Calculation policy – Multiplication in Curriculum 2014
Progression of methods across the school

The following calculation policy has been devised to meet the requirements of the National curriculum 2014 for the teaching and learning of mathematics, and is designed to ensure a smooth and consistent, yet rapid progression of learning calculations across the school.

Guidance for use of the policy
- The following standards are what we would expect most children to achieve.
- Children achieving below the standards, for example children with S.E.N, will need to be given the method most appropriate for their level of achievement.
- Children achieving the expected standards in calculation will be provided with more opportunities to apply their calculations, at their age-related level, in more challenging contexts and problems.

A context for calculation
- Calculations should be given a real-life context.

Children should be encouraged to:

- **Approximate their answers before calculating.**
- **Check their answers after calculation using an appropriate strategy.**
- **Consider if a mental calculation would be appropriate before using written methods.**
- **Develop mental fluency and an understanding of problem solving.**
- **Use reasoning skills**
- **Use manipulatives or visualisation where appropriate**

<u>**Using multplication facts**</u>

Tables should be taught from Y2 onwards, either as part of the mental oral starter or other times as appropriate within the day including by Rote learning.

Year 2 2 times table
     5 times table
     10 times table   (plus inverse operations)

Year 3 3 times table
     4 times table
     8 times table   (plus inverse operations)

Year 4 Derive and recall all multiplication facts up to 12 x 12 (plus inverse)

Years 5 & 6 Retain all multiplication facts up to 12 x 12 (plus inverse), from Year 4.

<u>Some useful information</u>

Using and applying division facts

Children should be able to utilise their tables knowledge to derive other facts.
e.g. If I know 3 x 7 = 21, what else do I know?
30 x 7 = 210, 300 x 7 = 2100, 3000 x 7 = 21 000, 0.3 x 7 = 2.1 etc

Use closely related facts already known

13 x 11 = (13 x 10) + (13 x 1)
   = 130 + 13
   = 143

Multiplying by 10 or 100

Knowing that the effect of multiplying by 10 is a shift in the digits one place to the left.
Knowing that the effect of multiplying by 100 is a shift in the digits two places to the left.
Understand the role of 0 as a place holder.

Partitioning

23 x 4 = (20 x 4) + (3 x 4)
   = 80 + 12
   = 102

**Use of factors**   8 x 12 = 8 x 4 x 3

MANY MENTAL CALCULATION STRATEGIES WILL CONTINUE TO BE USED. THEY ARE NOT REPLACED BY WRITTEN METHODS.

<u>Foundation and Y1</u>

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 using concrete equipment and hoops to create sets of objects.

```
   5        +        5        +        5        =        15
```
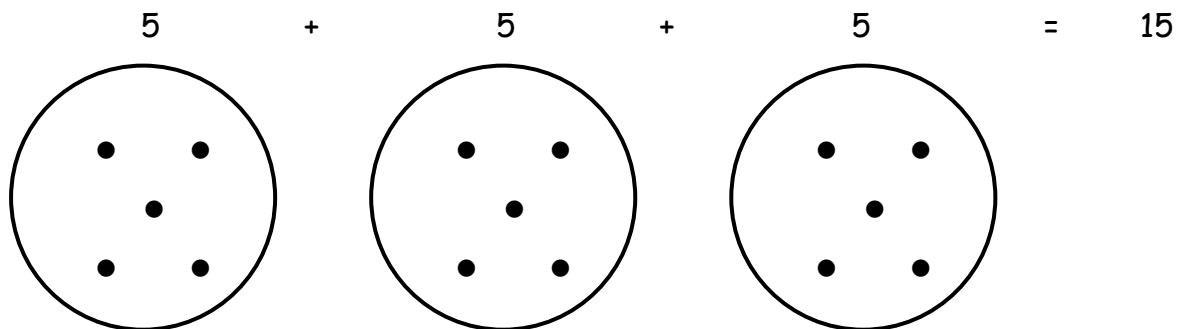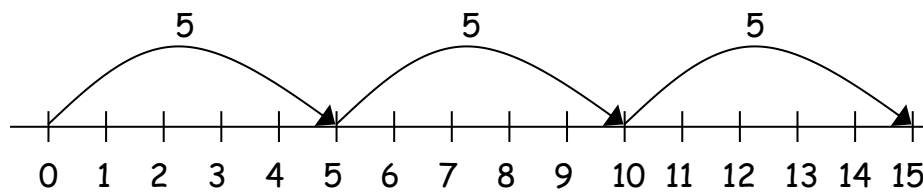
Y2

Children will develop their understanding of multiplication and use jottings to support calculation in combination with their knowledge of times tables.

✓ **Repeated addition**

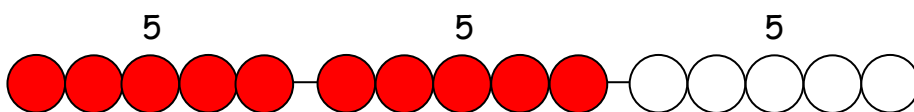3 times 5   is   5 + 5 + 5 = 15   or   3 lots of 5   or   5 x 3

Repeated addition can be shown easily on a number line:

5 x 3 = 5 + 5 + 5
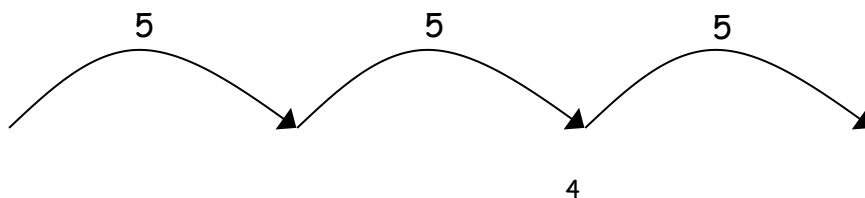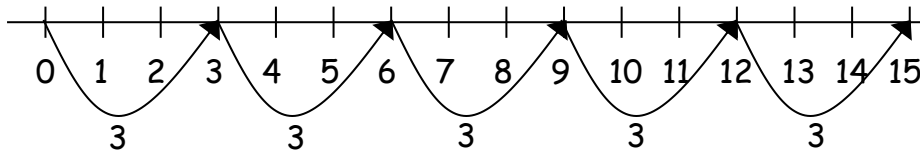

and on a bead bar:

5 x 3 = 5 + 5 + 5

✓ **Commutativity with Number Lines**

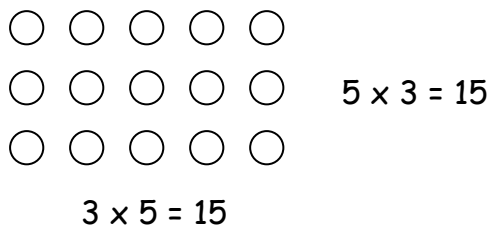Children should know that 3 x 5 has the same answer as 5 x 3. This can also be shown on the number line.

A number line from 0 to 15 showing jumps of 3: 0 → 3 → 6 → 9 → 12 → 15, each jump labelled 3.

✓ **Commutativity with Arrays**

Children should be able to model a multiplication calculation using an array and use it to describe commutativity.

5 x 3 = 15

3 x 5 = 15

Children should also:
Solve problems involving recall of multiplication facts, in context.

<u>Y3</u>

Children will continue to use repeated addition but should become more reliant on application of tables facts and be able to use formal written methods.

3 times 6   is   6 + 6 + 6 = 18   or   3 lots of 6   or   6 x 3

Children should use a wide range of materials including number lines or bead bars to support their understanding, during calculation.

✓   **Arrays**

Children should be able to model a multiplication calculation using an array.

9 x 4 = 36

9 x 4 = 36
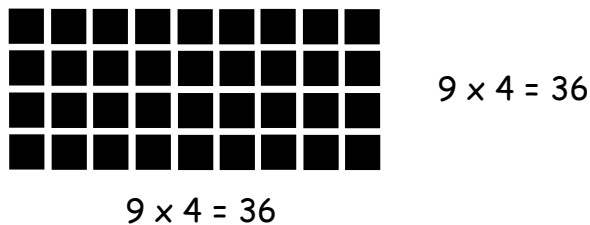
Children will also develop an understanding of:

✓   **Using simple symbols to stand for unknown numbers to complete equations, in problems including the use of inverse operations**

□ x 5 = 20   3 x n = 18   a x b = 32

✓   **Partitioning**

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

6

Partitioning may be used to demonstrate and then children should move onto the grid method of multiplication.

Grid method

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

23 x 8

Children will approximate first
23 x 8 is approximately 25 x 8 = 200

x	20	3
8	160	24

$$\begin{array}{r} 160 \\ +\ \ 24 \\ \hline 184 \end{array}$$

Y4

Children should be able to multiply a three-digit number by a one digit number.
Children should solve integer scaling problems and harder correspondence problems such as n objects are connected to m objects.
Children should also be able to multiply three numbers, mentally.

Grid method

HTU x U   **and**   **TU x TU**

346 x 9
Children will approximate first
346 x 9 is approximately 350 x 10 = 3500

x	300	40	6
9	2700	360	54

```
  2700
+  360
+   54
  3114
   1 1
```

Y5

Children should learn the short and long methods of multiplication, to multiply numbers up to 4-digits by a one or two digit number.
Using similar methods, they will be able to multiply decimals with one decimal place by a single digit number, approximating first. They should know that the decimal points line up under each other.

e.g. 4.9 x 3

Children will approximate first
4.9 x 3 is approximately 5 x 3 = 15

<u>Short multiplication – multiplication by a single digit</u>

812 x 7

```
    812
x     7
   5684
     5  1
```

<u>Long multiplication – multiplication by more than a single digit</u>

372 x 24

```
    372
x    24
   6000
   1200
   1400
    280
     40
```

$$\underline{\qquad\quad 8}$$

$$\underline{\quad 8928}$$

$$\qquad\qquad 1$$

Children will approximate first

372 x 24 is approximately 400 x 25 = 10000

<u>Y6</u>

Children calculate with short and long multiplication as in Year 5, with more fluency and with the following raised expectations:

Children should:
- *Using methods, be able to multiply decimals with up to two decimal places by a single digit number and then two digit numbers, approximating first. They should know that the decimal points line up under each other.*
- *Multiply multi-digit numbers up to 4 digits by two digit whole numbers using long multiplication.*
- *Perform mental calculations including with mixed operations and large numbers.*
- *Carry out mixed calculation problems using knowledge of the correct order to use operations.*
- *Estimate and check answers to calculations to determine, in the context of a problem, an appropriate degree of accuracy.*

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