

MULTIPLICATION

YEAR 2

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals ($=$) signs.

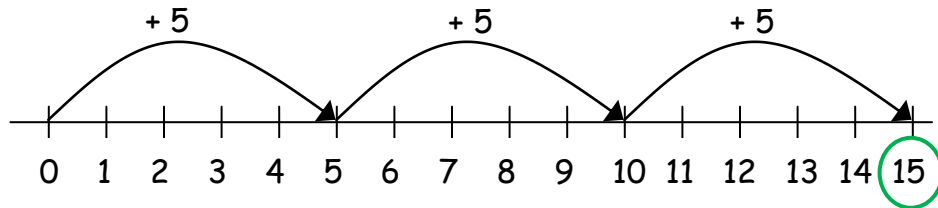
Show that multiplication of two numbers can be done in any order (commutative) whereas division of one number by another cannot.

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:

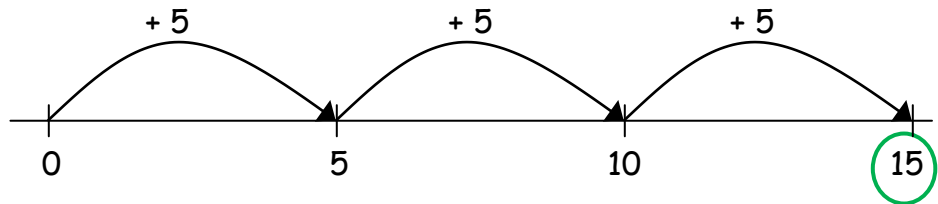
$$3 \times 5 = 5 + 5 + 5$$



Children will then practise adding 2 numbers on a blank number line where they will write in the multiples themselves.

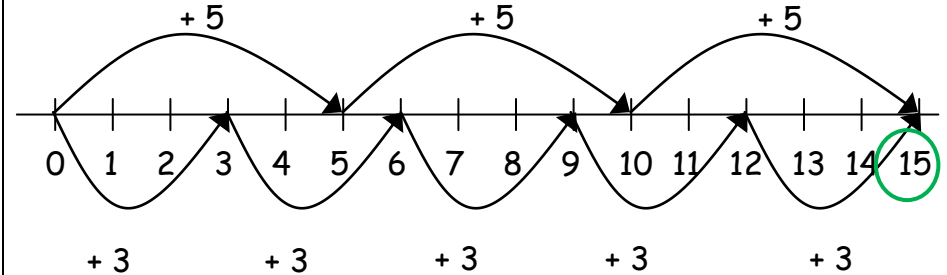
$$3 \times 5$$

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



Commutativity

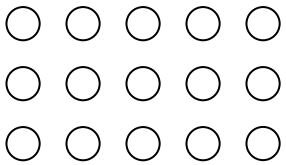
Children should know that 3×5 has the same answer as 5×3 . This can also be shown on the number line.



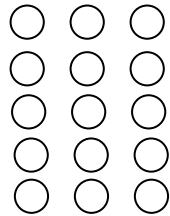
Arrays

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

$$5 \times 3 = 15$$



$$3 \times 5 = 15$$



Doubling

Children should understand that doubling is the same as multiplying by 2.
They should know doubles up to 20 where the 1s digit does not bridge 10
e.g., 14, 12.

Example

Double 14

$$14 = 10 + 4$$



$$20 + 8 = 28$$

YEAR 3

Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.

Grid method

2 digit x 1 digit

$$23 \times 8$$

$$\begin{array}{r|l|l} \times & 20 & 3 \\ \hline 8 & 160 & 24 \end{array}$$

1. Draw grid.
2. Partition 2 digit number.
3. Multiply 10s number by 1s number and write answer in grid.
4. Multiply 1s.
5. Add the 2 totals using either a mental or written strategy.

Later in the year, children will use the grid method with numbers that bridge 100.

$$36 \times 6$$

$$\begin{array}{r|l|l} \times & 30 & 6 \\ \hline 6 & 180 & 36 \end{array}$$

$$\begin{array}{r} 100 + 80 + 0 \\ + 30 + 6 \\ \hline 100 + 110 + 6 \\ \hline = 216 \end{array}$$

Doubling

Children should understand that doubling is the same as multiplying by 2. They should be able to double numbers up to 50 using partitioning when the 1s digit bridges 10.

E.g. Double 48

$$\begin{array}{l} 48 = 40 + 8 \\ \swarrow \quad \searrow \\ 80 \quad + \quad 16 = \textcircled{96} \end{array}$$

Children should then be able to use their doubling knowledge to mentally multiply by 4 - double and double again. They will also be able to mentally multiply by 8 - double, double and double again.

E.g. $12 \times 4 = 48$

1. Double 12

$$\begin{array}{l} 12 = 10 + 2 \\ \swarrow \quad \searrow \\ 20 \quad + \quad 4 = 24 \\ \swarrow \quad \searrow \\ 40 \quad + \quad 8 = \textcircled{48} \end{array}$$

Now
double
again.

YEAR 4

Multiply two-digit and three-digit numbers by a one-digit number using a formal written layout.

Children will continue to use the grid method.

2 digit x 1 digit

$$45 \times 7 = 315$$

x	40	5
7	280	35

$$\begin{array}{r} 280 \\ + 35 \\ \hline 5 \text{ (0 + 5)} \\ 110 \text{ (80 + 30)} \\ 200 \text{ (200 + 0)} \\ \hline 315 \end{array}$$

NB: The addition sum should be performed using the written method they are confident with, or mentally.

3 digit x 1 digit

$$346 \times 9 = 3114$$

X	300	40	6
9	2700	360	54

$$\begin{array}{r} 2700 \\ + 360 \\ \hline 54 \\ 4 \text{ (0 + 0 + 4)} \\ 110 \text{ (0 + 60 + 50)} \\ 1000 \text{ (700 + 300)} \\ 2000 \text{ (2000 + 0)} \\ \hline 3114 \end{array}$$

By the end of Year 4 children will be moving onto the vertical expanded 'ladder' method.

Example 1

$$253 \times 6 = 1518$$

$$\begin{array}{r} 253 \\ \times 6 \\ \hline 18 \text{ (3 \times 6)} \\ 300 \text{ (50 \times 6)} \\ 1200 \text{ (200 \times 6)} \\ \hline 1518 \end{array}$$

Example 2

$$312 \times 7 = 2184$$

$$\begin{array}{r} 312 \\ \times 7 \\ \hline 14 \text{ (2 \times 7)} \\ 70 \text{ (10 \times 7)} \\ 2100 \text{ (300 \times 7)} \\ \hline 2184 \end{array}$$

- 1) Set out the calculation as shown above.
- 2) Write the steps at the side to show the calculations that you will carry out.
- 3) Perform each step ensuring that place value columns line up.
- 4) Draw an equals line and add up the steps using either a mental or written strategy.

YEAR 5

Multiply numbers up to four digits by or a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers.

Children will continue to use the vertical expanded 'ladder' method.

4 digit x 1 digit

$$1233 \times 4 = 4932$$

$$\begin{array}{r} 1233 \\ \times \quad 4 \\ \hline 12 \\ 120 \\ 800 \\ 4000 \\ \hline 4932 \end{array}$$

(3 x 4)
(30 x 4)
(200 x 4)
(1000 x 4)

3 digit x 2 digit

$$372 \times 24 = 8928$$

$$\begin{array}{r} 372 \\ \times 24 \\ \hline 40 \\ 1400 \\ 6000 \\ 8 \\ 280 \\ 1200 \\ \hline 8928 \end{array}$$

(2 x 20)
(70 x 20)
(300 x 20)
(2 x 4)
(70 x 4)
(300 x 4)

- 1) Set out the calculation as shown.
- 2) Write the steps at the side to show the calculations that you will carry out.
- 3) The number that you are multiplying by needs to be partitioned.
- 4) Perform each step ensuring that place value columns line up.
- 5) Draw an equals line and add up the steps using a written strategy.

By the end of Year 5 children will be moving onto short multiplication when multiplying by a single digit.

Example 1

$$263 \times 8 = 2104$$

$$\begin{array}{r} 263 \\ \times \quad 8 \\ \hline 2104 \end{array}$$

5 2

- 1) Set out the calculation as shown above.
- 2) Multiply 3 by 8 - write the 10s digit underneath the 10s column.
- 3) Multiply 6 by 8, adding on the 'carried' 2 from previous calculation.
- 4) Multiply 2 by 8, adding on the 'carried' 5 from previous column.

Example 2

$$323 \times 7 = 2261$$

$$\begin{array}{r} 323 \\ \times \quad 7 \\ \hline 2261 \end{array}$$

1 2

N.B: when teaching short multiplication, children should have a secure knowledge of place value. Therefore, the digits in each calculation should be treated as ones.

YEAR 6

Multiply multi-digit numbers up to four digits by a two-digit whole number using the formal written method of long multiplication.

Multiply one-digit numbers with up to two decimal places by whole numbers.

- Pupils multiply decimals by whole numbers, starting with the simplest cases, such as $0.4 \times 2 = 0.8$ and in practical contexts, such as measures and money.

When multiplying by a 2 digit number, children will move from the vertical expanded 'ladder' method onto the formal written method of long multiplication.

3 digit x 2 digit

$$\begin{array}{r} 382 \\ \times 26 \\ \hline 7640 \quad (382 \times 20) \\ 2292 \quad (382 \times 6) \\ \hline 9932 \end{array}$$

NB: Leave a line between calculations to allow for carried numbers.

Instructions for example on left

- 1) Set out the calculation as shown above.
- 2) Partition 26 into tens and ones ($20 + 6$)
- 3) We will focus on 382×20 first, but to multiply by 20, we will multiply by 10 and then multiply by 2. To do this, first place a 0 in the ones column to act as a place holder.
- 4) Multiply the 'top' number by the 10s digit in the 'bottom' number, carrying any 10s as needed.
 $2 \times 2 = 4$
 $8 \times 2 = 16 + 1 = 17$
 $3 \times 2 = 6 + 1 = 7$
- 5) Multiply the 'top' number by the 1s digit in the 'bottom' number, carrying any 10s as needed.
 $2 \times 6 = 12$
 $8 \times 6 = 48 + 1 = 49$
 $3 \times 6 = 18 + 4 = 22$
- 6) Add both numbers using column addition.

4 digit x 2 digit

$$\begin{array}{r} 4362 \\ \times 26 \\ \hline 87240 \\ 1 \end{array}$$

$$\begin{array}{r} 26172 \\ 2 3 1 \\ \hline \end{array}$$

$$\begin{array}{r} 113412 \\ 1 1 \\ \hline \end{array}$$

When multiplying decimal numbers, children will use the grid method OR the ladder method.

1 digit x 2 dp

$$4 \times 6.7 = 26.8$$

$$\begin{array}{c|c|c} \times & 6 & 0.7 \\ \hline 4 & 24 & 2.8 \end{array}$$

$$+ \begin{array}{r} 24.0 \\ 2.8 \\ \hline 26.8 \end{array}$$

NB: Good practice is to 'fill in' any gaps with 0s to ensure that the digits line up correctly.

$$4 \times 6.7 = 26.8$$

$$\begin{array}{r} 4.0 \\ \times 6.7 \\ \hline 24.0 \quad (4 \times 6) \\ 02.8 \quad (4 \times 0.7) \\ \hline 26.8 \end{array}$$