LISTERDALE

Progression in Calculations

Multiplication

Progression in Multiplication

EYFS
Recognise and make equal groups.
Group objects in different contexts. Doubling to 10-verbally recall facts, understand that doubling is 'twice as many.' Begin to find patterns in the number system on a 100 square.

How many wheels altogether?

Year 1
Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
Recall and use doubles of all numbers to 10 .

There are ___ groups of ___ pencils.

Arrays. Looking at columns and rows. Counting using a variety of practical resources.

Year 2
Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even number.
Understand multiplication as repeated addition.
Show that multiplication of two numbers can be done in any order (commutative).
Derive and use doubles of simple two-digit numbers (numbers in which the ones total less than 10).
Calculate mathematical statements for multiplication (using repeated addition) within the multiplication tables and write them using the multiplication (×), and equals (=) signs
Solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts

$10 = 2 \times 5$
$5 \times 2 = 10$
$2 + 2 + 2 + 2 + 2 = 10$
$10 = 5 + 5$

2 lots of 5   5 lots of 2

Multiplication is commutative

$2 \times 5 = 10$
$5 \times 2 = 10$
$2 \times 5 = 10$
$5 \times 2 = 10$

Missing numbers need to be placed in all possible places.
$7 \times 2 = \blacktriangleright$ $\blacktriangleright = 2 \times 7$
$7 \times \blacktriangleright = 14$ $14 = \blacktriangleright \times 7$
$\blacktriangleright \times 2 = 14$ $14 = 2 \times \blacktriangleright$
$\square \times \blacktriangleright = 14$ $14 = \blacktriangleright \times \square$

Use doubling to multiply by 2.
$15 \times 2 = \mathbf{30}$
$10 + 5$
$20 + 10 = \mathbf{30}$

Year 3
Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
Choose an appropriate strategy to solve a calculation based upon the numbers involved.
Derive and use doubles of all numbers to 100.
Derive and use doubles of all multiples of 50 to 500.
Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for **two-digit numbers times one-digit** numbers, using mental method and progressing to more formal written methods.
Use estimation to check answers to calculations.
Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Practically and pictorially, partitioning into tens and ones.
3×23

$23 \times 3 =$
$3 \times 3 = 9$
$20 \times 3 = 60$
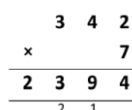$+$
69

23
$\times \ 3$
69

Year 4

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

Choose an appropriate strategy to solve a calculation based upon the numbers involved.

Recognise and use factor pairs and commutativity in mental calculations.

Use partitioning to double any number, including decimals to one decimal place.

Use place value, known and derived facts to multiply mentally, including:
- multiplying by 0 and 1
- multiplying together three numbers.

Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.

Use estimation and inverse to check answers to calculations.

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.
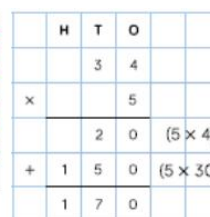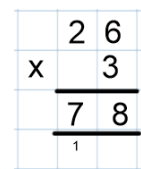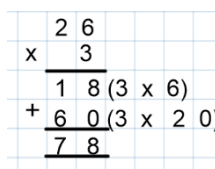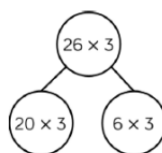
342 × 7 becomes

Distributive Law
Multiplying a number by a group of numbers added together is the same as doing each multiplication separately.

$3 \times (2 + 4) = 3{\times}2 + 3{\times}4$

3 x (2+4)   3x2 + 3x4

Approximate by rounding first: E.g.
223 x 8 to 200 x 8 = 1600
72 x 38 to 70 x 40 = 2800

Year 5

Choose an appropriate strategy to solve a calculation based upon the numbers involved.

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.

Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3).

Use partitioning to double any number, including decimals to two decimal places.

Multiply numbers mentally drawing upon known facts.

Solve problems involving multiplication including using their knowledge of factors and multiples, squares and cubes.

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.

Use estimation and inverse to check answers to calculations.

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, including scaling by simple fractions and problems involving simple rates

Multiply two multiples of 10 fluently. E.g.
30 x 60 = 1800
20 x 60 = 1200

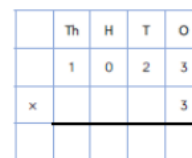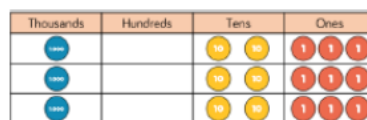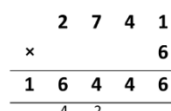Multiply whole numbers and decimals by 10, 100 and 1000 fluently. E.g.
23 x 100 =
45 x 10 =
3.6 x 100 =
3.87 x 1000 =

Practically and pictorially:

2741 × 6 becomes

Importance of place holder in Long Multiplication
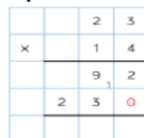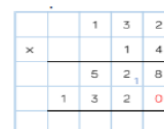
Year 6

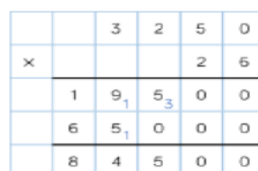Choose an appropriate strategy to solve a calculation based upon the numbers involved.

Identify common factors, common multiples and prime numbers.

Use partitioning to double any number.

Perform mental calculations, including with mixed operations and large numbers.

Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.

Multiply one-digit numbers with up to two decimal places by whole numbers.

Use estimation and inverse to check answers to calculations.

Use their knowledge of the order of operations to carry out calculations involving the four operations.

Solve problems involving addition, subtraction, multiplication and division.

Multiply one-digit numbers with up to two decimal places by whole numbers

Find the product without the decimal point and put the point in the answer afterwards.

5.36 x 8 becomes

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  536
x   8
 4288
  2 4
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Since, 5.36 had two decimal places when we started, 5.36 × 8 will also have two decimal places in its answer.

Therefore, 5.36 × 8 = 42.88

Formal methods

	4	2	6	7
×			3	4

Missing number problems:

	□	7	4	□
×				6
1	6	□	□	6