

Multiplication

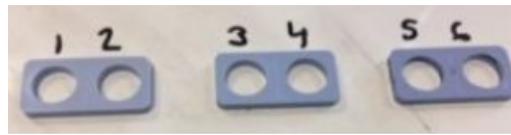
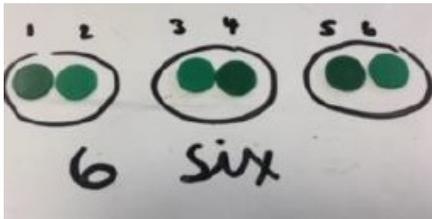
Early Years

Pupils should be able to:

- solve problems involving doubling
- exceeding Early Learning Goals—counting in 2, 5, 10

Making Equal Groups

Use of everyday objects, cubes and counters to put them into equal groups and then counting on in ones. If children are secure, they could write as $2 + 2 + 2$



Children should use real life objects like socks to put into pairs

Use of pictorial representations to make equal groups



How many groups of two have you made?

Use of a number track and a counter or white-board pen to count on in ones but emphasising the multiples

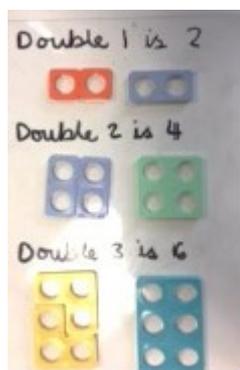
1 2 3 4 5 6



Not necessary to move on to this abstract stage. Most children will stay in the concrete / pictorial stage and exploring equal groups

Doubling

Use of Numicon to double numbers. If children know the shape of the numbers, then it will be easier for them to recall their doubling facts



Use of fingers, concrete objects, songs etc all to support doubling

Use of multi-link cubes to double a number. Children can see the two parts are the same size and then put them together to double



Double 4 is 8

Vocabulary groups of, equal groups, double

Multiplication

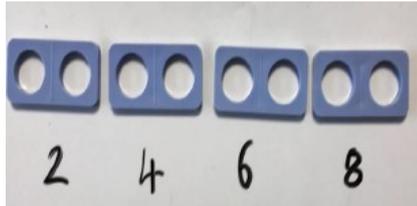
Year 1

Pupils should be able to:

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

Counting in Multiples

Use of everyday objects or Numicon to count in 2s, 5s and 10s

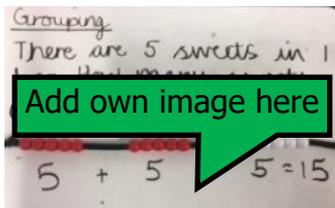


Use of images, both given and created by the children to support counting in 2s, 5s and 10s

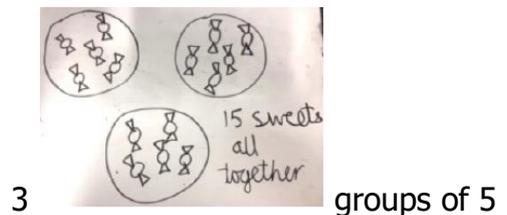


Repeated Addition

Show with real life objects, Numicon, bead strings etc to understand multiplication as repeated addition and grouping

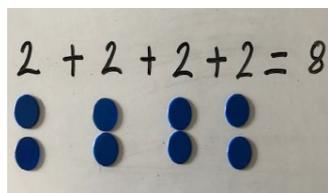


Draw own visuals and use images to support multiplication as grouping

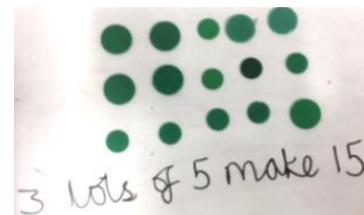


Arrays

Move grouping on quickly to regular arrays. Repeated addition to support understanding of arrays

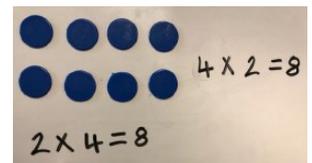


Draw own visuals to support multiplication as grouping



Commutative Relationship

Introducing the commutative relationship to show that two equations can be created from one array



Mental Maths

To count on in multiples of 2, 5 and 10 to solve multiplication problems and recognise the multiplication symbol. To make connections between arrays, number patterns and counting in 2s,



Vocabulary groups of, times, multiply, addition, arrays, lots of

Multiplication

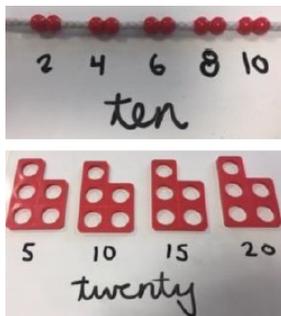
Year 2

Pupils should be taught to:

- recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication within the multiplication tables and write them using multiplication (x) and equals (=) symbols
- show that multiplication of two numbers can be done in any order (commutative)
- solve problems involving multiplication using materials, arrays, repeated addition, mental methods and multiplication facts, including problems in contexts

Count in Multiples

Use of practical apparatus to support counting in multiples of 2, 5, 10



Ensure children write the amount in numerals and words

Use of pictorials to support counting on in multiples



Mentally counting on in multiples. Children should use pattern spotting to support their understanding of multiples

0, 5, 10, 15 ...

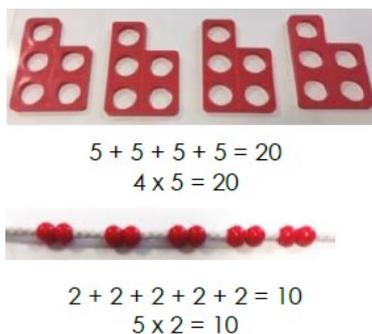
"Multiples of 5 end in 0 and 5 only. They are even and odd numbers."

"48 cannot be a multiple of 5 because it doesn't end in 0 or 5"

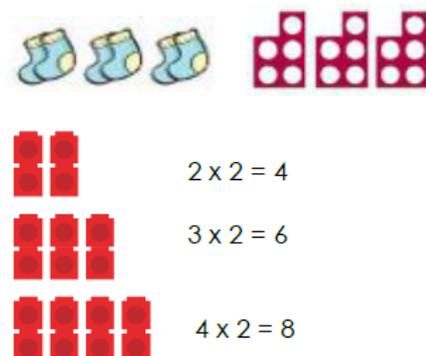
Ensure children count forwards and backwards

Repeated Addition

Children use concrete material to understand multiplication as repeated addition



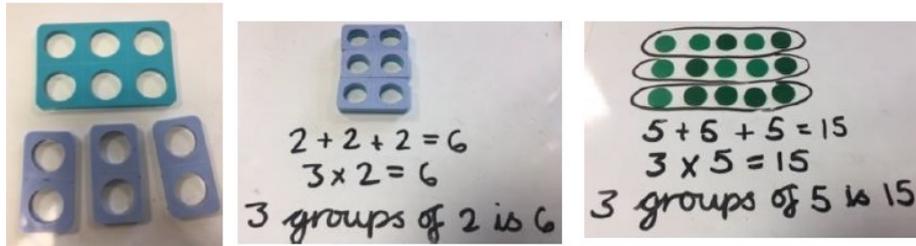
Use of pictorials in books or drawings to support understanding of multiplication as repeated addition



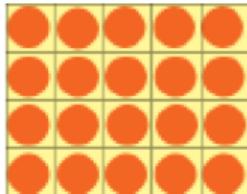
Vocabulary groups of, times, multiply, addition, arrays, lots of, multiplication

Arrays

Use of practical apparatus such as counters and Numicon to support solving multiplication problems using arrays



Using pictorials in books, children can count the total in multiples to solve problems



$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

Twenty

Children can draw an array as a method to solve problems



Commutative Relationship

Use of concrete resources to show that multiplication can be done in any order

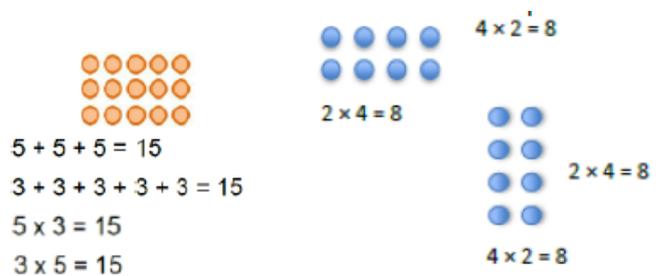


$$3 \times 5 = 15$$

$$5 \times 3 = 15$$

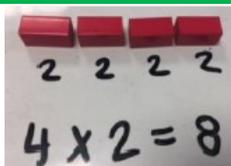


Move and draw arrays in different ways to show the commutative relationship



Bar Model

Mental Maths



Children can use practical resources such as Cuisenaire rods to solve problems using a physical bar model.

Children use their knowledge of counting on in multiples to solve problems

$$5 \times 8 = 40$$

"I'll count on in 5 eight times"



Solving Problems in Context

Rosie bought 6 boxes of marbles. There are 5 marbles in each box. How many marbles does Rosie have in total?

Children should have experience of using different methods (such as real objects, arrays, repeated addition, Cuisenaire bar models) to solve word problems as well as choosing the most efficient method for the problem



Vocabulary groups of, times, multiply, addition, arrays, lots of, multiplication

Multiplication

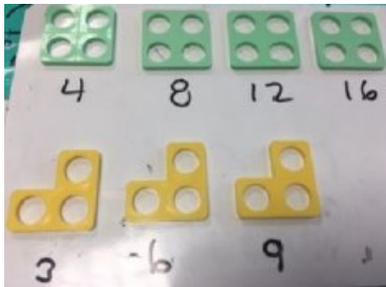
Year 3

Pupils should be taught to:

- recall and use multiplication facts for the 3, 4 and 8 multiplication tables
- 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 and progressing to formal written methods
- solve problems, including missing number problems

Commutative Relationship

Use of practical apparatus to support counting in multiples of 3, 4 and 8



Use of pictorials to support counting on in multiples



24
twenty
8 groups of 3 is 24

Ensure children write the amount in numerals and words

Mentally counting on in multiples. Children should use pattern spotting to support their understanding of multiples

0, 5, 10, 15 ...

"Multiples of 4 end in 0, 2, 4, 6, 8. They are even numbers"

"53 cannot be a multiple of 8 because it is not an even number"



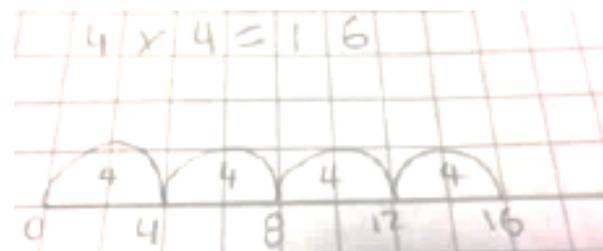
Ensure children count forwards and backwards

Number Line

Children can use concrete objects to support understanding of an empty number line



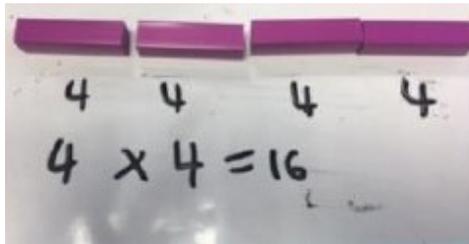
Children can use an abstract method of a number line



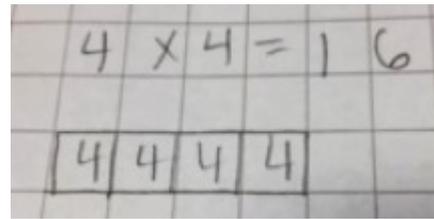
Vocabulary multiplicand (number to be multiplied), multiplier (amount the multiplicand is multiplied by), product, lots of, groups of, times, as much, factors

Bar Model

Children can use concrete objects to support understanding of a bar model



Children can draw own bar model to support solving multiplication problems



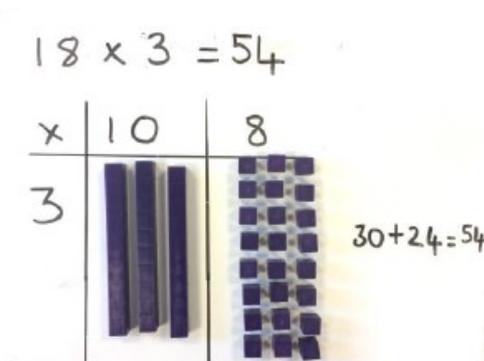
Grid Method: 2-digit by 1-digit

Grid method: Base 10

The two-digit number is partitioned horizontally with the tens digit coming first

The number is represented by the Base 10

$$18 \times 3$$



Answer: 54

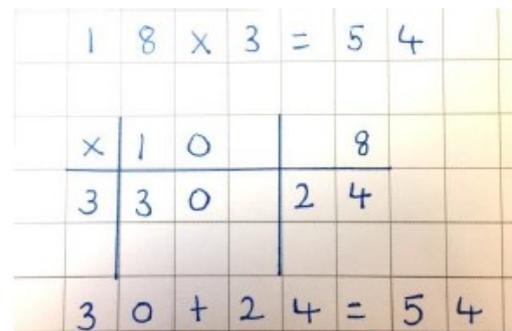
Practise estimation before solving calculations: is this a sensible answer?

Ensure children are using the multiplication facts for all times tables learned so far: 2, 3, 4, 5, 8, 10

Grid method

$$18 \times 3$$

- partition the number into tens and ones
- multiply the pairs of numbers
- record the answer in the grid
- recombine to find the answers



Answer: 54

Vocabulary multiplicand (number to be multiplied), multiplier (amount the multiplicand is multiplied by), product, lots of, groups of, times, as much, factors

Multiplication

Year 4

See Year 3 examples for counting in multiples mentally

Pupils should be taught to:

- count in multiples and solve problems within the 0, 1, 6, 7, 9, 11 and 12 times tables
- multiply two-digit and three-digit numbers by a one-digit numbers using formal written layout

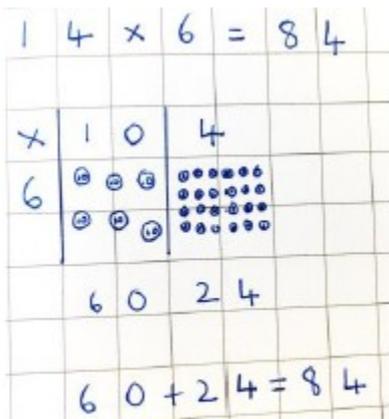
Grid Method: 2-digit by 1-digit

Grid method: pictorial

Recall the Base 10 method from Year 3

The two-digit number is partitioned horizontally with the tens digit coming first. The number is represented by the children's drawings of place value counters

$$14 \times 6 =$$



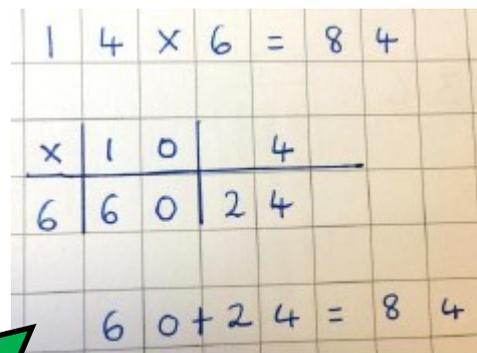
Answer: 84

Ensure that children have the opportunity to multiply by a range of different numbers from 2 to 12 building on their knowledge of multiplication facts (up to 12×12)

Grid method:

- partition the number into tens and ones
- multiply the pairs of numbers
- record the answer in the grid
- add the two answers together

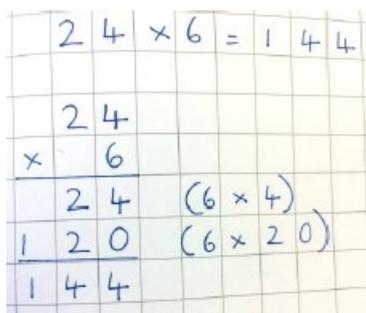
$$14 \times 6 =$$



Answer: 84

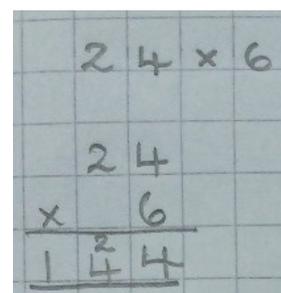
Expanded Short 2-digit by 1-digit

Children will use the expanded short method to multiply a two-digit number by a one-digit number



Short 2-digit by 1-digit

Once secure with the expanded method, they can use the short method to multiply a two-digit number by a one-digit number



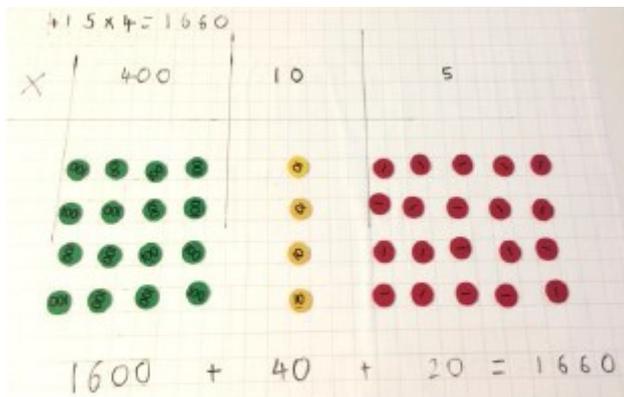
Vocabulary multiplicand (number to be multiplied), multiplier (amount the multiplicand is multiplied by), product, lots of, groups of, times, as much, factors

Grid Method: 3-digit by 1-digit

Grid method: place value counters

The three-digit number is partitioned horizontally with the hundreds digit coming first. The number is represented by the children's drawings of place value counters

$$415 \times 4$$

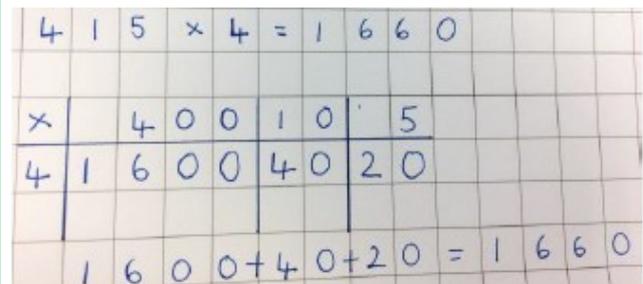


Answer: 1660

Grid method:

- partition the number into hundreds, tens and ones
- multiply the numbers
- record the answer in the grid
- add the three answers together

$$415 \times 4 =$$



Answer: 1660

Vocabulary multiplicand (number to be multiplied), multiplier (amount the multiplicand is multiplied by), product, lots of, groups of, times, as much, factors

Multiplication

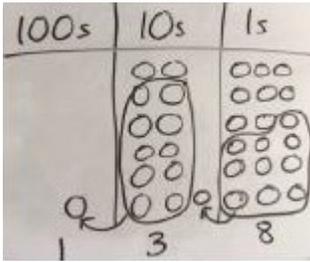
Year 5

Pupils should be taught to:

- multiply numbers up to 4 digits by one or two-digit numbers using a formal written method, including long multiplication for two-digit numbers

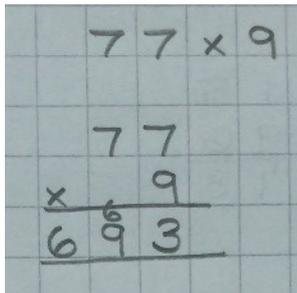
Short Multiplication up to 4-Digit by 4-Digit

$23 \times 6 =$

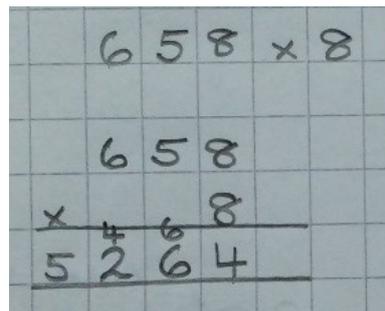


Use previous pictorial methods to support drawing out the answer first

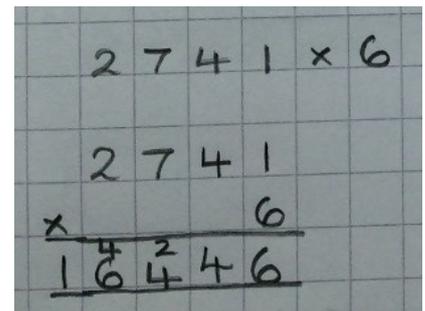
$77 \times 9 =$



$658 \times 8 =$



$2741 \times 6 =$



Expanded Long Multiplication

Expanded long multiplication (first with two-digit numbers multiplied by a teen number) is the step before long multiplication



Vocabulary multiplicand (number to be multiplied), multiplier (amount the multiplicand is multiplied by), product, lots of, groups of, times, as much, factors

Long Multiplication

Introduce long multiplication for multiplying a number up to four digits by a two-digit number

$$23 \times 13 =$$

23	×	13	=	299
23				
×	13			
	69			
230				
299				

Answer: 299

$$24 \times 16 =$$

24	×	16	=	384
24				
×	16			
	144			
240				
384				

Answer: 384

When children are confident with long multiplication, extend to three-digit numbers multiplied by a two-digit number

124	×	26
124		
×	26	
	744	
2480		
3224		

Ensure that children are using pictorial methods as shown in Year 4 and previous year groups to support their understanding

Vocabulary multiplicand (number to be multiplied), multiplier (amount the multiplicand is multiplied by), product, lots of, groups of, times, as much, factors

Multiplication

Year 6

Pupils should be taught to:

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

Short Multiplication

Practise and consolidation of multiplying a number by one digit may be needed in Year 6 so that children can confidently use the short method of multiplication to solve:

TO x O =

HTO x) =

ThHTO x O =

Ensure that children are using pictorial methods as shown in Year 4 and previous year groups to support their understanding

Please refer to previous years' guidance for short multipli-

Long Multiplication

Children consolidate using long multiplication for multiplying a number up to four digits by a two-digit number

HTO x TO

$$124 \times 26 =$$

Answer: 3224

Handwritten long multiplication of 124 by 26 on grid paper. The calculation shows 124 multiplied by 6 to get 744, and 124 multiplied by 20 to get 2480. The final product is 3224.

ThHTO x TO

Handwritten long multiplication of 262 by 29 on grid paper. The calculation shows 262 multiplied by 9 to get 2358, and 262 multiplied by 20 to get 5240. The final product is 7598.

Handwritten long multiplication of 2951 by 17 on grid paper. The calculation shows 2951 multiplied by 7 to get 20657, and 2951 multiplied by 10 to get 29510. The final product is 50167.

Vocabulary multiplicand (number to be multiplied), multiplier (amount the multiplicand is multiplied by), product, lots of, groups of, times, as much, factors