



Multiplication

Vocabulary:

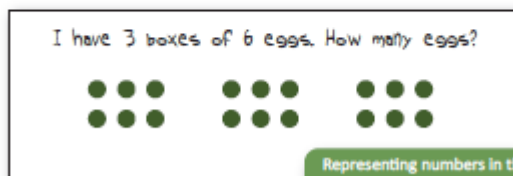
Groups of, lots of, times, array, altogether, multiply, count, Multiplied by, sets of, equal groups, commutative, multiple, product, partition, inverse, square, factor, integer, composite.

Stage 1 (Foundation Stage - Year 1)

Early work on multiplication involves counting on in steps of 2 initially, then in steps of 5 and 10. The concept of multiplication at this stage is **entirely** practical - it involves exploring real-life examples of equal sets or groups.



Just as with addition and subtraction, children can begin to substitute symbols for real objects.



Representing numbers in this way, ie in a grid, is called an array. In this example you can also see that the array shows that 6 is 3 lots of 2 and also 2 lots of 3.

Stage 2/3 (Year 2 - Year 3)

At stages 2 and 3 we represent multiplication as repeated addition, that is:

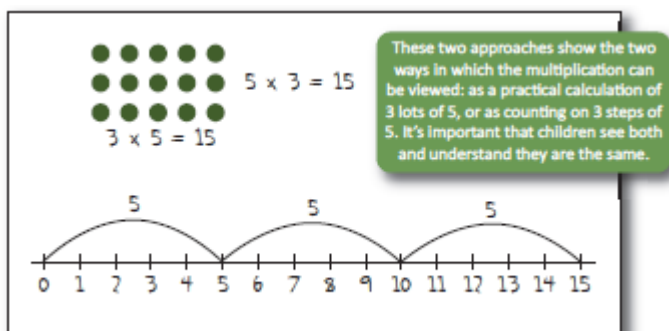
3 times 5

$5 + 5 + 5$

3 lots of 5

3×5 all represent the same calculation.

A difficult concept at this stage is that multiplication (like addition) is commutative. This means that 3×5 is the same as 5×3 . Using a grid (**array**) or a numberline, we can calculate a multiplication:

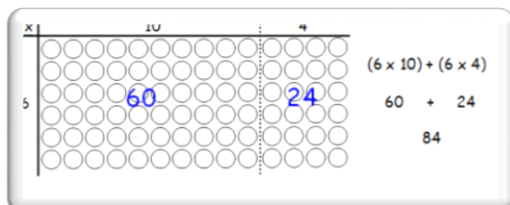


Both of these methods are used throughout stages 2 and 3 and are taught alongside the relevant tables in the following order:

- 2, 5 & 10 times tables (expected at Year 2)
- 3, 4 & 6 times tables (expected at Year 3)
- 7, 8 & 9 times tables (expected at Year 4)

Stage 4 (Year 4 - Year 5)

This stage introduces the 'grid method' - our preferred method of calculation for multiplication. They will develop their understanding of the grid method, initially supported by an array with a straightforward calculation with a two-digit number (TO) multiplied by a single-digit number (O).



$$23 \times 8 =$$

$$E = 25 \times 8 = 200$$

x	20	3
8		

We complete an estimate first so that we can check our answer. Then partition the two-digit number in to its tens (20) and units (3). Set the question out in a grid as shown.

Now calculate 8×20 and place the answer in the grid, following this with 8×3 . Add the two answers together to complete the calculation and check with the estimate.

$$23 \times 8 = 184$$

$$E = 25 \times 8 = 200$$

x	20	3	
8	160	24	
			184

Stage 5 (Year 4)

Stage 5 builds on stage 5 by extending the grid method to a range of other possible calculations.

- HTO x O (eg 346×9) & ThHTO x O (eg 4346×8)
- TO x TO (eg 72×38) & HTO x TO (eg 372×24)
- O.t x O (eg 4.9×3) & O.th x O (eg 6.73×7)

Example 1 is a simple expansion of Stage 4.

$$4346 \times 8 =$$

$$E = 4500 \times 8 = 36,000$$

x	4000	300	40	6
8	32000	2400	320	48

$A = 34,768$

32000
2400
320
48
34768

In example 2 there will be two rows in the grid - one for the tens and one for the units.

$$372 \times 24 =$$

$$E = 400 \times 25 = 10,000$$

x	300	70	2
20	6000	1400	40
4	1200	280	8

$A = 8928$

6000
1200
1400
280
40
8
8928

Example 3 requires a good understanding of decimals.

$$6.73 \times 7 =$$

$$E = 7 \times 7 = 49$$

x	6	0.7	0.03
7	42	4.9	0.21

$A = 47.11$

42
4.9
0.21
47.11

Stage 6 (Year 5/6)

Stage 6 children will use expanded written method of long multiplication. It is easy to see how this method develops from the grid method as the processes are the same with each section of the grid written in a column.

Stage 1:

$$56 \times 27 =$$
$$E = 60 \times 25 = 1500$$

Stage 2:

$$\begin{array}{r} 56 \\ \times 27 \\ \hline \end{array}$$

Stage 3:

$$\begin{array}{r} 56 \times 27 = \\ E = 60 \times 25 = 1500 \\ \begin{array}{r} 56 \\ \times 27 \\ \hline 42 \quad (6 \times 7) \\ 350 \quad (50 \times 7) \\ 120 \quad (6 \times 20) \\ 1000 \quad (50 \times 20) \\ \hline \end{array} \end{array}$$

Stage 4:

$$\begin{array}{r} 56 \times 27 = \\ E = 60 \times 25 = 1500 \\ \begin{array}{r} 56 \\ \times 27 \\ \hline 42 \quad (6 \times 7) \\ 350 \quad (50 \times 7) \\ 120 \quad (6 \times 20) \\ 1000 \quad (50 \times 20) \\ \hline 1512 \\ \hline 1 \end{array} \end{array}$$

Callout 1 (Green box): Remembering to estimate first, set out the calculation lining up the tens and units. There are four calculations: 50×20 , 6×20 , 50×7 & 6×7 . Write each of these on a separate line.

Callout 2 (Green box): Now the simple process of totaling the four lines is all that is left to do. Then check the answer against the estimate.

Stage 7 (Year 6)

The final stage for this operation is the compact written method of long multiplication. Children should only move on to this method when they have a secure understanding of stage 6.

$$34 \times 47$$

$$E \ 30 \times 50 = 1500$$

$$\begin{array}{r} 34 \\ \times 47 \\ \hline 238 \quad (7 \times 34) \\ 1360 \quad (40 \times 34) \\ \hline 1598 \end{array}$$