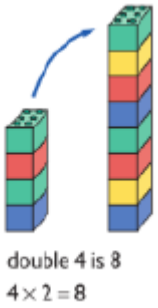
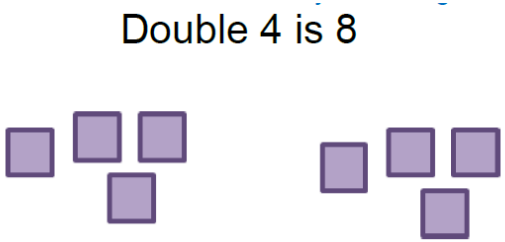
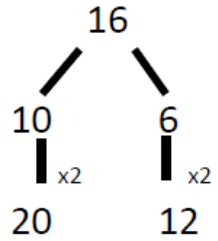
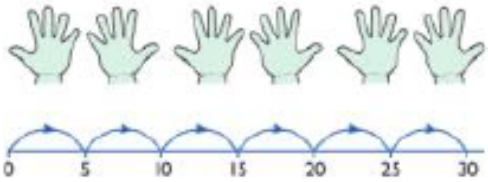
Coppice Valley Primary School
Calculation procedure

Multiplication
Key vocabulary: double, times, multiplied by, the product of, groups of, lots of, equal groups, factor, product

Objective and strategy	Concrete	Pictorial	Abstract
Doubling Suggested year group(s): Rec, Year 1	Use practical activities to show how to double a number.  double 4 is 8 $4 \times 2 = 8$	Draw pictures to show how to double a number.  	Year 3 upwards: Partition a number and then double each part before recombining it back together. 
Counting in multiples Suggested year group(s): All year groups learning new times tables/counting sequence	Count in multiples supported by concrete objects in equal groups. 	 Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25, 30

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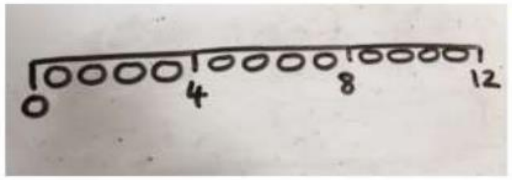
<table>
<tr>
<td></td>
<td> 
  </td>
<td>  </td>
<td></td>
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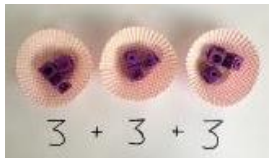
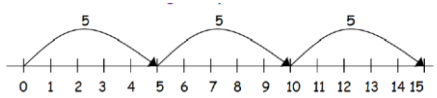
<tr>
<td>Repeated addition

Suggested year group(s): Year 2</td>
<td>  

Use different objects to add equal groups.
  </td>
<td>There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?
 
2 add 2 add 2 equals 6
 

5 + 5 + 5 = 15</td>
<td>Write addition sentences to describe objects and pictures.
 
2 + 2 + 2 + 2 + 2 = 10

Children can then record this on an empty number line:</td>
</tr>
</table>

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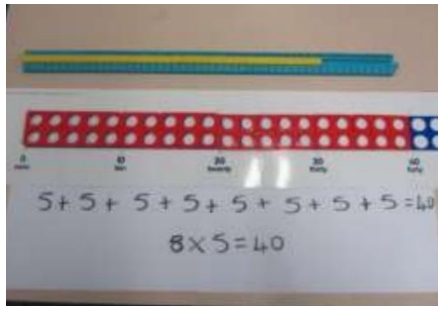
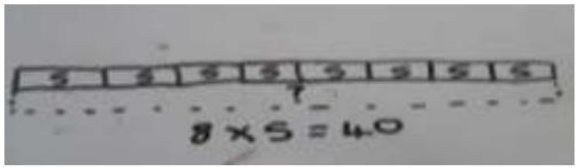
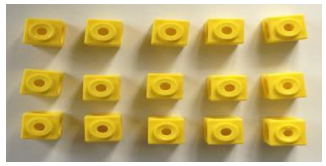
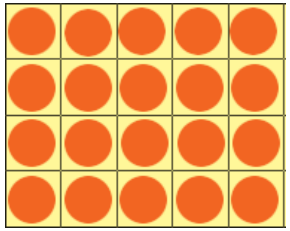
		Children can record this as a bar model:  The dotted line shows the unknown quantity. Children could then replace the question mark with the number 40.	8 x 5 = 40 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40 0 5 10 15 20 25 30 35 40
Arrays - showing commutativity Suggested year group(s): Year 1, Year 2, Year 3	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.  4×2=8 2×4=8  2×4=8 4×2=8  Link arrays to areas of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition. Factor x Factor = Product

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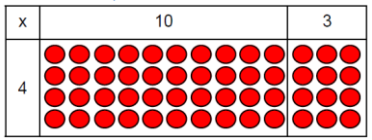
			 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 3 + 3 + 3 + 6 = 15
Grid method Suggested year group(s): Year 3, Year 4	Show the link with arrays to first introduce the grid method. 4 rows of 10. 4 rows of 3.  Move on to using Base 10 to move towards a more compact method.	Children can represent the work they have done with place value counters in a way that they understand.	Start with multiplying by one-digit numbers and showing the clear addition alongside the grid. **×** | **30** | **5** **7** | **210** | **35** **210 + 35 = 245** Moving forward, multiply by a 2-digit number showing the different rows within the grid method.

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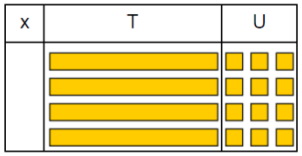
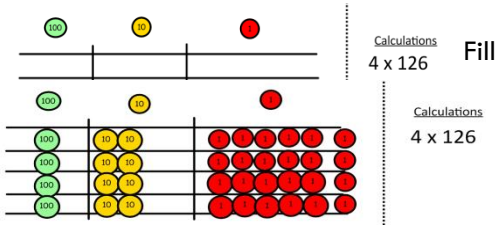
4 rows of 13.



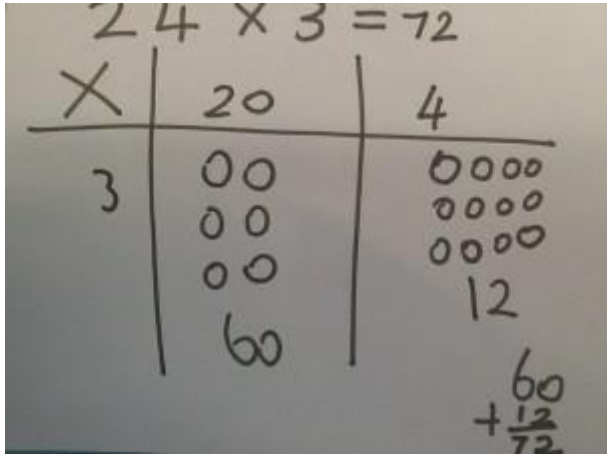
Move on to place value counters to show how we are finding groups of a number.
We are multiplying by 4 so we need 4 rows.

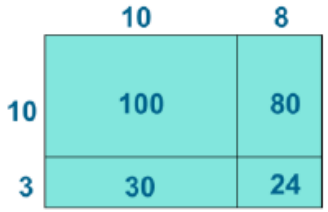


each row with 126.

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

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





X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

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	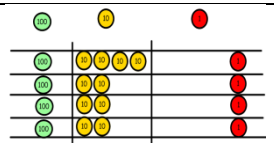 Then you have your product. 		

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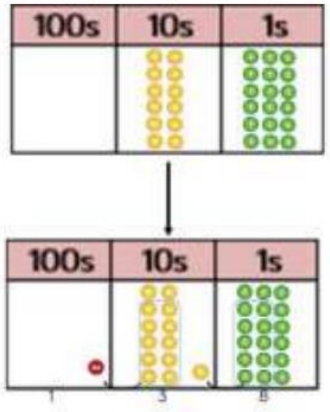
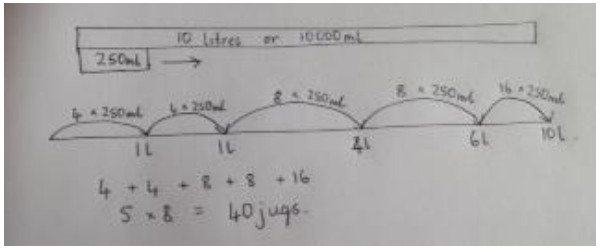
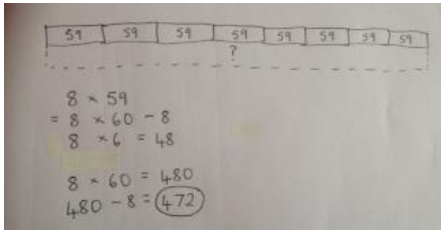
Column method Suggested year group(s): Year 5, Year 6	Children can continue to be supported by place value counters at this stage of multiplication. 6 x 23 =  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens. '*With counters, prove that 6 x 23 = 138*'	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.   	Formal written method 6 x 23 = 23 x 6 138 1 1 Start with long multiplication, reminding the children about lining up their numbers clearly in columns. 74 x 63 12 210 240 + 4200 4662

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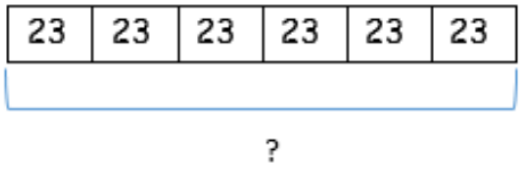
When children start to multiply 3d × 3d and 4d × 2d etc., they should be confident with the abstract:

To get 744 children have solved 6 × 124.
To get 2480 they have solved 20 × 124.

$$\begin{array}{r} 1\ 2\ 4 \\ \times\quad 2\ 6 \\ \hline 7\ 4\ 4 \\ 2\ 4\ 8\ 0 \\ \hline 3\ 2\ 2\ 4 \\ \hline 1\ 1 \end{array}$$

Answer: 3224

Conceptual variation; different ways to ask children to solve 6 × 23



Mai had to swim 23 lengths, 6 times a week.
How many lengths did she swim in one week?

With the counters, prove that 6 x 23 = 138

Find the product of 6 and 23

6 x 23 =

□ = 6 × 23

$$\begin{array}{rr} 6 & 23 \\ \times\ 23 & \times\ 6 \\ \hline & \end{array}$$

What is the calculation?
What is the product?

100s	10s	1s