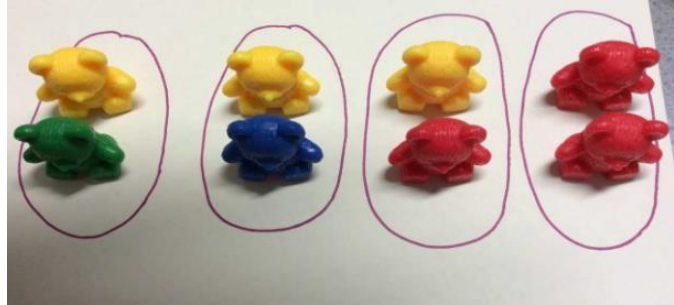
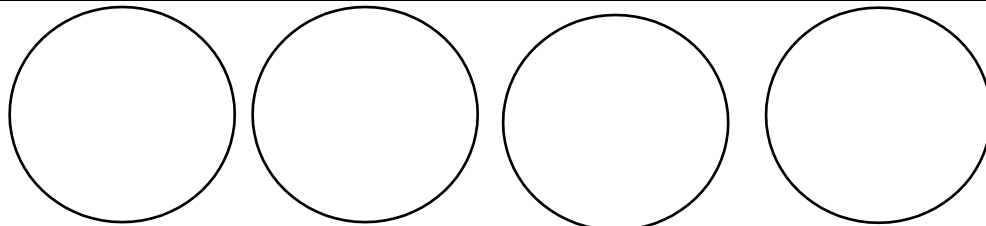
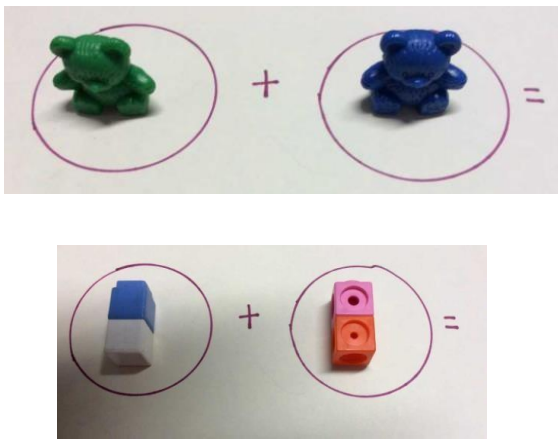
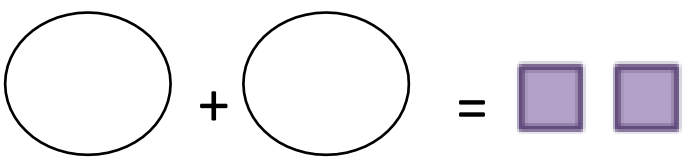

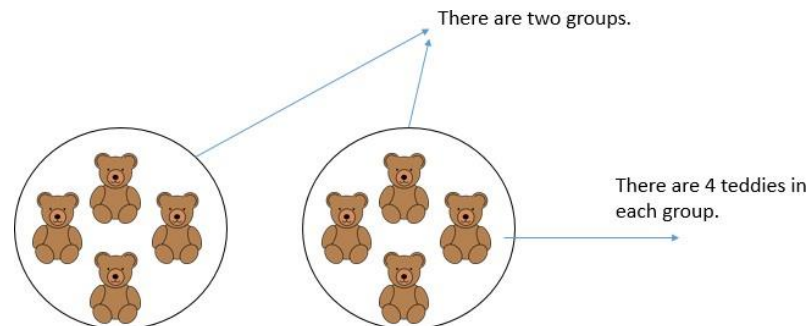


# Calculation Progression - Multiplication

Early Years

**Key Vocabulary:** *multiplication, multiply, multiplied by, multiple, grouping, doubling, array*

**Times Tables:** *To count in steps of 2s and 10s and begin to count in 5s.*


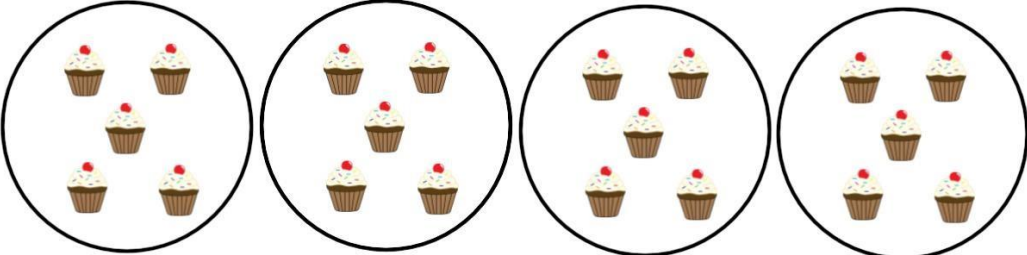

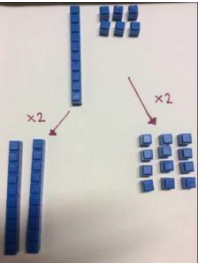
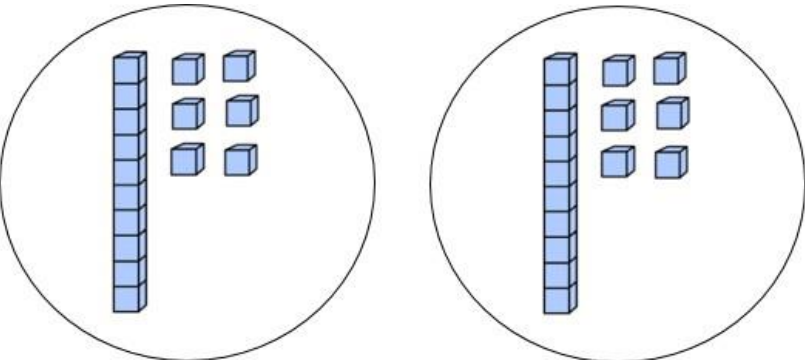
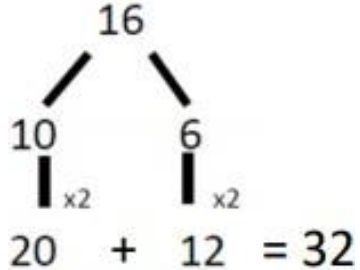
Objective & Strategy	Concrete	Pictorial	Abstract
<p>To count in steps of 2s and 10s and begin to count in steps of 5.</p>	<p>Children will count in steps of 2s and 10s. They will begin to count in 5s.</p> 	 <p>Children will verbally say their number sequence aloud to demonstrate their understanding.</p>	<p>2, 4, 6, 8...</p> <p>10, 20, 30, 40...</p> <p>5, 10, 15, 20, 25, 30...</p>
<p>To be able to double numbers.</p>	<p>Using practical activities using manipulative including uni-fix cubes to demonstrate doubling.</p> 	<p>Children will begin to draw pictures to demonstrate doubling.</p> <p>Double 1 equals 2.</p> 	<p><math>1 + 1 = 2</math></p> <p><b>Stem Sentence:</b> Double <u>1</u> equals <u>2</u></p>
<p>To experience equal groups of objects.</p>	<p>Children will experience equal groups of objects. Children will be encouraged to count the groups, then count how many objects are in a group. E.g. <math>2 \times 4 =</math></p> 	<p>Children will have images of equal groups to solve multiplication sentences by counting how many are in each equal group.</p> 	<p><math>2 \times 4 = 8</math></p> <p><b>Stem Sentence:</b> I know there are <u>2</u> groups with <u>4</u> in each group.</p>

# Calculation Progression - Multiplication


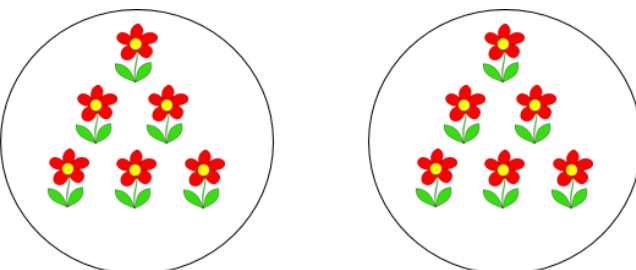

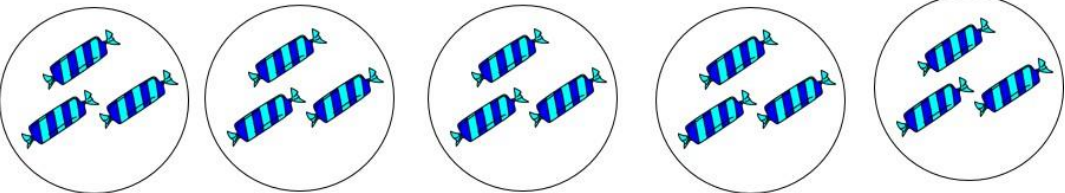
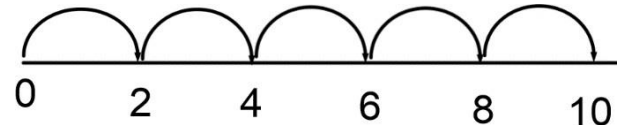

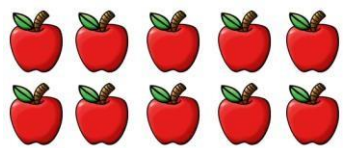
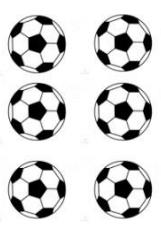
## Year 1

**Key Vocabulary:** multiplication, multiply, multiplied by multiple, grouping, doubling, array

**Times Tables:** Children in Year 1 need to count in steps of 2, 5 and 10.

Objective & Strategy	Concrete	Pictorial	Abstract
<p>To count in steps of 2, 5 and 10s.</p>	<p>Children will be able to use concrete resources to count in steps of 2, 5 and 10.</p> 	<p>Children will verbally say their number sequence aloud to demonstrate their understanding. Children would begin to count aloud and write numbers to match the sequence. E.g. 0, 5, 10, 15, 20...</p> 	<p>Children will be able to count aloud in sequences, starting at different points.</p> <p>Children will be able to write sequences with multiples of numbers 2, 4, 6, 8...</p> <p>10, 20, 30, 40...</p> <p>5, 10, 15, 20, 25, 30...</p>
<p>To double numbers up to 20.</p>	<p>Children will demonstrate knowledge of doubling through concrete resources, including uni-fix cubes.</p>  <p>Double 20 equals 40.                      Double 16 equals 32</p> <p>When beginning to double more complex numbers, children will need to explore partitioning the whole number into tens and ones, using base 10, and double the tens and then the ones, before recombining to find the total.</p> 	<p>Children will be able to use jottings and picture representations to show demonstration of doubling.</p>  <p><b>Double 16 equals 32</b></p>	<p>Children will learn to partition a number and then double each part before recombining it back together.</p>  <p><b>Stem Sentence:</b> Double <u>1</u> equals <u>2</u></p>

## Calculation Progression - Multiplication

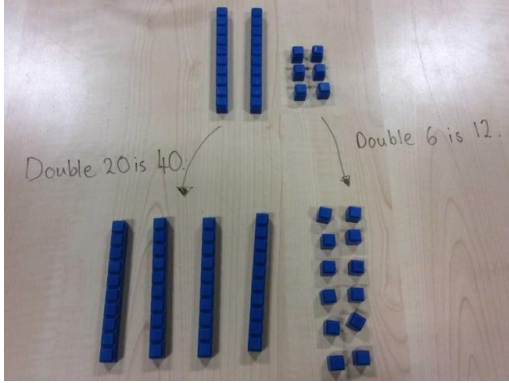
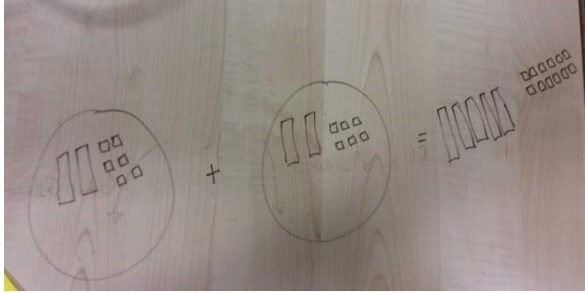
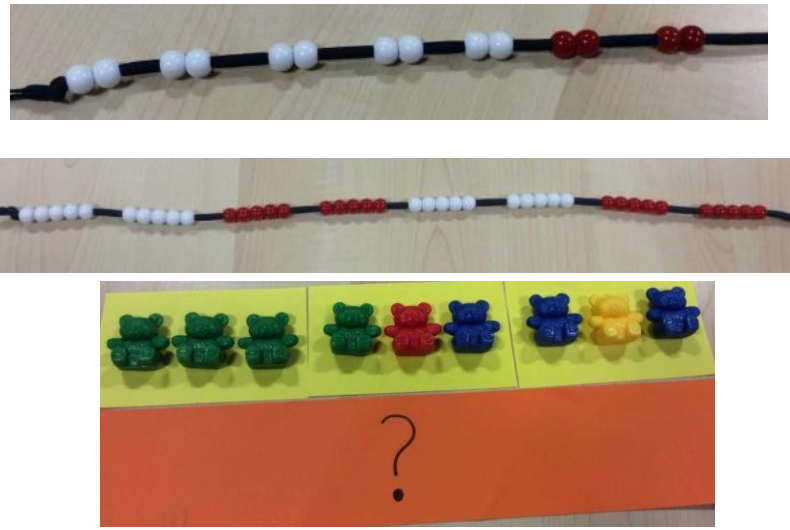
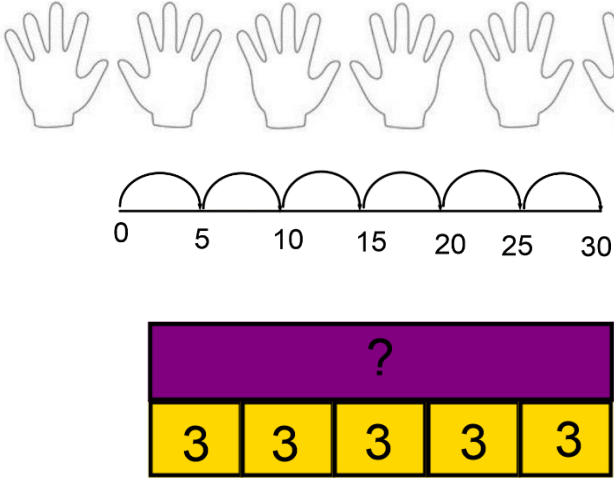
<p>To make equal groups and count the total.</p>	<p>Children will use concrete resources to make equal groups.</p> <div style="text-align: center;">  </div> <p><b>Stem Sentence:</b> I know there are <u>2</u> groups with <u>6</u> in each group.</p>	<p>Children will draw jottings and have pictorial representations to demonstrate knowledge of equal groups.</p> <p style="text-align: center;"><math>2 \times 6 = 12</math></p> <div style="text-align: center;">  </div> <p style="text-align: center;">I know there are 2 groups and in each group there are 6 flowers.</p>	<p style="text-align: center;"><math>2 \times 6 = 12</math></p> <p style="text-align: center;"><b>Stem Sentence:</b> I know there are <u>2</u> groups with <u>6</u> in each group.</p>
<p>To understand multiplication as repeated addition.</p>	<p>Children will be able to use a range of concrete resources to add equal groups.</p> <div style="text-align: center;">  </div>	<p>Children will use pictorial representations, including the use of a number line to solve problems.</p> <p style="text-align: center;">There are 3 sweets in 1 bag. How many sweets are in 5 bags altogether?</p> <div style="text-align: center;">  <p style="text-align: center;"><math>3 + 3 + 3 + 3 + 3 = 15</math></p>  </div>	<p>Children will be able to write addition number sentences to describe pictures or objects.</p> <p style="text-align: center;"><math>3 + 3 + 3 + 3 + 3 = 15</math></p>
<p>To understand multiplication as arrays.</p>	<p>Children will create arrays using concrete objects, which they then can describe what it represents e.g. 2 lots of 5, 3 lots of 10.</p> <div style="text-align: center;">  </div>	<p>Children will draw their own pictorial representations and will have the visually provided to show understanding of arrays.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>2 lots of 5</p>  </div> <div style="text-align: center;"> <p>3 lots of 2.</p>  </div> </div>	<p style="text-align: center;"><math>3 \times 2 = 6</math></p> <p style="text-align: center;"><math>2 \times 5 = 10</math></p>

# Calculation Progression - Multiplication

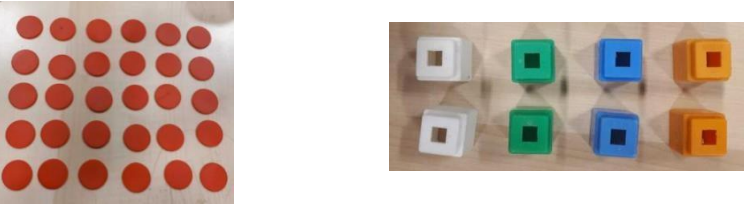

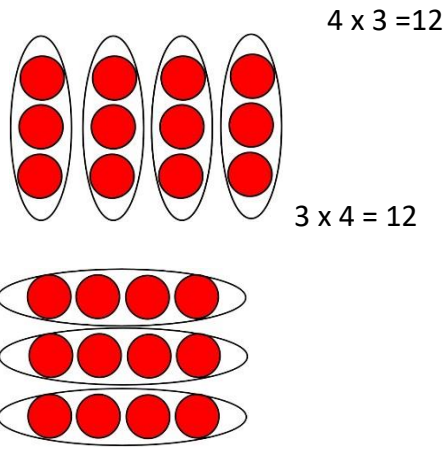
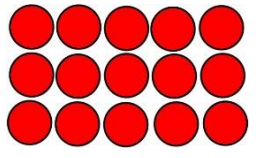

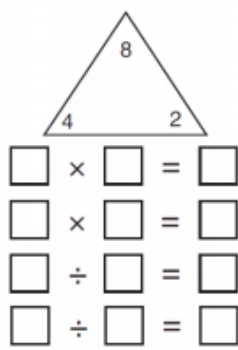
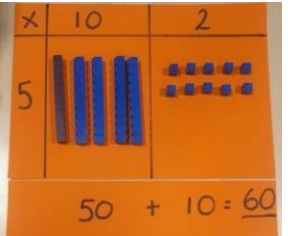
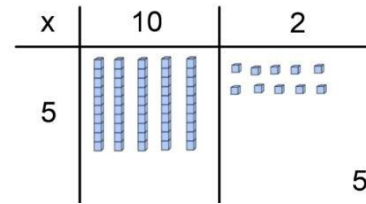
## Year 2

**Key Vocabulary:** multiplication, multiply, multiplied by, multiple, grouping, doubling, array, row, column, groups of, times once, twice, three times ... ten times, repeated addition, one each, two each, three each ... ten each, equal groups of, multiplication table, multiplication fact.

**Times Tables:** children in Year 2 need to count in steps of 2, 3, 5 and 10s.

Objective & Strategy	Concrete	Pictorial	Abstract
To double numbers up to 100.	<p>Model using base 10 to partition a number and then double the ones and the tens.</p> <p><b>Double 26 is 52</b></p> 	<p>Draw pictures and representations to show how to double numbers.</p> <p><b>Double 26 is 52</b></p> 	<p>Partition a number and then double each part before recombining back together.</p> $  \begin{array}{r}  26 \\  \swarrow \quad \searrow \\  20 \quad 6 \\  \downarrow \times 2 \quad \downarrow \times 2 \\  40 \quad + \quad 12 = 52  \end{array}  $
To count in multiples of 2s, 3s, 5s and 10s (repeated addition).	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models.</p> 	<p>Number lines, counting sticks and bar models should be used to show representation of counting in multiples.</p> 	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers. 0, 2,</p> <p>4, 6, 8, 10</p> <p>0, 3, 6, 9, 12, 15</p> <p>0, 5, 10, 15, 20, 25, 30</p> <p><math>4 \times 3 =</math> <input type="text"/></p>

## Calculation Progression - Multiplication


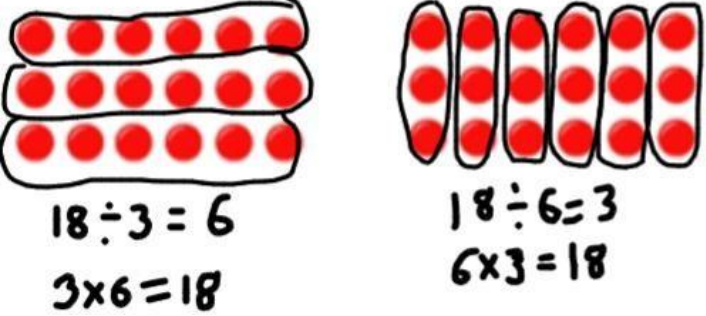
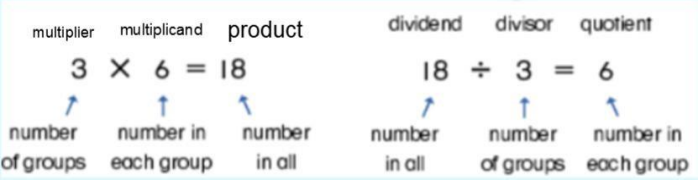
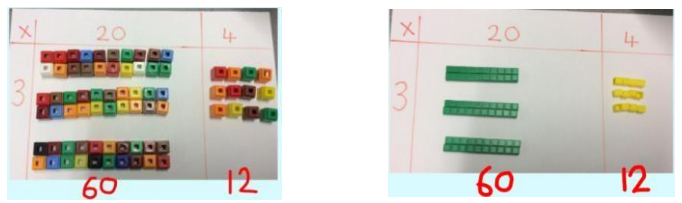
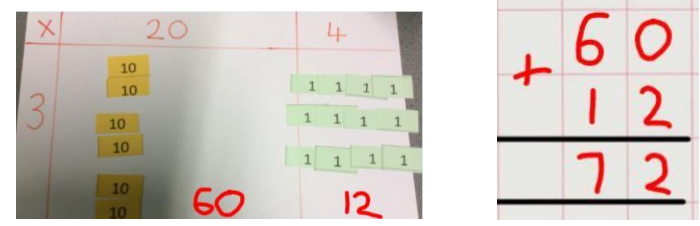
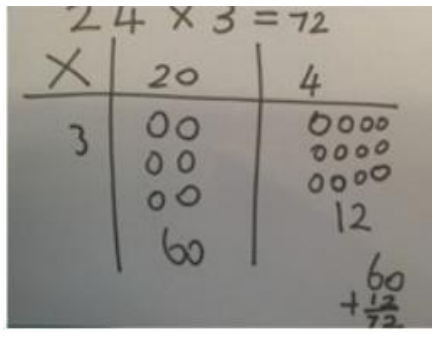
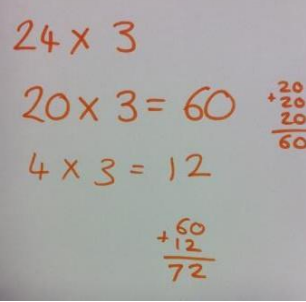
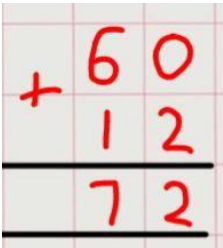
<p>To show that multiplication is commutative.</p>	<p>Children will create arrays using a variety of concrete resources, including cubes and counters.</p>  <p>Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer</p>  <p style="display: flex; justify-content: space-around;"><span><math>4 \times 3 = 12</math></span><span><math>3 \times 4 = 12</math></span></p>	<p>Children will use a range of pictures to represent arrays to show different calculations and show commutativity.</p> 	<p>Children will write the different multiplication sentences to show the commutative law.</p> <p><math>12 = 3 \times 4</math></p> <p><math>12 = 4 \times 3</math></p> <p>Children will also be able to use an array to write multiplication number sentences and reinforce repeated addition.</p>  <p style="display: flex; justify-content: space-around;"><span><math>3 + 3 + 3 + 3 + 3 = 15</math></span><span><math>5 \times 3 = 15</math></span></p> <p style="display: flex; justify-content: space-around;"><span><math>5 + 5 + 5 = 15</math></span><span><math>3 \times 5 = 15</math></span></p>						
<p>To use related multiplication and division facts using the inverse for the 2, 3, 5 and 10 times table.</p> <p>This will be taught alongside division to show how the numbers relate and build fluency.</p>	<p>Children will use concrete resources, including cubes to represent arrays. These will then form part of the learning process to explain number related facts and begin to write these in number form.</p> <p><math>2 \times 4 = 8</math>    <math>4 \times 2 = 8</math>    <math>8 \div 2 = 4</math>    <math>8 \div 4 = 2</math></p> 	<p>Children will use pictorial representations to solve missing number facts that demonstrate related facts.</p> 	<p>Children will show all 8 related number sentences to demonstrate related facts.</p> <p style="text-align: center;"><math>2 \times 4 = 8</math></p> <p style="text-align: center;"><math>4 \times 2 = 8</math></p> <p style="text-align: center;"><math>8 \div 2 = 4</math></p> <p style="text-align: center;"><math>8 \div 4 = 2</math></p> <p style="text-align: center;"><math>8 = 2 \times 4</math></p> <p style="text-align: center;"><math>8 = 4 \times 2</math></p> <p style="text-align: center;"><math>2 = 8 \div 4</math></p> <p style="text-align: center;"><math>4 = 8 \div 2</math></p>						
<p>To begin to use the grid method to solve multiplication problems</p>	<p>Children will be introduced to the grid method by using arrays to demonstrate the links.</p> <p style="text-align: center;"><math>12 \times 5 = 60</math></p> <p><b>Step 1:</b> Partition the number into tens and ones, e.g. <math>12 = 10</math> and <math>2</math> and place the multiplier to the side.</p> <p><b>Step 2:</b> times the multiplicand by the multiplier. E.g. <math>10 \times 5</math> and <math>2 \times 5</math> and record the answers in base 10 in the boxes.</p> <p><b>Step 3:</b> Add both answers to find the total for multiplication sentence. E.g. <math>50 + 10 = 60</math></p> 	<p>Children can represent their work with place value counters or base 10 in a way that they understand. They can draw the counters (using colours to show different amounts or just use the circles in the different columns) or base 10 like shown below.</p> <p><math>12 \times 5 = 60</math></p> 	<p>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <p style="text-align: center;"><math>12 \times 5 = 60</math></p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;">x</td> <td style="border-bottom: 1px solid black; padding: 5px;">10</td> <td style="border-bottom: 1px solid black; padding: 5px;">2</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">5</td> <td style="padding: 5px;">50</td> <td style="padding: 5px;">10</td> </tr> </table> <p style="text-align: right; margin-top: 10px;"><math>50 + 10 = 60</math></p>	x	10	2	5	50	10
x	10	2							
5	50	10							

# Calculation Progression - Multiplication

## Year 3

**Key Vocabulary:** multiplication, multiply, multiplied by, multiple, factor, product, grouping, doubling, array, row, column, groups of, times once, twice, three times ... ten times, repeated addition, one each, two each, three each ... ten each, equal groups of, multiplication table, multiplication fact.

**Times tables-** Children in Year 3 need to be able to confidently count in steps of 2, 3, 4, 5, 8, 10, 50 and 100.

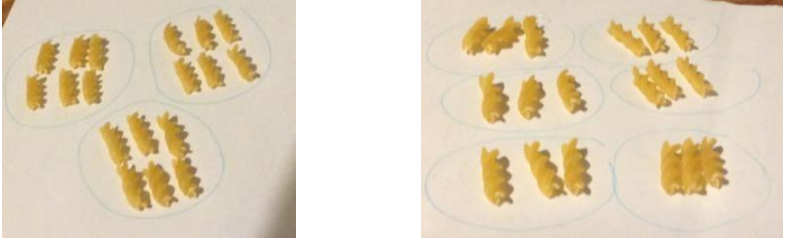
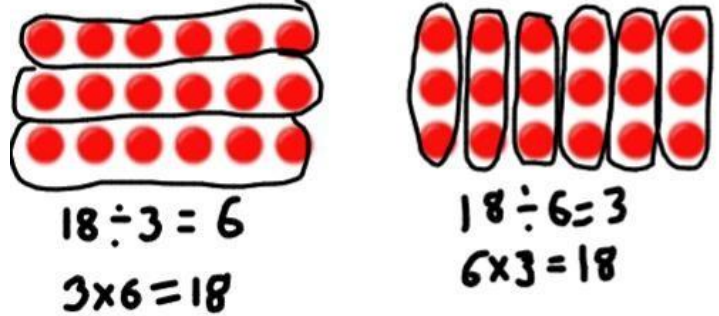
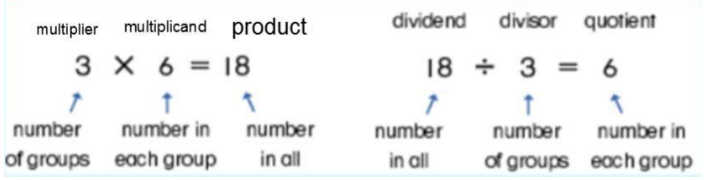
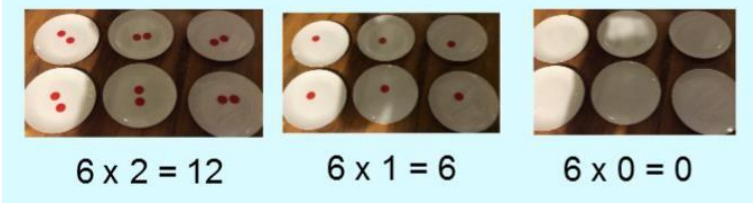
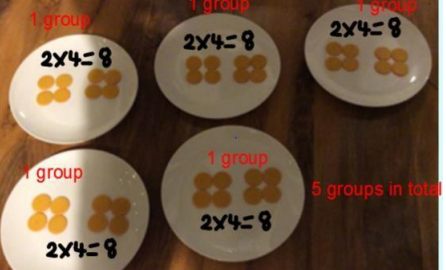
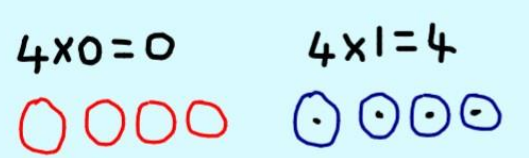
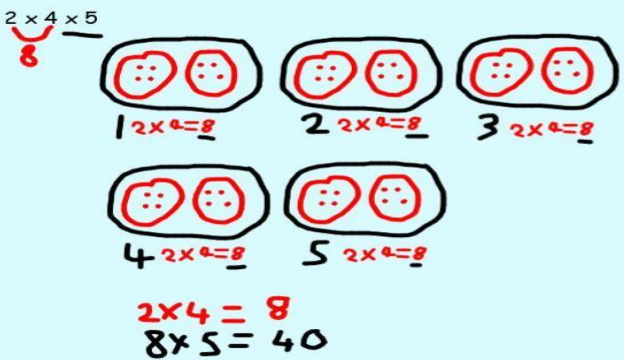
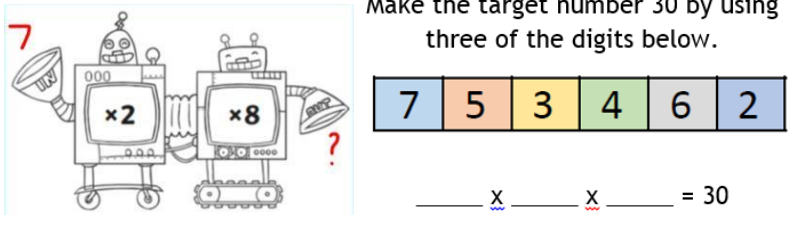
Objective & Strategy	Concrete	Pictorial	Abstract						
<p>To use related multiplication and division facts using the inverse for the 2, 3, 4, 5, 8 and 10 times table.</p>	<p>Children understand the link between multiplication and division and use physical objects to find related facts.</p> <p><math>3 \times 6 = 18</math>   <math>18 \div 3 = 6</math>   <math>6 \times 3 = 18</math>   <math>18 \div 6 = 3</math></p> 	<p>Children represent an array pictorially then find the associated multiplication and division facts by sorting into equal groups.</p> 	<p>Children apply their understanding of inverse relationships to write related multiplication and division statements.</p> <p><math>3 \times 6 = 18</math>   <math>18 = 3 \times 6</math>  <math>6 \times 3 = 18</math>   <math>18 = 6 \times 3</math>  <math>18 \div 3 = 6</math>   <math>6 = 18 \div 3</math>  <math>18 \div 6 = 3</math>   <math>3 = 18 \div 6</math></p> <p>They use associated vocabulary correctly and know what each number represents in the calculation.</p> 						
<p>To use a formal written method of multiplication (grid method).  2-digit x 1 digit number</p>	<p>Children use partitioning to multiply numbers using the grid method. They partition the multiplicand and multiply each part by the multiplier. Children use base ten and place value counters to represent arrays of the partitioned number.</p> <p><math>24 \times 3 = 72</math></p> <p>Use of unit cubes   use of base 10</p>  <p>Use of place value counters   finding the total</p> 	<p>Children show their understanding by represent the calculation in the grid using their own pictorial representation.</p> <p><math>24 \times 3 = 72</math></p>  <p>Children use jottings to partition the multiplicand and multiply each part by the multiplier.</p> 	<p><b>Formal Method</b> The children use the grid method for larger numbers. They multiply numbers by first partitioning the multiplicand and then multiplying each part by the multiplier. In year 3 children are expected to multiply 2-digit by a 1 digit number.</p> <p><math>24 \times 3 = 72</math></p> <table border="1" data-bbox="1935 1402 2439 1516"> <tr> <td>X</td> <td>20</td> <td>4</td> </tr> <tr> <td>3</td> <td>60</td> <td>12</td> </tr> </table>  <p>Children apply their knowledge of multiplication to word problems.</p> <p><i>There are 5 balloons in a packet. There are 18 packets in a box. How many balloons are there altogether in a box?</i></p>	X	20	4	3	60	12
X	20	4							
3	60	12							

# Calculation Progression - Multiplication

## Year 4

**Key Vocabulary:** multiplication, multiply, multiplied by, multiple, factor, product, grouping, doubling, array, row, column, groups of, times once, twice, three times ... ten times, repeated addition, one each, two each, three each...ten each, equal groups of, multiplication table, multiplication fact, inverse, square, squared, cube, cubed, distributive law.

**Times tables-** Children in Year 4 need to be able to confidently count in steps of 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

Objective & Strategy	Concrete	Pictorial	Abstract
<p>To recall multiplication and division facts for multiplication tables up to 12x 12.</p>	<p>Children continue to deepen their understanding of the link between multiplication and division and use physical objects to find related facts.</p> <p><math>3 \times 6 = 18</math>   <math>18 \div 3 = 6</math>   <math>6 \times 3 = 18</math>   <math>18 \div 6 = 3</math></p> 	<p>Children represent an array pictorially then find the associated multiplication and division facts by sorting into equal groups.</p> 	<p>Children apply their understanding of inverse relationships to write related multiplication and division statements.</p> <p><math>3 \times 6 = 18</math>   <math>18 = 3 \times 6</math>  <math>6 \times 3 = 18</math>   <math>18 = 6 \times 3</math>  <math>18 \div 3 = 6</math>   <math>6 = 18 \div 3</math>  <math>18 \div 6 = 3</math>   <math>3 = 18 \div 6</math></p> <p>They use associated vocabulary correctly and know what each number represents in the calculation.</p> 
<p>To multiply and divide mentally, including: multiplying by 0 and 1 and multiplying together 3 numbers.</p>	<p>Children multiply and divide numbers by zero and one. They understand the meaning of the calculation and the need of equal sized groups.</p>  <p><math>6 \times 2 = 12</math>   <math>6 \times 1 = 6</math>   <math>6 \times 0 = 0</math></p> <p>Children use objects to calculate totals when three numbers are multiplied together.</p> <p><math>2 \times 4 \times 5 = 40</math></p> 	<p>Children show their understanding of multiplying by 0 and 1 by drawing representations.</p> <p><math>4 \times 0 = 0</math>   <math>4 \times 1 = 4</math></p>  <p>Children use objects to calculate totals when three numbers are multiplied together.</p> <p><math>2 \times 4 \times 5 = 40</math></p>  <p>Or they may decide to represent it as <math>2 \times (4 \times 5)</math>   <math>2 \times (20) = 40</math></p>	<p>Children understand how to multiply by 1 and 0 and apply to word problems.</p> <p><math>1 \times 83 =</math>   <math>76 \times 1 =</math>  <math>4567 \times 0 =</math>   <math>0 \times 23 =</math></p> <p><i>Jack earns £12 a week on his paper round. He did not work for one week whilst he was on holiday. How much did he earn?</i></p> <p>Children solve number puzzles using the knowledge of multiplying 3 single digit numbers.</p> 

# Calculation Progression - Multiplication

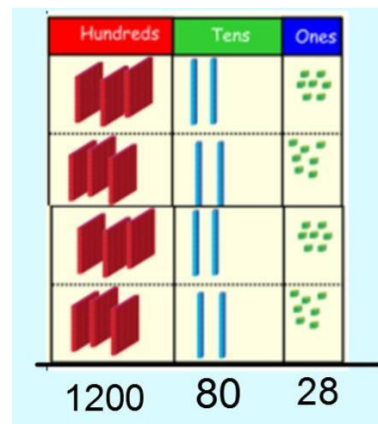
To use a formal written method of multiplication (grid method).  
3-digit x 1 digit number

Children recap the grid method introduced in Year 3 and represent calculations using the place value counters and base ten equipment. They first partition the multiplicand then multiply each part by the multiplier.

$327 \times 4 = 1308$



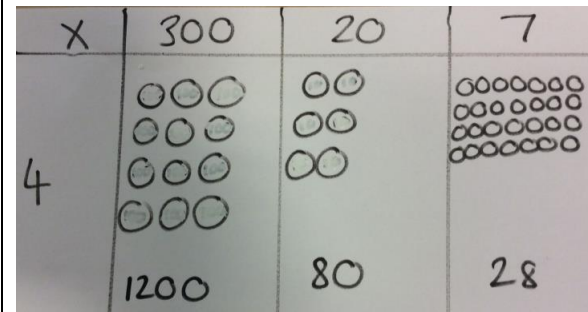
$1200 + 80 + 28 = 1308$



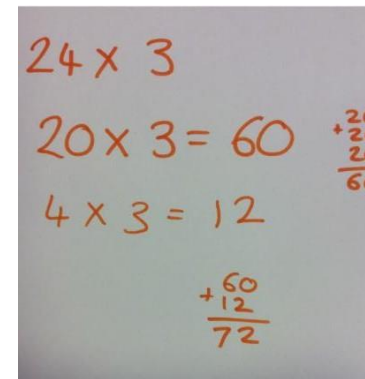
$1200 + 80 + 28 = 1308$

Children show their understanding by represent the calculation in the grid using their own pictorial representation.

$327 \times 4 = 1308$



Children use jottings to partition the multiplicand and multiply each part by the multiplier.

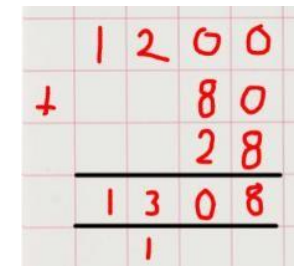


**Formal Method**

The children continue to use the grid method using partitioning to multiply each part. In year 4 children are expected to multiply 3-digit by a 1 digit number.

$327 \times 4 = 1308$

X	300	20	7
4	1200	80	28



$1200 + 80 + 28 = 1308$

Children apply their knowledge of multiplication to worded problems.

Mia buys four apples and six bananas.

Apple 27p, Banana 17p

A box has 70 chocolates in it. 20 children each take 3 chocolates.

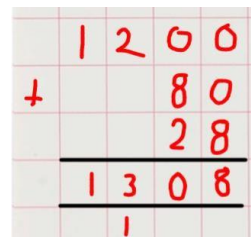
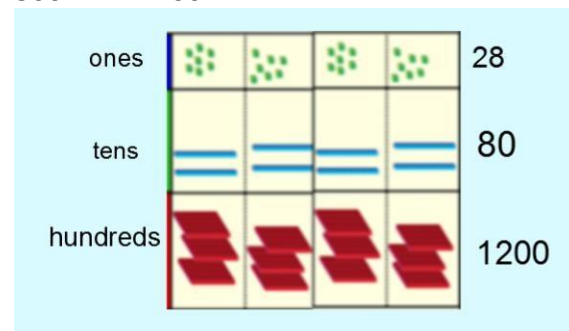
How much does she spend altogether? How many chocolates are left in the box?

To use a formal written method of multiplication (short multiplication).  
3-digit x 1 digit number

Children represent calculations using the place value counters and base ten equipment and move towards using a columnar method. They begin by multiplying the ones, then the tens then the hundreds before finding the total.

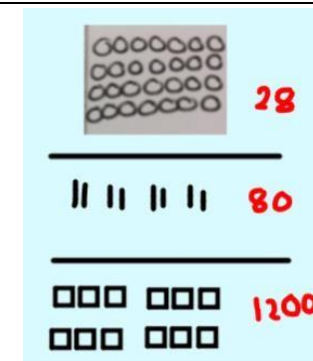
$327 \times 4 = 1308$

$7 \times 4 = 28$   
 $20 \times 4 = 80$   
 $300 \times 4 = 1200$



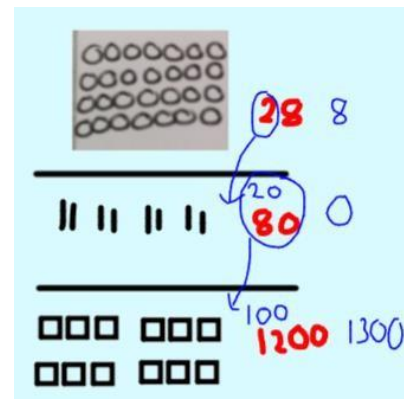
Children represent the calculation by drawing pictorial representations. They partition the multiplicand then multiply each part by the multiplier.

$327 \times 4 = 1308$



Children understand the place value and can exchange between columns which leads to the formal condensed method.

$327 \times 4 = 1308$



**Formal Method**

In year 4 children are expected to multiply a 3-digit by a 1 digit number.

Children apply their knowledge of the grid method begin to record in a columnar form. At this stage they still partition the multiplicand and multiply each part by the multiplier.

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

Children then move on to using the condensed method of short multiplication. They carry below the line.

$$\begin{array}{r} 327 \\ \times 4 \\ \hline 1308 \\ \small 1 \quad 2 \end{array}$$

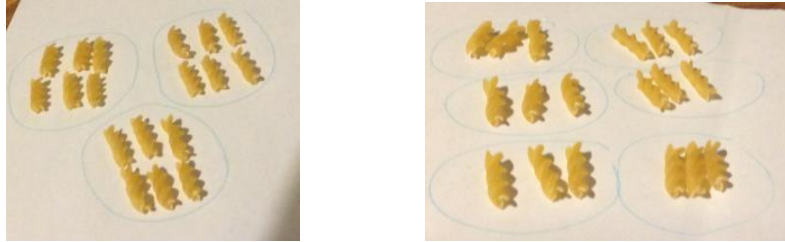
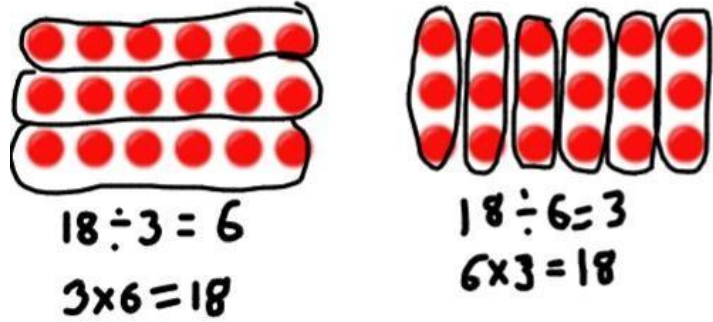
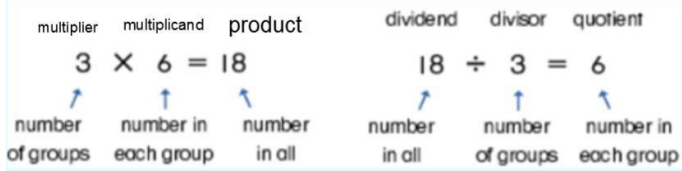

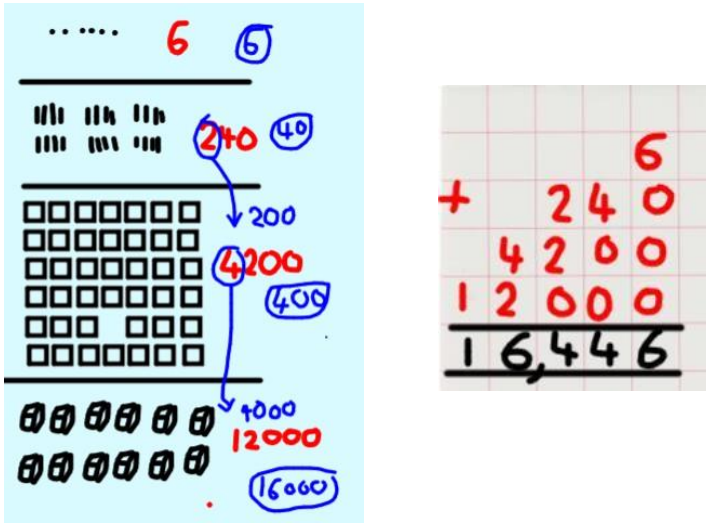


# Calculation Progression - Multiplication

## Year 5

**Key Vocabulary:** multiplication, multiply, multiplied by, multiple, factor, product, grouping, doubling, array, row, column, groups of, times once, twice, three times ... ten times, repeated addition, one each, two each, three each ... ten each, equal groups of, multiplication table, multiplication fact, inverse, square, squared, cube, cubed, distributive law.

**Times tables-** Children in Year 5 need to be able to confidently count in steps of 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

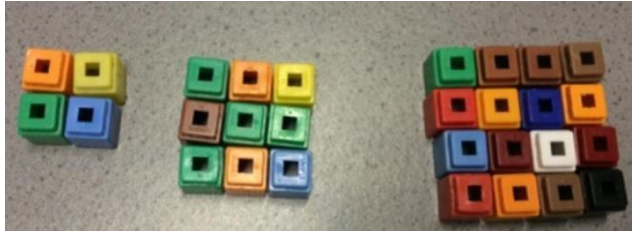
Objective & Strategy	Concrete	Pictorial	Abstract
<p>To recall multiplication and division facts for multiplication tables up to 12x 12.</p>	<p>Children continue to deepen their understanding of the link between multiplication and division and use physical objects to find related facts.</p> <p><math>3 \times 6 = 18</math>   <math>18 \div 3 = 6</math>   <math>6 \times 3 = 18</math>   <math>18 \div 6 = 3</math></p> 	<p>Children represent an array pictorially then find the associated multiplication and division facts by sorting into equal groups.</p> 	<p>Children apply their understanding of the inverse relationships to write related multiplication and division statements.</p> <p><math>3 \times 6 = 18</math>   <math>18 = 3 \times 6</math>  <math>6 \times 3 = 18</math>   <math>18 = 6 \times 3</math>  <math>18 \div 3 = 6</math>   <math>6 = 18 \div 3</math>  <math>18 \div 6 = 3</math>   <math>3 = 18 \div 6</math></p> <p>They use associated vocabulary correctly and know what each number represents in the calculation.</p> 
<p>To use a formal written method of multiplication (short multiplication).</p> <p>Up to 4-digit x 1 digit number</p>	<p>Children represent calculations using the place value counters and base ten equipment. They solve in a columnar form and begin by multiplying the ones, then the tens then the hundreds then the thousands before finding the total.</p> <p><b><math>2741 \times 6 = 16,446</math></b></p> <p><math>1 \times 6 = 6</math>  <math>40 \times 6 = 240</math>  <math>700 \times 6 = 4,200</math>  <math>2000 \times 6 = 12,000</math></p> 	<p>Children represent the calculation by drawing pictorial representations. They partition the multiplicand then multiply each part by the multiplier. They understand the place value and can confidently exchange between columns. This leads to the condensed method.</p> 	<p><b>Formal Method</b></p> <p>In year 5 children are expected to multiply numbers up to a 4-digit by a 1 digit number.</p> <p>The children continue to use the condensed method of short multiplication but with larger numbers. The number is carried underneath between columns.</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="2077 1417 2315 1669"> <p><math>342 \times 7</math> becomes</p> <math display="block">\begin{array}{r} 342 \\ \times \quad 7 \\ \hline 2394 \\ \hline 21 \end{array}</math> </div> <div data-bbox="2507 1417 2775 1669"> <p><math>2741 \times 6</math> becomes</p> <math display="block">\begin{array}{r} 2741 \\ \times \quad 6 \\ \hline 16446 \\ \hline 42 \end{array}</math> </div> </div>

## Calculation Progression - Multiplication

To recognise and use square numbers and cube numbers.

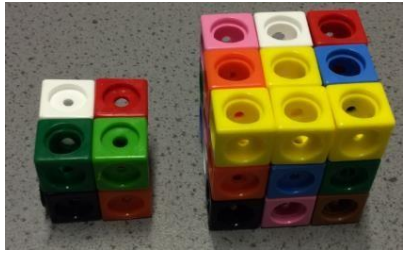
Children use resources to explore squared and cubed numbers.

**Square numbers**



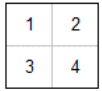
4                      9                      16

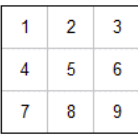
**Cubed numbers**

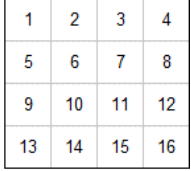


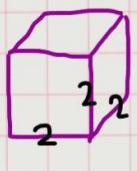
8                      27

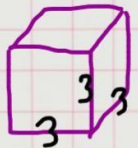
Children represent squared and cubed numbers pictorially. They use the correct notation for squared ( $^2$ ) and cubed ( $^3$ ).

$2^2$   
  
 $2 \times 2 = 4$

$3^2$   
  
 $3 \times 3 = 9$

$4^2$   
  
 $4 \times 4 = 16$

  
 $2 \times 2 = 4$   
 $4 \times 2 = 8$   
 $2^3 = 8$

  
 $3 \times 3 = 9$   
 $9 \times 3 = 27$   
 $3^3 = 27$

Children can find and recognise squared and cubed numbers and use the correct notation for squared ( $^2$ ) and cubed ( $^3$ ).

$2^2$  or  $2 \times 2 = 4$

$3^2$  or  $3 \times 3 = 9$

$4^2$  or  $4 \times 4 = 16$

$1^3 = 1 \times 1 \times 1 = 1$

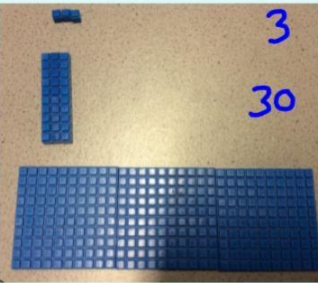
$2^3 = 2 \times 2 \times 2 = 8$

$3^3 = 3 \times 3 \times 3 = 27$

$4^3 = 4 \times 4 \times 4 = 64$

To multiply whole numbers and those involving decimals by 10, 100 and 1,000

Children use resources to understand what 10, 100 and 1000 times bigger looks like.



$3$   
 $30$   
 $300$

30 is ten times bigger than 3.  
 300 is ten times bigger than 30.  
 300 is one hundred times bigger than 3.

Children use place value grids to multiply numbers by 10, 100 and 1000s. They understand the movement of the digits on the place value grid.

**Multiplying**

X 10	digits move LEFT 1 space
X 100	digits move LEFT 2 spaces
X 1000	digits move LEFT 3 spaces

←

$123 \times 100 = 12300$

10 000	1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

They apply this knowledge to decimal numbers.

$7.9 \times 1000 = 7900$

10 000	1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

Children apply their knowledge of place value to multiply numbers by 10, 100 and 1000, including decimal numbers.

$34 \times 100 = 3400$   
 $1234 \times 1000 = 1234000$   
 $5.6 \times 10 = 56$   
 $12.367 \times 100 = 1236.7$

They apply their knowledge to word and number puzzles.

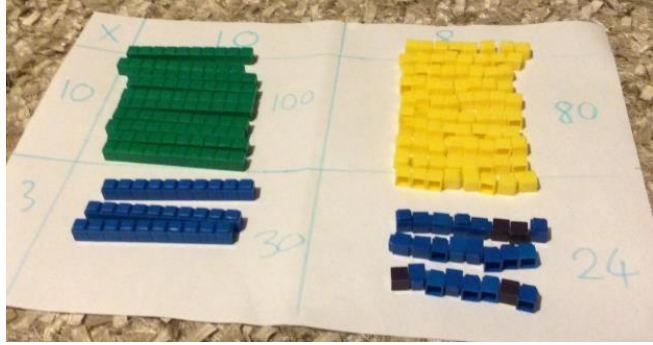
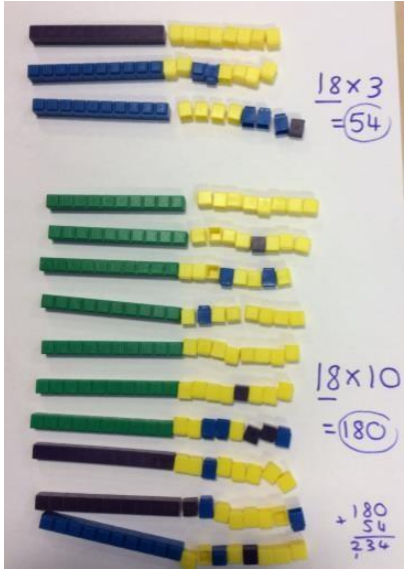
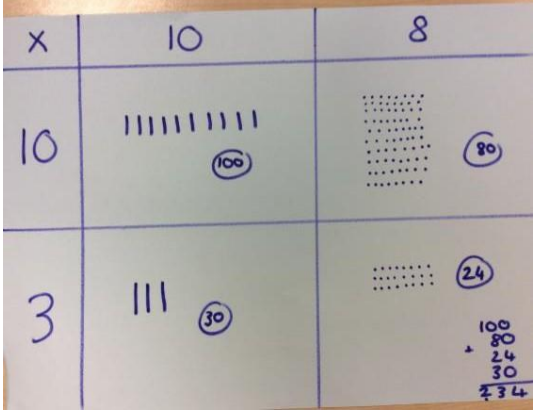
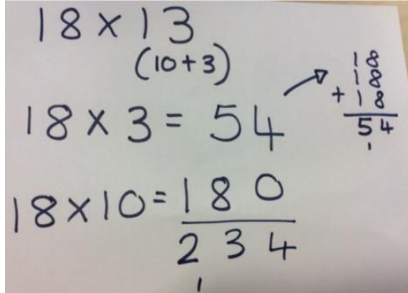
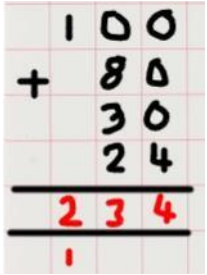
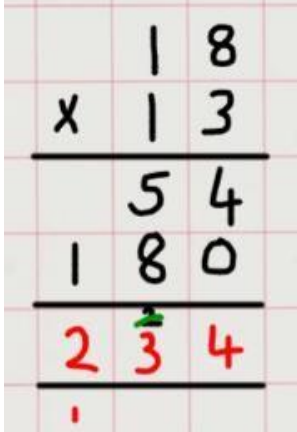
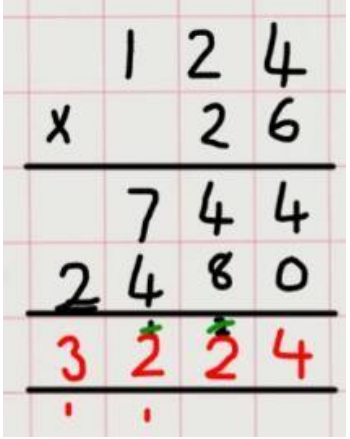
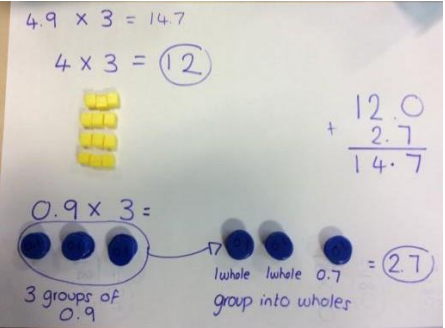
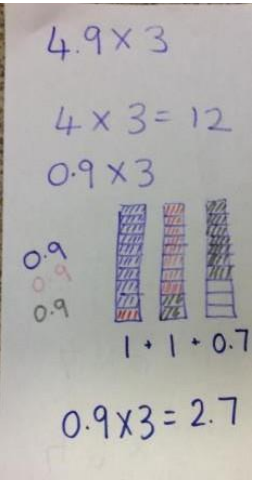
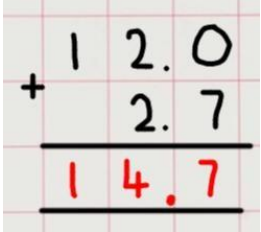
Complete these calculations.

$15 \times 100 = \boxed{\phantom{000}}$

$\boxed{\phantom{000}} \times 10 = 1500$

*Breen Airways charges £1600 for a return flight to Australia. King Airlines is ten times cheaper. How much do King Airlines charge?*

## Calculation Progression - Multiplication


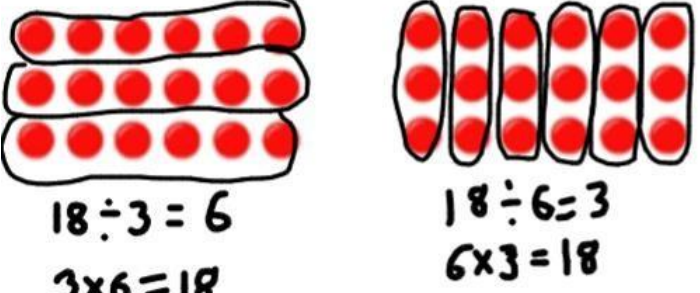
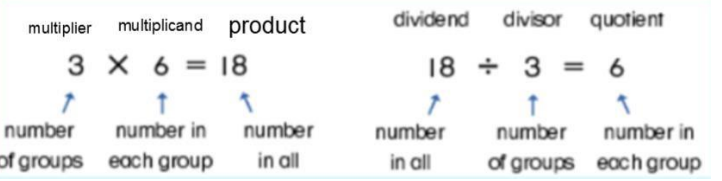
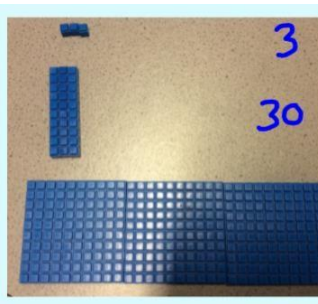
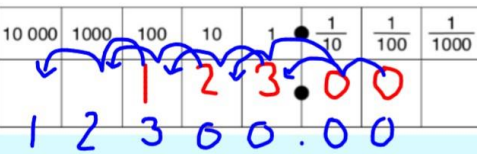
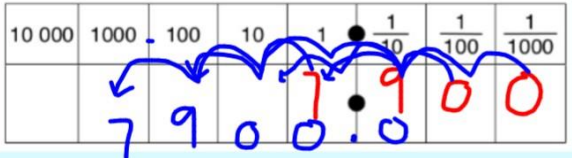
<p>To use a formal written method of multiplication (long multiplication).</p> <p>Up to 4-digit x 2 digit number</p>	<p>Children represent calculations using the place value counters using the grid method.</p> <p><b>18 x 13 = 234</b></p>  <p><b>18 x 13 = 234</b></p>  <p>Children then solve in a columnar form. They begin by multiplying the ones, then the tens, the hundreds then the thousands before finding the total.</p>	<p>Children will first use their knowledge of place value to partition the multiplicand and multiplier. They then show their understand pictorially in a grid method.</p> <p><b>18 x 13 = 234</b></p>  <p>Children then move towards the columnar method by representing each stage with jottings. Children are encouraged to multiply the ones first.</p> <p><b>18 x 13 = 234</b></p> 	<p>Children will first secure their understanding using the grid method.</p> <p>18 x 13 = 234</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td></td><td>100</td><td>80</td></tr> <tr><td></td><td>30</td><td>24</td></tr> </table>  <p>They will then move on to a more condensed method of long multiplication.</p> <p><b>18 x 13 = 234</b></p>  <p><b>124 x 26 = 3224</b></p> 					100	80		30	24
	100	80										
	30	24										
<p>To use a formal written method of multiplication to multiply number up to 2 decimal places (grid method).</p> <p>Decimal numbers x 1 digit number</p>	<p>Children represent calculations using the place value counters and base ten equipment. They partition the decimal number and multiply by the multiplier. They then find the total.</p> <p><b>4.9 x 3 = 14.7</b></p> 	<p>Children continue to multiply decimal numbers by partitioning the decimal number. They draw pictorial representations and use jottings to find the total.</p> <p><b>4.9 x 3 = 14.7</b></p> 	<p>Using the grid method, children will be able to multiply decimals with one decimal place by a single digit number. They should know that the decimal points line up under each other and place holders are added.</p> <p><b>4.9 x 3 = 14.7</b></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td></td><td>12</td><td>2.7</td></tr> </table> 					12	2.7			
	12	2.7										

# Calculation Progression - Multiplication

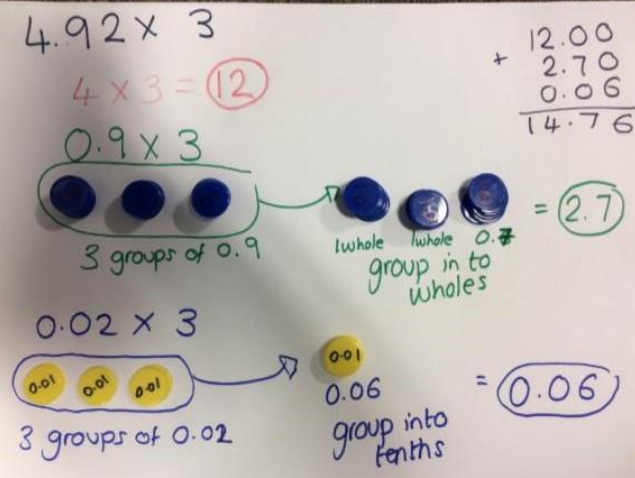
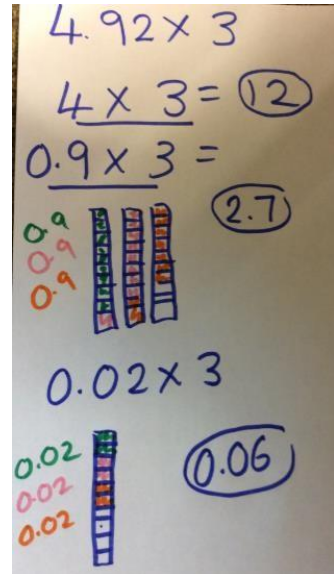
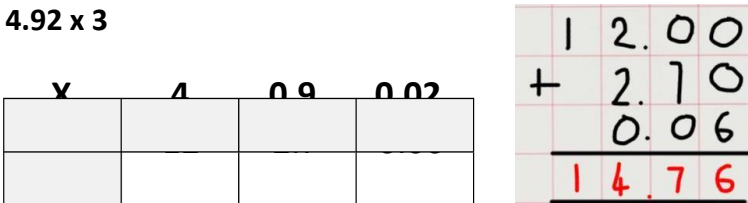
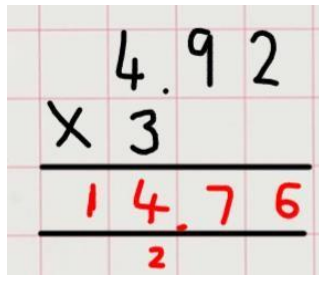

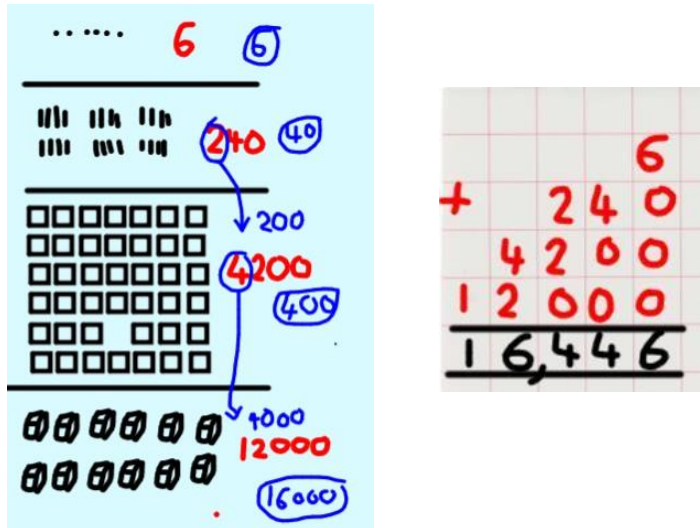
## Year 6

**Key Vocabulary:** multiplication, multiply, multiplied by, multiple, factor, product, grouping, doubling, array, row, column, groups of, times once, twice, three times ... ten times, repeated addition, one each, two each, three each ... ten each, equal groups of, multiplication table, multiplication fact, inverse, square, squared, cube, cubed.

**Times tables**-children in Year 4 needs to be able to confidently count in steps of 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

Objective & Strategy	Concrete	Pictorial	Abstract
<p>To recall multiplication and division facts for multiplication tables up to 12x 12.</p>	<p>Children continue to deepen their understanding of the link between multiplication and division and use physical objects to find related facts.</p> <p><math>3 \times 6 = 18</math>   <math>18 \div 3 = 6</math>   <math>6 \times 3 = 18</math>   <math>18 \div 6 = 3</math></p> 	<p>Children represent an array pictorially then find the associated multiplication and division facts by sorting into equal groups.</p> 	<p>Children apply their understanding of inverse relationships to write related multiplication and division statements.</p> <p><math>3 \times 6 = 18</math>   <math>18 = 3 \times 6</math>  <math>6 \times 3 = 18</math>   <math>18 = 6 \times 3</math>  <math>18 \div 3 = 6</math>   <math>6 = 18 \div 3</math>  <math>18 \div 6 = 3</math>   <math>3 = 18 \div 6</math></p> <p>They use associated vocabulary correctly and know what each number represents in the calculation.</p> 
<p>To multiply whole numbers and those involving decimals by 10, 100 and 1,000</p>	<p>Children use resources to understand what 10, 100 and 1000 times bigger looks like.</p>  <p>30 is ten times bigger than 3.          300 is ten times bigger than 30.          300 is one hundred times bigger than 3.</p>	<p>Children use place value grids to multiply numbers by 10, 100 and 1000s. They understand the movement of the digits left on the place value grid.</p> <p><b>Multiplying</b>          X 10   digits move LEFT 1 space          X 100   digits move LEFT 2 spaces          X 1000   digits move LEFT 3 spaces</p> <p>←</p> <p><math>123 \times 100 = 12300</math></p>  <p>They apply this knowledge to decimal numbers.</p> <p><math>7.9 \times 1000 = 7900</math></p> 	<p>Children apply their knowledge of place value to multiply numbers by 10, 100 and 1000, including decimal numbers.</p> <p><math>34 \times 100 = 3400</math>  <math>1234 \times 1000 = 1234000</math>  <math>5.6 \times 10 = 56</math>  <math>12.367 \times 100 = 1236.7</math></p> <p>They apply their knowledge to word and number puzzles.</p> <p>Here are five number cards.</p> <p>0.47   10   100   1000   4.07</p> <p>Use four of the cards to complete these calculations.</p> <p><math>47 \div \square = \square</math></p> <p><math>\square \times \square = 40.7</math></p>

## Calculation Progression - Multiplication

<p>To use a formal written method of multiplication to multiply number up to 2 decimal places (grid method).</p> <p>Decimal numbers x 1 digit number</p>	<p>Children represent calculations using the place value counters and base ten equipment. They partition the decimal number and multiply by the multiplier. They then find the total.</p> <p><b>4.92 x 3 = 14.76</b></p> 	<p>Children continue to multiply decimal numbers by partitioning the decimal number. They draw pictorial representations and jottings to find the total.</p> <p><b>4.92 x 3 = 14.76</b></p> 	<p><b>Formal method</b></p> <p>Using the grid method, children will be able to multiply decimals with up to two decimal places by a single digit number. They should know that the decimal points line up under each other and zeros are added at place holders.</p> <p><b>4.92 x 3</b></p> <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr><td>x</td><td>4</td><td>9</td><td>2</td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table>  <p>Children will move onto using the condensed method.</p> 	x	4	9	2																																														
x	4	9	2																																																		
<p>To use a formal written method of multiplication (short multiplication).</p> <p>Multi-digit numbers x 1 digit number</p>	<p>Children represent calculations using the place value counters and base ten equipment. They solve in a columnar form and begin by multiplying the ones, then the tens then the hundreds then the thousands before finding the total.</p> <p><b>2741 x 6 = 16,446</b></p> <p>1 x 6 = 6 40 x 6 = 240 700 x 6 = 4,200 2000 x 6 = 12,000</p> 	<p>Children represent the calculation by drawing pictorial representations. They partition the multiplicand then multiply each part by the multiplier. They understand the place value and can confidently exchange between columns. This leads to the condensed method.</p> 	<p><b>Formal Method</b></p> <p>In year 6 children are expected to multiply multi digit numbers by a 1 digit number.</p> <p>The children continue to use the condensed method of short multiplication. The number is carried underneath.</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center; padding: 5px;"> <p>342 x 7 becomes</p> <table border="1" style="margin: 0 auto;"> <tr><td>3</td><td>4</td><td>2</td></tr> <tr><td>x</td><td></td><td>7</td></tr> <tr><td colspan="3" style="border-top: 1px solid black;"></td></tr> <tr><td>2</td><td>3</td><td>9</td><td>4</td></tr> <tr><td colspan="4" style="border-top: 1px solid black;"></td></tr> <tr><td>2</td><td>1</td><td></td><td></td></tr> </table> </td> <td style="text-align: center; padding: 5px;"> <p>2741 x 6 becomes</p> <table border="1" style="margin: 0 auto;"> <tr><td>2</td><td>7</td><td>4</td><td>1</td></tr> <tr><td>x</td><td></td><td></td><td>6</td></tr> <tr><td colspan="4" style="border-top: 1px solid black;"></td></tr> <tr><td>1</td><td>6</td><td>4</td><td>4</td><td>6</td></tr> <tr><td colspan="5" style="border-top: 1px solid black;"></td></tr> <tr><td>4</td><td>2</td><td></td><td></td><td></td></tr> </table> </td> </tr> </table>	<p>342 x 7 becomes</p> <table border="1" style="margin: 0 auto;"> <tr><td>3</td><td>4</td><td>2</td></tr> <tr><td>x</td><td></td><td>7</td></tr> <tr><td colspan="3" style="border-top: 1px solid black;"></td></tr> <tr><td>2</td><td>3</td><td>9</td><td>4</td></tr> <tr><td colspan="4" style="border-top: 1px solid black;"></td></tr> <tr><td>2</td><td>1</td><td></td><td></td></tr> </table>	3	4	2	x		7				2	3	9	4					2	1			<p>2741 x 6 becomes</p> <table border="1" style="margin: 0 auto;"> <tr><td>2</td><td>7</td><td>4</td><td>1</td></tr> <tr><td>x</td><td></td><td></td><td>6</td></tr> <tr><td colspan="4" style="border-top: 1px solid black;"></td></tr> <tr><td>1</td><td>6</td><td>4</td><td>4</td><td>6</td></tr> <tr><td colspan="5" style="border-top: 1px solid black;"></td></tr> <tr><td>4</td><td>2</td><td></td><td></td><td></td></tr> </table>	2	7	4	1	x			6					1	6	4	4	6						4	2			
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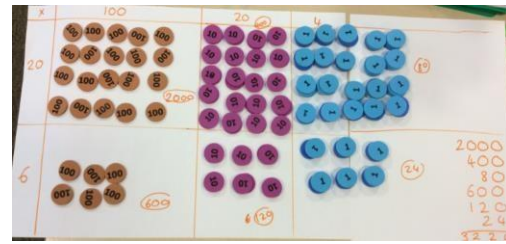
# Calculation Progression - Multiplication

To use a formal written method of multiplication (long multiplication).

Multi-digit x 2 digit number

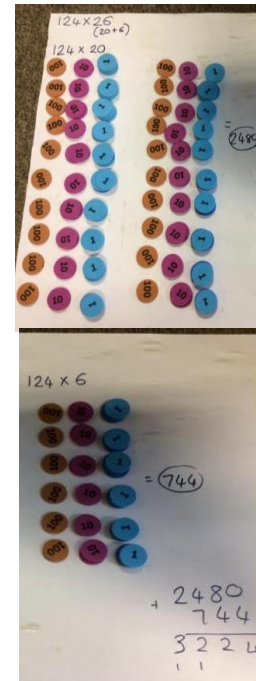
Children represent calculations using the place value counters using the grid method.

$124 \times 26 = 3224$



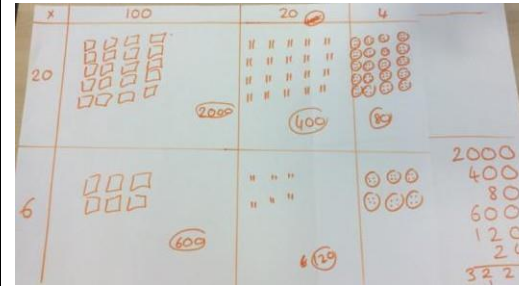
They then solve calculations in a columnar form and begin by multiplying the ones, the tens then the hundreds then the thousands before finding the total.

$124 \times 26 = 3224$



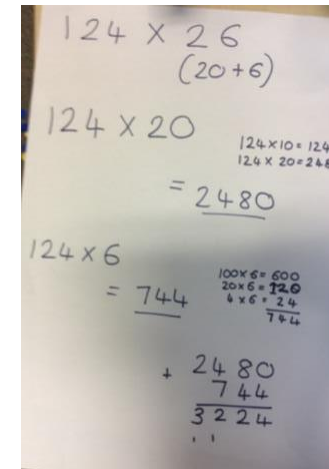
Children will first use their knowledge of place value to partition the multiplicand and multiplier. They then show their understand pictorially in a grid method.

$124 \times 26 = 3224$



$124 \times 26 = 3224$

Children then move towards the columnar method by representing each stage with jottings. Children are encouraged to multiply the ones first.

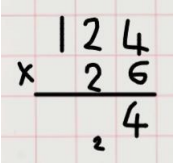


## Formal Method

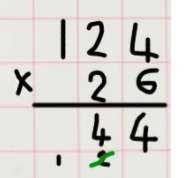
In year 6 children are expected to multiply multi digit numbers by a 2 digit number. The children are introduced to long multiplication. The number is carried underneath.

$124 \times 26 = 3224$

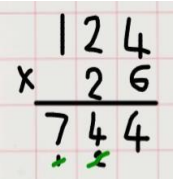
**Step 1:** Multiply the multiplier by the multiplicand. Start with the ones, multiply 6 by 4 (24). Write the 4 in the ones column and carry the 20 below the line.



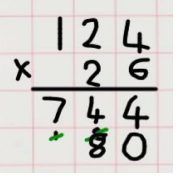
**Step 2:** Multiply the 6 by 20 (120) and add the 2 (122). Cross off the carried 20. Write the 4 in the tens column and carry the 100 below the line.



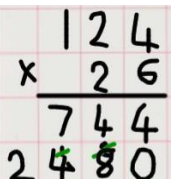
**Step 3:** Multiply the 6 by 100 (600) and add the 100 (700). Cross off the carried 100. Write the 7 in the hundreds.



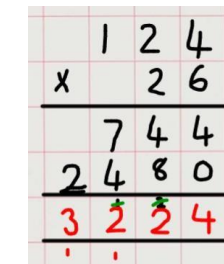
**Step 4:** Move to the tens column on the multiplier and start a new line. Multiply the 20 by 4 (80) and record.



**Step 5:** Multiply the 20 by 20 (400) and record. Then multiply the 20 by the 100 (200) and record.



**Step 6:** Total the numbers.



4 digit x 2 digit  
 $1234 \times 16 = 19,744$

