

Steps to Success - Multiplication

Step 1 - Early Learning

Children will begin by using concrete objects such as cubes, counters and Numicon to count equal groups of objects.

$2 \times 4 = \square$
 Each child has two eyes.
 How many eyes do four children have?

 $2 + 2 + 2 + 2$


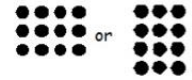


Children will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups.



Step 2 - Informal Written Methods

Children are taught to understand multiplication as repeated addition and scaling. It is important that it is described and recognised as an array.

<p>$5 \times 3 = \square$ There are 5 cakes in a pack. How many cakes in 3 packs?  $5 + 5 + 5$</p>	<p>Dots or tally marks are often drawn in groups. This shows 3 lots of 5.</p>
<p>$4 \times 3 = \square$ A chew costs 4p. How much do 3 chews cost? </p>	<p>Drawing an array (3 rows of 4 or 3 columns of 4) gives children an image of the answer. It also helps develop the understanding that 4×3 is the same as 3×4.</p>

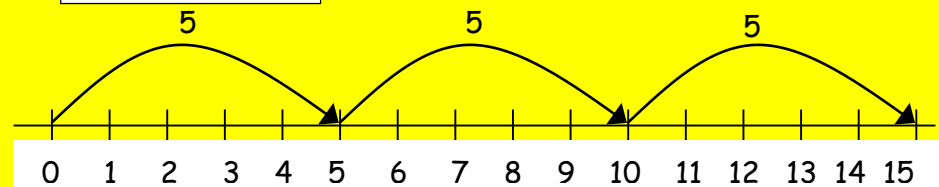
Children will develop their understanding of multiplication and use jottings to support calculation:

✓ Repeated addition

3 times 5 is $5 + 5 + 5 = 15$ or 3 lots of 5 or 3×5

Repeated addition can be shown easily on a number line:

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





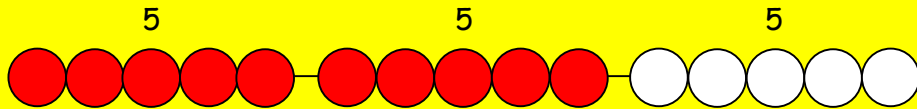
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Step 2 - Informal Written Methods Continued

Repeated addition continued

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



T0 x 0
14 x 5

How is multiplication the same as repeated addition?

The number line helps me see each group of 5 clearly. If I add 5 fourteen times, that is the same as 5 multiplied by 14 (5×14). I can make 14 individual jumps of 5 along the number line, or 1 jump of 5×10 and 1 jump of 5×4 . Table facts will help me do this more quickly.

T0 x 0
14 x 5

The number line shows 5 multiplied by 14. This is equal to 14 multiplied by 5 (14 jumps of 5 on the number line).

Multiplication is *repeated addition*.

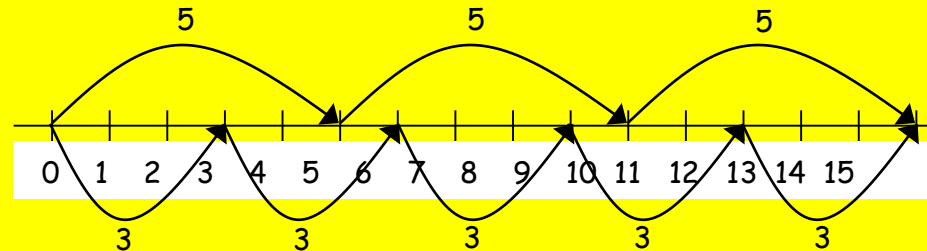
Using table facts to make bigger jumps is more efficient.

$14 \times 5 = 70$

Step 2 - Informal Written Methods Continued

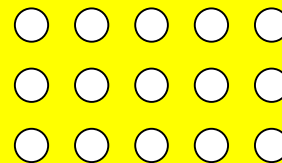
✓ **Commutativity**

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



✓ **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.



$$5 \times 3 = 15$$

$$3 \times 5 = 15$$



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Step 2 - Informal Written Methods Continued

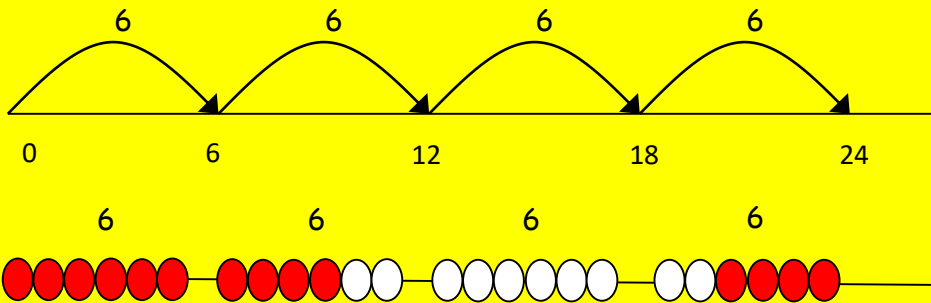
Children will continue to use:

✓ **Repeated addition**

4 times 6 is $4 + 4 + 4 + 4 + 4 = 24$ (four six times)

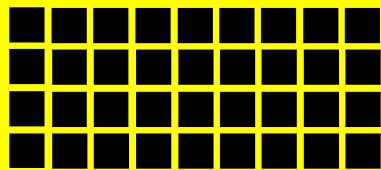
but can also be seen as 4 lots of 6 or 4×6 ($6 + 6 + 6 + 6 = 24$)

Children should use number lines or bead bars to support their understanding.



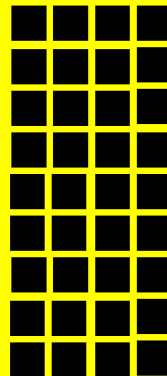
✓ **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development



$$4 \times 9 = 36$$

$$9 \times 4 = 36$$



Step 2 - Informal Written Methods Continued

Children will also develop an understanding of

✓ **Scaling**

e.g. Find a ribbon that is 4 times as long as the blue ribbon



5cm



20cm

✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

$$\square \times 5 = 20$$

$$3 \times \triangle = 18$$

$$\square \times \circ = 32$$

✓ **Partitioning**

$$\begin{aligned}
 38 \times 5 &= (30 \times 5) + (8 \times 5) \\
 &= 150 + 40 \\
 &= 190
 \end{aligned}$$



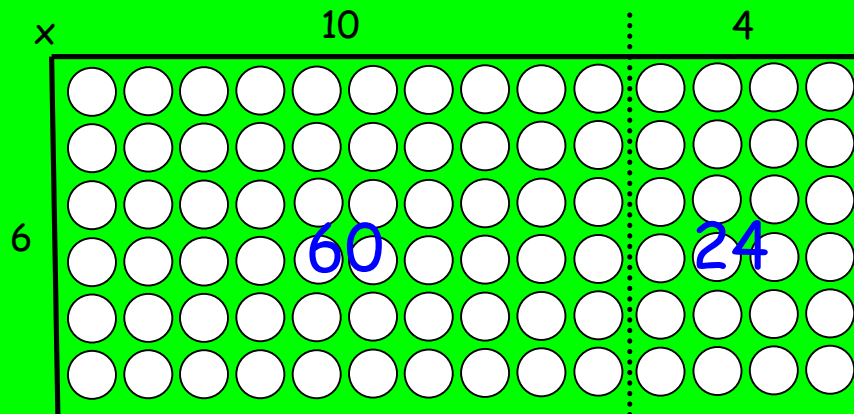
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Step 3 - Beginning of Written Methods

✓ The Array Method

Children will continue to use arrays where appropriate leading into the array method of multiplication.



$$(6 \times 10) + (6 \times 4)$$

$$60 + 24$$

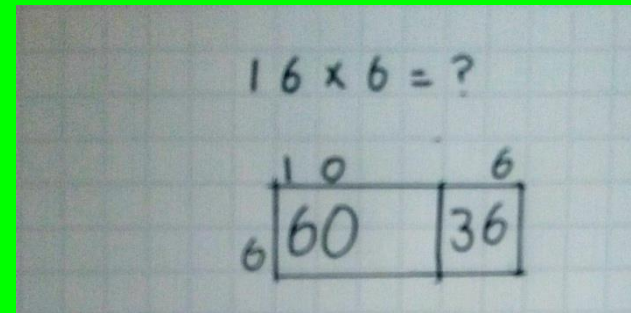
$$84$$

Step 3 - Beginning of Written Methods

✓ Array Method Continued

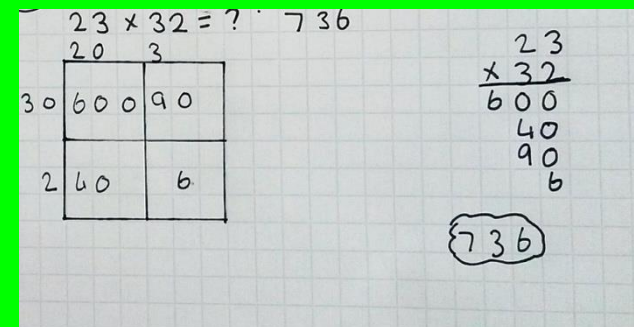
$$T0 \times 0$$

$$16 \times 6 = ?$$



$$T0 \times T0$$

$$23 \times 32 = ?$$





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Step 4 - Formal Written Method

Use an expanded method, linked to the array.

$$\begin{array}{r} 354 \\ \times 7 \\ \hline 2100 \\ 350 \\ 28 \\ \hline 2478 \end{array}$$

300	50	4
2100	350	28

$23 \times 32 = ?$ 736

30	600	90
2	40	6

$$\begin{array}{r} 23 \\ \times 32 \\ \hline 600 \\ 40 \\ 90 \\ 6 \end{array}$$

736

Step 4 - Formal Written Method Continued

Once secure, children can then compact their method, using their mental calculations. Carrying out both the expanded and compact method side by side can help with introducing the compact method.

$$\begin{array}{r} 33 \\ \times 43 \\ \hline 1200 \\ 90 \\ 120 \\ \hline 1419 \end{array}$$

$$\begin{array}{r} 33 \\ \times 43 \\ \hline 1200 \\ 129 \\ \hline 1419 \end{array}$$