National Curriculum Programme of Study;

- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

Y5
Multiplication

BY THE END OF YEAR 5…

By the end of Year 5, children will be able to show their understanding as;

```
      2  7  4  1
  x            6
  1  6  4  4  6
        4     2
```

```
            4  2  7  6
  x               3  4
      1  7  1  0  4
            1  3  2
  1  2  8  2  8  0
            2  1
  1  4  5  3  8  4
            1
```

Following on from Year 4…
Formal column method for short multiplication (HTU x U)

```
      1  4  3
  x         6
      8  5  8
        2  1
```

The compact column method for multiplication of HTU x U is introduced towards the end of Year 4, once children have worked through the grid and expanded stages to embed conceptual understanding.

Consolidation of short multiplication should continue with increasingly large numbers, using the same method as that taught previously. The grid or expanded methods should be returned to as appropriate.

```
      2  7  4  1
  x            6
  1  6  4  4  6
        4     2
```

Short multiplication involving decimal numbers

Decimal multiplication should be introduced in context, e.g. requiring children to calculate the cost of 6 items, priced at £3.25 each.

The expanded method should be used for recording, ensuring that the accompanying explanation details the value of the digits in terms of their monetary value;
'6 lots of 5 pence are 30 pence… 6 lots of 20 pence is £1.20… 6 lots of £3 is £18.00… 30 pence add 20 pence is 50 pence, £18 add £1 is £19… giving a total of £19.50

```
      3  .  2  5
  x            6
         .  3  0
      1  .  2  0
  1  8  .  0  0
  1  9  .  5  0
```
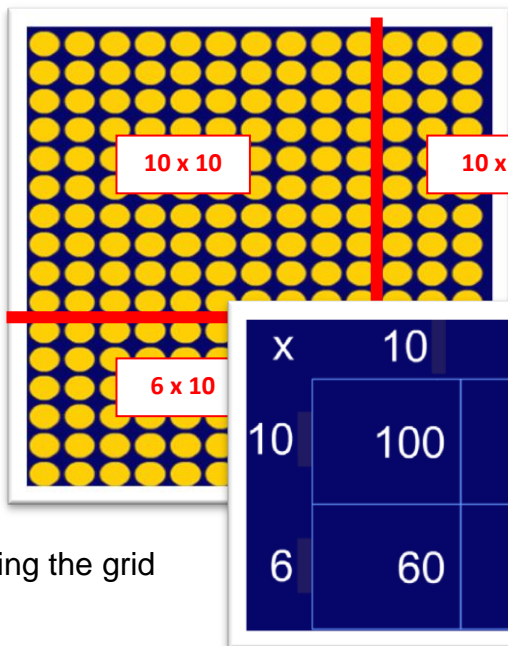
```
    3 . 2 5
x           6
─────────────
  1 9 . 5 0
─────────────
    1   1       3
```

Once the children are considered to have the required conceptual understanding, and they are confident in using the language required to maintain the value of the digits involved, they can be introduced to the compact method for multiplication involving decimals.

As with all other stages, the children should be shown the two calculations alongside each other, enabling the children to see the similarities between the two different written layouts.

Introducing long multiplication

10 x 10

10 x 3

6 x 10

```
x      10      3
10    100     30
6      60     18
```

using the grid

When introducing long multiplication (2-digits x 2-digits), the array again provides a useful tool for enabling children to 'see' the parts of the multiplication, and secure a visual image.

Here 16 x 13 is shown as an array.
Adding the red lines, the array can be split into four sections;
(10 x 10) + (10 x 3) + (6 x 10) + (6 x 3)

The same calculation should then be shown method (the image shown here is created using the 'Multiplication Grid' Interactive Teaching Programme, published by the National Strategies).

Column method for long multiplication

```
      1 6
x     1 3
─────────
      1 8
      3 0
    1 6 0
─────────
    2 0 8
─────────
  1
```

The same calculation as shown previously with the array and grid should be used to show the layout for expanded column multiplication involving two 2-digit numbers.
The children should be encouraged to discuss the different parts of the calculation and where they appeared in the previous representations.

As soon as children have the necessary conceptual understanding, move to the compact column method for long multiplication. Initially, modelling needs to be alongside the expanded form and accompanied with clear explanation and precise use of mathematical vocabulary.

```
      1 6
x     1 3
─────────
      4 8
  1
    1 6 0
─────────
    2 0 8
─────────
  1
```

Extending to the multiplication of larger numbers

```
        1   4   2
  x         3   1
  ─────────────────
        1   4   2
    4   2   6   0
  ─────────────────
    1
```

Extend to long multiplication for 3-digit by a 2-digit number, and then 4-digit by a 2-digit number, maintaining the importance of verbalising the value of the digits involved.

```
            4   2   7   6
  x                 3   4
  ─────────────────────────
        1   7   1   0   4
                1   3   2
    1   2   8   2   8   0
                2   1
  ─────────────────────────
    1   4   5   3   8   4
                1
```