PROGRESSION THROUGH CALCULLTION FOR MULTIPLICATION

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. *The mental calculation strategies taught will continue to be used and developed and should not be replaced by written methods.*

The following stages are standards that we expect the majority of our children to achieve.

Step 1

Children will experience equal groups of objects and will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups.
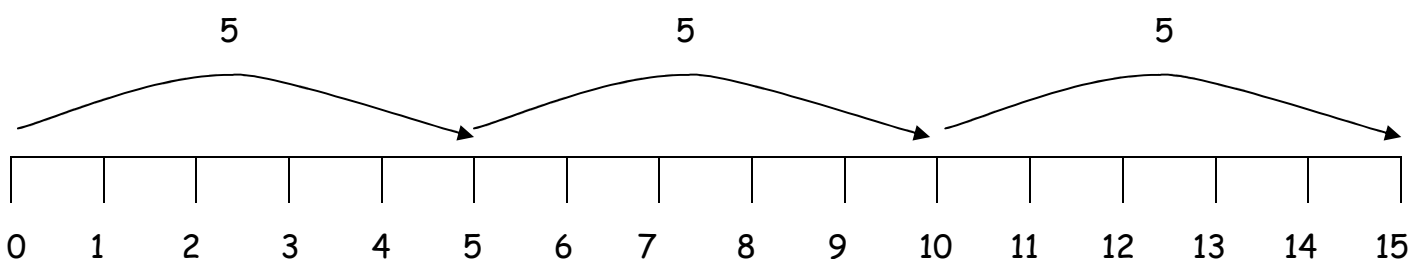
Step 2

Children will develop their understanding of multiplication and use jottings to support calculation:

> Repeated addition

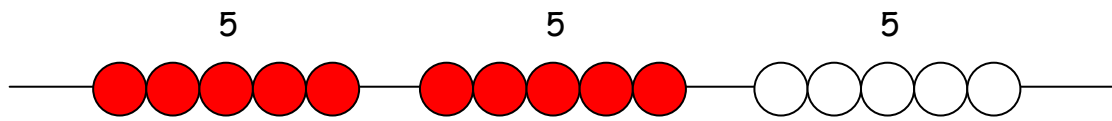3 times 5   is   5 + 5 + 5 = 15   or   3 lots of 5   or   3 x 5

Repeated addition can be shown on a number line:

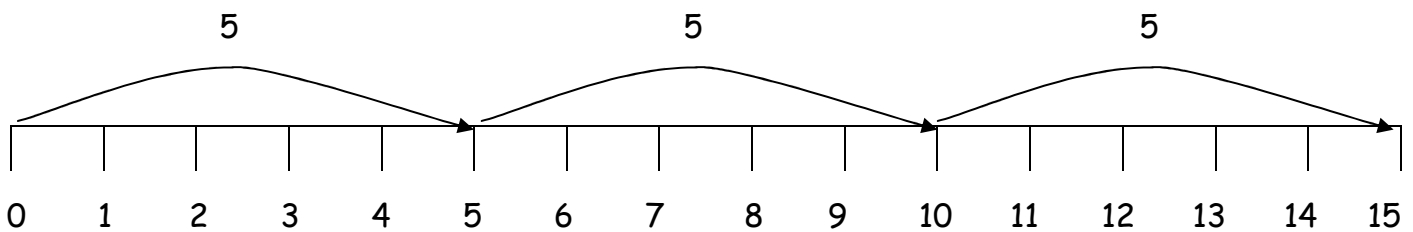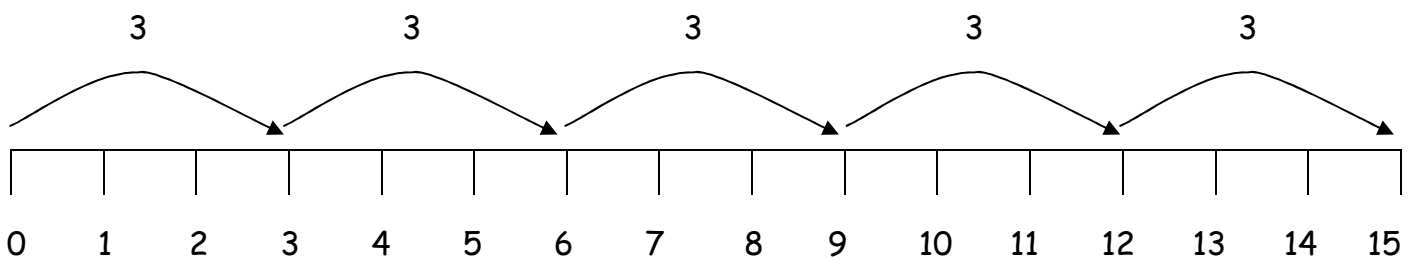5 x 3 = 5 + 5 + 5

Repeated addition can be shown on a bead string or bead bar:

5 x 3 = 5 + 5 + 5

5   5   5

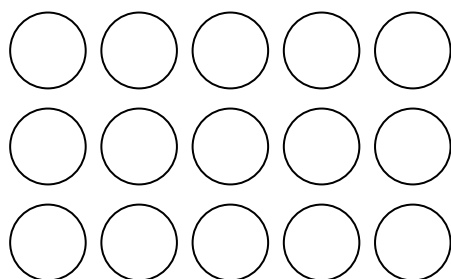➢ Commutatively

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

3   3   3   3   3

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

5   5   5

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15
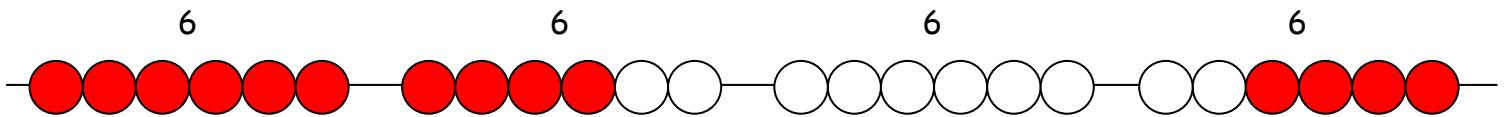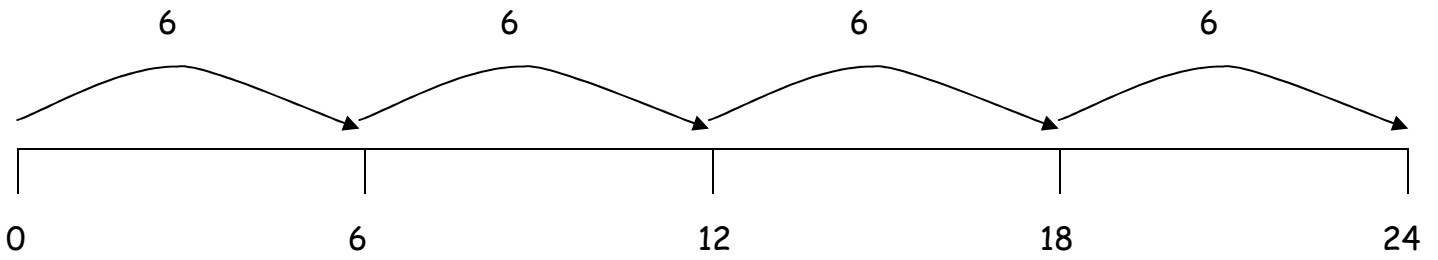
➢ Arrays

3 x 5 = 15

5 x 3 = 15

Step 3

Children will continue to use:

➢ Repeated addition

4 times 6   is   6 + 6 + 6 + 6 = 24   or   4 lots of 6   or   6 x 4

Children should use number lines or bead strings or bead bars to support their understanding.

➢ Arrays

Children should be able to model multiplication using an array.

4 x 9 = 36
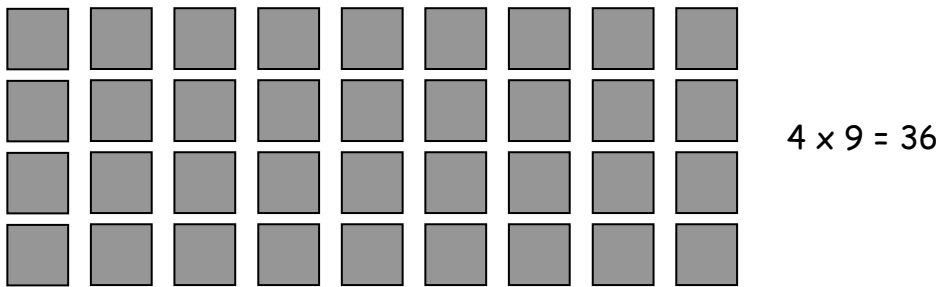
9 x 4 = 36

➢ Scaling

Children should develop an understanding of scaling.
e.g. Find a ribbon that is 4 times as long as the blue ribbon.

5 cm   20 cm

➢ Using symbols to stand for unknown numbers to complete equations using inverse operations.

$\boxed{}$ x 5 = 20   3 x $\triangle$ = $\boxed{}$ x $\bigcirc$ = 32

Step 4

➢ Partitioning

38 x 5 = (30 x 5) + (8 x 5)
　　　 = 150 + 40
　　　 = 190

Step 5

➢ Grid method

TU x U
(Short multiplication – multiplication by a single digit)

23 x 8

X	20	3
8	160	24

```
  1  6  0
+    2  4
---------
  1  8  4
```

HTU x U
(Short multiplication – multiplication by a single digit)

346 x 6

X	300	40	6
6	1800	240	36

```
  1  8  0  0
     2  4  0
+       3  6
------------
  2  0  7  6
```
　　　　　1

THTU x U
(Short multiplication – multiplication by a single digit)

4346 x 8

X	4000	300	40	6
8	32000	2400	320	48

```
  3 2 0 0 0
    2 4 0 0
      3 2 0
+       4 8
  ─────────
  3 4 7 6 8
```

TU x TU
(Long multiplication – multiplication by more than a single digit)

72 x 38

X	70	2
30	2100	60
8	560	16
	2660	76

```
  2 6 6 0
+     7 6
  ───────
  2 7 3 6
      ┼
```

HTU x TU
(Long multiplication – multiplication by more than a single digit)

372 x 24

X	300	70	2
20	6000	1400	40
4	1200	280	8
	7200	1680	48

```
  7 2 0 0
  1 6 8 0
+     4 8
  ───────
  8 9 2 8
     ┼
```

Using similar methods, children will be able to multiply decimals with up to two decimal places by a single digit number and then a two digit number. They should know that the decimal points line up underneath each other.

For example:

4.9 x 3

X	4	0.9
3	12	2.7

```
  1  2  .  0
+    2  .  7
  1  4     7
```

4.92 x 3

X	4	0.9	0.02
3	12	2.7	0.06

```
  1  2  .  0  0
+    2  .  7  0
     0  .  0  6
  1  4     7  6
```

Step 6

➢ Expanded short multiplication

23 x 8

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

Children should extend this method to at least THTU x U and to multiply decimals

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

> Expanded long multiplication

72 x 38

```
          7   2
  ×       3   8
          1   6
      5   6   0
          6   0
  2   1   0   0
  2   7   3   6
          1̶
```

Children should extend this method to at least HTU x TU and to multiply decimals

72 3.8

```
          7   2   .   0
  ×           3   .   8
              1   .   6
      5   6       .   0
              6   .   0
      2   1   0   .   0
      2   7   3   .   6
              1̶
```

Alternatively, children can set the amounts to whole numbers, i.e. 72 x 38 and convert to decimals after the calculation.

Step 7

> Short Multiplication

23 x 8

```
          2   3
  ×           8
      1   8   4
          2̶
```

Children should extend this method to at least THTU x U and to multiply decimals

2.3 x 8

```
        2  .  3
  ×           8
    1   8  .  4
        2
```

> Long Multiplication

72 x 38

```
            7   2
    ×       3   8
        5   7₁  6
    2   1   6   0
    2   7   3   6
            1
```

286 x 29

```
            2   8   6
    ×           2   9
        2   5₇  7₅  4
        5₁  7₁  2   0
        8   2   9   4
            1
```

Using similar methods, children will be able to multiply decimals with up to two decimal places. They should know that the decimal points line up under each other.

…….

By the end of Year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.

Children should not go onto the next stage if:
1. **they are not ready.**
2. **they are not confident.**

Children should be encouraged to approximate their answers before calculating.
Children should be encouraged to check their answers after calculation using an appropriate strategy.