About our Calculation Policy

The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics It is also designed to give pupils a consistent progression of learning calculation methods across the school. Please note that early learning in number and calculation in Reception follows the 'Development Matters' EYFS document, and this calculation policy is designed to build on progressively from the content and methods established in the Early Years Foundation Stage.

Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014. It is vital that pupils are taught according to the stage that they are currently working at, being moved onto the next level when they are ready or working at a lower stage until they are secure enough to move on.

Providing a context for calculation

A problem solving approach helps to build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. It is important that any type of calculation is given a real life context. This must be a priority within calculation lessons.

Choosing a calculation method

Children need to be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved...

Can I do it in my head?

Could I use some jottings to help me?

Should I use a written method to work it out?

Multiplication

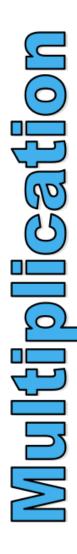**Early Years** Multiply with concrete objects, arrays and pictorial representations.

4 + 4 + 4

(Multiplication as repeated addition)

Key skills for multiplication in Early Years:

- Recognise numerals 1 to 20 and place them in order.

- Count actions or objects which cannot be moved.

- Record using marks that they can interpret and explain.

- Estimate how many objects they can see and check by counting.

- Record, using marks and pictures that they can interpret and explain.

- Help children to recognise that when a group of objects is separated in different ways the total is the same.

- Provide a wide range of number resources and encourage children to be creative in identifying and devising problems and solutions in all areas of learning.

- Help children to understand that five fingers on each hand make a total of ten fingers altogether, or that two rows of three eggs in the box make six eggs altogether.

Vocabulary: groups of, lots of, times, altogether, multiply, count

Multiplication

Year 1 Multiply with concrete objects, arrays and pictorial representations.

Amy needs five strawberries for each smoothie.

She is making five smoothies. How many strawberries will she need?

Each smoothie needs two bananas. How many bananas are needed to make eight smoothies?

Children should have experience of counting equal group of objects in 2s, 5s and 10s.

Present practical problem solving activities involving counting equal sets or groups, as above.

Key skills for multiplication at Y1:

- Count in multiples of 2, 5 and 10.

- Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

- Make connections between arrays, number patterns, and counting in twos, fives and tens.

- Begin to understand doubling using concrete objects and pictorial representations.

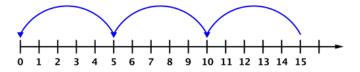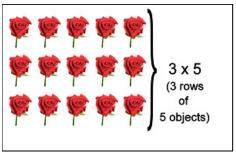Vocabulary: groups of, lots of, times, altogether, multiply, count, array

Multiplication

Year 2 Multiply using arrays and repeated addition (using at least 2s, 5s and 10s)

Repeated addition on a number line

Starting from 0 make equal jumps on a numberline to work out multiplication facts. Write multiplication statements such as 3 x 5= 15

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

3 x 5
(3 rows of 5 objects)

Use arrays to explore commutativity

$5 \times 3 = 3 + 3 + 3 + 3 + 3 = 15$

$3 \times 5 = 5 + 5 + 5 = 15$

Mental strategy – children should begin to recall multiplication facts for 2,5 and 10 times tables through practice in counting and understanding the operation.

Key skills for multiplication at Y2:

- Count in steps of 2, 3 and 5 from zero, and in 10s from any number.

- Recall and use multiplication facts from the 2, 5 and 10 multiplication tables, including recognising odds and evens.

- Write and calculate number statements using the x and = signs.

- Show that multiplication can be done in any order (commutative).

- Solve a range of problems using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.

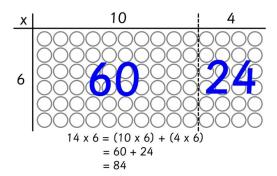- Use a variety of language to discuss and describe multiplication.

Key vocabulary: groups of, lots of, times, altogether, multiply, count, array, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times…, inverse

Year 3 Multiply 2-digits by a single digit number

The grid method for multiplying 2-digit by single-digits:

Eg.   23 x 8 = 184

X	20	3
8	160	24

$14 \times 6 = (10 \times 6) + (4 \times 6)$
$= 60 + 24$
$= 84$

Link the grid method to an array

Key skills for multiplication at Y3:

- Recall and use multiplication facts for the 2, 3, 4, 5, 9 and 10 multiplication tables, and multiply multiples of 10.

- Write and calculate number statements using the multiplication tables they know, including 2-digit x single-digit, drawing upon mental methods, and progressing to reliable written methods.

- Solve multiplication problems, including missing number problems.

- Develop mental strategies using commutativity (e.g. 4 x 12 x 5 = 4 x 5 x 12 = 20 x 12 = 240)

- Solve simple problems in contexts, deciding which operations and methods to use.

- Develop efficient mental methods to solve a range of problems e.g using commutativity (4 × 12 × 5 = 4 × 5 × 12 = 20 × 12 = 240) and for missing number problems _ x 5 = 20, 3 x _ = 18, _ x _ = 32

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, _times as big as, once, twice, three times..., inverse, partition, grid method, multiple, product, tens, units, value

Year 4 Multiply 2 and 3-digits by a single digit, using all multiplication tables up to 12 x 12

Developing the grid method

Eg. 136 x 5 = 680

X	100	30	6
5	500	150	30

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  500
  150
+  30
─────
  680
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Key skills for multiplication at Y4:

• Count in multiples of 6, 7, 8, 25 and 1000

• Recall multiplication facts for all multiplication up to 12 x 12.

• Recognise place value of digits in up to 4-digit numbers

• Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers.

• Use commutativity and other strategies mentally 3 x 6 = 6 x 3 , 2 x 6 x 5 = 10 x 6 , 39x7 = 30 x 7 + 9 x 7.

• Solve problems with increasingly complex multiplication in a range of contexts.

• Count in multiples of 6, 7, 9, 25 and 1000

• Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, groups of, sets of, lots of, equal groups, times, multiply, times as big as, once, twice, three times... inverse, partition, grid method, multiple, product, tens, units, value, sets of
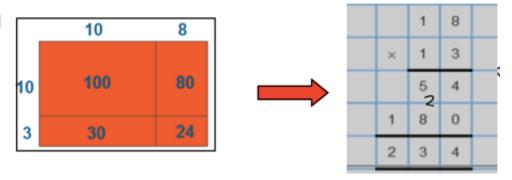
Multiplication

Year 5 Multiply up to 4-digits by 1 or 2 digits.

Introducing column multiplication

x	300	20	7
4	1200	80	28

$$\begin{array}{r} 327 \\ \times \quad 4 \\ \hline 1308 \\ {}_{1}{}_{2} \end{array}$$

Introduce long multiplication

	10	8
10	100	80
3	30	24

$$\begin{array}{r} 18 \\ \times \quad 13 \\ \hline 54 \\ {}_{2} \\ 180 \\ \hline 234 \end{array}$$

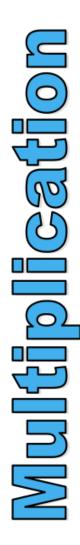### Key skills for multiplication at Y5:

- Solve problems where larger numbers are decomposed into their factors.

- Identify multiples and factors, using knowledge of multiplication tables to 12x12.

- Multiply and divide integers and decimals by 10, 100 and 1000

- Recognise and use square and cube numbers and their notation

- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times…, inverse, partition, grid method, total, multiple, product, tens, units, value, sets of, square, factor, integer, decimal, short/long multiplication, carry

Multiplication

Year 6 Short and long multiplication as in Y5, and multiply decimals with up to 2 d.p. by a single digit.

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  3 . 1 9
×   8
2 5 . 5 2
  1   7
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Key skills for multiplication at Y6:

- Recall multiplication facts for all times tables up to 12 x 12 (as Y4 and Y5).

- Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.

- Perform mental calculations with mixed operations and large numbers.

- Solve multi-step problems in a range of contexts, choosing appropriate combinations of operations and methods.

- Estimate answers using round and approximation and determine levels of accuracy.

- Round any integer to a required degree of accuracy.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times… partition, grid method, total, multiple, product, inverse, square, factor, integer, decimal, short / long multiplication, carry, tenths, hundredths, decimal