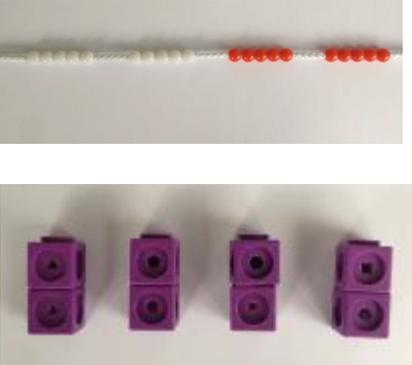
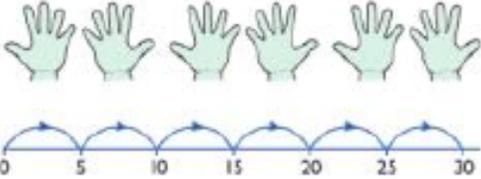
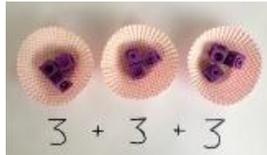


Progression in Calculations for Multiplication

Stage	Concrete	Pictorial	Abstract
Counting in multiples	 <p>Count in multiples supported by concrete objects in equal groups.</p>	 <p>Use a number line or pictures to continue support in counting in multiples.</p>	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20, 25, 30</p>

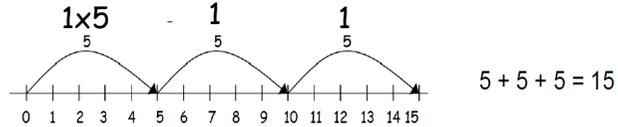
Repeated addition



Use different objects to add equal groups.

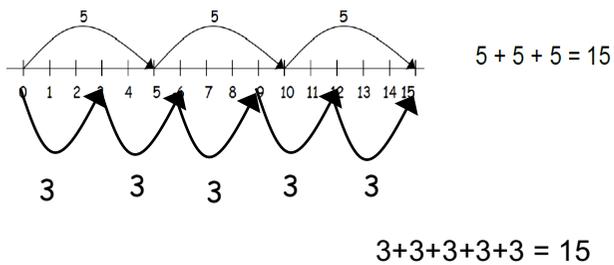
Repeated addition can be shown easily on a number line:

$$3 \times 5 = 5 + 5 + 5$$



Commutativity

Children should know that 3×5 has the same answer as 5×3 . This can also be shown on the number line.



Write addition sentences to describe objects and pictures.



$$2 + 2 + 2 + 2 + 2 = 10$$

Arrays

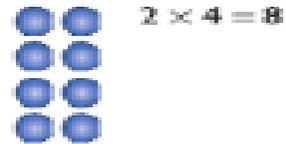
Children should be able to model a multiplication calculation using an array.



Draw arrays in different rotations to find **commutative** multiplication sentences.



$$2 \times 4 = 8$$



$$4 \times 2 = 8$$

Use an array to write multiplication sentences and reinforce repeated addition.



$$5 + 5 + 5 = 15$$

$$3 + 3 + 3 + 3 + 3 = 15$$

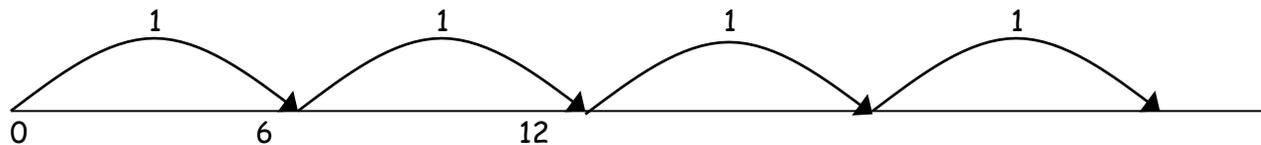
$$3 \times 5 = 15$$

$$5 \times 3 = 15$$

Using an empty number line

Children should then move onto using empty number lines to support their understanding.

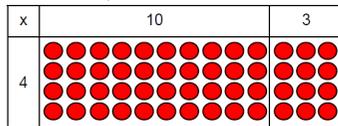
$$4 \times 6 =$$



Grid Method

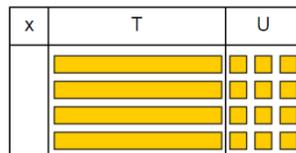
Show the link with arrays to first introduce the grid method.

$$13 \times 4 =$$



4 rows of 10
4 rows of 3

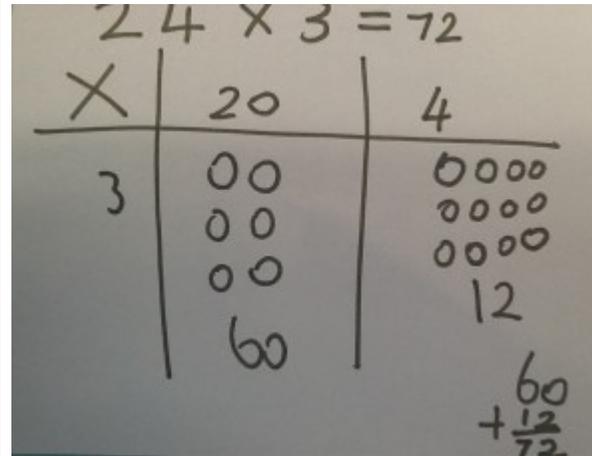
Move on to using Base 10 to move towards a more compact method.



4 rows of 13

Children can represent the work they have done with place value counters in a way that they understand.

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.



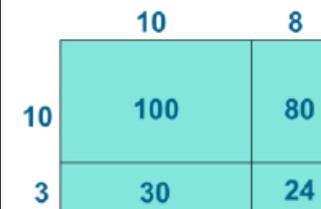
Start with short multiplication – multiplication by a single digit. Children should show the clear addition alongside the grid.

x	30	5
7	210	35

$$210 + 35 = 245$$

Move onto multiplying a 3-digit and 4-digit number by a single digit using the same method.

Moving forward, multiply by a 2-digit number showing the different rows within the grid method.

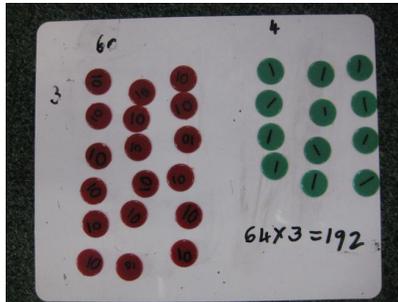


x	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

Again children should show the clear addition alongside the grid.

Formal method-
column
multiplication

Children can continue to be supported by place value counters at the stage of multiplication.



It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.

Short Multiplication

24 x 6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ 2 \end{array}$$

Answer: 144

342 x 7 becomes

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ 21 \end{array}$$

Answer: 2394

2741 x 6 becomes

$$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ 42 \end{array}$$

Answer: 16 446

Remind children about lining their numbers up clearly in columns.

Long Multiplication

24 x 16 becomes

$$\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ 240 \\ \hline 384 \end{array}$$

Answer: 384

124 x 26 becomes

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ 11 \end{array}$$

Answer: 3224

124 x 26 becomes

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ 11 \end{array}$$

Answer: 3224

If it helps, children can write out what they are solving next to their answer before moving to the more compact method shown above.

$$\begin{array}{r} 32 \\ \times 24 \\ \hline 8 \quad (4 \times 2) \\ 120 \quad (4 \times 30) \\ 40 \quad (20 \times 2) \\ 600 \quad (20 \times 30) \\ \hline 768 \end{array}$$

$$\begin{array}{r} 74 \\ \times 63 \\ \hline 12 \\ 210 \\ 240 \\ + 4200 \\ \hline 4662 \end{array}$$

By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.

Children should not be made to go onto the next stage if:

- 1) they are not ready.
- 2) they are not confident.

Children should be encouraged to approximate their answers before calculating.

Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.