

MULTIPLICATION

Year 1 Procedural Fluency Multiply with concrete objects arrays and pictorial representations

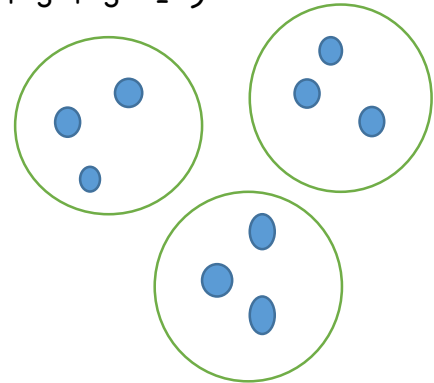


How many legs will 3 teddies have?

$$2 + 2 + 2 = 6$$

There are 3 sweets in one bag.
How many sweets are there in 3 bags altogether?

$$3 + 3 + 3 = 9$$



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

Key skills for multiplication at Yr 1:

- Count in multiples of 2, 5 and 10.
- **Reasoning:** 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.

MULTIPLICATION

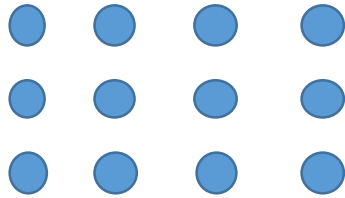
Year 2 Procedural Fluency Multiply and using arrays and repeated addition using at least 2s, 5s and 10s

Arrays

$$4 \times 3 = 12$$

$$4 \times 3 = 3 + 3 + 3 + 3$$

$$3 \times 4 = 4 + 4 + 4$$



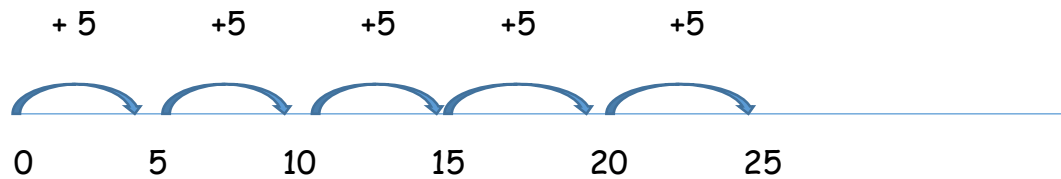
Use arrays to help teach children to understand the commutative law of multiplication and give examples such

$$3 \times \underline{\quad} = 6$$

Use repeated addition on a number line

Starting from 0, make equal jumps on a number line to work out multiplication facts and write multiplication facts and write multiplication statements using x and = signs.

$$4 \times 5 = \text{ or can say 4 lots 5}$$



Use mental recall:

Children should begin to recall multiplication facts for 2, 5 and times tables through practise in counting and understanding of the operation.

Key Vocabulary: groups of, lots of, times, array, altogether, multiply, count, repeated addition, column, row, commutative, sets of, equal groups, times as big as. Once, twice, three times.

Key Skills for multiplication:

- Count in steps of 2, 3, and 5 from 0 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)
- **Reasoning:** Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods and multiplication facts.
- Pupils use a variety of language to describe multiplication

MULTIPLICATION

Year 3 Procedural Fluency Multiply 2 - digits by a single digit number

Introduce the grid method for multiplying 2 - digit by a single digit:

E.g $23 \times 8 = 184$

X	20	3
8	160	24

Expanded Written Method

$$\begin{array}{r} 23 \\ \times 8 \\ \hline 24 \quad (3 \times 8) \\ 160 \quad (20 \times 8) \\ \hline 184 \end{array}$$

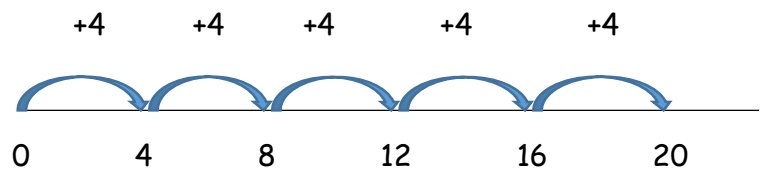
Introduce grid method physically with deennes, making an array to show the calculation.

Children should describe what they do by referring to the actual values of the digits. E.g it's 20×8 not 2×8 . Teach the expanded method alongside the grid method to physically show what is being multiplied.

Where appropriate use place values. **It is considered too early to teach short multiplication**

To do this children must be able to:

- Partition numbers into tens and unit and recognise value.
- Multiply multiples of 10 by a single digit using known facts and place value.
- Recall multiplication facts in the 2, 3, 4, 5, 8 and 10 tables.
- Strategies used for multiplication facts taught using repeated addition on a number line, bead bar or arrays.



Key Vocabulary: groups of, lots of, times, array, altogether, multiply, count, repeated addition, column, sets of, equal groups, times, partition, grid method, multiple, product, tens, units, value

Key Skills for multiplication:

- Recall and use multiplication facts for 2, 3, 4, 5, 8, 10 multiplication tables, and multiply multiples of 10.
- Write and calculate number statements using multiplication tables they know, including $TU \times U$ drawing upon mental methods and move to formal written methods.
- **Reasoning:** Solve problems including missing number problems.
- Develop mental methods knowing multiplication can be done in any order. 7×4 can be done using $(5 \times 4) + (2 \times 4)$

MULTIPLICATION

Year 4 Procedural Fluency Multiply 2 and 3 - digits by a single digit number

Revise the grid method using tables up to 12.

Expanded Written Method

E.g $136 \times 5 = 680$

X	100	30	6
5	500	150	30

$$\begin{array}{r} 136 \\ \times 5 \\ \hline 30 \quad (6 \times 5) \\ 150 \quad (30 \times 5) \\ \hline 500 \quad (100 \times 5) \\ 680 \end{array}$$

Encourage column addition to add, or set out
Using the expanded written method.

Making an array to show the calculation.

Move onto short multiplication (See Yr 5) if and when children are confident and accurate multiplying 2 and 3 digit numbers by a single digit this way and are already confident "exchanging" for the written addition

To do this children must be able to:

- Approximate first before they calculate to check for reasonableness. E.g 346×9 is close to $346 \times 10 = 3500$
- Multiply multiples of ten and one hundred by a single digit
- Recall all tables up to 12×12
- Recognise facts: $9 \times 7 = (5 \times 9) + (2 \times 9)$ $45 + 18 = 63$
- Use patterns for calculations: $8 \times 6 = 48$ $80 \times 6 = 480$
- Use associative law for mental calculations: 6×15 $6 \times (5 \times 3)$
 $(6 \times 5) \times 3 = 90$

Key Vocabulary: groups of, lots of, times, array, altogether, multiply, count, repeated addition, column, sets of, equal groups, times, partition, grid method, multiple, product, tens, units, value

Key Skills for multiplication:

- Count in multiples of 6, 7, 9, 25 and 1000
- Recall all multiplication facts 12×12
- Recognise inverse operation for multiplication and division
- Recognise place value of digits in a 4 digit number
- Use place value facts to multiply mentally
- Use commutativity law for mental strategies: $2 \times 6 \times 5 = 10 \times 6$ $39 \times 7 = 30 \times 7 + 9 \times 7$
- **Reasoning:** Solve problems with increasing complexity in range of contexts.

MULTIPLICATION

Year 5 Procedural Fluency Multiply 4– digits by 1 or 2 digit numbers

Introducing column multiplication:

- Introduce by comparing a grid method calculation to a short multiplication method to see how the steps are related, but notice how there are less steps involved in the column method.
- Children need to be taught to approximate first. E.g 78×32 changed to 80×30 . Check answer for reasonableness.

Short multiplication

X	300	20	7
4	1200	80	28



$$\begin{array}{r} 327 \\ \times 4 \\ \hline 1308 \end{array}$$

Pupils could be asked to work out a calculation using the grid and then compare it to the column method. How similar? Different? Unpick the steps and show how reduces. **Only use if proficient in grid method**

Introduce Long multiplication for multiplying by 2 digits

x	10	8
10	100	80
3	30	24



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

(3×18)
(10×18)

Move onto 4 digit numbers.

Only use this method if secure in the grid method and the expanded method. Teachers should continue with these methods until pupils are confident with them.

18×10 : put 0 in units first as multiplying by 10, then 8×1 and 1×1

Key Vocabulary: groups of, lots of, times, array, altogether, multiply, count, repeated addition, column, sets of, equal groups, times, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short / long multiplication

Key Skills for multiplication:

- Use related facts for doubling and halving: double or halve the most significant digit first.
- Multiply 25 by multiplying by 100 and dividing by 4.
- Use factors; 9×18 $9 \times (6 \times 3)$
- Use commutative law 14×12 $(2 \times 7) \times 12$ $2 \times (7 \times 12)$ 2×84
- Identify multiples and factors and use vocab for prime numbers and prime factors
- Recognise all prime, square and cubed numbers up to 100.
- **Reasoning:** Solve problems involving multiplication and factors and prime numbers
- **Reasoning:** Solve problems involving scaling up of simple fractions.

MULTIPLICATION

Year 6 Procedural Fluency Short and long multiplication as in Year 5 and multiply decimals with up to 2 decimal places by a single digit.

x	5000	600	40	3
6	30,000	36,00	240	18

$$\begin{array}{r}
 5\ 6\ 4\ 3 \\
 \times \quad \quad 8 \\
 \hline
 5\ 3\ 2 \\
 4\ 5\ 1\ 4\ 4
 \end{array}$$

The amount of time that should be spent teaching expanded method will depend on how secure children are with the grid method and place value.

x	200	80	5
60	12,000	4800	300
3	600	240	15

$$\begin{array}{r}
 1\ 2\ 4 \\
 \times \quad 2\ 6 \\
 \hline
 1\ 2 \\
 7\ 4\ 4 \\
 \hline
 2\ 4\ 8\ 0 \\
 \hline
 3\ 2\ 2\ 4 \\
 \hline
 1\ 1
 \end{array}
 \quad \begin{array}{l}
 (6 \times 124) \\
 (20 \times 124)
 \end{array}$$

The first step of the grid method is to show all the calculations and how it relates to the expanded method. When pupils are comfortable with the expanded method, teachers may move to the formal method of long multiplication.

Multiply 1 or 2 digit numbers with up to 2 decimal places

- Estimate and check before calculating.

- Use known facts to calculate: $8 \times 6 = 48$ $0.8 \times 6 = 4.8$

x	4	0.8	0.03
6	24	4.8	0.18

$$\begin{array}{r}
 4.83 \\
 \times \quad 6 \\
 \hline
 4\ 1 \\
 2\ 8.98
 \end{array}$$

Or can do 483×6 and \div by 100

Key Vocabulary: groups of, lots of, times, array, altogether, multiply, count, repeated addition, column, sets of, equal groups, times, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short / long multiplication / tenths / hundredths / decimal

Key Skills for multiplication:

- Multiply multi digit numbers up to 4 digit \times 2 digit using long multiplication
- Perform mental calculations with mixed operations and large numbers
- Solve multi-step problems in a range of contexts
- Estimate answers using round and approximation and determine levels of accuracy; round integers.
- Use associative law. E.g 10.6×30 $10.6 \times (10 \times 3)$ or $(10.6 \times 10) \times 3$
- **Reasoning:** Solve problems involving multiplication and factors and prime numbers
- **Reasoning:** Solve problems involving scaling up of simple fractions.

