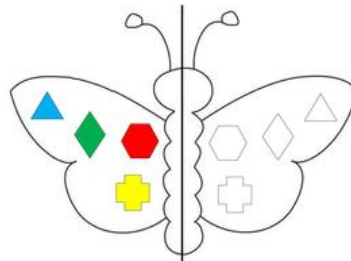# Multiplication

Foundation Stage 2 Objectives:

- 40 – 60 months - Finds the total number of items in two groups by counting all of them.
- In practical activities and discussions begins to use the vocabulary involved in multiplication
- Early Learning Goal - They solve problems, including doubling, halving and sharing.

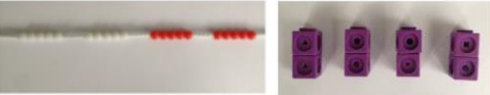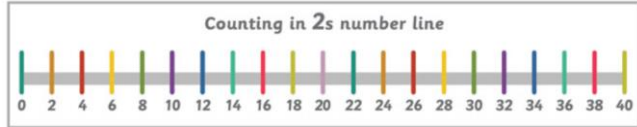| Concrete	Pictorial	Abstract
Looking at reflections in the mirror Make prints by folding paper in half 		
Doubling on hands and finding doubles on dominoes etc. 		Match the dots/colour them in…
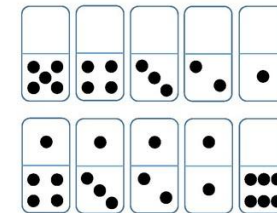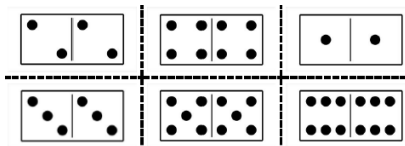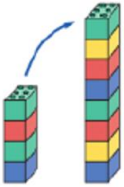
Year 1 Objectives:
- solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher
- Non-statutory guidance: Through grouping small quantities, pupils begin to understand: multiplication and doubling numbers and quantities.
- They make connections between arrays, number patterns, and counting in 2s, 5s and 10s.

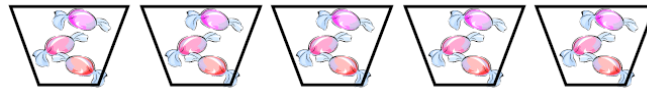| Concrete	Pictorial	+
Start with doubling using concrete resources double 4 is 8 $4 \times 2 = 8$	Use diagrams to show doubling.	$2+2=4$
  Count in 2s, 5s and 10s using resources to support	 Count in 2s, 5s and 10s on your hands and recognise the patterns on number lines. Counting in **2**s number line 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	2,4, 6 etc.

Introduce repeated addition for multiplication. Use resources to show the amount in each group. Progress on to representing this as an array. Use contextual links to problem solve.

3 + 3 + 3
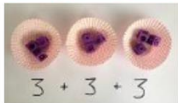
Solve multiplication problems through repeated addition, using pictures, diagrams and own drawings to support understanding.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
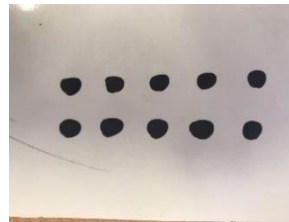
Starting to use arrays and looking for patterns when counting in multiples.

$5+5+5 = 15$

Year 2 Objectives:

Pupils should be taught to:

- Count in steps of 2, 3, 5 and 10.
- recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
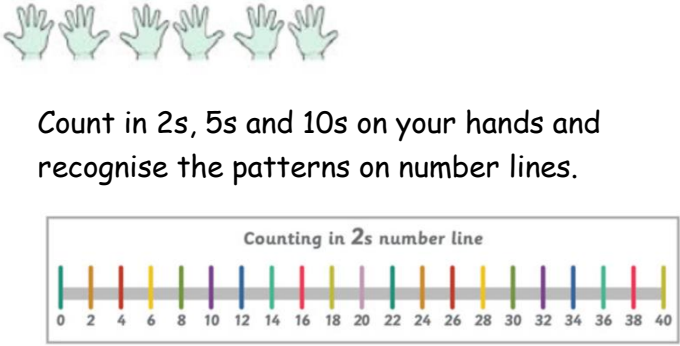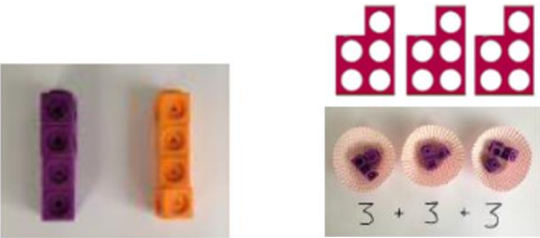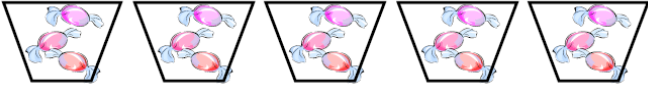- calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs
- show that multiplication of 2 numbers can be done in any order (commutative)
- solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts

Concrete	Pictorial	Abstract
  Count in 2s, 5s and 10s using resources to support	 Count in 2s, 5s and 10s on your hands and recognise the patterns on number lines. Counting in 2s number line 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	2,4, 6 etc.
 3 + 3 + 3		**5+5+5 = 15** **3 × 5 = 15** **5 × 3 = 15** **(commutativity)** **Relate to division facts (once division has been taught):** **15÷3= 5** **15÷5= 3** **Variation Ideas:** 2 x 3

Introduce repeated addition for multiplication. Use resources to show the amount in each group. Progress on to representing this as an array. Use contextual links to problem solve.	Solve multiplication problems through repeated addition, using pictures, diagrams and own drawings to support understanding when **grouping.**	2 x 30 2 x 300 20 x 3 200 x 3

Show repeated addition as jumps on a number line.

3 ×5

5 × 3

5 + 5 + 5 = 15

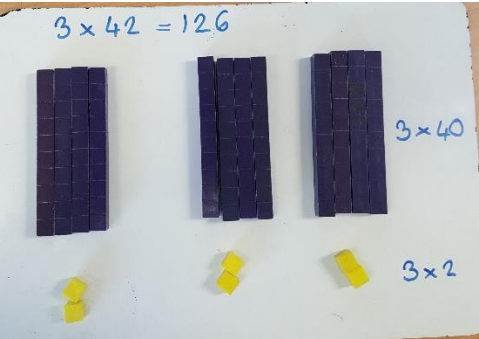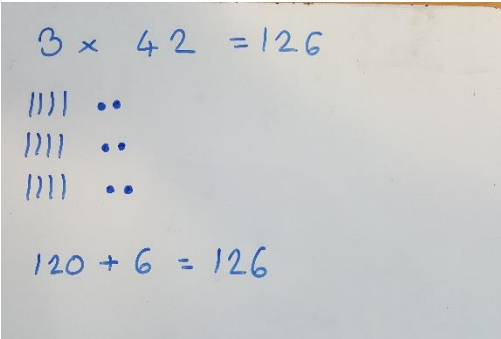| 5	5	5
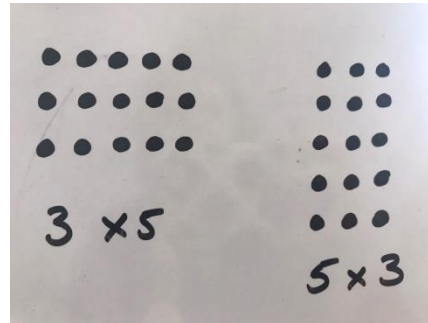
Year 3 Objectives:

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, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Concrete	Pictorial	Abstract
  Build on use on arrays to show the commutative law.	5 x 3 = 15 3 x 5 = 15 'The product of ___ and ___ is equal to the product of ___ and ___.' This can then be simplified to: '___ times ___ is equal to ___ times ___.'	5x3=15 3x5=15 **Relate to division facts:** 15÷3= 5 15÷5= 3
		<table><tr><td>×</td><td>**40**</td><td>**2**</td><td>=</td></tr><tr><td>**3**</td><td>120</td><td>6</td><td>126</td></tr></table> 3 x 42 = 126 3 x 40 = 120 3 x 2 = 6 120 + 6 = 126
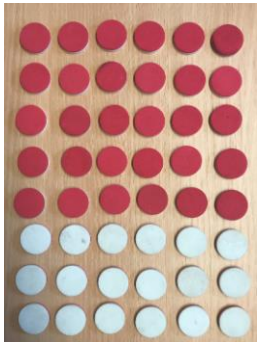
<u>Doubling</u> 48 x 2 = 80 16	<u>Doubling</u> 48 x 2 = |||| ::: : |||| ::: : 80 + 16 = 96	<u>Doubling</u> 48 x 2 = 96 48 (40 x 2) + (8 x 2) 80 + 16 = 96

Year 4 Objectives:

Pupils should be taught to:

- recall multiplication facts for multiplication tables up to 12 × 12
- use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together 3 numbers
- recognise and use factor pairs and commutativity in mental calculations
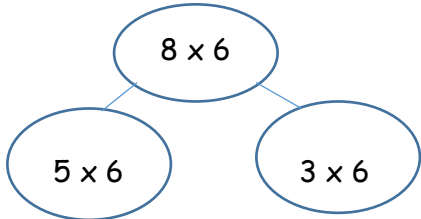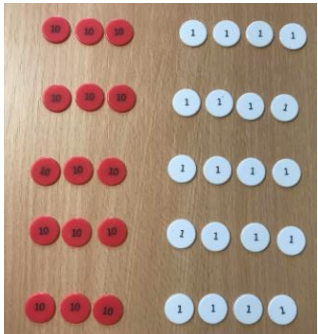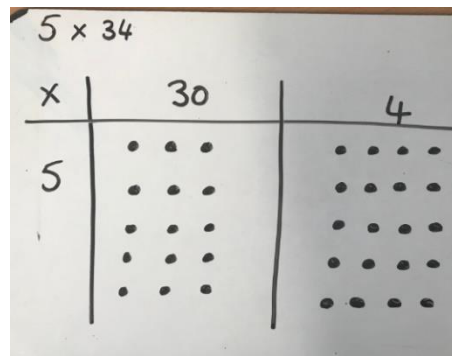- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

Concrete	Pictorial	Abstract
See above for arrays to demonstrate commutativity.	*'The product of ____ and ____ is equal to the product of ____ and ____.'* This can then be simplified to: '____ **times** ____ **is equal to** ____ **times** ____.'	
Using partitioning of a factor to support mental approaches with multiplication 	 Discussion point: Which other ways could you partition the factors? e.g. 4 x 6 and 4 x 6 8 x 3 and 8 x 3 8 x 5 and 8 x 1 Could also been shown with a numberline	8 x 6 = 5 x 6 = 30 3 x 6 = 18 30 + 18 = 48

5 x 34 =

| 34 | 34 | 34 | 34 | 34 |

5 x 34 =
5 x 30 = 150 because 5 x 3 = 15
5 x 4 = 20
150 + 20 = 170

×	30	4	=
5	150	20	170

150 + 20 = 170

34 x 5 =
5 x 30 = 150
5 x 4 = 20
150 + 20 = 170

```
      3   4
  ×       5
      2   0
  1   5   0
  1   7   0
```

This may lead to a compact method.

```
      3   4
  ×       5
        2
  1   7   0
```

Progress onto 3 digit multiplied by a 1 digit number using the same strategies as above.

Demonstrate 3 x 1 digit before using compact method.

274 x 8 =
8 x 200 = 1600
8 x 70 = 560
8 x   4 = 32
1600 + 560 + 32 = 2192

Year 5 Objectives:

Pupils should be taught to:
- 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 mentally, drawing upon known facts
- multiply whole numbers and those involving decimals by 10, 100 and 1,000

Concrete	Pictorial	Abstract
Children can continue to be supported by place value counters at this stage of multiplication. This initially done where there is no regrouping. 321 x 2 = 642 It is important at this stage that they always multiply the ones first.		Secure compact multiplication with 3 x 1 digit and 4 x 1 digit. Leading to a compact method:

Multiplying 2 x 2 digit using the expanded method.

Extending onto compact multiplication before moving onto 3 and 4 digit numbers x 2 digit.

Progress onto calculations with missing numbers.

Demonstrate using the grid method 2 x 2 digit before moving to a more formal method to secure understanding.

x	30	6	
20	600	120	= 720
4	120	24	= 144

720 + 144 = 864

	3	6	
x	2	4	
	2	4	(4 x 6)
1	2	0	(4 x 30)
1	2	0	(20 x 6)
6	0	0	(20 x30)
8	6	4	

Leading to:

	3	6
x	2	4
	2	
1	4	4
1		
7	2	0
8	6	4

Year 6 Objectives:

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
- perform mental calculations, including with mixed operations and large numbers

Concrete	Pictorial	Abstract
As year 5 but progressing onto using decimals TO.t x O as an expanded calculation. (tens, ones and tenths x ones) If pupils are secure, they may prgress onto the compact method.		Expanded $\begin{array}{ccccc} T & O & . & t \\ \hline 2 & 3 & . & 3 \\ \times & & 7 & \\ \hline & 2 & . & 1 \\ 2 & 1 & . & 0 \\ 1 & 4 & 0 & . & 0 \\ \hline 1 & 6 & 3 & . & 1 \\ \hline \end{array}$ Compact $\begin{array}{c|c|c|c} T & O & . & t \\ \hline 2 & 3 & . & 3 \\ \times & & 7 & \\ & {}_2 & & {}_2 \\ \hline 1 & 6 & 3 & . & 1 \\ \end{array}$