Calculation Policy - Multiplication

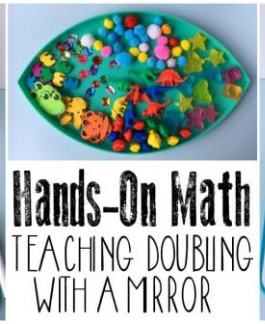
EYFS

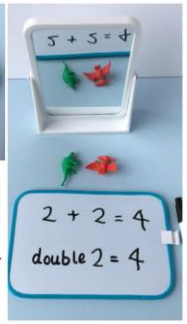
Understanding the operation and related vocabulary

- record using marks that they can interpret and explain
- begin to use the vocabulary involved in multiplying, *double, pattern*

Recalling number facts

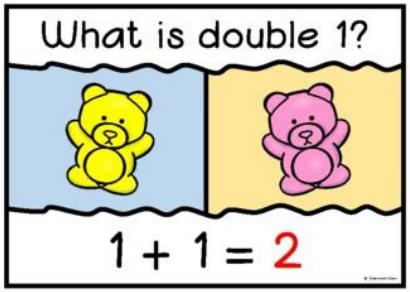
- Explore and represent patterns with numbers – even, odds, double facts, sharing.





Mental methods

- solve simple problems involving doubling and equal groups



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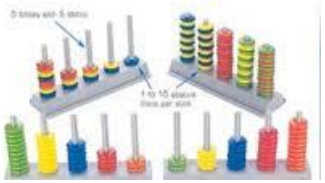
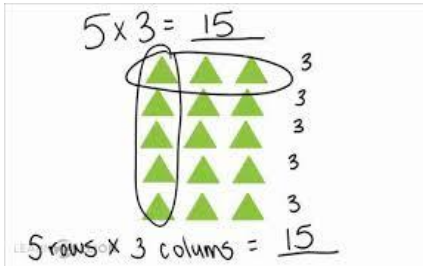
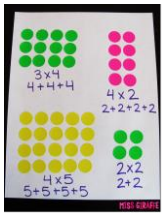
Calculation Policy - Multiplication

Year 1	Year 2
Understanding the operation and related vocabulary	
• Begin to understand multiplication by using concrete objects, pictorial representations and arrays to solve problems; make connections between the different representations and use pictorial representations • begin to use the vocabulary involved in multiplying; *array, row, column, groups of, lots of,* 	• Understand multiplication as ○ repeated addition ○ describing an array ○ scaling (to compare 2 items) e.g. twice as high • show that multiplication of two numbers can be done in any order • recognise the inverse relationship between multiplication and division • write statements using the multiplication (×), and equals (=) signs • understand and use the vocabulary involved in multiplying*; multiple, multiply, table, times, once, twice, three, ten ……..times as big, repeated addition*
Recalling number facts	
• count in multiples of twos, fives and tens    • know doubles of all numbers to 10 • begin to recognise odd and even numbers	• count in steps of 2, 3, and 5 from 0 • recall doubles of all numbers to 15 and doubles of multiples of 5 to 50 • recall and use multiplication facts for the 2, 5 and 10 multiplication tables recognise odd and even numbers
Mental methods and mental methods with jottings	
• count a set of objects by grouping in 2s, 5s or 10s • solve problems involving doubling and equal groups ○ use patterns of last digits, e.g. 0 and 5 when counting in fives ○ use knowledge of multiplication facts from the 2, 5 and 10 times-tables, e.g. recognise that there are 15 objects altogether because there are three groups of five 	 • calculate mathematical statements for multiplication within the multiplication tables explain as repeated addition and represent in arrays. • use doubling to connect 2, 4 and 8 multiplication tables ○ partition: double the tens and ones separately, then recombine ○ use knowledge that halving is the inverse of doubling and that doubling is equivalent to multiplying by two ○ partition: when doubling, double the tens and ones separately, then recombine

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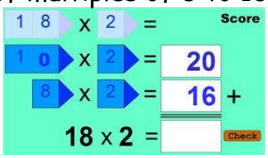
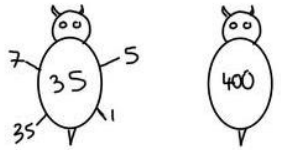
Calculation Policy - Multiplication

Year 3	Year 4
Understanding the operation and related vocabulary	

• Understand multiplication as
  ○ repeated addition
  ○ describing an array
  ○ scaling
  ○ correspondence problems
• understand commutativity and associativity
• understand the inverse relationship between multiplication and division
• solve missing numbers problems involving multiplication
• understand, read and spell vocabulary related to multiplication correctly, *product*
	• Continue to understand multiplication as
	  ○ repeated addition
	  ○ describing an array
	  ○ scaling
	  ○ correspondence problems
	• understand the distributive law
	• continue to understand commutativity and associativity
	• continue to understand the inverse relationship between multiplication and division
	• continue to solve missing number problems
	• understand, read and spell vocabulary related to multiplication correctly *factor*

Recalling number facts	
• count from 0 in multiples of 4, 8, 50 and 100 • recall doubles of all numbers to 20, doubles of multiples of 5 to 100 and doubles of multiples of 100 to 500  • recall and use multiplication facts for the 3, 4 and 8 multiplication tables and begin to use knowledge of place value to derive related facts	• count in multiples of 6, 7, 9, 25 and 1 000 • derive doubles of multiples of 50 to 1000 and multiples of 1000 • recall multiplication facts for multiplication tables up to 12 × 12, and use place value to derive related facts • recognise and use factor pairs 

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Calculation Policy - Multiplication

Mental methods and mental methods with jottings

- calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers
- recognise that when multiplying by 10 or 100 the digits move one or two places to the left and zero is used as a place holder
- use knowledge of multiplication facts and place value, e.g.
  - **7 x 8 = 56 to find 70 x 8, 7 x 80**

- multiply mentally using place value, known and derived facts, including: multiplying by 0 and 1; multiplying together three numbers
- partition: double or halve the tens and ones separately, then recombine
- use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right and zero is used as a place holder
- use partitioning and the distributive law to multiply, e.g.
  - **13 × 4 = (10 + 3) × 4**
    = (10 × 4) + (3 × 4)
    = 40 + 12 = 52

Formal written layout

- begin to use formal written method for two-digit numbers multiplied by one-digit numbers – short multiplication

No carrying

$$\begin{array}{r} 32 \\ \times \quad 3 \\ \hline 96 \end{array}$$

Carrying once

	5	2
x		8
4	1	6
	1	

- multiply two-digit and three-digit numbers by a one-digit number using formal written layout - short multiplication

$$\begin{array}{r} 7\ 2 \\ \times \quad 7 \\ \hline 5\ 0\ 4 \\ \hline 1 \end{array}$$

Estimating and checking

- estimate the answer to a calculation
- use inverse operations to check answers
- use equivalent calculations to check answers

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Calculation Policy - Multiplication

Year 5	Year 6
Understanding the operation and related vocabulary	

• Understand
  ○ scaling by simple fractions
  ○ simple rates
• continue to understand the distributive, commutative and associative laws
• continue to solve missing number problems
• begin to use brackets
• read, spell and pronounce mathematical vocabulary related to multiplication correctly; *square, cube, prime numbers, prime factors, composite numbers*
	• Continue to understand
	  ○ scaling by fractions
	  ○ rate
	• use their knowledge of the order of operations
	• continue to solve missing number problems
	• explore the order of operations using brackets
	• read, spell and pronounce mathematical vocabulary related to multiplication correctly;*common factor, common multiple*

Recalling number facts	
• count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • derive doubles of decimals (to one decimal place) using knowledge of place value • continue to recall multiplication facts for multiplication tables up to 12 × 12 fluently, and derive and use related facts • identify multiples and factors, and common factors of two numbers. • establish whether a number up to 100 is prime and recall primes up to 19 recognise and use square and cube numbers	• derive doubles of decimals (to two decimal places) using knowledge of place value • continue to recall multiplication facts for multiplication tables up to 12 × 12 fluently, and derive and use related facts • identify common factors, common multiples and prime numbers • continue to use square and cube numbers
Mental methods and mental methods with jottings	

• multiply numbers mentally drawing upon known facts
• use factors to construct equivalence statements
• begin to multiply tenths, and one-digit whole numbers and tenths by one-digit whole numbers, e.g.
  ○ form an equivalent calculation, e.g. to multiply by 5, multiply by 10, then halve; to multiply by 20, double, then multiply by 10
  ○ use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right relative to the decimal point, and zero is used as a place holder
  ○ use knowledge of multiplication and division facts and understanding of place value, e.g. when calculating with multiples of 10
	• perform mental calculations, including with mixed operations, large numbers and decimals.

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Formal written layout

- 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
- multiply numbers with up to one decimal places by a one-digit whole number

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- multiply numbers with up to two decimal places by one-digit and two-digit whole numbers

Use methods the same as year 5 but with larger/harder numbers and decimals.

Short multiplication

24 × 6 becomes

$$\begin{array}{r} {\scriptstyle 2}\ \ 2\ 4 \\ \times\ \ \ \ 6 \\ \hline 1\ 4\ 4 \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{r} \ \ 3\ 4\ 2 \\ \times\ \ \ \ \ 7 \\ \hline 2\ 3\ 9\ 4 \\ {\scriptstyle 2\ \ 1} \end{array}$$

Answer: 2394

Long multiplication

24 × 16 becomes

$$\begin{array}{r} {\scriptstyle 2} \\ 2\ 4 \\ \times\ 1\ 6 \\ \hline 2\ 4\ 0 \\ 1\ 4\ 4 \\ \hline 3\ 8\ 4 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\ \ 2} \\ 1\ 2\ 4 \\ \times\ \ 2\ 6 \\ \hline 2\ 4\ 8\ 0 \\ 7\ 4\ 4 \\ \hline 3\ 2\ 2\ 4 \\ {\scriptstyle 1\ \ 1} \end{array}$$

Answer: 3224

Estimating and checking

use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
continue to use appropriate strategies to check answers