Calverton Primary School Calculation Policy Multiplication

Multiplication Year 1

CPA Approach
(Concrete, pictorial, Abstract)

Doubling and repeated addition

Understand multiplication is related to doubling and combing groups of the same size (repeated addition) for 2, 5, 10.

Washing line, and other practical resources for counting. Concrete objects: Base Ten, Numicon, bundles of straws, bead strings

$2 + 2 + 2 + 2 + 2 = 10$
$2 \times 5 = 10$
2 multiplied by 5
5 pairs
5 hops of 2

$5 + 5 + 5 + 5 + 5 + 5 = 30$
$5 \times 6 = 30$
5 multiplied by 6
6 groups of 5
6 hops of 5

$4 \times 2 = 8$
$2 \times 4 = 8$

$2 \times 4 = 8$
$4 \times 2 = 8$

2 hops of 4
4 hops of 2

Bar Modelling

Use of bar model as a visual to support early multiplication. This can be taught through cubes or counters

4	4	4

$3 \times 4 = 12$

Problem solving

Problem solving with concrete objects (including money and measures) Use arrays to begin to understand multiplication can be done in any order (commutative)

Vocabulary
Groups of, times, multiply, addition, arrays, lots of
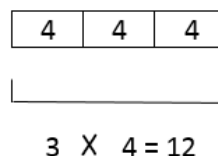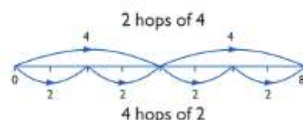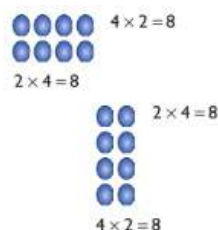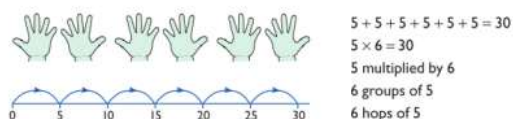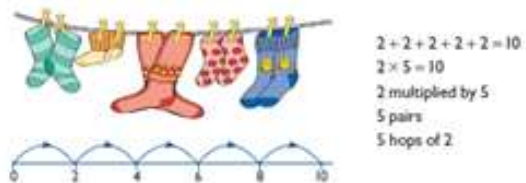
Multiplication Year 2

CPA Approach
(Concrete, Pictorial, Abstract)

Times table Facts

Recall and use multiplication facts for the 2, 5 and 10 multiplication tables as a minimum requirement Develop understanding of solving multiplication problems using arrays, objects, pictorial representations and number lines (see Year 1).

Number Sentences

Expressing multiplication as a number sentence using x and explore commutative law of multiplication

Scaling

Begin to develop understanding of multiplication as scaling (3 times bigger/taller)

Number lines

Using number lines with a link to repeated addition.

Doubling numbers up to 10 + 10

Link with understanding scaling
Using known doubles to work out
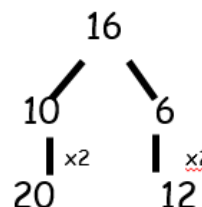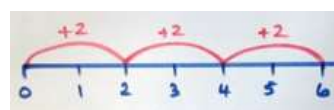double 2digit numbers
(double 15 = double 10 + double 5)

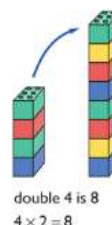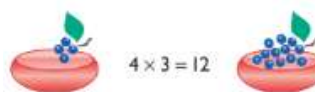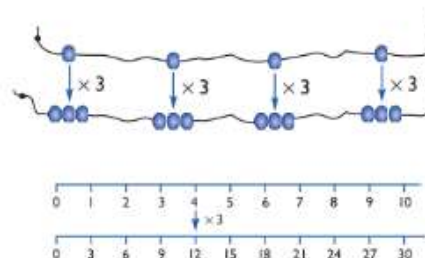## Towards written methods

Use arrays and jottings to develop an understanding of doubling two digit numbers

Solve missing number problems.

$4 \times 3 = 12$

double 4 is 8
$4 \times 2 = 8$

7 x 2 = □   □ = 2 x 7
7 x □ = 14   14 = □ x 7
□ x 2 = 14   14 = 2 x □

Vocabulary

Groups of, times, multiply, addition, arrays, lots of, multiplication

Multiplication Year 3

CPA Approach
(Concrete, pictorial, Abstract)

Mental methods

Doubling 2 digit numbers using partitioning

Demonstrating multiplication on a number line – jumping in larger groups of amounts
13 x 4 = 10 groups of 4 then 3 groups of 4

Recall and use multiplication facts for the 3, 4 and 8 multiplication tables

Bar modelling

Developing this method further to go alongside calculations

Written methods (progressing to 3digit x 1digit)

Developing written methods using understanding of visual images to group and create equal groups of objects and pictures

Grid method

2 and 3 digit by 1 digit only looking at partitioning of multiplicand

Short Multiplication

2 by 1 digit numbers using known facts to support

×	30	5
7		

24 × 6 becomes

```
    2  4
×      6
――――――――
 1  4  4
    2
```
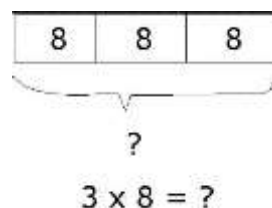
Answer: 144

Vocabulary

Multiplicand (Number to be multiplied) Multiplier (Amount that multiplicand is being multiplied by) Product, lots of, groups of, times, as much, factors

Multiplication Year 4

**CPA Approach
(Concrete, pictorial, Abstract**

Mental methods

Counting in multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.

Recall and use multiplication facts for the 6, 7, 9, 11 and 12 multiplication tables
Use known facts to multiply by multiples of 10

Written methods (progressing to 3digit x 2digit, including 1dp)

Children to embed and deepen their understanding to multiply up to 2d x 2d progressing to 3d x 2d and decimals to 1dp. Ensure this is still linked back to their understanding of arrays and supported using place value counters

Leading to short written method including regrouping (carrying):

Children to use their knowledge of multiplication tables and inverse, supported by pictorial representations and the Bar Method

Bar Model to support calculations and word problems
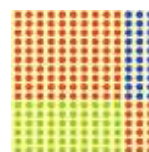
43 x 6 by partitioning

X	40	3
6	240	18

Courtney baked 24 cookies to share with her friends. If she shares her cookies with 6 friends, how many cookies would each friend get?
C = amount of cookies for each friend
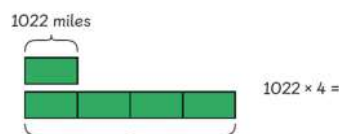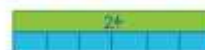
1022 miles

$1022 \times 4 =$

Vocabulary
Multiplicand (Number to be multiplied) Multiplier (Amount that multiplicand is being multiplied by)
Product, lots of, groups of, times, as much, factors

Multiplication Year 5

CPA Approach
(Concrete, pictorial, Abstract)

Mental methods

X whole numbers and decimals by 10, 100, 1000 using knowledge of place value to move digits

Use practical resources and jottings to explore equivalent statements (e.g. 4 x 35 = 2 x 2 x 35)

Recall of prime numbers up to 19 and identify prime numbers up to 100 (with reasoning)

Identify multiples and factor pairs for numbers

Written methods (progressing to 4d x 2d)

Children to continue to explore long and short methods:

As in Year 4, children to use their knowledge of multiplication tables and inverse, supported by pictorial representations and the Bar Method

Grid method to multiply 2 digit numbers by 2 digit numbers e.g. 39 x 51 =

Bar model to support Problem solving. Link with other operations

```
    1 1 8
  ×     3
  _____
    2 4  → multiply by ones
    3 0  → multiply by tens
+ 3 0 0  → multiply by hundreds
  _____
    3 5 4
```

```
  1 3 3
  1 1 4 4
×       8
_____
  9 1 5 2
```

	50	1
30	?	?
9	?	?

Jason rode with his uncle for 6 hours at the average rate of 49 miles per hour. How far did he travel?

Jason's miles	1	2	3	4	5	6
	49	49	49	49	49	49

49 × 6 =
(40×6) +(9×6)
=240 + 54
= 294

Jason travelled ___294___ miles.

Vocabulary

Multiplicand (Number to be multiplied) Multiplier (Amount that multiplicand is being multiplied by) Product, lots of, groups of, times, as much, Factors

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Multiplication Year 6

CPA Approach
(Concrete, pictorial, Abstract)

Mental methods

Identifying common factors and multiples of given numbers and prime numbers
X 2d and 3d numbers by 1d mentally or using jottings
Perform mental calculations including mixed operations and large numbers

X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

$23 \times 113 = $

$$20 \times 113 = 2260$$
$$3 \times 113 = 339$$
$$23 \times 113 = 2599$$

Written methods

Continue to refine and deepen understanding of written methods including grid method, expanded column and fluency for using column multiplication supported by jottings and the Bar Method

```
    5172
  x   38
  41376
   151
+ 155160
    2
  196536
    1
```

Bar model to support word problems and percentages

Vocabulary
Multiplicand (Number to be multiplied) Multiplier (Amount that multiplicand is being multiplied by)
Product, lots of, groups of, times, as much, Factors

Calverton Primary School Calculation Policy Multiplication

Micro Steps

The year group markings relate to Mental Arithmetic sessions.
To be used also in planning where appropriate to learning

1. 2 digit ×1 digit without carrying. (2 times table only – maximum in top multiplier 44). E.g. 34 × 2	23 × 2 41 × 2	Year 3 Term 2	
2. 3 digit ×1 digit without carrying. (2 times tables only – maximum in top multiplier 44). E.g 324 × 2	123 × 2 231 × 2	Year 3 Term 2	
3. 2 digit × 1 digit (2 times table only) carrying into tens column 49 E.g 26 × 2	TU 17 × 2 18 × 2	Year 3 Term 2	
4. 2 digit × 1 digit (2 times table only) carrying in to both columns E.g. 76 × 2	TU 87 × 2 58 × 2	Year 3 Term 4	
Assessment of stages 1-7			
5. 2 digit × 1 digit (2-9 times table) carrying in both columns. E.g. 73 × 5	67 × 3 89 × 3	Year 3 Term 4	
6. 3 digit x 1 digit carrying across any columns E.g. 345 × 6	434 × 5 743 × 6	Year 3 Term 4	Year 3 Term 6
7. 3 digit x 1digit carrying across any columns with 0 in tens Column	T 503 × 4 909 × 2	Year 3 Term 6	Year 4 Term 2

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		Recap on learning	
E.g 407 x 8			
8. Repeat steps as above with decimal numbers E,g. 3.5 x 6	1.7 × 2 8.7×2 8.9×6 4.34 × 5 5.03 × 4 74.3 × 6 90.9 × 2	Year 3 Term 6	Year 4 Term 2 Year 3 Term 6

9. Numbers with any length of digits x 1 digit. (including money) E.g. 456.2 x 5	456.7 x 3 £41.50 x 3	Year 4 Term 2	Year 4 Term 4 Recap on learning
Assessment of stages 5 - 9			
10. 2 digit x 2 digit (maximum value of multiplier 11 – 19) E.g. 23 x 13	48 x 12 56 x 15	Year 4 Term 4	
11. 2 digit x 2 digit when one of the multipliers is a multiple of 10 E.g. 45 x 70	63 x 10 95 x 20	Year 4 Term 4	

12. 2 digit x 2 digit when the answer to the tens x units in the multiplier is a multiple of 10
 	
E.g. 30 x 63
	T u
	25 x 37
	45 x 28
	
	       25
	       37
	      175
	      150
	      600
		Year 4 Term 4	

13. 2 digit x 2 digit - any values E.g. 36 x 74	48 x 56 19 x 27	Year 4 Term 6	Year 5 Term 2 Greater Depth

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14. 3 digits x 2 digits with 0's in any place value of either number E.g. 304 x 56	407 x 27 270 x 47	**Year 4 Term 6**	**Year 5 Term 2 Greater Depth**
15. 3 digit x 2 digit with 0's in any place value of either number E.g. 402 x 67	306 x 37 508 x 28	**Year 4 Term 6**	**Year 5 Term 2 Greater Depth**
Assessment of stages 10 -15			
16. 2 digit (1dp) x 2 digit, when final answer ends in a 0 e.g. 176.0 = 176 E.g. 3.5 x 64	4.5 x 34 6.5 x 68	**Year 5 Term 4**	
17. 2 digits (1dp) x 2 digits. Any 2 numbers. E.g. 4.7 x 86	5.6 x 27 3.7 x 64	**Year 5 Term 6**	**Year 6 Term 2**
18. 2 digit (1dp) x 3 digit. Any 2 numbers E.g. 453 x 6.2	234 x 7.3 356x 6.4	**Year 5 Term 6**	**Year 6 Term 2**

19. Any Money amount x 2 digit number E.g. £43.95 x 62	£37.29 x 73 £ 53.95 x 84	**Year 6 Term 2**
20. 3 digit x 3 digit number E.g. 643 x 706	754 x 603 807 x 326	**Year 6 Term 2**
Assessment of stages 16 – 20		

Calverton Primary School Calculation Policy Multiplication

Year Group Objectives for Multiplication

Year 1

Pupils should be taught to:

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

Year 2

Pupils should be taught to:

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- How that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Year 3

Pupils should be taught to:

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Year 4

Pupils should be taught to:

- Recall multiplication and division facts for multiplication tables up to 12 × 12

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- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- Recognise and use factor pairs and commutativity in mental calculations
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

Year 5

Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- Know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers
- Establish whether a number up to 100 is prime and recall prime numbers up to 19 ♣ 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 and divide numbers mentally drawing upon known facts
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 Mathematics – key stages 1 and 2 33 Statutory requirements
- Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Year 6

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- Perform mental calculations, including with mixed operations and large numbers
- Identify common factors, common multiples and prime numbers

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- Use their knowledge of the order of operations to carry out calculations involving the four operations
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why Mathematics – key stages 1 and 2 40 Statutory requirements
- Solve problems involving addition, subtraction, multiplication and division
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.