

MULTIPLICATION

In order to support written calculation the following mental strategies are essential.

To multiply successfully, children need to be able to:

- count on in steps, e.g. work out 10×3 by counting on in 10s
- understand commutativity, e.g. work out 5×7 by recalling seven 5s if they don't yet know their seven times table
- recall all multiplication facts to 12×12 by the end of Year 4
- partition number into multiples of one thousand, hundred, ten and one;
- work out products such as: 70×5 , 70×50 , 700×5 , 700×50 or 7000×5 using the related fact 7×5 and their knowledge of place value;
- Multiply numbers by 10, 100 and 1000 and understand the effect.

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for multiplication.

Key vocabulary related to multiplication:

Foundation

Lots of, groups, times, altogether

Key Stage One

Double, count on, repeat, multiply.

Lower Key Stage Two

multiplication, product, multiple.

Upper Key Stage Two

Square, product, factor.

Foundation Stage

Solve problems including doubling.

Count repeated groups of the same size (socks, gloves)

Children will count in 2s and 10s and begin to count in 5s.



Practical problem solving activities involving equal sets or groups e.g. dog biscuits

Double objects and numbers

Double 5

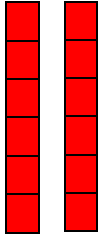


double 4 is 8

Year 1

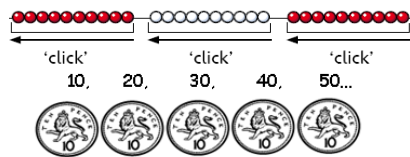
Multiply with concrete objects, pictorial representations and arrays.

Continue to build on doubling experience of foundation stage by doubling single digit numbers (towers, fingers etc).



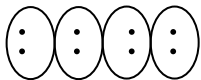
Counting in steps of 2, 5, 10 (linking to gloves/socks, fingers/hands, coins).

Children will need practical experience of counting equal groups of objects too.



Record as repeated addition and as an array.

$2+2+2+2 = 2 \times 4$ 2 multiplied by 4, 4 lots of 2



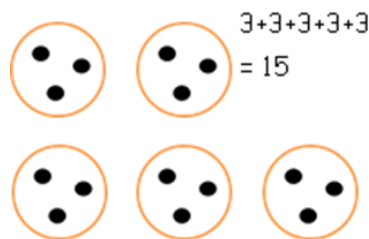
Present Practical problem solving activities involving counting equal groups as below:



$$2 + 2 + 2 = 6 \text{ or } 2 \times 3 = 6$$

How many legs will 3 teddies have?

There are 3 sweets in one bag.
How many sweets are in 5 bags altogether?

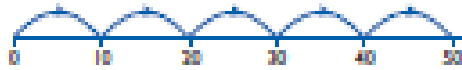
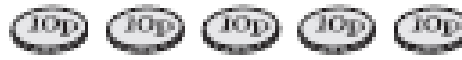


Year 2

Multiply using arrays and repeated addition (using at least 2s, 5s and 10s)

Counting in steps

Building on Year 1 steps and also count in 3s and 4s.



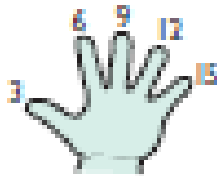
Recall and use multiplication facts for the 2, 5 and 10

Children will need to learn their times tables to x12

e.g. $12 \times 2 = 24$

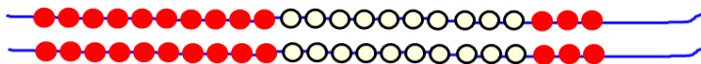
Counting and understanding the operation is needed as well as memorising facts.

Find five 3s, six 5s, five 10s



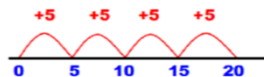
Doubling teen numbers building from towers to partitioning, progressing to two-digit numbers when secure.

$$\begin{array}{r} 23 \times 2 \\ 40 + 6 = 46 \end{array}$$



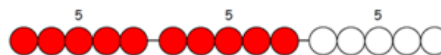
Use repeated addition on a number line:

Making equal jumps from zero on a number line to work out multiplication facts and write statement using \times and $=$ sign e.g. $5 \times 4 = 20$

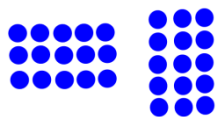


$$5 \times 4 = 5 + 5 + 5 + 5$$

Also show using practical apparatus such as a bead bar.

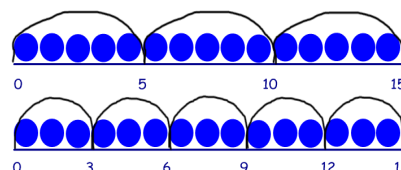


Use arrays:



Use arrays to support understanding of commutative law of multiplication.

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

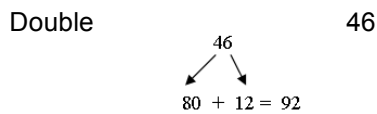


Year 3

Multiply 2-digits by a single digit number

Recall and use **3, 4 and 8** multiplication facts.

Double two digit numbers:



Investigating $\times 10/100$ understanding the effect to build on at a later point.

Thousands	Hundreds	Tens	Ones
		3	1
	3	1	0

Introduce the **grid method** for multiplying 2-digit by single-digits as a stepping stone to the formal written method:

Step 1 Introduce the grid method with children physically making an array to represent the calculation (e.g. make 8 lots of 23 with 10s and 1s place value counters), then translate this to grid method format.

	8
3	XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX
20	XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX

x	8
3	24
20	160
	184

Step 2

Move on quickly to showing the children the **expanded written method**, using the grid method alongside as necessary.

Leading to

$$\begin{array}{r}
 23 \\
 \times 8 \\
 \hline
 24 \quad (3 \times 8) \\
 \underline{160} \quad (20 \times 8) \\
 184
 \end{array}$$

Step 3

Use the formal written method.

$$\begin{array}{r}
 23 \\
 \times 8 \\
 \hline
 184 \\
 \hline
 2
 \end{array}$$

Year 4

Multiply 2 and 3-digits by a single digit, using all multiplication tables up to 12×12

Recall all multiplication facts to 12×12 .

Consolidate knowledge of $\times 10/100$ to support written methods.

Include multiples of ten and one hundred by a single digit, using their multiplication table knowledge. $7 \times 8 = 56$ $70 \times 8 = 560$ $700 \times 8 = 5600$

Multiply two and three digit by a single digit using short multiplication method (use grid method as a support):

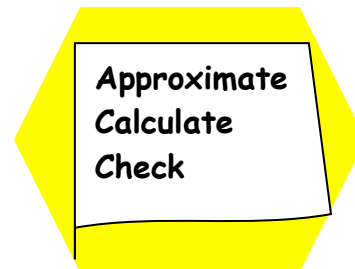
x	7
2	14
40	280
300	2100
<hr/>	
2394	

342×7 becomes

$$\begin{array}{r} 3 4 2 \\ \times 7 \\ \hline 2 3 9 4 \\ \hline 2 1 \end{array}$$

Answer: 2394

Approximate before they calculate, and make this a regular part of their calculating, going back to the approximation to check the reasonableness of their answer. e.g. " 346×9 is approximately $350 \times 10 = 3500$." Record an approximation to check the final answer against.



Year 5

Multiply numbers up to 4 digits by a 1 or 2 digit number.

Multiply decimals by 10, 100 and 1000.

Thousands	Hundreds	Tens	Ones	tenths
			1	3
1	3	0	0	0

Decimal point
DOES NOT
move!

Short multiplication

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

Answer: 16 446

Long multiplication

(TU x TU and HTU x TU):

e.g. $312 \times 23 =$

$$\begin{array}{r} 312 \\ \times 23 \\ \hline 936 \quad (312 \times 3) \\ 6240 \quad (312 \times 20) \\ \hline 7176 \\ 1 \end{array}$$

Year 6

Multiply multi digit numbers up to 4 digits by 2 digit numbers using long multiplication.

$$\begin{array}{r} 341 \\ \times 52 \\ \hline 682 \\ 17050 \\ \hline 17732 \end{array}$$

Multiply numbers with up to 2 decimal places by whole numbers.

$$\begin{array}{r} 34.5 \\ \times 7 \\ \hline 241.5 \\ \hline 33 \end{array}$$