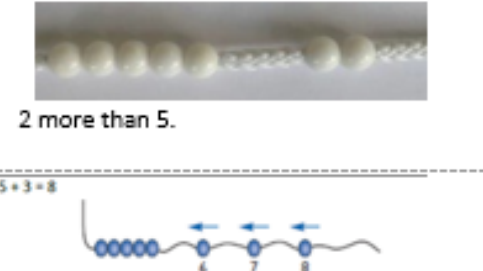
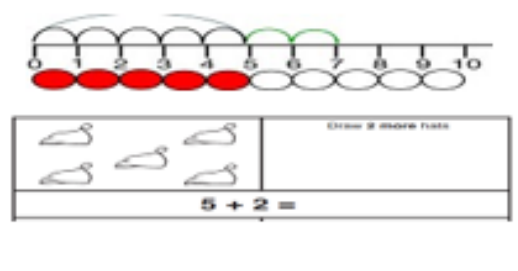

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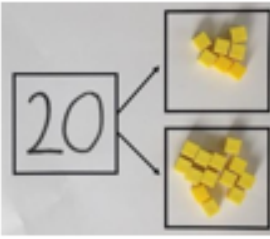
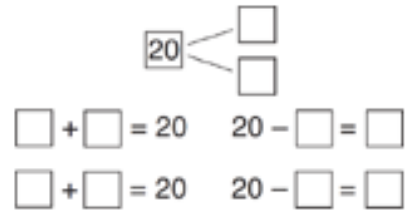
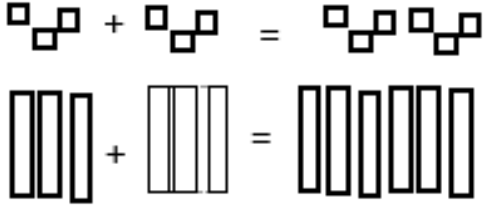
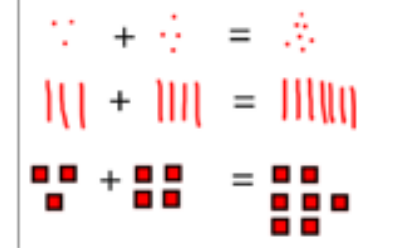


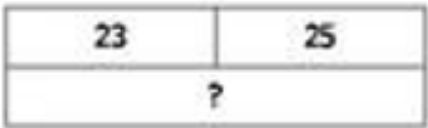
This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added. It is a working document and will be revised and amended as necessary.

Addition

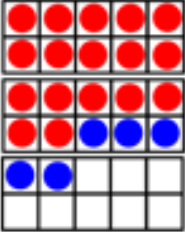
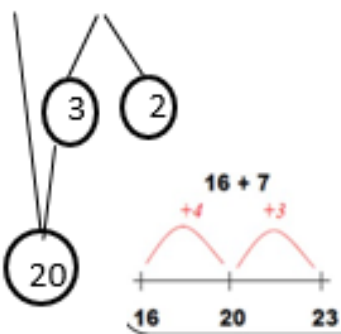
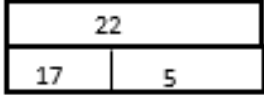

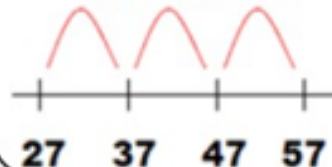

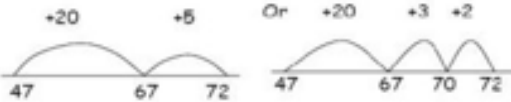
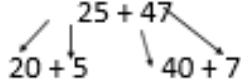

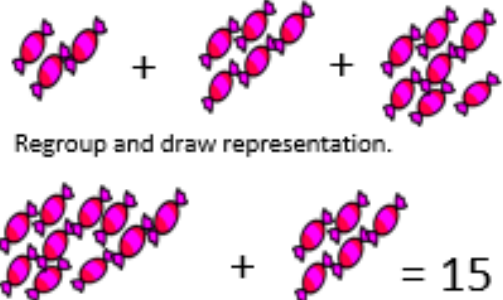


Objective & Strategy	Concrete	Pictorial	Abstract
<p>Combining two parts to make a whole: part- whole model</p>	 <p>Use part- whole model.</p> <p>Use cubes to add two numbers together as a group or in a bar.</p>	 <p>Use pictures to add two numbers together as a group or in a bar.</p>	 <p>Use the part-part whole diagram as shown above to move into the abstract.</p>
<p>Starting at the bigger number and counting on</p>	 <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>	<p>$12 + 5 = 17$</p>  <p>Start at the larger number on the number line and count on in ones or in one jump to find the answer.</p>	<p>$5 + 12 = 17$</p> <p>Place the larger number in your head and count on the smaller number to find your answer.</p>
<p>Regrouping to make 10.</p> <p><i>This is an essential skill for column addition later.</i></p>	 <p>$6 + 5 = 11$</p> <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>	<p>$7 + 4 = 11$</p> <p>If I am at seven, how many more do I need to make 10. How many more do I add on now?</p>
<p>Represent & use number bonds and related subtraction facts within 20</p>	 <p>2 more than 5.</p> <p>$5 + 3 = 8$</p>	 <p>$5 + 2 = 7$</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>'7 is 5 more than 2.'</p> 

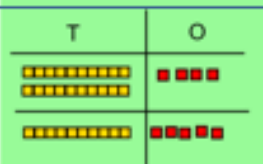

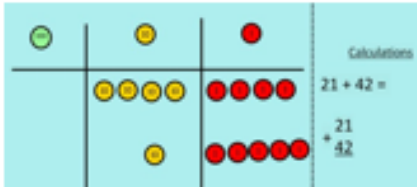
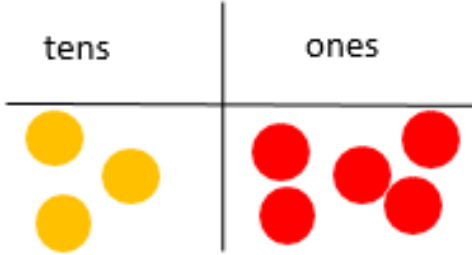
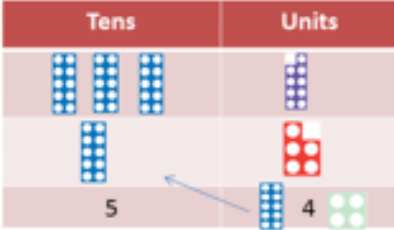
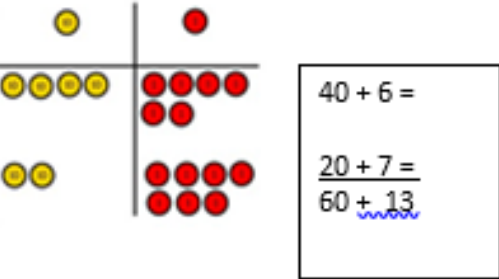


Objective & Strategy	Concrete	Pictorial	Abstract
Adding multiples of ten	<p style="text-align: center;">$50 = 30 + 20$</p>  <p style="text-align: center;">Model using dienes and bead strings</p>	 <p style="text-align: center;">$3 \text{ tens} + 5 \text{ tens} = \underline{\quad} \text{ tens}$ $30 + 50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



Objective & Strategy	Concrete	Pictorial	Abstract
Add a two digit number and ones	 <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>17 + 5 = 22</p> <p>Use part part whole and number line to model.</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> 
Add a 2 digit number and tens	 <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>
Add two 2-digit numbers	 <p>Model using dienes, place value counters and numicon</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>
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>10 + 7 = 17</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>


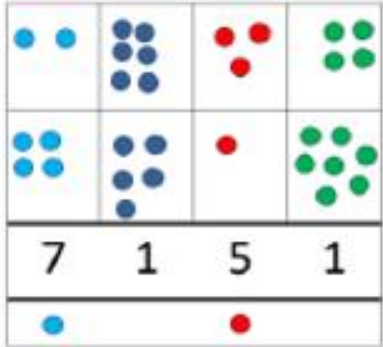
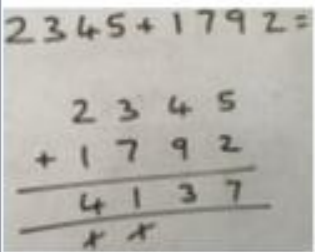

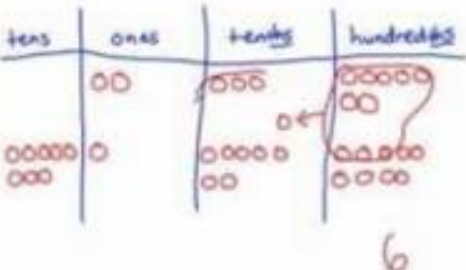

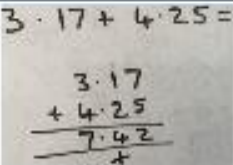
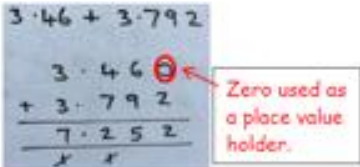
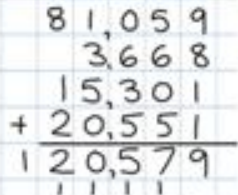
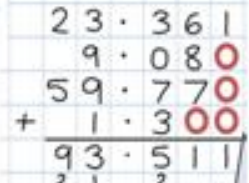


Objective & Strategy	Concrete	Pictorial	Abstract
<p>Column Addition—no regrouping (friendly numbers)</p> <p>Add two or three 2 or 3-digit numbers.</p>	<p>Model using Dienes or Numicon</p>  <p>Add together the ones first, then the tens.</p>   <p>Move to using place value counters</p>	<p>Children move to drawing the counters using a tens and one frame.</p> 	$\begin{array}{r} 21 \\ + 42 \\ \hline 63 \end{array}$ <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</p>	$\begin{array}{r} 20 + 5 \\ 40 + 8 \\ \hline 60 + 13 = 73 \end{array}$ <p>Start by partitioning the numbers before formal column to show the exchange.</p>




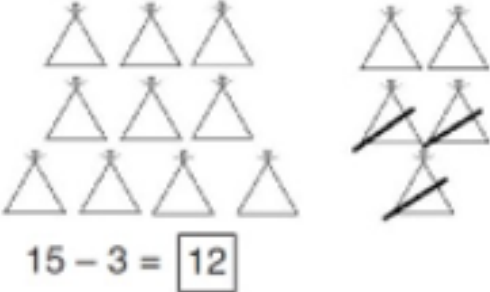


Objective & Strategy	Concrete	Pictorial	Abstract
<p>To set out TU + TU (that lie within the tens boundary) in columns and record as expanded column addition</p>		<p>Children can draw a representation of the grid to further support their understanding, exchanging the ten.</p>	
<p>HTU + TU (that cross the tens boundary) in columns and record as column addition</p>		<p>Children can draw representation of the grid to further support their understanding, carrying the ten <u>underneath</u> the line.</p>	

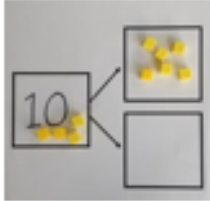
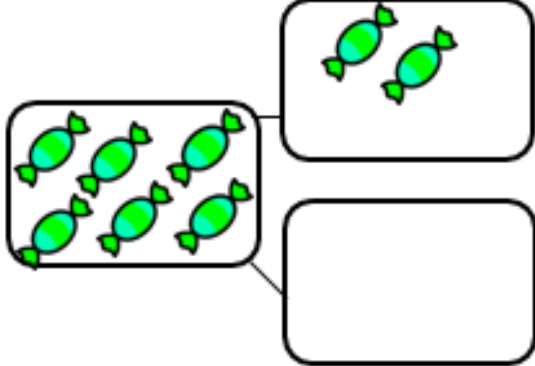
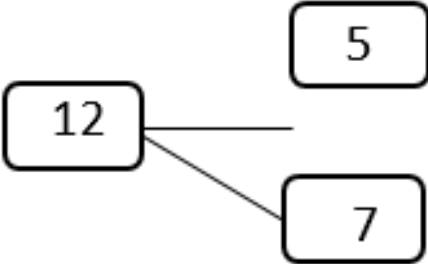

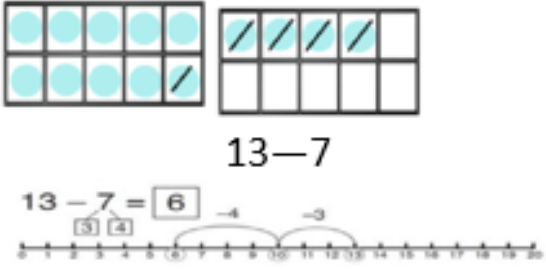


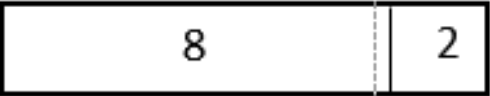


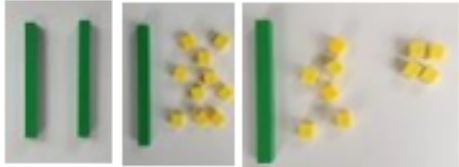
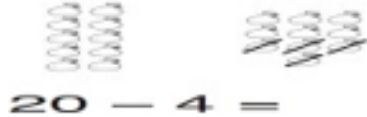

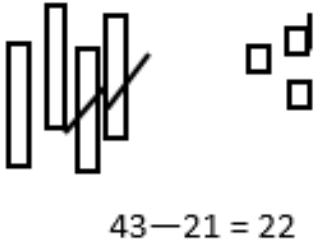
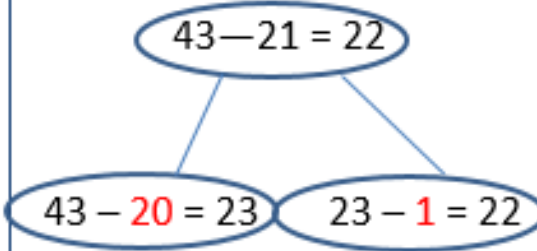
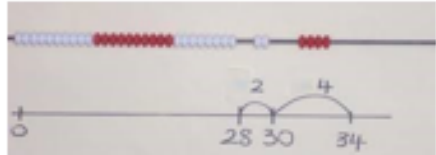
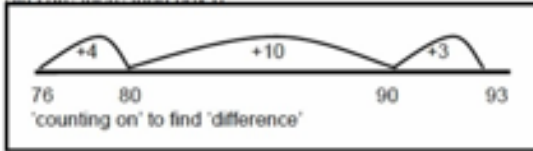
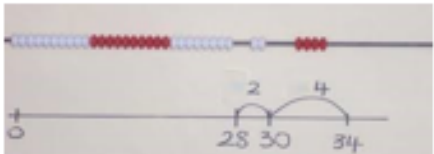
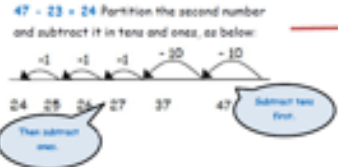
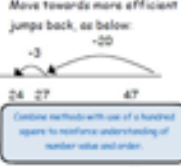
Objective & Strategy	Concrete	Pictorial	Abstract
<p>Y4—add numbers with up to 4 digits</p>	<p>Children continue to use dienes or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.</p> 	 <p>Draw representations using place value grid.</p>	 <p>Continue from previous work to carry hundreds as well as tens. Relate to money and measures</p>
<p>Y5—add numbers with more than 4 digits.</p> <hr/> <p>Add decimals with 2 decimal places, including money.</p>	<p>Introduce decimal place value counters and model exchange for addition. Links to measure and money.</p> 	<p>$2.37 + 81.79$</p> 	  
<p>Y6—add several numbers of increasing complexity</p> <hr/> <p>Including adding money, measure and decimals with different numbers of decimal points.</p>	<p>As year 4/5</p>	<p>As year 4/5</p>	 <p>Insert zeros for place holders.</p> 

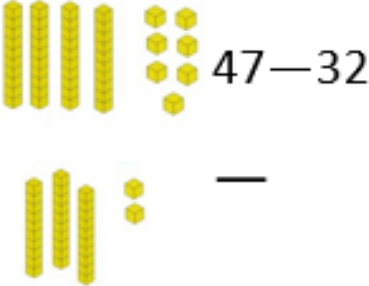
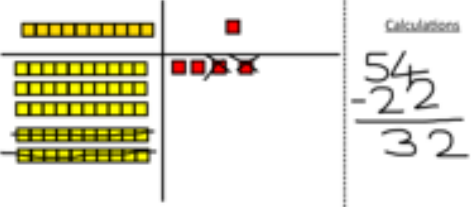
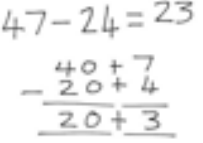
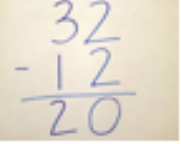
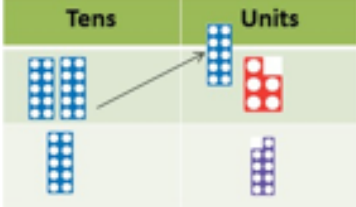
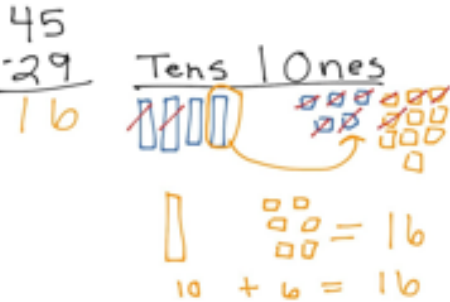
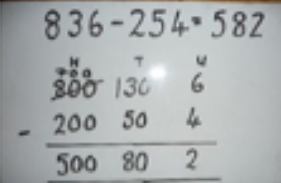
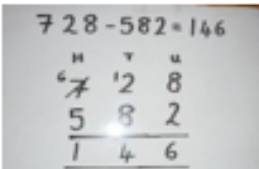
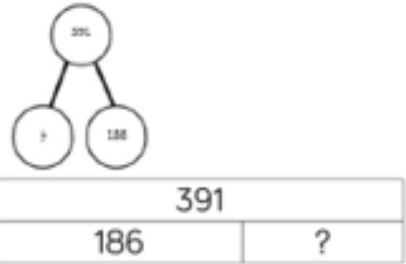
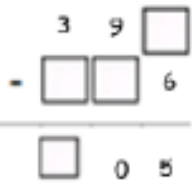
Subtraction

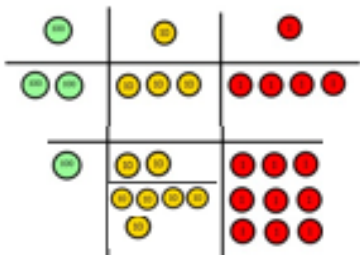
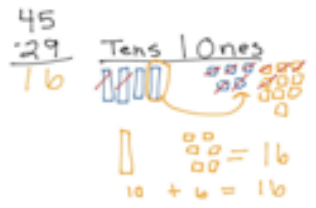
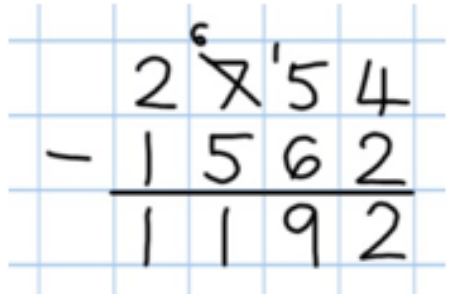
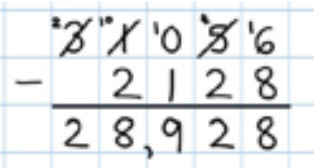
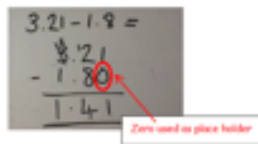
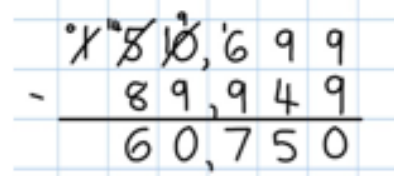


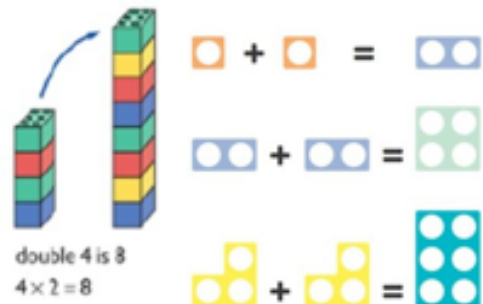

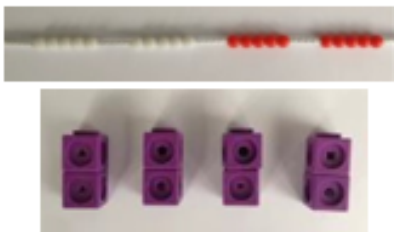

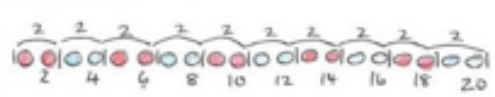
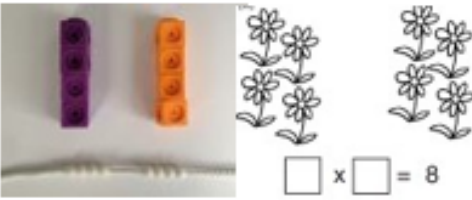

Objective & Strategy	Concrete	Pictorial	Abstract
Taking away ones.	<p>Use physical objects, counters, cubes etc to show how objects can be taken away.</p>  $4 - 2 = 2$	 <p>15 - 3 = 12</p> <p>Cross out drawn objects to show what has been taken away.</p>	$7 - 4 = 3$ $16 - 9 = 7$
Counting back	 <p>Move objects away from the group, counting backwards.</p> <p>Move the beads along the bead string as you count backwards.</p>	 <p>Count back in ones using a number line.</p>	Put 13 in your head, count back 4. What number are you at?

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Represent and use number bonds and related subtraction facts within 20</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>14—9</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>13—7</p> <p>13 - 7 = 6</p> <p>Jump back 3 first, then another 4. Use ten as the stopping point.</p>	<p>16—8</p> <p>How many do we take off first to get to 10? How many left to take off?</p>
<p>Bar model</p>	 $5 - 2 = 3$		 $10 = 8 + 2$ $10 = 2 + 8$ $10 - 2 = 8$ $10 - 8 = 2$

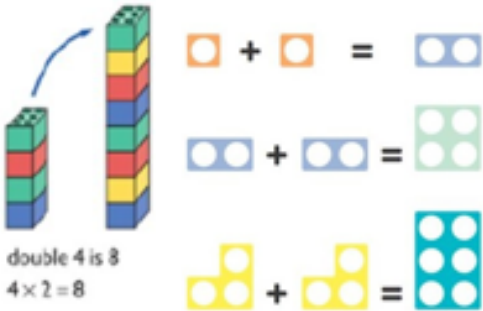

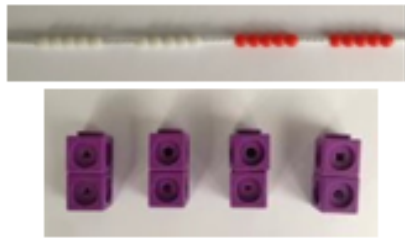
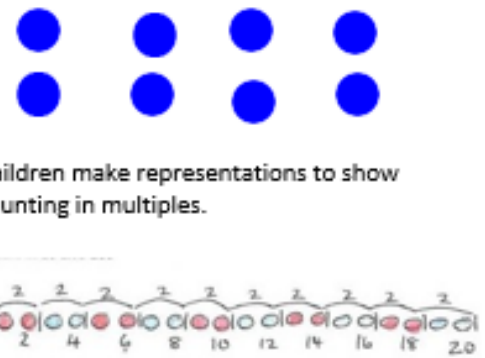
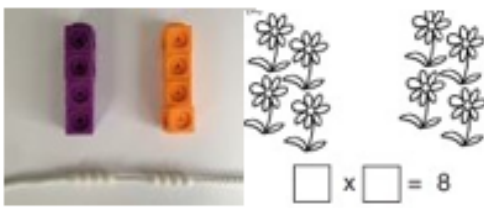

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Regroup a ten into ten ones</p>	 <p>Use a PV chart to show how to change a ten into ten ones, use the term 'take and make'</p>		<div style="background-color: #f08080; width: 40px; height: 40px; margin-left: auto; margin-right: auto;"></div> <p style="text-align: center;">$20 - 4 = 16$</p>
<p>Partitioning to subtract without regrouping.</p> <p><i>'Friendly numbers'</i></p>	<p>$34 - 13 = 21$</p>  <p>Use Dienes to show how to partition the number when subtracting without regrouping.</p>	<p>Children draw representations of Dienes and cross off.</p> 	
<p>Make ten strategy</p> <p><i>Progression should be crossing one ten, crossing more than one ten, crossing the hundreds.</i></p> <p><i>(counting on to find the difference)</i></p>	 <p>$34 - 28$</p> <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>	<p style="text-align: center;">$93 - 76 = 17$</p>
<p>Encourage children to draw own number lines</p>			 <p>Teaching children to bridge through ten can help them to become more efficient, for</p>

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Column subtraction without regrouping (friendly numbers)</p>	 <p>47—32</p> <p>Use base 10 or Numicon to model</p>	 <p>Calculations</p> $\begin{array}{r} 54 \\ - 22 \\ \hline 32 \end{array}$ <p>Darw representations to support understanding</p>	 <p>47—24=23</p> $\begin{array}{r} 40+7 \\ - 20+4 \\ \hline 20+3 \end{array}$ <p>Intermediate step may be needed to lead to clear subtraction understanding.</p>  $\begin{array}{r} 32 \\ - 12 \\ \hline 20 \end{array}$
<p>Column subtraction with regrouping</p>	 <p>Begin with base 10 or Numicon. Move to pv counters, modelling the exchange of a ten into tten ones. Use the phrase 'take and make' for exchange.</p>	 <p>45 -29 16</p> <p>Tens Ones</p> <p>Children may draw base ten or PV counters and cross off.</p>	 <p>836—254=582</p> <p>Begin by partitioning into pv columns</p>  <p>728—582=146</p> <p>Then move to formal method.</p>
<p>Missing numbers</p>			<p>Missing digit calculations</p>  $\begin{array}{r} 39\Box \\ - \Box\Box6 \\ \hline \Box05 \end{array}$

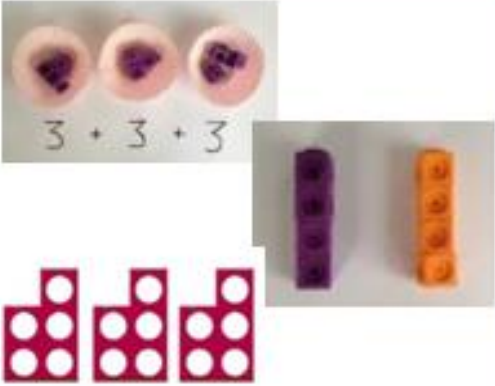
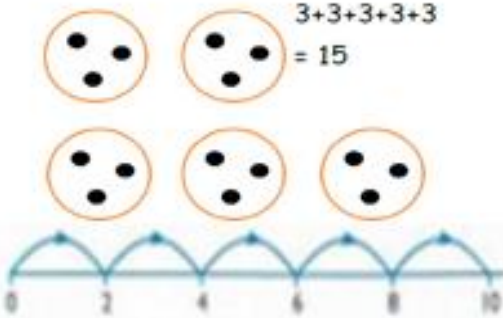


Objective & Strategy	Concrete	Pictorial	Abstract
<p>Subtracting tens and ones</p> <hr/> <p>Year 4 subtract with up to 4 digits.</p> <hr/> <p><i>Introduce decimal subtraction through context of money</i></p>	<p style="text-align: center;">$234 - 179$</p>  <p style="text-align: center;">Model process of exchange using Numicon, base ten and then move to PV counters.</p>	<p>Children to draw pv counters and show their exchange</p> <hr/> 	 <p style="text-align: center;">Use the phrase 'take and make' for exchange</p>
<p>Year 5- Subtract with at least 4 digits, including money and measures.</p> <hr/> <p><i>Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal</i></p>	<p>As above</p>	<p>Children to draw pv counters and show their exchange – as above</p>	 
<p>Year 6—Subtract with increasingly large and more complex numbers and decimal values.</p>			

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Doubling</p>	<p>Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling</p>  <p>double 4 is 8 $4 \times 2 = 8$</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> $+ = 32$
<p>Counting in multiples</p>	<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.</p> <p>Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20, 25, 30</p>
<p>Making equal groups and counting the total</p>	 <p>$\square \times \square = 8$</p> <p>Use manipulatives to create equal groups.</p>	<p>Draw  to show $2 \times 3 = 6$</p> <p>Draw and make representations</p>	$2 \times 4 = 8$

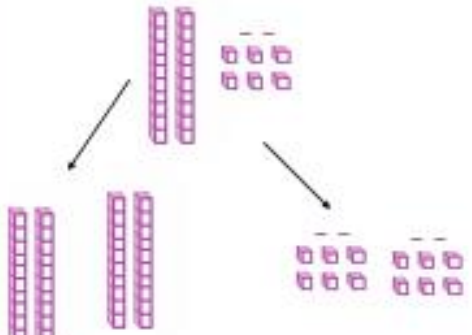
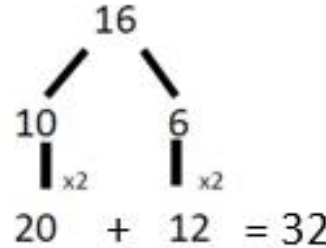






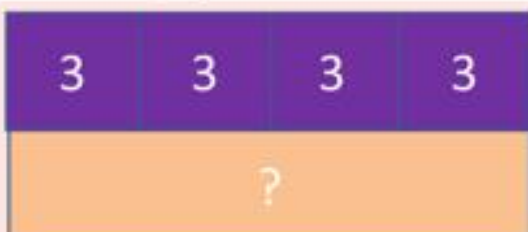


Objective & Strategy	Concrete	Pictorial	Abstract
<p>Doubling</p>	<p>Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling</p>  <p>double 4 is 8 $4 \times 2 = 8$</p>	<p>Draw pictures to show how to double numbers</p> <p>Double 4 is 8</p> 	<p>Partition a number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

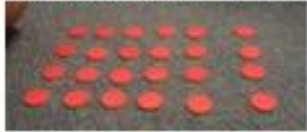




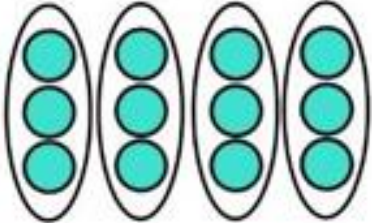
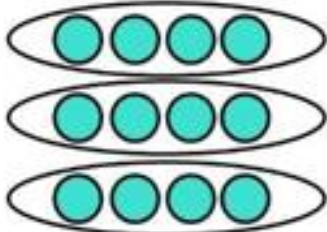


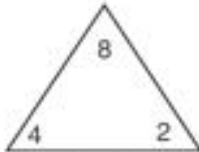


Objective & Strategy	Concrete	Pictorial	Abstract
Repeated addition	 <p>Use different objects to add equal groups</p>	<p>Use pictorial including number lines to solve problems</p> <p>There are 3 sweets in one bag. How many sweets are in 5 bags altogether?</p> 	<p>Write addition sentences to describe objects 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 of arrays to show understanding</p>	$3 \times 2 = 6$ $2 \times 5 = 10$

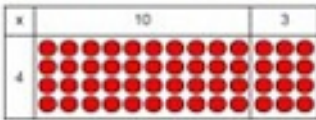
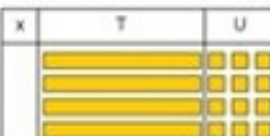

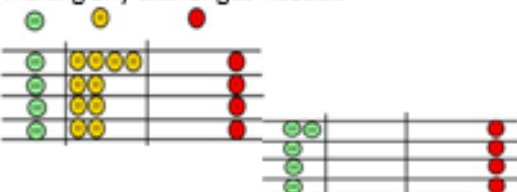
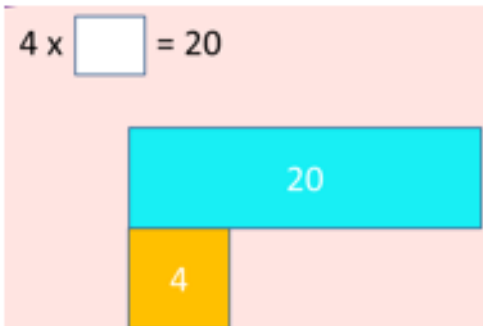


Objective & Strategy	Concrete	Pictorial	Abstract
<p>Doubling</p>	<p>Model doubling using dienes and PV counters.</p>  <p>$40 + 12 = 52$</p>	<p>Draw pictures and representations to show how to double numbers</p>	<p>Partition a number and then double each part before recombining it back together.</p>  <p>$20 + 12 = 32$</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>$5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40$</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.</p> <p>Write sequences with multiples of numbers.</p> <p>0, 2, 4, 6, 8, 10</p> <p>0, 3, 6, 9, 12, 15</p> <p>0, 5, 10, 15, 20, 25, 30</p> <p>$4 \times 3 = \square$</p>



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>$12 = 3 \times 4$</p> <p>$12 = 4 \times 3$</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p>$5 + 5 + 5 = 15$</p> <p>$3 + 3 + 3 + 3 + 3 = 15$</p> <p>$5 \times 3 = 15$</p> <p>$3 \times 5 = 15$</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"/> \times <input type="text"/> = <input type="text"/> <input type="text"/> \times <input type="text"/> = <input type="text"/> <input type="text"/> \div <input type="text"/> = <input type="text"/> <input type="text"/> \div <input type="text"/> = <input type="text"/> </p>	<p>$2 \times 4 = 8$</p> <p>$4 \times 2 = 8$</p> <p>$8 \div 2 = 4$</p> <p>$8 \div 4 = 2$</p> <p>$8 = 2 \times 4$</p> <p>$8 = 4 \times 2$</p> <p>$2 = 8 \div 4$</p> <p>$4 = 8 \div 2$</p> <p>Show all 8 related fact family sentences.</p>



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 4 x 126</p> <p>Fill each row with 126</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>4 x <input type="text"/> = 20</p>	<p>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <table border="1" data-bbox="1657 454 2004 550"> <tr> <td>x</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>210</td> <td>35</td> </tr> </table> <p>210 + 35 = 245</p> <p>Moving forward, multiply by a 2 digit number showing the different rows within the grid method.</p> <table border="1" data-bbox="1668 869 1993 1077"> <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>Grid method recap from year 3 for 2 digits x 1 digit</p> <p>Move to multiplying 3 digit numbers by 1 digit. (year 4 expectation)</p>	<p>Use 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 4×126</p> <p>Fill each row with 126</p> <p>Add up each column, starting with the ones making any exchanges needed</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>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <table border="1" data-bbox="1646 446 1982 550"> <tr> <td>x</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>210</td> <td>35</td> </tr> </table> <p>$210 + 35 = 245$</p>	x	30	5	7	210	35																																	
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<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. $321 \times 2 = 642$</p> <table border="1" data-bbox="465 1109 806 1508"> <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> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></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													<table border="1" data-bbox="1093 986 1451 1077"> <tr> <td>x</td> <td>300</td> <td>20</td> <td>7</td> </tr> <tr> <td>4</td> <td>1200</td> <td>80</td> <td>28</td> </tr> </table> <p>The grid method may be used to show how this relates to a formal written method.</p> <p>Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.</p>	x	300	20	7	4	1200	80	28	<table data-bbox="1713 965 1904 1356"> <tr> <td></td> <td>327</td> </tr> <tr> <td>x</td> <td>4</td> </tr> <tr> <td colspan="2"><hr/></td> </tr> <tr> <td></td> <td>28</td> </tr> <tr> <td></td> <td>80</td> </tr> <tr> <td></td> <td>1200</td> </tr> <tr> <td></td> <td><hr/></td> </tr> <tr> <td></td> <td>1308</td> </tr> </table> <p>This may lead to a compact method.</p>		327	x	4	<hr/>			28		80		1200		<hr/>		1308
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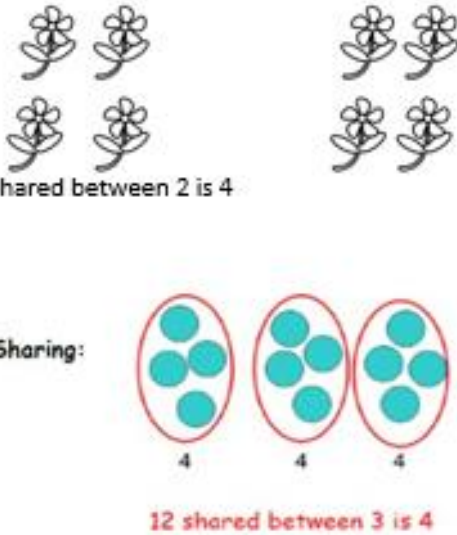


Objective & Strategy	Concrete	Pictorial	Abstract																																																																							
<p>Column Multiplication for 3 and 4 digits x 1 digit.</p>	<table border="1" data-bbox="474 311 824 721"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr><td></td> <td></td> <td></td> </tr> <tr><td></td> <td></td> <td></td> </tr> <tr><td></td> <td></td> <td></td> </tr> <tr><td></td> <td></td> <td></td> </tr> </tbody> </table> <p data-bbox="846 367 974 670">It is important at this stage that they always multiply the ones first.</p> <p data-bbox="474 726 974 861">Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. $321 \times 2 = 642$</p>	Hundreds	Tens	Ones													<table border="1" data-bbox="1102 322 1456 406"> <tr> <td>x</td> <td>300</td> <td>20</td> <td>7</td> </tr> <tr> <td>4</td> <td>1200</td> <td>80</td> <td>28</td> </tr> </table>	x	300	20	7	4	1200	80	28	<div data-bbox="1697 316 1886 710" style="text-align: right;"> $\begin{array}{r} 327 \\ \times \quad 4 \\ \hline 128 \\ 80 \\ \hline 1308 \end{array}$ </div> <table border="1" data-bbox="1572 746 1818 933"> <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 colspan="4"><hr/></td></tr> <tr><td></td><td>1</td><td>3</td><td>0</td><td>8</td></tr> <tr><td></td><td>'</td><td>2</td><td></td><td></td></tr> </table> <p data-bbox="1881 778 2049 890">This will lead to a compact method.</p>		3	2	7	x			4	<hr/>					1	3	0	8		'	2																												
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<p>Column multiplication</p>	<p>Manipulatives may still be used with the corresponding long multiplication modelled alongside.</p>	<table border="1" data-bbox="1034 1013 1355 1232"> <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> <p data-bbox="996 1468 1523 1540">Continue to use bar modelling to support problem solving</p>		10	8	10	100	80	3	30	24	<table border="1" data-bbox="1563 989 1814 1268"> <tr><td></td><td>1</td><td>8</td></tr> <tr><td>x</td><td>1</td><td>3</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td></td><td>5</td><td>4</td></tr> <tr><td></td><td>2</td><td></td></tr> <tr><td>1</td><td>8</td><td>0</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td>2</td><td>3</td><td>4</td></tr> </table> <p data-bbox="1848 989 2038 1189">18 x 3 on the first row (8 x 3 = 24, carrying the 2 for 20, then 1 x 3)</p> <p data-bbox="1848 1212 2038 1476">18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in units first</p> <table border="1" data-bbox="1572 1340 1892 1564"> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>x</td><td></td><td></td><td>1</td><td>6</td></tr> <tr><td colspan="5"><hr/></td></tr> <tr><td></td><td>7</td><td>4</td><td>0</td><td>4</td></tr> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>0</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td></td><td>1</td><td>9</td><td>7</td><td>4</td><td>4</td></tr> </table> <p data-bbox="1769 1436 1892 1508">(1234×6)</p> <p data-bbox="1769 1484 1892 1556">(1234×10)</p>		1	8	x	1	3	<hr/>				5	4		2		1	8	0	<hr/>			2	3	4		1	2	3	4	x			1	6	<hr/>						7	4	0	4		1	2	3	4	0	<hr/>							1	9	7	4	4
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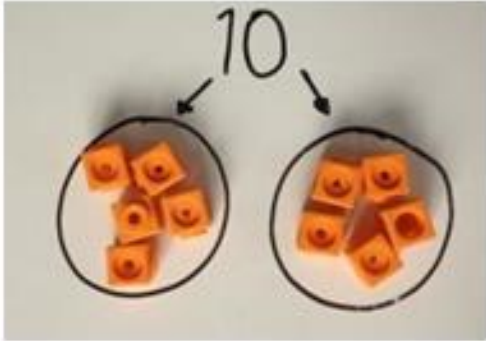

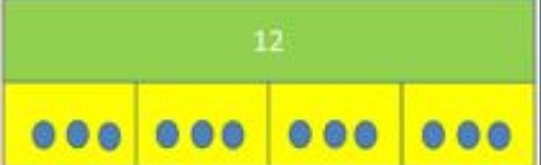


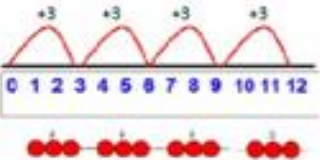

Objective & Strategy	Concrete	Pictorial	Abstract
Multiplying decimals up to 2 decimal places by a single digit.			<p>Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.</p> $ \begin{array}{r} 3.19 \\ \times 8 \\ \hline 25.52 \end{array}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

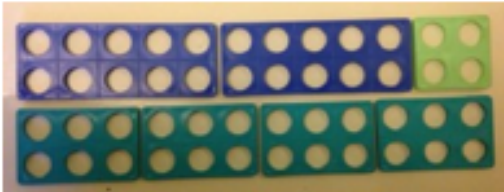

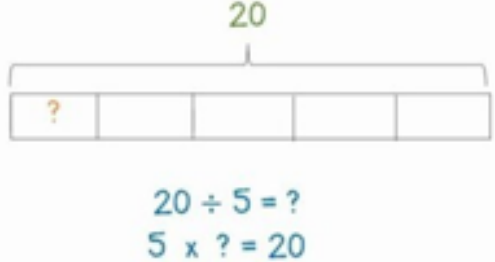

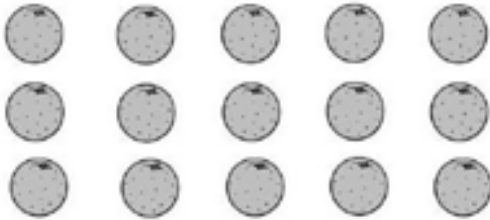




Objective & Strategy	Concrete	Pictoria I	Abstract
<p>Division as sharing</p> <p>Use Gordon ITPs for modelling</p>	 <p>I have 10 cubes, can you share them equally in 2 groups?</p>	<p>Children use pictures or shapes to share quantities.</p> 	<p>12 shared between 3 is 4</p>

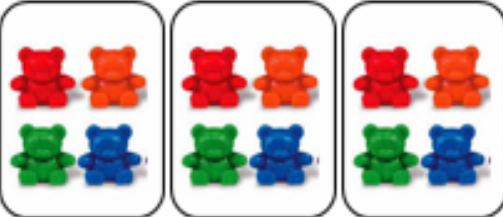



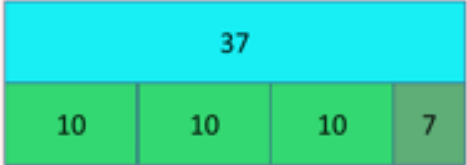
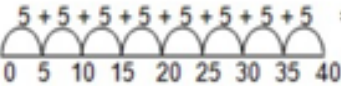
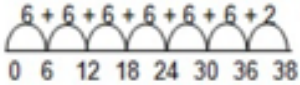


Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing	 <p>I have 10 cubes, can you share them equally in 2 groups?</p>	<p>Children use pictures or shapes to share quantities.</p>  <p>$8 \div 2 = 4$</p> <p>Children use bar modelling to show and support understanding.</p>  <p>$12 \div 4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

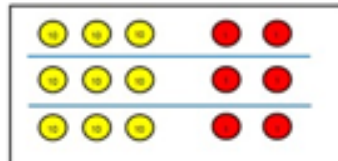


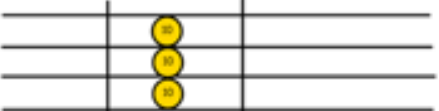
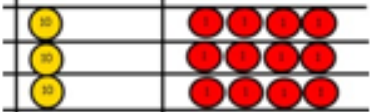
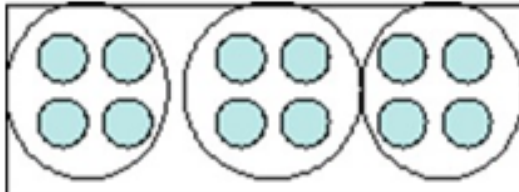
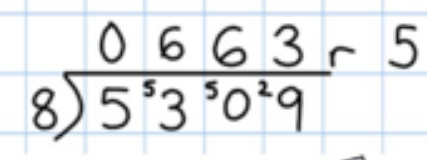
Objective & Strategy	Concrete	Pictorial	Abstract
Division as grouping	<p>Use cubes, counters, objects or place value counters to aid understanding.</p>  <p>24 divided into groups of 6 = 4</p> $96 \div 3 = 32$ 	<p>Continue to use bar modelling to aid solving division problems.</p>  $20 \div 5 = ?$ $5 \times ? = 20$	<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 $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$</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
<p>Division with remainders.</p>	<p>$14 \div 3 =$</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>Example without remainder: $40 \div 5$ Ask "How many 5s in 40?" $5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 8 \text{ fives}$</p>  <p>Example with remainder: $38 \div 6$</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>$96 \div 3$</p> <table 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 $42 \div 3$</p> <p>$42 \div 3 =$</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 equal 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



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



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



Step 2—a remainder in the tens

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



Long Division

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 $\div 2 = 1$ hundred.</p>	$\begin{array}{r} \text{h t o} \\ 1 \\ 2 \overline{) 278} \\ -2 \\ \hline 0 \end{array}$ <p>Multiply $1 \times 2 = 2$, 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 $3 \times 2 = 6$, 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 $9 \times 2 = 18$, 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>

