## Multiplication

factor $x$ factor $=$ product
multiplier (number of equal groups) $x$ multiplicand (number in each group) $=$ product
In Key Stage 1, multiplication is taught through looking at equal groups.

## Equal groups

## Year 1

Children use practical resources to secure an understanding of equal and unequal groups. There is no reference to multiplication or use of the symbol.


Each plate has 4
These are equal groups.


## Year 2

The language moves into $\qquad$ groups of $\qquad$ _.


4 groups of $3=12$

This language is then continued into Key Stage 2 with more explicit links to multiplication.

## Repeated addition

## Year 2

Children learn that repeatedly adding the same number means that they can be grouped together. It is vital that children understand this concept as it underpins all later multiplication that they will come across.

Following this learning in Key Stage 1, the curriculum then splits into two strands of multiplication:

1. learning times-tables facts
2. multiplying larger numbers

These are taught as separate topics. Times-tables are always taught first as children must be secure in these to be able to access the larger number multiplications.

## 1. Learning times-table facts

The following table summarises which times-tables are taught in each year group for the first time. Each year the children should continue to practise those learnt in the previous year groups.

| Year 1 | None - the focus is on securing addition and subtraction facts |
| :--- | :--- |
| Year 2 | $2 \mathrm{~s}, 5 \mathrm{~s}$ and 10 s |
| Year 3 | $3 \mathrm{~s}, 4 \mathrm{~s}$ and 8 s |
| Year 4 | $6 \mathrm{~s}, 7 \mathrm{~s}, 9 \mathrm{~s}, 11 \mathrm{~s}$ and 12 s |
| Year 5 | No new content taught but children should be constantly revising all tables up to $12 \times 12$ to ensure they are fluent. This is essential for work on <br> harder multiplication, fractions and decimals. |
| Year 6 |  |

## Similar strategies are used across all year groups to ensure that children have a deep understanding of how times-tables work and how to calculate them efficiently.

Multiplication as equal groups

As they learnt in year 2, children must continue to make links between "equal groups of ..." and multiplication. They should be able to identify this in images.


## Skip counting

Children should learn to count up in multiples of each number. This is a useful strategy for becoming familiar with each of the times-tables but is a very slow and inefficient strategy so children need to quickly move away from it.


## Equal groups within times-tables

Once children are confident with the above strategies, they should be explicitly taught that times-tables increase / decrease by equal amounts each time. This becomes an efficient calculation strategy as children can use a known fact and then add or subtract a group. Concrete resources and pictures are heavily used to support this thinking.

## Year 2

6 groups of $2=5$ groups of two plus another group of two.


$$
\begin{array}{rlc}
6 \times 2 & =10+2 & 6 \times 2 \text { is } 2 \\
& =12 & \text { more than } 10 .
\end{array}
$$

9 groups of two $=10$ groups of two subtract a group of two


## $9 \times 5=50-5$

$=45$

Year 3
3 groups of three $=2$ groups of three and another group of three.


$$
\begin{gathered}
2 \times 3=6 \\
3 \times 3=6+3
\end{gathered}
$$

10 groups of four $=9$ groups of four and another group of four


## Year 4

3 groups of seven $=2$ groups of seven and another group of seven.


10 groups of nine $=9$ groups of nine subtract one group of nine.


## Distributive law

This law is based on the idea that numbers are made up of other numbers (taught in Early Years Foundation Stage). If children know that 7 is made up of 5 and 2 , then they can extend this to 7 groups of $\qquad$ is made up of 5 groups of $\qquad$ and 2 groups of $\qquad$ Different colours are used on the images to highlight this concept to the children.

It is taught first with times-tables as a useful strategy for using something you know to find out something that you don't. This strategy is also taught when multiplying larger numbers (see below)

## Year 3

In this first example, 7 groups of three is made up of 5 groups of three and 2 groups of three. Since the 5 s and 2 s were learnt in year 2, this makes the calculation much easier.
IIHII

$$
7 \times 3=21
$$

6 groups of four is the same as 4 groups of four and 2 groups of four.


$$
6 \times 4=24
$$

## Year 4

This is continued in year 4 with new times-tables. This is particularly useful when it comes to learning the 11 and 12 times-tables.

6 groups of six $=5$ groups of six and 1 group of six.

| $\square \vdots$ | $\vdots$ |
| :--- | :--- |
| $\vdots$ | $\vdots$ |$\quad 6 \times 6=36$

3 groups of nine $=1$ group of nine and 2 groups of 9.


3 groups of eleven $=3$ groups of ten and 3 groups of 1 .

$3 \times 10=30$

$3 \times 11=30+3$
$=33$

## 2. Multiplying larger numbers

## Distributive law (partitioning)

The children have already been exposed to this strategy when learning it as an efficient way to calculate their times-tables. Now they will learn to apply this to larger numbers to support their calculations. Typically, the larger numbers are split by their place value and then each of these parts is multiplied.

| $\frac{\text { Year 3 }}{\text { In year 3, the partitioning strategy }}$ | $\frac{\text { Year 4 }}{\text { Starting with familiar multiplication questions and then moving }}$ | $\frac{\text { Year } 5}{\ln \text { year 5, children continue to use this strategy, first }}$ |
| :--- | :--- | :--- |

links together their knowledge of place value and of the distributive law of multiplication.

onto more complex ones, children partition numbers to multiply. This can be a mental strategy when the numbers are easier, but may become written as they get larger.
$3 \times 123=$

| 100 | 20 | 3 |
| :---: | :---: | :---: |
| 100 | 20 | 3 |
| 100 | 20 | 3 |
| $3 \times 100=300$ | $3 \times 20=60$ | $3 \times 3=9$ |

$100 \times 610 \times 6$

$\begin{aligned} 100 \times 6 & =600 \\ 10 \times 6 & =60\end{aligned}$
$\begin{aligned} 10 \times 6 & =60 \\ 6 \times 6 & =36\end{aligned}$
$\begin{array}{r}6 \times 6=36 \\ \hline 116 \times 6=696\end{array}$
$6 \times 6$
with multiplying by a 1 -digit number and then they are introduced to multiplying by a 2 -digit number,


$$
\begin{array}{r}
10 \times 26=260 \\
10 \times 26=260 \\
8 \times 26=208 \\
\hline 28 \times 26=728
\end{array}
$$


$12 \times 132=1320+264$
$=1584$

## Year 6

This learning is consolidated in year 6 with the focus being on 3 - and 4-digit numbers multiplied by a 2-digit number.

| $20 \times 113=2260$ | 100100100 | $300 \times 31=9300$ | $\begin{aligned} 100 \times 24 & =2400 \\ 10 \times 24 & =240 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| $3 \times 113=339$ | 1010 | $20 \times 31=620$ | $4 \times 24=96$ |
| $23 \times 113=2599$ |  | $320 \times 31=9920$ | $114 \times 24=2736$ |

## Written strategies

The main written strategy for solving multiplication problems is column multiplication. This should only be used when the calculation is too difficult to solve mentally.

## Year 3

Teaching begins with 2 -digit numbers. Concrete resources (Dienes) are always used to support understanding.

Children start by multiplying a 2 -digit by a 1 -digit number where there is no renaming. The expanded method is primarily taught to support their understanding of place value.

$23 \times 2=46$
There are 46 children in the 2 classes.

Next, they move onto multiplying a 2-digit number

## Year 4

Teaching begins with a recap of their learning from year 3 . This focuses on 2-digit $\times 1$-digit and moving towards the compact method (whilst always ensuring a good understanding of the expanded alongside).


## Year 5

Teaching starts by recapping learning from previous year groups when multiplying 2,3 and also 4 -digit numbers by a 1 -digit number.


The new learning introduces multiplying by a 2-digit number using the compact method.
by a 1-digit number where there is renaming.
First with the expanded method:


3 ones $\times 4=12$ ones 12 ones $=1$ ten 2 ones

$12+80=92$


Then with the compact method:


[^0]Next, they move onto multiplying a 3-digit number by a 1-digit number. Starting with no renaming:


Then moving onto renaming and also introducing the compact method.

$$
116 \times 6=
$$



## Year 6

This learning continues in year 6 with continued practice of multiplying by a 2 -digit number.


Finally, this strategy is also applied to calculating with decimals in year 6 .



[^0]:    7 ones $\times 4=28$ ones
    28 ones $=2$ tens +8 ones

