

Stem Sentences

Spine 2: Multiplication and Division




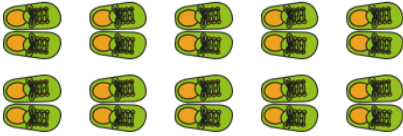
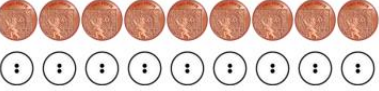
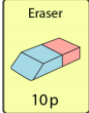


Year 1: 2.1	Unitizing
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Year 2: 2.5	Doubling and halving
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Year 2: 2.6	Division as sharing
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Unitizing


Example of stem sentence	Type of stem sentence	Examples from the NCETM PD Materials
This counter has ____ dots. It is worth ____	Structure	<p>How much is each counter worth?</p> <p>1 p pre-money token 2 p pre-money token 5 p pre-money token 10 p pre-money token</p> <p>This counter has 2 dots. It is worth 2. e. g The counter has 2 dots. It is worth 2.</p>
This is a ____ pence coin, It has value of ____p	Structure	<p>This is a 5p coin. It has a value of 5p.</p>
<p>I say two pence but I think two one-pennies</p> <p>I say five pence but I think five one pennies.</p> <p>I say ten pence but I think ten one pennies.</p>	Generalisation	<p>I say ten pence but I think ten one pennies.</p>
Each _____ has ____ parts Count in groups of _____	Language/ structure	<p>Each bike has 2 wheels. Count in groups of 2.</p>

Counting in Equal Groups


<p>The groups are equal because there are the same number in each group.</p> <p>The groups are unequal because there is a different number in each group.</p>	Generalisation	<p>The groups are equal because</p> <ul style="list-style-type: none"> • 'Max has some apples.' • 'The apples have been grouped.' • 'The groups are <u>equal</u> because there are <u>the same number</u> of apples in each group.' <ul style="list-style-type: none"> • 'Lucia has some apples.' • 'The apples have been grouped.' • 'The groups are <u>unequal</u> because there are <u>a different number</u> of apples in each group.'
Put into groups of _____	Structure	<p>Put into groups into 10</p> <p>Count in tens</p>

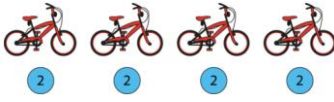
<p>One group of ____ Two group of ____ Three groups of ____</p> <p>____ group(s) of _____</p>	<p>Structure</p>	<p>Counting and unitising</p>   <p>One group of 10, two groups of 10, three groups of 10... One ten, two tens, three tens, ... 10,20, 30</p>
<p>There are ____ equal groups of ____ There are ____ in each group. There are ____ groups of ____</p>		<p>How many equal groups are there? How many cakes are there in each group?</p>  <p>There are five equal groups of cakes. There are three cakes in each group. There are five groups of three.</p>
<p>____ group(s) of ____ ____ group(s) of ____ make ____</p>	<p>Language/ structure</p>	<p>One group of two, two groups of two, three groups of two.... Two, four six One two, two twos, three threes.</p>  <p>Ten groups of 2 make 10</p>
<p>There are ____ coins Each coin has a value of ____p ____ lots of ____p is ____p altogether</p>	<p>Structure/ language</p>	 <p>There are nine coins Each coin has a value of 2p This is 18p.</p>
<p>The _____ cost ____p Each coin has a value of ____p So I need _____ coins. Count in _____ s to check</p>	<p>Structure/ language</p>	<p>How many five-pence coins would you need to buy this rubber?</p>   <p>The rubber cost 10p Each coin has a value of 5p So I need 2 coins. Check by counting in 5 s 5, 10.</p>
<p>____ represents the number of ____ ____ represents the number of ____ in each _____</p>	<p>Structure</p>	 <p>6 represents the number of nests 3 represents the number of eggs in each next.</p>

Repeated Addition.

<p>___ add ___ add ___ ___ + ___ + ___</p>	<p>Structure</p>	 <p>3 add 3 add 3 add 3 3 + 3 + 3 + 3</p>
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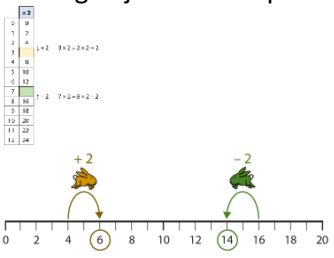
Factors and products.

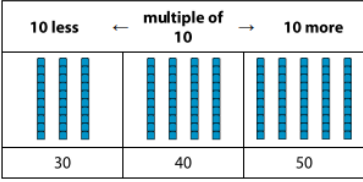
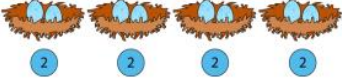
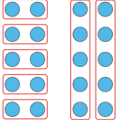

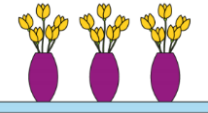
<p>There are ___ groups of ___ ___ x ___ + ___ ___ = ___ x ___</p>	<p>Structure / language</p>	<p>How many shoes are there? Count in groups of two.</p>  <div style="border: 1px solid black; width: 200px; height: 20px; margin: 5px auto; text-align: center;">6</div> <p>3 x 2 = 6 or 6 = 3 x 2 There are three groups of two; there are six altogether.</p>
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<p>___ is a factor ___ is a factor The product of ___ and ___ is ___ ___ is the product of ___ and ___</p>	<p>Language / structure.</p>	<p>How many wheels altogether?</p>  <p>Two, four, six, eight. There are eight wheels Four is a factor Two is a factor The product of four and two is eight Eight is the product of four and two.</p>
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<p>What does the ___ represent? ___ is the product of ___ and ___ The product of ___ and ___ is ___.</p>	<p>Structure / language</p>	<table border="1" style="margin-bottom: 10px;"> <tr><td>3</td><td>×</td><td>2</td><td>=</td><td>6</td></tr> <tr><td>factor</td><td>×</td><td>factor</td><td>=</td><td>product</td></tr> </table> <table border="1" style="margin-bottom: 10px;"> <tr><td>6</td><td>=</td><td>3</td><td>×</td><td>2</td></tr> <tr><td>product</td><td>=</td><td>factor</td><td>×</td><td>factor</td></tr> </table> <p>What does the 3 represent? What does the 2 represent? What does the 6 represent?</p> <p>Six is the product of two and three The product of two and three is six.</p>	3	×	2	=	6	factor	×	factor	=	product	6	=	3	×	2	product	=	factor	×	factor
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factor	×	factor	=	product																		
6	=	3	×	2																		
product	=	factor	×	factor																		

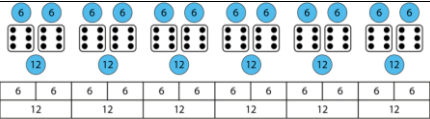
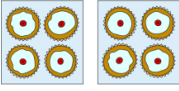

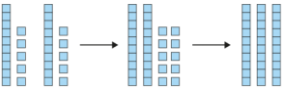
<p>Factor times factor is equal to the product The product is equal to factor times factor.</p>	<p>Generalisation</p>	
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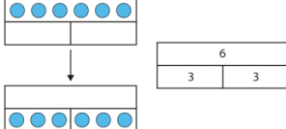
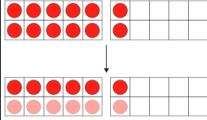
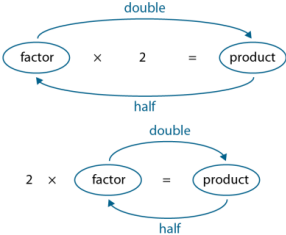
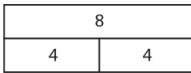
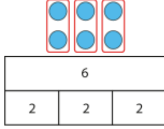
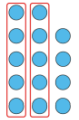
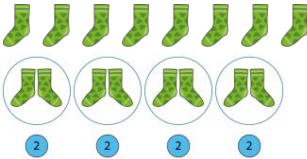
<p>___ x ___ is ___ x ___ and one more ___ ___ x ___ = ___ x ___ + ___ ___ x ___ is ___ x ___ and one less ___ ___ x ___ = ___ x ___ - ___</p>	<p>Structure.</p>	<p>Finding adjacent multiples.</p>  <p>3 x 2 = 2 x 2 + 2 3 x 2 is 2 x 2 one one more 2</p> <p>7 x 2 = 8 x 2 - 2 7 x 2 is 8 x 2 and one less 2</p>
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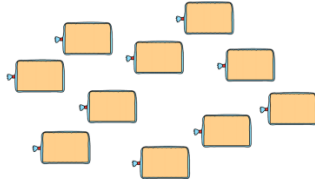
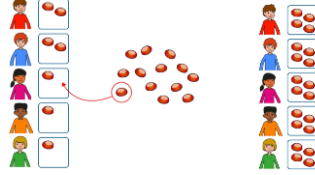
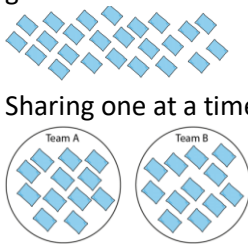
<p>_____ has one more group of _____ than _____</p> <p>_____ has one fewer group of _____ than forty.</p>	<p>Structure/ language</p>	<p>Using the language of groups.</p>  <p>Forty has one more group of ten than thirty Thirty has one fewer group of ten than forty.</p>
Commutativity		
<p>There are _____ groups of _____. There are _____ altogether</p> <p>There are _____ _____, _____ times. There are _____ altogether</p>	<p>Structure</p>	 <p>$2 + 2 + 2 + 2 = 8$ There are four groups of two eggs. There are eight eggs altogether $4 \times 2 = 8$</p> <p>There are two eggs, four times. There are eight eggs altogether $2 \times 4 = 8$</p>
<p>_____ represents the number of groups. _____ represents the number in each group. _____ groups of _____</p>		 <p>5 represents the number of groups 2 represents the number in each group. 5 groups of 2</p> <p>2 represents the number of groups 5 represents the number in each group. 2 groups of 5</p>
<p>If there are _____ equal groups, we can use the _____ times table.</p> <p>_____ is a factor so we can use the _____ times table.</p>	<p>Structure</p>	 <p>5 groups of 6 = 6 groups of 5 If there are 5 equal groups, we can use the 5 times table.</p> <p>5 is a factor so we can use the 5 times table.</p>
<p>The product of _____ and _____ is equal to the product of _____ and _____</p> <p>_____ times _____ is equal to _____ times _____</p>	<p>Structure.</p>	 <p>The product of 3 and 5 is equal to the product of 5 and 3 3 times 5 is equal to 5 times 3. $3 \times 5 = 5 \times 3$</p>
<p>The order of the numbers does not matter.</p>	<p>Generalisation</p>	<p>$4 \times 5 = 5 \times 4$</p>
<p>No of groups x group size = product</p> <p>Group size x no of groups = product.</p>	<p>Generalisation</p>	

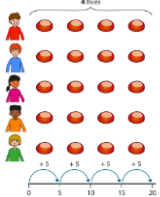
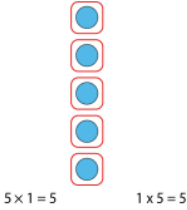
Connecting the times tables																												
<p>There are ____ groups of ____</p> <p>There are ____ groups of ____</p>	Structure	<p>There are 5 groups of ten</p> <p>There are 10 groups of 5.</p>																										
<p>For every group of 10, there are two groups of 5.</p> <p>Products in the ten times table are also in the five times table.</p> <p>Even multiples of 5 are also multiples of 10.</p>	Generalisation / structure.																											
<p>For every one group of four, there are two groups of two.</p>	Generalisation / structure.	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td> </tr> <tr> <td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td> </tr> </table>	2	2	2	2	2	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4						
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4	4	4	4	4	4	4	4	4	4																			
<p>Products in the four times table are also in the two times table.</p> <p>The product of an even number and two is a product in the four times tables.</p>	Generalisation / structure.	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>2 × 0 = 0</td><td>4 × 0 = 0</td></tr> <tr><td>2 × 1 = 2</td><td>4 × 1 = 4</td></tr> <tr><td>2 × 2 = 4</td><td>4 × 2 = 8</td></tr> <tr><td>2 × 3 = 6</td><td>4 × 3 = 12</td></tr> <tr><td>2 × 4 = 8</td><td>4 × 4 = 16</td></tr> <tr><td>2 × 5 = 10</td><td>4 × 5 = 20</td></tr> <tr><td>2 × 6 = 12</td><td>4 × 6 = 24</td></tr> <tr><td>2 × 7 = 14</td><td>4 × 7 = 28</td></tr> <tr><td>2 × 8 = 16</td><td>4 × 8 = 32</td></tr> <tr><td>2 × 9 = 18</td><td>4 × 9 = 36</td></tr> <tr><td>2 × 10 = 20</td><td>4 × 10 = 40</td></tr> <tr><td>2 × 11 = 22</td><td>4 × 11 = 44</td></tr> <tr><td>2 × 12 = 24</td><td>4 × 12 = 48</td></tr> </table>	2 × 0 = 0	4 × 0 = 0	2 × 1 = 2	4 × 1 = 4	2 × 2 = 4	4 × 2 = 8	2 × 3 = 6	4 × 3 = 12	2 × 4 = 8	4 × 4 = 16	2 × 5 = 10	4 × 5 = 20	2 × 6 = 12	4 × 6 = 24	2 × 7 = 14	4 × 7 = 28	2 × 8 = 16	4 × 8 = 32	2 × 9 = 18	4 × 9 = 36	2 × 10 = 20	4 × 10 = 40	2 × 11 = 22	4 × 11 = 44	2 × 12 = 24	4 × 12 = 48
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<p>Four is double two so:</p> <p>____ times four is double ____ times two.</p> <p>____ fours is double ____ twos.</p> <p>____ times two is half of ____ times four.</p> <p>____ twos is half of ____ fours.</p>	Structure	<p>Four is double two</p> <p>Five times four is double five times two.</p> <p>Five fours is double five twos.</p> <p>Five times two is half of five times four.</p> <p>Five twos is half of five fours.</p>																										
<p>Products in the eight times table are also in the four times table.</p> <p>The product of an even number and four is a product in the eight times table.</p>	Generalisation / structure.	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>4 × 0 = 0</td><td>8 × 0 = 0</td></tr> <tr><td>4 × 1 = 4</td><td>8 × 1 = 8</td></tr> <tr><td>4 × 2 = 8</td><td>8 × 2 = 16</td></tr> <tr><td>4 × 3 = 12</td><td>8 × 3 = 24</td></tr> <tr><td>4 × 4 = 16</td><td>8 × 4 = 32</td></tr> <tr><td>4 × 5 = 20</td><td>8 × 5 = 40</td></tr> <tr><td>4 × 6 = 24</td><td>8 × 6 = 48</td></tr> <tr><td>4 × 7 = 28</td><td>8 × 7 = 56</td></tr> <tr><td>4 × 8 = 32</td><td>8 × 8 = 64</td></tr> <tr><td>4 × 9 = 36</td><td>8 × 9 = 72</td></tr> <tr><td>4 × 10 = 40</td><td>8 × 10 = 80</td></tr> <tr><td>4 × 11 = 44</td><td>8 × 11 = 88</td></tr> <tr><td>4 × 12 = 48</td><td>8 × 12 = 96</td></tr> </table>	4 × 0 = 0	8 × 0 = 0	4 × 1 = 4	8 × 1 = 8	4 × 2 = 8	8 × 2 = 16	4 × 3 = 12	8 × 3 = 24	4 × 4 = 16	8 × 4 = 32	4 × 5 = 20	8 × 5 = 40	4 × 6 = 24	8 × 6 = 48	4 × 7 = 28	8 × 7 = 56	4 × 8 = 32	8 × 8 = 64	4 × 9 = 36	8 × 9 = 72	4 × 10 = 40	8 × 10 = 80	4 × 11 = 44	8 × 11 = 88	4 × 12 = 48	8 × 12 = 96
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<p>Eight is double four, so ____ eights is double ____ fours.</p> <p>Four is half of eight, so ____ fours is half of ____ eights.</p>	Structure	<p>Eight is double four, so 5 eights is double 5 fours.</p> <p>Four is half of eight, so 5 fours is half of 5 eights.</p> <p>5 × 4 = 20</p> <p>5 × 8 = 40 (double 20).</p>																										

<p>Products in the eight times table are also in the two and four times table.</p> <p>Products in the four times table are also in the two times table.</p>	<p>Generalisation / structure.</p>	<p>Seeing the groups of two and four in groups of eight:</p>																										
<p>For numbers with more than two digits: If the final two digits are divisible by four then the number is divisible by four.</p>	<p>Generalisation</p>																											
<p>For every one groups of 6 there are two groups of 3</p>	<p>Structure</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td></tr> </table>	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	6								
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<p>Products in the six times table are also in the three times table.</p> <p>The product of an even number and three is a product in the six times table.</p>	<p>Generalisation / structure.</p>	<table border="1" style="width: 100%; text-align: center;"> <tbody> <tr><td>0 x 3 = 0</td><td>0 x 6 = 0</td></tr> <tr><td>1 x 3 = 3</td><td>1 x 6 = 6</td></tr> <tr><td>2 x 3 = 6</td><td>2 x 6 = 12</td></tr> <tr><td>3 x 3 = 9</td><td>3 x 6 = 18</td></tr> <tr><td>4 x 3 = 12</td><td>4 x 6 = 24</td></tr> <tr><td>5 x 3 = 15</td><td>5 x 6 = 30</td></tr> <tr><td>6 x 3 = 18</td><td>6 x 6 = 36</td></tr> <tr><td>7 x 3 = 21</td><td>7 x 6 = 42</td></tr> <tr><td>8 x 3 = 24</td><td>8 x 6 = 48</td></tr> <tr><td>9 x 3 = 27</td><td>9 x 6 = 54</td></tr> <tr><td>10 x 3 = 30</td><td>10 x 6 = 60</td></tr> <tr><td>11 x 3 = 33</td><td>11 x 6 = 66</td></tr> <tr><td>12 x 3 = 36</td><td>12 x 6 = 72</td></tr> </tbody> </table>	0 x 3 = 0	0 x 6 = 0	1 x 3 = 3	1 x 6 = 6	2 x 3 = 6	2 x 6 = 12	3 x 3 = 9	3 x 6 = 18	4 x 3 = 12	4 x 6 = 24	5 x 3 = 15	5 x 6 = 30	6 x 3 = 18	6 x 6 = 36	7 x 3 = 21	7 x 6 = 42	8 x 3 = 24	8 x 6 = 48	9 x 3 = 27	9 x 6 = 54	10 x 3 = 30	10 x 6 = 60	11 x 3 = 33	11 x 6 = 66	12 x 3 = 36	12 x 6 = 72
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<p>Six is double three, so ___ sixes are double ___ threes.</p> <p>Three is half of six, so ___ threes are half of ___ sixes.</p>	<p>Structure.</p>	<p>Six is double three, so six sixes are double six threes.</p> <p>Three is half of six, so 5 threes is half of 5 eights.</p> <p>$6 \times 3 = 18$</p> <p>$6 \times 6 = 36$ (double 18).</p>																										
<p>For every one group of nine, there are three groups of three.</p>	<p>Generalisation / structure.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>9</td><td>9</td><td>9</td><td>9</td><td>9</td><td>9</td></tr> </table>	3	3	3	3	3	3	3	3	3	3	3	3	9	9	9	9	9	9								
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<p>Nine is tripple three so ___ nines is tripple ___ threes.</p>	<p>Structure.</p>	<p>Nine is tripple three so 2 nines is tripple 2 threes.</p>																										
<p>Six is half of twelve so ___ sixes is half of ___ twelves.</p> <p>Twelve is double six so ___ twelves is double ___ sixes.</p>	<p>Structure</p>	<p>Six is half of twelve so five sixes is half of five twelves.</p> <p>Twelve is double six so five twelves is double five sixes.</p>																										

<p>For every one group of twelve there are two groups of six</p>	<p>Generalisation / structure</p>																											
<p>The product of ___ and zero is zero. The product of zero and ___ is zero</p>	<p>Structure</p>	<table border="1" data-bbox="778 315 1018 533"> <tr><td>0 x 0 = 0</td><td>0 x 0 = 0</td></tr> <tr><td>1 x 0 = 0</td><td>0 x 1 = 0</td></tr> <tr><td>2 x 0 = 0</td><td>0 x 2 = 0</td></tr> <tr><td>3 x 0 = 0</td><td>0 x 3 = 0</td></tr> <tr><td>4 x 0 = 0</td><td>0 x 4 = 0</td></tr> <tr><td>5 x 0 = 0</td><td>0 x 5 = 0</td></tr> <tr><td>6 x 0 = 0</td><td>0 x 6 = 0</td></tr> <tr><td>7 x 0 = 0</td><td>0 x 7 = 0</td></tr> <tr><td>8 x 0 = 0</td><td>0 x 8 = 0</td></tr> <tr><td>9 x 0 = 0</td><td>0 x 9 = 0</td></tr> <tr><td>10 x 0 = 0</td><td>0 x 10 = 0</td></tr> <tr><td>11 x 0 = 0</td><td>0 x 11 = 0</td></tr> <tr><td>12 x 0 = 0</td><td>0 x 12 = 0</td></tr> </table> <p>The product of 3 and 0 is 0 The product of 0 and 3 is 0.</p>	0 x 0 = 0	0 x 0 = 0	1 x 0 = 0	0 x 1 = 0	2 x 0 = 0	0 x 2 = 0	3 x 0 = 0	0 x 3 = 0	4 x 0 = 0	0 x 4 = 0	5 x 0 = 0	0 x 5 = 0	6 x 0 = 0	0 x 6 = 0	7 x 0 = 0	0 x 7 = 0	8 x 0 = 0	0 x 8 = 0	9 x 0 = 0	0 x 9 = 0	10 x 0 = 0	0 x 10 = 0	11 x 0 = 0	0 x 11 = 0	12 x 0 = 0	0 x 12 = 0
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<p>When 0 is a factor, the product is zero.</p>	<p>Generalisation / language</p>	<p>0 x 2 = 0 0 x 5 = 0 0 x 10 = 0 2 x 0 = 0 5 x 0 = 0 10 x 0 = 0</p>																										
<p>The product of ___ and one is ___. The product of one and ___ is ___</p>	<p>Structure</p>	<table border="1" data-bbox="778 696 1018 913"> <tr><td>0 x 1 = 0</td><td>1 x 0 = 0</td></tr> <tr><td>1 x 1 = 1</td><td>1 x 1 = 1</td></tr> <tr><td>2 x 1 = 2</td><td>1 x 2 = 2</td></tr> <tr><td>3 x 1 = 3</td><td>1 x 3 = 3</td></tr> <tr><td>4 x 1 = 4</td><td>1 x 4 = 4</td></tr> <tr><td>5 x 1 = 5</td><td>1 x 5 = 5</td></tr> <tr><td>6 x 1 = 6</td><td>1 x 6 = 6</td></tr> <tr><td>7 x 1 = 7</td><td>1 x 7 = 7</td></tr> <tr><td>8 x 1 = 8</td><td>1 x 8 = 8</td></tr> <tr><td>9 x 1 = 9</td><td>1 x 9 = 9</td></tr> <tr><td>10 x 1 = 10</td><td>1 x 10 = 10</td></tr> <tr><td>11 x 1 = 11</td><td>1 x 11 = 11</td></tr> <tr><td>12 x 1 = 12</td><td>1 x 12 = 12</td></tr> </table> <p>The product of 3 and 1 is 3 The product of 1 and 3 is 3.</p>	0 x 1 = 0	1 x 0 = 0	1 x 1 = 1	1 x 1 = 1	2 x 1 = 2	1 x 2 = 2	3 x 1 = 3	1 x 3 = 3	4 x 1 = 4	1 x 4 = 4	5 x 1 = 5	1 x 5 = 5	6 x 1 = 6	1 x 6 = 6	7 x 1 = 7	1 x 7 = 7	8 x 1 = 8	1 x 8 = 8	9 x 1 = 9	1 x 9 = 9	10 x 1 = 10	1 x 10 = 10	11 x 1 = 11	1 x 11 = 11	12 x 1 = 12	1 x 12 = 12
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<p>When 1 is a factor, the product is equal to the other factor.</p>	<p>Generalisation / language.</p>																											
<p>Doubling and Halving.</p>																												
<p>2 groups of _____ is equal to ___ x 2</p>	<p>Structure</p>	 <p>There are two boxes. Each box contains four cakes. 2 groups of 4 is equal 4 x 2</p>																										
<p>If there are two equal groups we can use the two times table</p>	<p>Generalisation</p>																											
<p>There are two groups of _____ There are ____, two times This is the same as double _____</p>	<p>Structure</p>	 <p>There are two groups of 5 There are five, two times This is the same as double 5.</p>																										
<p>If we need to double/find twice the amount, we can use facts from the two times table.</p>	<p>Generalisation</p>																											
<p>Doubling a whole number always gives an even number.</p>	<p>Generalisation</p>																											
<p>Double ___ = double ___ + double ___</p>	<p>Structure</p>	<p>Partition to double</p>  <p>Double 15 = double 10 + double 5 = 20 + 10 = 30</p>																										
<p>When one of the factors is two, the product is double the other factor.</p>	<p>Generalisation</p>																											

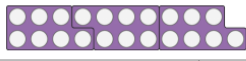
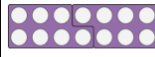
<p>There are ____ altogether; half of ____ is equal to ____</p>		 <p>There are 6 altogether; half of 6 is equal to 3.</p>
<p>Half of ____ = Half of ____ + half of ____</p>	<p>Language/ structure</p>	<p>Partitioning to half</p>  <p>Half of 12 = half of 10 + half of 2 = 5 + 1 = 6</p>
<p>When one of the factors is 2, the other factor is half of the product.</p>	<p>Generalisation</p>	
<p>I know that double ____ is ____; so half of ____ is ____</p>	<p>Language / structure.</p>	<p>Link between doubling and halving</p>  <p>I know that double four is equal to eight; so half of eight is equal to four.</p>
<p>Division as grouping.</p>		
<p>____ divided into groups of ____</p>	<p>Structure/ language</p>	<p>Quotitive division <i>'There are fifteen biscuits. If I put them into bags of five, how many bags will I need?'</i> 15 divided into groups of 5.</p>
<p>There are ____ groups of ____; there are ____ altogether. ____ is divided into groups of ____ . There are ____ groups. ____ is divided into ____ groups of ____</p>	<p>Structure</p>	 <p>There are three groups of two; there are six altogether. Six divided into groups of two. There are three groups Six is divided into three groups of two</p>
<p>____ is divided into groups of ____ with a remainder of ____</p>	<p>Structure</p>	<p>Division with a remainder</p>  <p>14 = 5 + 5 + 4 14 = 2 x 5 + 4 Fourteen is divided into two groups of five with a remainder of four.</p>
<p>____ is divided into groups of ____ . There are ____ groups.</p>	<p>Structure</p>	<p>There are eight socks. If I put them into pairs, how many pairs will there be?</p>  <p>Eight is divided into groups of 2. There are four groups There are four groups of two in eight.</p>

<p>The ___ represents the total number of seeds The ___ represents the number of seeds in each group/pot</p>	<p>Structure</p>	<p>There are fourteen seeds. Two seeds are planted in each pot How many pots are needed?</p>  <p>Fourteen divided into groups of two The 14 represents the total number of seeds The 2 represents the number of seeds in each group/pot.</p>										
<p>Dividend ÷ divisor = quotient.</p>	<p>Generalisation / language</p>	<table border="1" data-bbox="778 528 1246 629"> <tr> <td>30</td> <td>÷</td> <td>5</td> <td>=</td> <td>6</td> </tr> <tr> <td>dividend</td> <td>÷</td> <td>divisor</td> <td>=</td> <td>quotient</td> </tr> </table>	30	÷	5	=	6	dividend	÷	divisor	=	quotient
30	÷	5	=	6								
dividend	÷	divisor	=	quotient								
<p>___ is the dividend ___ is the divisor ___ is the quotient.</p>	<p>Language</p>	<p>I buy ten loaves of bread. I can fit five loaves into each bag. How many bags do I need?</p>  <p>$10 \div 5 = 2$ The dividend is ten. It represents how many loaves I have altogether. The divisor is five. It represents the number in each bag. The quotient is 2. It represents how many bags I will need.</p>										
<p>Division as sharing</p>												
<p>___ divided between ___</p>	<p>Language / structure</p>	<p>Partitive division <i>'I have twenty conkers and I share them equally between five children. How many conkers does each child get?'</i> 20 divided between 5</p>										
<p>___ are shared equally between _____. Each child gets _____</p>	<p>Language / structure</p>	<p>I have twenty conkers and I share them equally between five children. How many conkers does each child have?</p>  <p>Twenty conkers are shared equally between five children. Each child gets four conkers.</p>										
<p>___ divided between ___ is equal to ___ each.</p>	<p>Structure</p>	<p>There are twenty-four bean bags. If they are shared equally between two teams, how many bean bags does each team get?</p>  <p>Sharing one at a time ...</p> <p>$24 \div 2 = 12$ Twenty four divided between two is equal to twelve each.</p>										

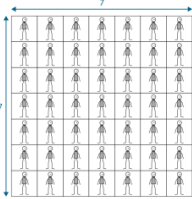
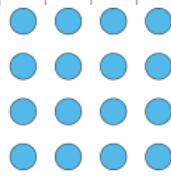
<p>One ___ is one each. That's ___ Two ___ is two each. That's ___</p> <p>_____ divided between ___ is equal to ___ each.</p>	<p>Structure</p>	 <p>One five is one each. That's five Two fives is two each. That's ten Three fives is three each. That's fifteen. Four fives is four each. That's twenty. $20 \div 5 = 4$ Twenty divided between five is equal to four each.</p>															
<p>If the divisor is two, we can use the two times table to find the quotient.</p> <p>If the divisor is five, we can use the five times table to find the quotient.</p> <p>If the divisor is two, the quotient is half of the dividend.</p>	<p>Generalisation</p>																
<p>Rules of divisability</p>																	
<p>A number is divisible by two if the ones digits is even.</p>	<p>Generalisation</p>	<p><i>'Sort these numbers according to whether they can be divided by two or not.'</i></p> <table border="1" data-bbox="778 1016 1088 1048"> <tr> <td>4</td><td>62</td><td>2</td><td>7</td><td>100</td><td>5</td><td>31</td><td>34</td><td>48</td><td>99</td><td>43</td> </tr> </table> <table border="1" data-bbox="783 1070 1083 1160"> <tr> <th>Can be divided by 2</th> <th>Can't be divided by 2</th> </tr> <tr> <td> </td> <td> </td> </tr> </table>	4	62	2	7	100	5	31	34	48	99	43	Can be divided by 2	Can't be divided by 2		
4	62	2	7	100	5	31	34	48	99	43							
Can be divided by 2	Can't be divided by 2																
<p>A number is divisible by ten if the ones digits is zero.</p>	<p>Generalisation</p>	<p><i>'Which year group(s) can be put into teams of ten?'</i></p> <table border="1" data-bbox="804 1189 1038 1335"> <thead> <tr> <th>Year group</th> <th>Number of children</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>150</td> </tr> <tr> <td>2</td> <td>135</td> </tr> <tr> <td>3</td> <td>120</td> </tr> </tbody> </table>	Year group	Number of children	1	150	2	135	3	120							
Year group	Number of children																
1	150																
2	135																
3	120																
<p>A number is divisible by five if the ones digits is five or zero.</p>	<p>Generalisation</p>	<p><i>'Stickers come in sheets of five. How many stickers could I have altogether? Circle the correct answers.'</i></p> <p>40 105 52 5 75 90</p>															
<p>When the divisor is equal to one, the quotient is equal to the dividend.</p>	<p>Generalisation</p>																
<p>When zero is a factor, the product is zero.</p> <p>When the dividend is zero, the quotient is zero.</p>	<p>Generalisation</p>	<p>$0 \times 5 = 0$ One of the facotrs is zero so the product is zero. Zero groups of five is zero.</p>															
<p>When one is a factor, the product is equal to the other factor.</p>	<p>Generalisation</p>	<p>$1 \times 10 = 10$ One of the facotrs is one so the product is ten.</p>															
<p>When the dividend is zero, the quotient is zero.</p>	<p>Generalisation</p>	<p>$0 \div 2 = 0$ $0 \div 5 = 0$ $0 \div 10 = 0$</p>															
<p>When the dividend is equal to the divisor, the quotient is one.</p>	<p>Generalisation</p>	<p>$2 \div 2 = 1$ $5 \div 5 = 1$ $10 \div 10 = 1$</p>															

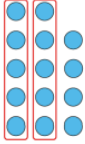
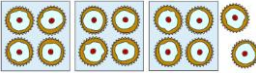
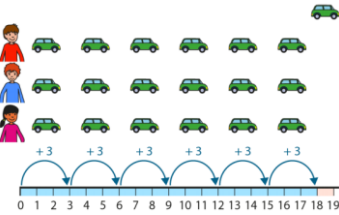
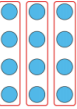
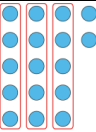
When the divisor is equal to one, the quotient is equal to the dividend.	Generalisation	$2 \div 1 = 2$ $5 \div 1 = 5$ $10 \div 1 = 10$
For a number to be divisible by three, the sum of the digits of the number must be divisible by three.	Generalisation	e.g. 453 $4 + 5 + 3 = 12$ (12 is divisible by 3) $1 + 2 = 3$ (Keep adding and if you get 3, 6 or 9 then it is divisible by 3)
For a number to be divisible by three, it must be divisible by 3 and divisible by 2 (even)	Generalisation	
For a number to be divisible by nine, the sum of the digits of the number must be divisible by nine.	Generalisation	e.g. 63 $6 + 3 = 9$ 567 $5 + 6 + 7 = 18$ $1 + 8 = 9$

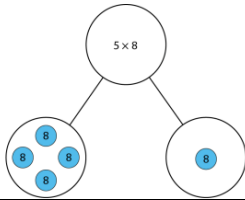
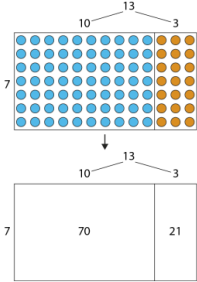
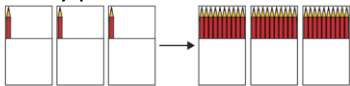
Odd and Even factors

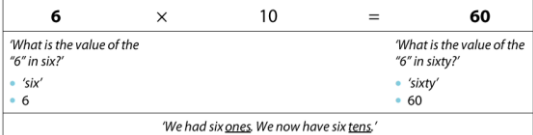
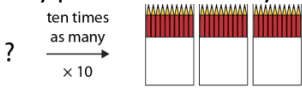
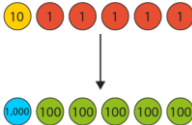
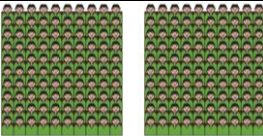

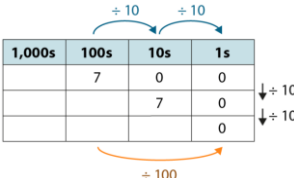
Odd factor x odd factor = odd product	Generalisation	 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">$3 \times 7 = 21$</td> <td style="text-align: center;">$7 \times 3 = 21$</td> </tr> <tr> <td style="text-align: center;">odd odd odd</td> <td style="text-align: center;">odd odd odd</td> </tr> </table>	$3 \times 7 = 21$	$7 \times 3 = 21$	odd odd odd	odd odd odd
$3 \times 7 = 21$	$7 \times 3 = 21$					
odd odd odd	odd odd odd					
Even factor x odd factor = even product	Generalisation	 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">$2 \times 7 = 14$</td> <td style="text-align: center;">$7 \times 2 = 14$</td> </tr> <tr> <td style="text-align: center;">even odd even</td> <td style="text-align: center;">odd even even</td> </tr> </table>	$2 \times 7 = 14$	$7 \times 2 = 14$	even odd even	odd even even
$2 \times 7 = 14$	$7 \times 2 = 14$					
even odd even	odd even even					
Odd factor x even factor = even product.	Generalisation					
Even factor x even factor = even product.	Generalisation					

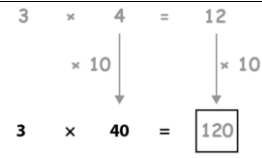
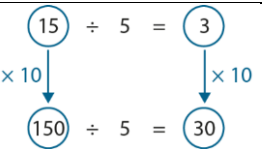
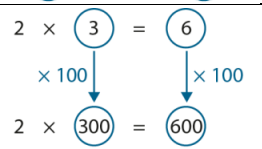
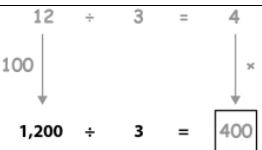
Square Numbers

<p>We can write this as ___ times ___ is equal to ___.</p> <p>Both factors are the same, so we can also write this as ___ squared is equal to ___</p>	Structure	<p>There are seven netball teams, each with seven players.</p>  <p>We can write this as 7 times 7 is equal to 49. $7 \times 7 = 49$</p> <p>Both factors are the same, so we can also write this as 7 squared is equal to 49 $7^2 = 49$</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">7^2</td> <td style="text-align: center;">=</td> <td style="text-align: center;">4</td> <td style="text-align: center;">9</td> </tr> </table>	7^2	=	4	9
7^2	=	4	9			
<p>When both factors have the same value, the product is called a square number.</p> <p>Square numbers can be represented by square shaped arrays.</p>	Generalisation					

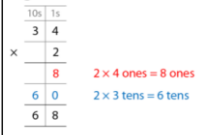


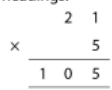
Division with remainders.																
<p>___ is divided into groups of __ . There are __ groups with a remainder of ___</p>	<p>Structure</p>	 <p>14 is divided into groups of 5. There are 2 groups of 5 with a remainder of 4. $14 = 5 + 5 + 4$ $14 = 2 \times 5 + 4$</p> <p>The '14' represents the total number of counters The '2 x 5' represents 2 groups of 5 The '4' represents the remaining counters.</p>														
<p>___ divided into equal groups of __ is equal to __, with a remainder of ___.</p>	<p>Structure</p>	<p>A baker has fourteen cakes. He sells cakes in boxes of four. How can he box the cakes?</p>  <p>Fourteen divided into equal groups of four is equal to three, with a remainder of two.</p> <p>So, the baker can make three boxes of cakes with two left over.</p>														
<p>Dividend ÷ divisor = quotient r remainder</p>	<p>Generalisation</p>	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>14</td> <td>÷</td> <td>4</td> <td>=</td> <td>3</td> <td>r</td> <td>2</td> </tr> <tr> <td>dividend</td> <td>÷</td> <td>divisor</td> <td>=</td> <td>quotient</td> <td>r</td> <td>remainder</td> </tr> </table>	14	÷	4	=	3	r	2	dividend	÷	divisor	=	quotient	r	remainder
14	÷	4	=	3	r	2										
dividend	÷	divisor	=	quotient	r	remainder										
<p>_____ divided between _____ is equal to ___ each with a remainder of _____.</p>	<p>Language / structure.</p>	<p>Partitive division</p>  <p>Nineteen divided between three is equal to six each with a remainder of one.</p>														
<p>The largest multiple of ___ that is less than or equal to ___ is _____.</p>	<p>Language / structure.</p>	<p>$0 \times 5 = 0$ $1 \times 5 = 5$ $2 \times 5 = 10$ $3 \times 5 = 15$ $4 \times 5 = 20$</p> <p>The largest multiple of five that is less than or equal to nineteen is fifteen.</p>														
<p>The remainder is always less than the divisor.</p>	<p>Generalisation</p>															
<p>___ is a multiple of __, so when it is divided into groups of __ there are none left over: there is no remainder.</p>	<p>Structure</p>	 <p>12 is a multiple of 4, so when it is divided into groups of 4 there are none left over: there is no remainder.</p>														
<p>___ is not multiple of __, so when it is divided into groups of __ there are some left over: there is a remainder.</p>	<p>Structure</p>	 <p>17 is not multiple of 5, so when it is divided into groups of 5 there are some left over: there is a remainder.</p>														

<p>If the dividend is a multiple of the divisor there is no remainder. If the dividend is not a multiple of the divisor. There is a remainder.</p>	<p>Language / Generalisation</p>									
<p>Connecting multiplication and division.</p>										
<p>The product in the multiplication equation has the same value as the dividend in the matching division equation.</p>	<p>Structure / language/ generalisation.</p>	<p>$a \times b = c$ $c \div a = b$</p>								
<p>The factors in the multiplication equation have the same values as the divisor and the quotient in the matching division equation.</p>	<p>Structure / language/ generalisation.</p>	<p>$a \times b = c$ $c \div a = b$</p>								
<p>Distributive law</p>										
<p>___ is equal to ___ plus ___ so ___ times ___ is equal to ___ times ___ plus ___ times ___</p>	<p>Structure</p>	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <table border="1" style="font-size: small;"> <tr> <td style="padding: 5px;">$5 = 4 + 1$</td> <td style="padding: 5px;">$4 = 5 - 1$</td> </tr> <tr> <td style="padding: 5px;">$5 \times 8 = 4 \times 8 + 1 \times 8$</td> <td style="padding: 5px;">$4 \times 8 = 5 \times 8 - 1 \times 8$</td> </tr> <tr> <td style="padding: 5px;">$= 32 + 8$</td> <td style="padding: 5px;">$= 40 - 8$</td> </tr> <tr> <td style="padding: 5px;">$= 40$</td> <td style="padding: 5px;">$= 32$</td> </tr> </table> <p style="font-size: x-small; margin-top: 5px;"><i>'Five is equal to four plus one, so five times eight is equal to four times eight plus one times eight.'</i></p> <p style="font-size: x-small; margin-top: 5px;"><i>'Four is equal to five minus one, so four times eight is equal to five times eight minus one times eight.'</i></p> </div> </div>	$5 = 4 + 1$	$4 = 5 - 1$	$5 \times 8 = 4 \times 8 + 1 \times 8$	$4 \times 8 = 5 \times 8 - 1 \times 8$	$= 32 + 8$	$= 40 - 8$	$= 40$	$= 32$
$5 = 4 + 1$	$4 = 5 - 1$									
$5 \times 8 = 4 \times 8 + 1 \times 8$	$4 \times 8 = 5 \times 8 - 1 \times 8$									
$= 32 + 8$	$= 40 - 8$									
$= 40$	$= 32$									
<p>Partition ___ x ___ into ___ x ___ and ___ x ___</p>		<p>Derive multiplication facts beyond known times tables.</p> <div style="text-align: center;">  </div> <p>Partition 7×13 into 7×10 and 7×3</p> $7 \times 13 = 7 \times 10 + 7 \times 3$ $= 70 + 21$ $= 91$								
<p>___ x ___ = ___ x ___ add ___ x ___ OR ___ x ___ = ___ x ___ subtract ___ x ___</p>	<p>Structure</p>	<p>Working flexibly</p> <table border="1" style="width: 100%; text-align: center; font-size: small;"> <tr> <td colspan="2">$6 \times 18 = ?$</td> </tr> <tr> <td style="padding: 5px;">$6 \times 18 = 6 \times 10 + 6 \times 8$</td> <td style="padding: 5px;">$6 \times 18 = 6 \times 20 - 6 \times 2$</td> </tr> <tr> <td style="padding: 5px;">$= 60 + 48$</td> <td style="padding: 5px;">$= 120 - 12$</td> </tr> <tr> <td style="padding: 5px;">$= 108$</td> <td style="padding: 5px;">$= 108$</td> </tr> </table> <p>6×18 can be partitioned into 6×10 add 6×8 Or 6×20 subtract 6×2.</p>	$6 \times 18 = ?$		$6 \times 18 = 6 \times 10 + 6 \times 8$	$6 \times 18 = 6 \times 20 - 6 \times 2$	$= 60 + 48$	$= 120 - 12$	$= 108$	$= 108$
$6 \times 18 = ?$										
$6 \times 18 = 6 \times 10 + 6 \times 8$	$6 \times 18 = 6 \times 20 - 6 \times 2$									
$= 60 + 48$	$= 120 - 12$									
$= 108$	$= 108$									
<p>Multiplying and dividing by 10, 100 or 1,000</p>										
<p>For every one pencil of Emily's Jamie has ten. ___ multiplied by ten is equal to ___ ___ is ten times the size of ___</p>		<p>Emily has three pencils; Jamie has ten times as many. How many pencils does Jamie have?</p> <div style="text-align: center;">  </div> <p>For every one pencil of Emily's Jamie has ten. Think of 3 and make it ten times the size. Think of 3 and multiply by ten. 3 multiplied by ten is equal to 30 30 is ten times the size of 3 30 pencils is ten times as many as 3 pencils. Jamie has 30 pencils.</p>								

<p>To find ten times as many , multiply by ten.</p> <p>All multiples of ten have a ones digit of zero.</p>	<p>Generalisation</p>	
<p>We had ___ ones. We now have ___ tens.</p>	<p>Structure / language</p>	
<p>To multiply a whole number by ten, place a zero after the final digit of that number.</p>	<p>Generalisation</p>	<p>It is important to use the phrase ‘place a zero’ rather than ‘add a zero.’ The placed zero is a place value holder.</p>
<p>___ is ten times as many as ___ Emily has ___ pencils</p>	<p>Structure.</p>	<p>Jamie has 30 pencils; he has ten times as many as Emily. How many pencils does Emily have?</p>  <p>30 is ten times as many as 3 Emily has 3 pencils</p>
<p>To find the inverse of ten times as many, divide by ten.</p> <p>To divide a multiple of ten by ten, remove the zero from the ones place.</p>	<p>Generalisation</p>	
<p>___ multiplied by one hundred is equal to ___</p> <p>___ is one hundred times the size of ___</p>		<p>I have 15, This is one ten and five ones. How much is one hundred times this amount?</p>  <p>15 multiplied by one hundred is equal to 1500 1500 is one hundred times the size of 15</p>
<p>All multiples of 100 have both a tens and ones digit of zero.</p>	<p>Generalisation</p>	
<p>To multiply a whole number by a hundred, place two zeros after the final digit of that number.</p>	<p>Generalisation</p>	<p>It is important to use the phrase ‘place a zero’ rather than ‘add a zero.’ The placed zero is a place value holder.</p>
<p>___ divided by one hundred is equal to ___</p>	<p>Structure</p>	 <p>200 divided by one hundred is equal to 2 $200 \div 100 = 2$</p>
<p>Multiplying by one hundred is equivalent to multiplying by ten, and then multiply by ten again.</p>	<p>Generalisation</p>	
<p>Dividing by one hundred is equivalent to dividing by ten, and then divide by ten again.</p>	<p>Generalisation</p>	

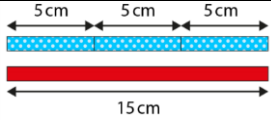
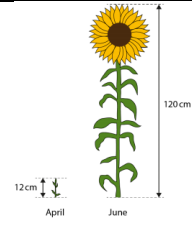
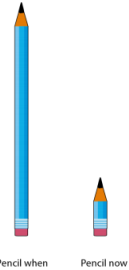
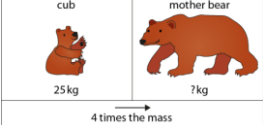
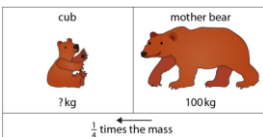
<p>If one factor is made ten times the size, the product will be ten times the size.</p>	<p>Generalisation</p>	
<p>If the dividend is made ten times the size, the quotient will be ten times the size.</p>	<p>Generalisation</p>	
<p>If one factor is made one hundred times the size, the product will be one hundred times the size.</p>	<p>Generalisation</p>	
<p>If the dividend is made one hundred times the size, the quotient will be one hundred times the size.</p>	<p>Generalisation</p>	
<p>To multiply multiples of ten, one hundred or one thousand, remove the zeros, find the product of the single digits numbers then replace the zeros.</p>	<p>Generalisation</p>	

Short multiplication

<p>Partition ___ into ___ and ___ Multiply the ones ___ x ___ Multiple the tens ___ x ___</p>	<p>Structure</p>	<div style="border: 1px solid black; padding: 5px;"> <p>Informal written method: $34 \times 2 = 30 \times 2 + 4 \times 2$ $= 60 + 8$ $= 68$</p> <p>Expanded multiplication algorithm:  </p> </div> <p>Partition 34 into 30 and 4 Multiply the ones ___ x ___ Multiple the tens ___ x ___</p>
<p>___ hundreds x ___ = ___ hundreds ___ tens x ___ = ___ tens ___ ones x ___ = ___ ones</p>	<p>Language / structure.</p>	 <p>5 hundreds $\times 3 = 15$ hundreds 2 tens $\times 3 = 6$ tens 1 one $\times 3 = 3$ ones</p> <p>$521 \times 3 = 500 \times 3 + 20 \times 3 + 1 \times 3$ $= 1500 + 60 + 3$</p>
<p>Partition ___ into ___ and ___ ___ x ___ ones = ___ ones Write the ___ in the ones column (and ___ in the tens column) ___ x ___ tens = ___ tens Write the ___ in the tens column (and ___ in the hundreds column)</p>	<p>Structure</p>	<p>Example 1 – compact layout <i>with</i> place-value headings:</p>  <ul style="list-style-type: none"> • 4×2 ones = 8 ones 'Write "8" in the ones column.' • 4×3 tens = 12 tens = 1 hundred + 2 tens 'Write "1" in the hundreds column and "2" in the tens column.' <p>Example 2 – compact layout <i>without</i> place-value headings:</p>  <ul style="list-style-type: none"> • 5×1 one = 5 ones 'Write "5" in the ones column.' • 5×2 tens = 10 tens; 10 tens = 1 hundred and 0 tens 'Write "1" in the hundreds column and "0" in the tens column.'

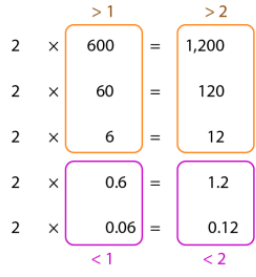
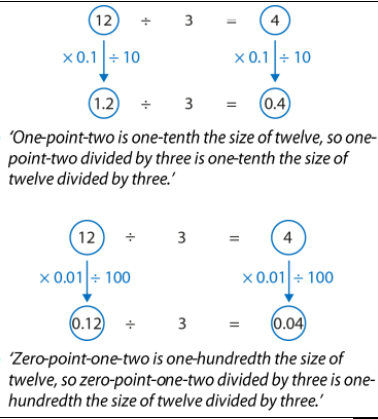
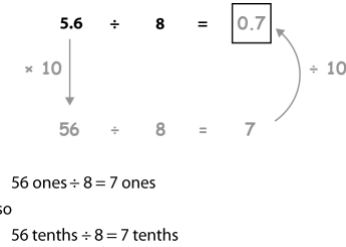
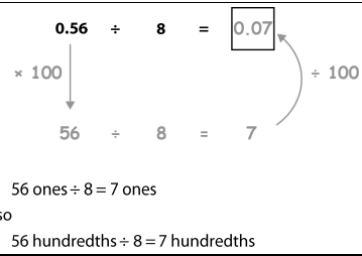
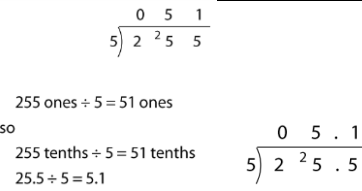
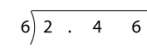
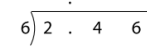

<p>___ x ___ ones = ___ ones + ___ tens</p> <p>___ x ___ tens = ___ tens + ___ hundreds.</p>	<p>Structure</p>	<p>Multiplication algorithm – expanded layout</p> <table border="1" style="margin-left: 20px;"> <tr><td>100s</td><td>10s</td><td>1s</td></tr> <tr><td></td><td>3</td><td>8</td></tr> <tr><td>x</td><td></td><td>4</td></tr> <tr><td></td><td>3</td><td>2</td></tr> <tr><td></td><td>1</td><td>2</td><td>0</td></tr> <tr><td></td><td>1</td><td>5</td><td>2</td></tr> </table> <p>• 4 x 8 ones = 32 ones = 3 tens + 2 ones • 4 x 3 tens = 12 tens = 1 hundred + 2 tens • 1 hundred + 2 tens + 3 tens + 2 ones = 1 hundred + 5 tens + 2 ones</p> <p>Multiplication algorithm – compact layout:</p> <table border="1" style="margin-left: 20px;"> <tr><td></td><td>3</td><td>8</td></tr> <tr><td>x</td><td></td><td>4</td></tr> <tr><td></td><td>1</td><td>5</td><td>2</td></tr> <tr><td></td><td></td><td>3</td><td></td></tr> </table>	100s	10s	1s		3	8	x		4		3	2		1	2	0		1	5	2		3	8	x		4		1	5	2			3																	
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<p>If there are ten or more ones, we must regroup the ones into tens and ones.</p> <p>If there are ten or more tens, we must regroup the tens into hundreds and tens.</p>	<p>Generalisation</p>																																																			
<p>___ s are ___ (writing down ___ below the tens column and ___ in the ones column.)</p> <p>___ s are ___, plus ___ is ___ (write down ___ below the hundred column and + ___ in the tens column)</p> <p>___ s are ___; plus ___ is ___ (writing down ___ in the thousands column and ___ in the hundreds column)</p>	<p>Language and structure.</p>	<table border="1" style="margin-left: 20px;"> <tr><td></td><td>3</td><td>6</td><td>7</td></tr> <tr><td>x</td><td></td><td></td><td>4</td></tr> <tr><td></td><td>1</td><td>4</td><td>6</td><td>8</td></tr> <tr><td></td><td></td><td>2</td><td>2</td><td></td></tr> </table> <p>Four sevens are twenty-eight (writing down 2 below the tens column and 8 in the ones column.) Four sixes are twenty four, plus two is twenty six (write down 2 below the hundred column and 6 in the tens column) Four threes are twelve; plus two is fourteen (writing down 1 in the thousands column and 4 in the hundreds column)</p>		3	6	7	x			4		1	4	6	8			2	2																																	
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<p>___ ones x ___ = ___ ones</p> <p>SO</p> <p>___ hundredths x ___ = ___</p>		<table border="1" style="margin-left: 20px;"> <tr><td></td><td>4</td><td>5</td><td>6</td></tr> <tr><td>x</td><td></td><td></td><td>4</td></tr> <tr><td></td><td>1</td><td>8</td><td>2</td><td>4</td></tr> <tr><td></td><td></td><td>2</td><td>2</td><td></td></tr> </table> <p>456 ones x 4 = 1,824 ones</p> <p>so</p> <p>456 hundredths x 4 = 1,824 hundredths</p> <p>4.56 x 4 = 18.24</p> <table border="1" style="margin-left: 20px;"> <tr><td></td><td>4</td><td>.</td><td>5</td><td>6</td></tr> <tr><td>x</td><td></td><td></td><td></td><td>4</td></tr> <tr><td></td><td>1</td><td>8</td><td>.</td><td>2</td><td>4</td></tr> <tr><td></td><td></td><td></td><td>2</td><td>2</td><td></td></tr> </table>		4	5	6	x			4		1	8	2	4			2	2			4	.	5	6	x				4		1	8	.	2	4				2	2											
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<p>In short multiplication, if there is a decimal point in the number being multiplied put a decimal point in the product line, line it up with the decimal point in the number being multiplied.</p>	<p>Generalisation</p>	<p>Step 1 – lay out the calculation:</p> <table border="1" style="margin-left: 20px;"> <tr><td></td><td>2</td><td>.</td><td>4</td><td>6</td></tr> <tr><td>x</td><td></td><td></td><td></td><td>3</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p>Step 2 – write the decimal point for the product:</p> <table border="1" style="margin-left: 20px;"> <tr><td></td><td>2</td><td>.</td><td>4</td><td>6</td></tr> <tr><td>x</td><td></td><td></td><td></td><td>3</td></tr> <tr><td></td><td></td><td>.</td><td></td><td></td></tr> </table> <p>Step 3 – perform the calculation, with unitising:</p> <table border="1" style="margin-left: 20px;"> <tr><td></td><td>2</td><td>.</td><td>4</td><td>6</td></tr> <tr><td>x</td><td></td><td></td><td></td><td>3</td></tr> <tr><td></td><td>7</td><td>.</td><td>3</td><td>8</td></tr> <tr><td></td><td></td><td>1</td><td></td><td>1</td></tr> </table>		2	.	4	6	x				3							2	.	4	6	x				3			.				2	.	4	6	x				3		7	.	3	8			1		1
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Short Division		
<p>___ tens divided by ___ is equal to ___ tens each.</p> <p>___ ones divided by ___ is equal to ___ one each.</p> <p>___ tens and ___ ones make ___ each</p>	<p>Structure</p>	<p>$84 \div 4 = 21$</p> <p>8 tens \div 4 = 2 tens 4 ones \div 4 = 1 one</p> <hr/> <p>84 \div 4 = 21</p> <p>Eight tens divided by four is equal to two tens each. Four ones divided by four is equal to one one each. ___ tens and ___ ones make ___ each</p>
<p>If dividing the tens gives a remainder of one or more tens, we must exchange the remaining tens for ones.</p>	<p>Generalisation</p>	
<p>___ tens are one ten each. That's ___.</p> <p>___ tens are two tens each. That's ___.</p> <p>There are ___ tens left over.</p> <p>Exchange the remaining tens for ones.</p> <p>___ tens and ___ one is equal to ___ ones.</p> <p>___ ones divided between ___ is equal to ___ ones each.</p> <p>___ tens and ___ ones makes ___</p> <p>Each child gets ___ marbles.</p>	<p>Language / structure</p>	<p>$81 \div 3 =$</p> <p>Three tens are one ten each. That's thirty. Six tens are two tens each. That's sixty. There are two tens left over.</p> <p>Exchange the remaining tens for ones: Two tens and one one is equal to twenty one ones.</p> <p>Twenty one ones divided between three is equal to seven ones each.</p> <p>Add the partial quotients</p> <p>6 tens \div 3 = 2 tens 21 ones \div 3 = 7 ones</p> <hr/> <p>81 \div 3 = 27</p> <p>2 tens and 7 ones makes 27. Each child gets twenty-seven marbles.</p>
<p>___ tens and ___ ones divided between ___ is equal to ___ tens and ___ one.</p> <p>Each child gets _____</p>		<p>$21 \div 4$</p> <p>Eight tens and four ones divided between four is equal to two tens and one one. Each child gets twenty-ones sticks.</p>
<p>473 = ___ hundreds + ___ tens + ___ ones.</p> <p>___ hundreds \div ___ = ___ hundred(s) r ___ hundred (s).</p> <p>___ hundred(s) + ___ tens = ___ tens</p> <p>___ tens \div ___ = ___ tens r ___ tens</p> <p>___ tens + ___ ones = ___ ones</p> <p>___ ones \div ___ = ___ ones r ___ ones</p> <p>So</p> <p>___ \div ___ = ___ r ___</p>	<p>Language and structure.</p>	<p>$473 = 4$ hundreds + 7 tens + 3 ones. 4 hundreds $\div 3 = 1$ hundred r 1 hundred. 1 hundred + 7 tens = 17 tens 17 tens $\div 3 = 5$ tens r 2 tens 2 tens + 3 ones = 23 ones 23 ones $\div 3 = 7$ ones r 2 ones</p> <p>So $473 \div 3 = 157r2$</p>

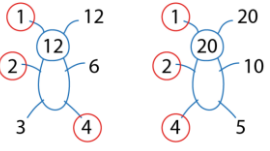
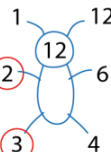
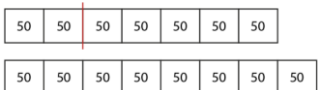

<p>If dividing the hundreds gives a remainder of one or more hundred, we must exchange the remaining hundreds for tens.</p>	<p>Generalisation</p>	
<p>Scaling</p>		
<p>The ____ is ____ times the length of the ____.</p>	<p>Structure / language</p>	 <p>The plain ribbon is three times the length of the spotty ribbon. $5\text{cm} \times 3 = 15\text{cm}$</p> <p>The 5cm represents the length of one spotty ribbon The 3 represents the number of spotty ribbons that are equal to the length of the plain ribbon. The 15cm represents the length of three spotty ribbons. It also represents the length of the plain ribbon.</p>
<p>If two objects are the same length, one object is one times the length of the other.</p>	<p>Generalisation</p>	
<p>____ multiplied by ____ is equal to ____ ____ is ____ times the size of ____</p>		 <p>12 multiplied by 10 is equal to 120 120 is 10 times the size of 12</p>
<p>____ divided by ____ is equal to ____ ____ is ____ times the size of ____</p>		<p><i>'A pencil was twenty centimetres long when it was new. It is now one-quarter times its original size. How long is the pencil now?'</i></p> <p>$20\text{cm} \times \frac{1}{4} = 5\text{cm}$ $20\text{cm} \div 4 = 5\text{cm}$</p> <ul style="list-style-type: none"> The pencil is now five centimetres long.' <p>5cm is $\frac{1}{4}$ times the size of 20cm</p> 
<p>The ____ is ____ times the mass of ____</p>		 <p>The mass of the mother bear is four times the mass of her cub. $25\text{kg} \times 4 = 100\text{kg}$ The mass of the mother bear is one hundred kilograms.</p>  <p>The mass of the cub is one quarter times the mass of his mother. $100\text{kg} \times \frac{1}{4} = 25\text{kg}$ $100 \div 4 = 25\text{kg}$ The mass of the bear cub is twenty-five kilograms.</p>

Equivalence		
<p>If I double one factor, I must halve the other factor for the product to stay the same.</p>	<p>Generalisation</p>	<p> $6 \times 2 = 12$ $3 \times 4 = 12$ </p>
<p>If I multiply ___ by two, I must divide ___ by two for the product to stay the same.</p>	<p>Structure</p>	<p> $6 \times 2 = 12$ $3 \times 4 = 12$ </p> <p>If I multiply 2 by two, I must divide 6 by two for the product to stay the same.</p>
<p>If I multiply one factor by two , I must divide the other factor by two for the product to stay the same.</p>	<p>Generalisation</p>	
<p>If I multiply one factor by ___ , I must divide the other factor by ___ for the product to stay the same.</p>	<p>Generalisation</p>	
<p>If I multiply the dividend by ____, I must multiply the divisor by ____ for the quotient to stay the same.</p>	<p>Language / structure.</p>	<p>Dividend ÷ divisor = quotient.</p> <p> $8 \div 4 = 2$ $80 \div 40 = 2$ $800 \div 400 = 2$ </p>
<p>If I divide the dividend by ____, I must divide the divisor by ____ for the quotient to stay the same.</p>	<p>Language / structure.</p>	<p> $3 \div 1 = 3$ $15 \div 5 = 3$ </p> <p><i>'If I divide the dividend by five, I must divide the divisor by five for the quotient to stay the same.'</i></p>
Calculation x and ÷ decimal fractions by whole numbers.		
<p>___ times ___ ones is equal to ___ ones, so ___ times ___ tenths is equal to ___ tenths.</p>	<p>Structure</p>	<p> $3 \times 4 = 12$ $3 \times 4 \text{ ones} = 12 \text{ ones}$ </p> <p> $3 \times 0.4 = 1.2$ $3 \times 4 \text{ tenths} = 12 \text{ tenths}$ </p> <p>3 times 4 ones is equal to 12 ones, so 3 times 4 tenths is equal to 12 tenths.</p>
<p>___ times ___ ones is equal to ___ ones, so ___ times ___ hundredths is equal to ___ hundredths.</p>	<p>Structure</p>	<p> $3 \times 0.04 = 0.12$ </p> <p> $3 \times 4 \text{ hundredths} = 12 \text{ hundredths}$ </p> <p>3 times 4 ones is equal to 12 ones, so 3 times 4 hundredths is equal to 12 hundredths.</p>
<p>One tenths of ___ metre(s) is ___ metre(s)</p>	<p>Structure</p>	<p><i>'William has a twelve-metre length of string. Mary's string is one-tenth times the length of William's string. How long is Mary's string?'</i></p> <p> William's string: 12m Mary's string: $12 \text{ m} \times 0.1 = 1.2 \text{ m}$ </p> <ul style="list-style-type: none"> 'One-tenth of twelve metres is one-point-two metres.' 'One-tenth of twelve metres is twelve-tenths of a metre.' <p>One tenths of 12 metre(s) is 1.2metre(s)</p>

<p>When a number is divided by ten, the digits move one place to the right.</p> <p>When a number is multiplied by 0.1 or 1/10, the digits move one place to the right. (Because $\times 0.1$ is equal to $\div 10$)</p>	<p>Generalisation</p>											
<p>When a number is divided by 100, the digits move two places to the right.</p> <p>When a number is multiplied by 0.01 or 1/100, the digits move one place to the right. (Because $\times 0.01$ is equal to $\div 100$)</p>	<p>Generalisation</p>											
<p>___ is one-tenth of the size of ___, so ___ times ___ is one-tenth the size of ___ times ___.</p>	<p>Structure</p>											
<p>___ is one-hundredth the size of ___, so ___ times ___ is one-hundredth the size of ___ times ___.</p>	<p>Structure</p>											
<p>If one factor is made one-tenth times the size, the product will be one-tenth times the size.</p> <p>If one factor is made one-hundredth times the size, the product will be one-hundredth times the size.</p>	<p>Generalisation</p>											
<p>I move the digits of the number being multiplied ___ places to the left until I get a whole number; then I multiply; then I move the digits of the product ___ places to the right.</p>	<p>Structure</p>											
<p>When a number is multiplied by one thousand, the digits move three places to the left.</p> <p>When a number is divided by one thousand, the digits move three places to the right.</p>	<p>Generalisation</p>											
<p>Dividing by one thousand is equivalent to multiplying by one thousandth.</p>	<p>Generalisation</p>	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">6,000</td> <td style="text-align: center;">\div</td> <td style="text-align: center;">1,000</td> <td style="text-align: center;">=</td> <td style="text-align: center;">6</td> </tr> <tr> <td style="text-align: center;">6,000</td> <td style="text-align: center;">\times</td> <td style="text-align: center;">0.001</td> <td style="text-align: center;">=</td> <td style="text-align: center;">6</td> </tr> </table> <ul style="list-style-type: none"> • 'What is the value of the "6" in six thousand?' <ul style="list-style-type: none"> • 'six thousand' 6,000 • 'What is the value of the "6" in six?' <ul style="list-style-type: none"> • 'six' 6 <p style="text-align: center; font-size: small;">'We had six thousands. We now have six ones.'</p>	6,000	\div	1,000	=	6	6,000	\times	0.001	=	6
6,000	\div	1,000	=	6								
6,000	\times	0.001	=	6								

<p>When a number is multiplied by a value greater than one, the product is greater than the original number.</p> <p>When a number is multiplied by a value less than one, the product is less than the original number.</p>	<p>Generalisation</p>	
<p>___ is one-tenth the size of ___ so ___ divided by ___ is one tenth the size of ___ divided by ___</p> <p>___ is one-hundredth the size of ___ so ___ divided by ___ is one hundredth the size of ___ divided by ___</p>	<p>Structure</p>	 <p>• 'One-point-two is one-tenth the size of twelve, so one-point-two divided by three is one-tenth the size of twelve divided by three.'</p> <p>• 'Zero-point-one-two is one-hundredth the size of twelve, so zero-point-one-two divided by three is one-hundredth the size of twelve divided by three.'</p>
<p>If the dividend is made one-tenth times the size, the quotient will be one-tenth times the size.</p>	<p>Generalisation</p>	 <p>56 ones ÷ 8 = 7 ones so 56 tenths ÷ 8 = 7 tenths</p>
<p>If the dividend is made one-hundredth times the size, the quotient will be one-hundredth times the size.</p>	<p>Generalisation</p>	 <p>56 ones ÷ 8 = 7 ones so 56 hundredths ÷ 8 = 7 hundredths</p>
<p>I move the digits of the dividend ___ places to the left until I get a whole number; then I divide; then I move the digits of the quotient ___ places to the right.</p>	<p>Generalisation</p>	
<p>___ ones ÷ ___ = ___ ones</p> <p>So</p> <p>___ tenths ÷ ___ = ___ tenths.</p>	<p>Structure</p>	 <p>255 ones ÷ 5 = 51 ones so 255 tenths ÷ 5 = 51 tenths 25.5 ÷ 5 = 5.1</p>
<p>If there is a decimal point in the dividend, put a decimal point in the quotient; line it up with the decimal point in the dividend.</p>	<p>Generalisation</p>	<p>Step 1 – write the divisor, dividend and frame:</p>  <p>Step 2 – write the decimal point for the quotient:</p>  <p>Step 3 – perform the calculation, with unitising:</p> 

Volume		
You can measure volume in cubic centimetres. You write this as cm^3	Generalisation	
This shape has a volume of ___ cm^3	Language	<p><i>'What is the volume of each shape?'</i></p> <p>• <i>'This shape has a volume of 4 cm^3.'</i></p>
This layer has ___ rows of cubes There are ___ 1cm^3 cubes in this layer. This layer has a volume of ___ cm^3 . The volume of the cuboid is ___ cm^3 .	Structure	<p><i>'What is the volume of this cuboid?'</i></p> <p>Step 1 – working out the volume of one layer:</p> <p>• <i>'This layer has three rows of three cubes.'</i> $3 \times 3 = 9$ • <i>'So there are nine 1 cm^3 cubes in this layer.'</i> • <i>'This layer has a volume of 9 cm^3.'</i></p> <p>Step 2 – adding the layers together:</p> <ul style="list-style-type: none"> • <i>'There are two layers of 9 cm^3.'</i> $9 \times 2 = 18$ • <i>'The volume of the cuboid is 18 cm^3.'</i>
The volume of a cuboid can be found by multiplying the length by the width by the height.	Generalisation	<p>Finding the volume of a cuboid:</p>
Length X width X height ___ cm X ___ cm X ___ cm = ___ cm^3	Structure	<p>Length X width X height. $4\text{cm} \times 3\text{cm} \times 6\text{cm} = 42\text{cm}^3$</p>
The ___ refers to the ___	Structure	<p><i>'If we stack up two trays, how many teacups will there be in total?'</i></p> <p>• <i>'One tray has three columns and four rows. There are two trays. We can write this as $3 \times 4 \times 2$.'</i> • <i>'The "3" refers to the number of columns.'</i> • <i>'The "4" refers to the number of rows.'</i> • <i>'The "2" refers to the number of trays.'</i></p> <p>$3 \times 4 \times 2 = 12 \times 2 = 24$</p>
If you change the order of the factors, the product remains the same.	Generalisation	
Factors, multiples, prime numbers and composite numbers.		
There are ___ tiles. There are ___ rows and ___ columns, So ___ and ___ are factors of ___.	Language / structure.	<p>There are 12 tiles. There are 4 rows and 3 columns, So 4 and 3 are factors of 12</p>
1 is a factor of all positive integers. Every positive integer is a factor of itself. The smallest factor of a positive integer is always 1. The largest factor of a positive integer is always itself.	Generalisation	

<p>___ is a factor of ___ because ___ is in the ___ times table.</p>	<p>Structure / language</p>	<p>“7” is a factor of “42” because “42” is in the “7” times table. ‘$42 \div 7 = 6$ so I can make a rectangular array that is 6×7.’ “6” and “7” are factors of “42”.</p>
<p>Numbers that have more than two factors are composite numbers.</p>	<p>Generalisation</p>	
<p>Numbers that have exactly two factors are prime numbers.</p>	<p>Generalisation</p>	
<p>The common factors of ___ and ___ are _____</p>	<p>Language / structure</p>	<p>Common factors</p>  <p>The common factors of “12” and “20” are “1”, “2” and “4”.</p>
<p>___ and ___ are prime factors of _____</p>		<p>Prime Factors</p>  <p>2 and 3 are prime factors of 12.</p>
<p>Combining calculations</p>		
<p>When there are no brackets, multiplication is completed before addition and subtraction.</p>	<p>Generalisation</p>	<p>• ‘Fill in the missing symbol (<, > or =).’</p> <p>$50 \times 2 + 50 \times 5$ ○ 50×8</p> 
<p>When there are no brackets, division is completed before addition and subtraction.</p>	<p>Generalisation</p>	
<p>$a \times c - c \times c = (a - b) \times c$</p>	<p>Structure / generalisation</p>	<p>‘There are six boxes of jumpers in the school office with ten jumpers in each box. Two of the boxes are sold. How many jumpers are left?’</p>  <p>$10 \times 6 - 10 \times 2 =$ $10 \times (6 - 2) =$ $10 \times 4 = 40$</p>
<p>When two dividends are divided by the same divisor, we can <u>add</u> the dividends first then divide.</p>	<p>Generalisation</p>	<p>$16 \div 4 + 12 \div 4$ $= (16 + 12) \div 4$ $= 28 \div 4$ $= 7$</p> <p>• ‘Each child gets seven sweets.’</p>
<p>When two dividends are divided by the same divisor, we can <u>subtract</u> the dividends first then divide.</p>	<p>Generalisation</p>	<p>$15 \div 3 - 9 \div 3$ $= (15 - 9) \div 3$ $= 6 \div 3$ $= 2$</p> <p>• ‘Kish has two more boxes than Jess.’</p>
<p>Long multiplication</p>		
<p>To multiply by a multiple of 10, use short multiplication by a single digit number then multiply by 10.</p>	<p>Generalisation</p>	<p>Ezra’s method:</p> $\begin{array}{r} 472 \times 30 \\ \times \quad 3 \\ \hline 1416 \\ 2 \\ \hline 1,416 \times 10 = 14,160 \end{array}$ <p>Ling’s method:</p> $\begin{array}{r} 472 \times 30 \\ \times \quad 30 \\ \hline 14160 \\ 2 \\ \hline 14160 \end{array}$

<p>To multiply two two digit numbers, first multiply by the ones, then multiply by the tens, and then add them together.</p>	<p>Generalisation</p>	<p>42 x 28 Short multiplication and combining partial products:</p> $\begin{array}{r} 42 \\ \times 28 \\ \hline 336 \\ 840 \\ \hline 1176 \end{array}$ <p>• <i>'There are 1,176 seats in this section of the stadium.'</i></p>																						
<p>Multiply by the units. Add the place value holder to show it is ten times the size. Multiply by the tens. Add the partial products.</p>	<p>Generalisation</p>	$\begin{array}{r} 312 \\ \times 28 \\ \hline 2496 \\ 6240 \\ \hline 8736 \end{array}$																						
<p>When multiplying, you can write a composite number as factor x factor and use the associative law to make the calculation more efficient.</p>	<p>Generalisation</p>	$\begin{array}{l} 23 \times 14 = 23 \times 2 \times 7 \\ = 46 \times 7 \\ = 322 \end{array} \quad \text{To} \quad \begin{array}{l} 23 \times 14 = 23 \times 7 \times 2 \\ = 161 \times 2 \\ = 322 \end{array}$																						
<p>Division – 2 digit divisors</p>																								
<p>If I divide the dividend by ten, I must divide the divisor by ten for the quotient to stay the same.</p>	<p>Generalisation</p>	<p>Scaling the dividend and divisor</p> $\begin{array}{c} 150 \div 30 = 5 \\ \downarrow 10 \quad \downarrow 10 \div \\ 15 \div 3 = 5 \end{array}$																						
<p>There are roughly ____ '____' in ____.</p>	<p>Structure</p>	<p>Two-digit ÷ two-digit calculation, with remainder: $295 \div 32 = ?$</p> <ul style="list-style-type: none"> Estimate: 32 is close to 30. 'Roughly how many 'thirties' are there in two hundred and ninety-five?' $9 \times 3 \text{ tens} = 27 \text{ tens}$ $9 \times 30 = 270$ 'There are roughly nine 'thirties' in two hundred and ninety-five.' <p>So, try subtracting 9×32 from 295</p> $\begin{array}{r} 9 \text{ r } 7 \\ 32 \overline{) 295} \\ \underline{288} \quad (9 \times 32) \\ 007 \end{array}$ <p>so $295 \div 32 = 9 \text{ r } 7$</p>																						
<p>Partition ____ into ____ and ____</p>	<p>Structure</p>	<p>Partitioning Ratio chart and partitioning: 'Becky has 434 cm of ribbon to wrap up prizes for a school competition. Each prize needs 31 cm of ribbon. How many prizes can she wrap?' $434 \div 31 = ?$</p> <table border="1" style="display: inline-table; margin-right: 20px;"> <tr><td></td><td>x31</td></tr> <tr><td>1</td><td>31</td></tr> <tr><td>2</td><td>62</td></tr> <tr><td>3</td><td></td></tr> <tr><td>4</td><td>124</td></tr> <tr><td>5</td><td>155</td></tr> <tr><td>6</td><td></td></tr> <tr><td>7</td><td></td></tr> <tr><td>8</td><td>248</td></tr> <tr><td>9</td><td></td></tr> <tr><td>10</td><td>310</td></tr> </table> <ul style="list-style-type: none"> Partition the dividend to calculate $\begin{array}{c} 434 \\ \swarrow \quad \searrow \\ 310 \quad 124 \end{array}$ $\begin{array}{r} 310 \div 31 = 10 \\ 124 \div 31 = 4 \\ \hline 434 \div 31 = 14 \end{array}$ <p>• 'Becky can wrap fourteen presents.'</p>		x31	1	31	2	62	3		4	124	5	155	6		7		8	248	9		10	310
	x31																							
1	31																							
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10	310																							
<p>____ hundreds divided by ____ is equal to ____ hundreds with a remainder of ____</p> <p>Exchange the remainder: ____ hundreds is equal to ____ tens.</p>	<p>Structure</p>	<p>Short division method Ratio chart and short division: 'Becky has 434 cm of ribbon to wrap up prizes for a school competition. Each prize needs 31 cm of ribbon. How many prizes can she wrap?' $434 \div 31 = ?$</p>																						

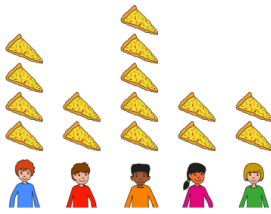
<p>___ tens divided by ___ is equal to ___ tens with a remainder of ___</p> <p>Exchange the remainder: ___ tens is equal to ___ ones.</p>		<table border="1"> <tr> <td>$\begin{array}{r} 0 \\ 31 \overline{) 434} \end{array}$</td> <td>4 hundreds \div 31 = 0 hundreds r 4 hundreds • 'Write "0" in the hundreds column...'</td> </tr> <tr> <td>$\begin{array}{r} 0 \\ 31 \overline{) 434} \end{array}$</td> <td>4 hundreds = 40 tens • '...and write "4" to the left of the tens digit of the dividend.'</td> </tr> <tr> <td>$\begin{array}{r} 0 \ 1 \\ 31 \overline{) 434} \end{array}$</td> <td>43 tens \div 31 = 1 ten r 12 tens • 'Write "1" in the tens column...'</td> </tr> <tr> <td>$\begin{array}{r} 0 \ 1 \\ 31 \overline{) 434} \end{array}$</td> <td>12 tens = 120 ones • '...and write "12" to the left of the ones digit of the dividend.'</td> </tr> <tr> <td>$\begin{array}{r} 0 \ 1 \ 4 \\ 31 \overline{) 434} \end{array}$</td> <td>124 ones \div 31 = 4 ones (refer to the ratio chart) • 'Write "4" in the ones column.'</td> </tr> </table>	$\begin{array}{r} 0 \\ 31 \overline{) 434} \end{array}$	4 hundreds \div 31 = 0 hundreds r 4 hundreds • 'Write "0" in the hundreds column...'	$\begin{array}{r} 0 \\ 31 \overline{) 434} \end{array}$	4 hundreds = 40 tens • '...and write "4" to the left of the tens digit of the dividend.'	$\begin{array}{r} 0 \ 1 \\ 31 \overline{) 434} \end{array}$	43 tens \div 31 = 1 ten r 12 tens • 'Write "1" in the tens column...'	$\begin{array}{r} 0 \ 1 \\ 31 \overline{) 434} \end{array}$	12 tens = 120 ones • '...and write "12" to the left of the ones digit of the dividend.'	$\begin{array}{r} 0 \ 1 \ 4 \\ 31 \overline{) 434} \end{array}$	124 ones \div 31 = 4 ones (refer to the ratio chart) • 'Write "4" in the ones column.'
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	Structure	<p>Long division</p> $\begin{array}{r} 0 \ 1 \ 4 \\ 31 \overline{) 434} \\ \underline{31} \\ 124 \\ \underline{124} \\ 0 \end{array}$ <p>(1 ten \times 31 = 31 tens) (4 ones \times 31 = 124 ones)</p>
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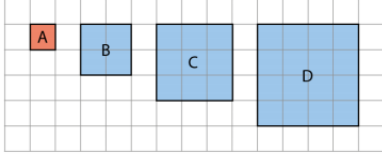
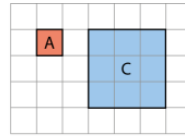
Compensation to calculate.

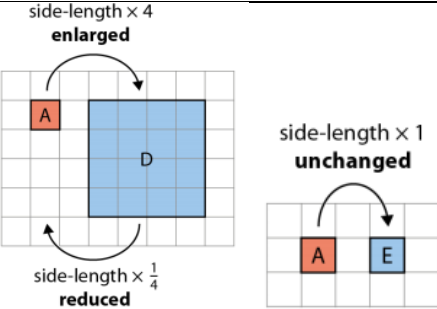
<p>If I double one factor, I must double the product.</p>	Generalisation	$\begin{array}{c} 20 \times 3 = 60 \\ \downarrow \text{double} \quad \downarrow \text{double} \\ 40 \times 3 = 120 \end{array}$
<p>If I multiply one factor by ___, I must multiply the product by ___.</p>	Structure/ language	$\begin{array}{c} 20 \times 3 = 60 \\ \downarrow \times 3 \\ 60 \times 3 = 180 \end{array}$ <p>If I multiply one factor by 3, I must multiply the product by 3.</p>
<p>If I divide one factor by ___, I must divide the product by ___.</p>	Structure/ language	$\begin{array}{c} 10 \times 1 = 10 \\ \downarrow \div 5 \\ 2 \times 1 = 2 \end{array}$ <p>If I divide one factor by 5, I must divide the product by 5.</p>
<p>If I multiply the dividend by ___ and keep the divisor the same, I must multiply the quotient by ___.</p>	Structure/ language	$\begin{array}{c} 6 \div 3 = 2 \\ \downarrow \times 4 \\ 24 \div 3 = 8 \end{array}$ <p>If I multiply the dividend by 4 and keep the divisor the same, I must multiply the quotient by 4.</p>
<p>If I double the divisor and keep the dividend the same, I must halve the quotient.</p>	Generalisation	$\begin{array}{c} 24 \div 4 = 6 \\ \downarrow \text{double} \quad \downarrow \text{half} \\ 24 \div 8 = 3 \end{array}$
<p>If I <u>multiply</u> the divisor by ___ and keep the dividend the same, I must <u>divide</u> the quotient by ___.</p>	Structure.	<p>'A rope is 80 m long. It is cut to one-half the size. Another rope is 80 m long. It is cut to one-eighth the size.'</p> $\begin{array}{c} 80 \div 2 = 40 \\ \downarrow \times 4 \quad \downarrow \div 4 \\ 80 \div 8 = 10 \end{array}$ <p>• 'If I multiply the divisor by four and keep the dividend the same, I must divide the quotient by four.'</p>
<p>If I <u>divide</u> the divisor by ___ and keep the dividend the same, I must <u>multiply</u> the quotient by ___.</p>	Structure.	<p>'Thirty-six cherries are put into punnets of twelve. Then thirty-six cherries are put into punnets of four.'</p> $\begin{array}{c} 36 \div 12 = 3 \\ \downarrow \div 3 \quad \downarrow \times 3 \\ 36 \div 4 = 9 \end{array}$ <p>• 'If I divide the divisor by three and keep the dividend the same, I must multiply the quotient by three.'</p>

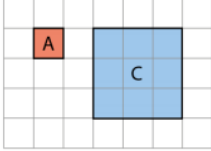
Mean Average

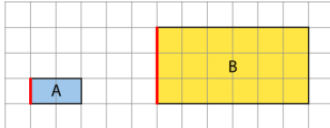
<p>The mean is the size of each part when a quantity is shared equally.</p> <p>The mean is the total of the numbers divided by how many numbers there are.</p>	<p>Generalisation</p>	
<p>The dividend is _____</p> <p>The divisor is _____ because _____</p> <p>The mean is $\frac{\text{_____}}{\text{_____}} = \text{_____}$</p>	<p>Language / structure.</p>	<p>Some children are given slices of pizza. What is the mean number of slices?</p>  <ul style="list-style-type: none"> The dividend is '15' (4 + 2 + 5 + 2 + 2). The divisor is '5' because there are five children. The mean is $15 \div 5 = 3$.
<p>If the number of values in the set stays the same and the total increases, the mean also increases.</p> <p>If the number of values in the set stays the same and the total decreases, the mean also decreases.</p>	<p>Generalisation</p>	

Ratio and Proportion

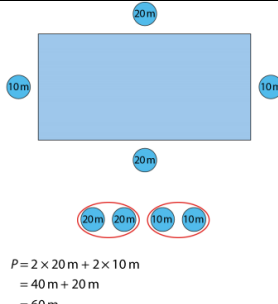
<p>For every _____ there are _____</p>	<p>Language / structure.</p>	 <p>For every one vase there are 5 flowers.</p> <table border="1" data-bbox="774 1187 1045 1321"> <thead> <tr> <th>Number of grapes that Lily eats</th> <th>Number of grapes that Ralph eats</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>10</td> </tr> <tr> <td>?</td> <td>20</td> </tr> <tr> <td>3</td> <td>?</td> </tr> </tbody> </table> <p>If Ralph eats twenty grapes, how many does Lily eat? If Lily eats three grapes, how many does Ralph eat?</p>	Number of grapes that Lily eats	Number of grapes that Ralph eats	1	10	?	20	3	?
Number of grapes that Lily eats	Number of grapes that Ralph eats									
1	10									
?	20									
3	?									
<p>The length of one of the sides of the square is _____ times the length of one of the sides of square _____.</p> <p>The side length of square _____ is _____ times the side-length of square _____.</p>	<p>Structure.</p>	 <p>Example comparison:</p> <ul style="list-style-type: none"> The length of one of the sides of square B is <u>two times</u> the length of one of the sides of square A. side-length of B = side-length of A \times 2 The length of one of the sides of square A is <u>one-half times</u> the length of one of the sides of square B. side-length of A = side-length of B $\times \frac{1}{2}$ 								
<p>To change shape _____ into shape _____, scale the side-lengths by a scale factor of _____.</p>		 <ul style="list-style-type: none"> To change shape A into shape C, scale the side-lengths by a scale factor of <u>three</u>. side-length of C = side-length of A \times 3 To change shape C into shape A, scale the side-lengths by a scale factor of <u>one-third</u>. side-length of A = side-length of C $\times \frac{1}{3}$ 								

<p>If the scale factor is greater than one, the shape is made larger. We can say the shape is enlarged.</p> <p>If the scale factor is equal to one, the shape is the same size.</p> <p>If the scale factor is less than one, the shape is made smaller. We can say the shape has been reduced.</p>	<p>Generalisation</p>	
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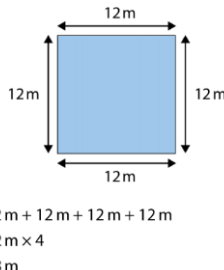
<p>The ratio of the dimensions of shape ___ to the dimensions of shape ___ is equal to ___ to ___.</p>	<p>Structure / language</p>	 <ul style="list-style-type: none"> • 'To change shape A into shape C, scale the side-lengths by a scale factor of three.' • 'The ratio of the dimensions of shape A to the dimensions of shape C is equal to <u>one-to-three</u>.' • 'We can write this as:' <p>dimensions of A : dimensions of C = 1 : 3</p>
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<p>To change shape ___ into shape ___, scale the dimensions by a scale factor of ___</p> <p>The ratio of dimensions of shape ___ to the dimensions of shape ___ is equal to ___ to ___</p>	<p>Structure / language.</p>	 <p>To change shape A into shape B, scale the dimensions by a scale factor of 3</p> <p>The ratio of dimensions of shape A to the dimensions of shape B is equal to 1 to 3</p>
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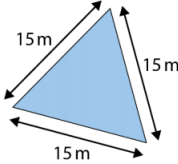
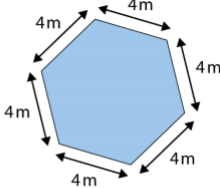
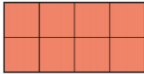
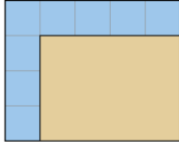
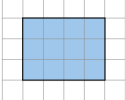

Area and Perimeter

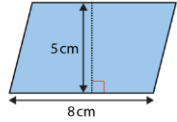
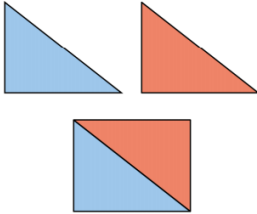
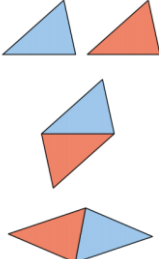
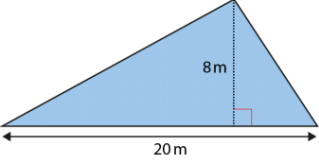
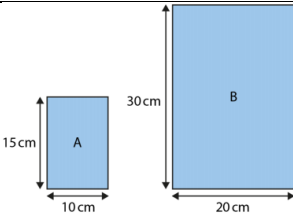
<p>Perimeter is equal to two times ___ plus two times ___.</p>	<p>Language / structure.</p>	
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<p>The perimeter of a rectangle is equal to two times the length of the long side plus two times the length of the short side.</p>	<p>Generalisation</p>	
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<p>Perimeter of the square is ___ + ___ + ___ + ___</p> <p>Or</p> <p>Perimeter of the square is 4 x _____</p>	<p>Structure</p>	
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<p>The perimeter of a square is four times the length of one of the sides.</p>	<p>Generalisation</p>	
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<p>Perimeter of the equilateral triangle is ____ + ____ + ____</p> <p>Or</p> <p>Perimeter of the equilateral triangle is 3 x ____</p>	<p>Structure</p>	 <p>$P = 15\text{ m} + 15\text{ m} + 15\text{ m}$ $= 3 \times 15\text{ m}$ $= 45\text{ m}$</p>
<p>The perimeter of an equilateral trinagle is three times the length of one of the sides.</p>	<p>Generalisation</p>	
<p>Perimeter of the regular hexagon is ____ + ____ + ____ + ____ + ____ + ____</p> <p>Or</p> <p>Perimeter of the regular hexagon is 6 x ____</p>		 <p>$P = 4\text{ m} + 4\text{ m} + 4\text{ m} + 4\text{ m} + 4\text{ m} + 4\text{ m}$ $= 6 \times 4\text{ m}$ $= 24\text{ m}$</p>
<p>To find the perimeter of a regular polygon, you multiply the length one of the sides by the number of sides.</p>	<p>Generalisation</p>	
<p>If you know the perimeter of a regular polygon you divide it by the number of sides to find the length of one of its sides.</p>	<p>Generalisation</p>	
<p>This shape has an area of ____ square units.</p>		 <p>This shape has an area of 8 square units.</p>
<p>We can measure area in square centimetres. We write this as cm²</p>	<p>Generalisation</p>	
<p>The ____ represents the ____</p>	<p>Structure</p>	 <p>$5\text{ cm} \times 4\text{ cm} = 20\text{ cm}^2$ $4\text{ cm} \times 5\text{ cm} = 20\text{ cm}^2$ $A = 20\text{ cm}^2$</p> <p><i>'The "5 cm" represents the width.'</i> <i>'The "4 cm" represents the length.'</i> <i>'The "20 cm²" represents the area.'</i></p>
<p>To find the area of a rectangle multiply the length by the width.</p>	<p>Generalisation</p>	 <p>$4 \times 3 = 12\text{ cm}^2$</p>
<p>A parallelogram can be made into a rectangle that has the same area.</p>	<p>Generalisation</p>	

<p>The base is ____ The perpendicular height is ____ The area is ____</p>	<p>Structure/ language</p>	<p><i>'Find the area of this parallelogram.'</i></p>  <ul style="list-style-type: none"> • <i>'The base is 8 cm.'</i> • <i>'The perpendicular height is 5 cm.'</i> • <i>'The area is $8 \times 5 = 40 \text{ cm}^2$.'</i>
<p>To find the area of a parallelogram multiply the base by the perpendicular height.</p>	<p>Generalisation</p>	
<p>Two right-angled triangles that are the same can be joined to make a rectangle.</p> <p>A rectangle can be divided into two right-angled triangles.</p>	<p>Generalisation</p>	<p>Combining two triangles to make a rectangle:</p> 
<p>Two triangles that are the same can be joined to make a parallelogram.</p> <p>A parallelogram can be divided into two triangles.</p>	<p>Generalisation</p>	<p>Combining two triangles to make a parallelogram:</p> 
<p>To find the area of a triangle multiply the base by the perpendicular height and then divide by two.</p>	<p>Generalisation</p>	<p><i>'Find the area of this triangle.'</i></p>  <ul style="list-style-type: none"> • <i>'The base is 20 m.'</i> • <i>'The perpendicular height is 8 m.'</i> • <i>'The area is $20 \times 8 \div 2 = 160 \div 2 = 80 \text{ m}^2$.'</i>
<p>Shapes can have the same perimeter but different areas.</p> <p>Shapes can have the same area but different perimeters.</p>	<p>Generalisation</p>	
<p>When a shape has been transformed by a scale factor, the perimeter is also transformed by the same scale factor.</p>	<p>Generalisation</p>	 <p>perimeter = $10 + 10 + 15 + 15 = 50 \text{ cm}$ perimeter = $20 + 20 + 30 + 30 = 100 \text{ cm}$ $50 \times 2 = 100$</p> <p><i>'The perimeter has changed by a scale factor of two.'</i></p>