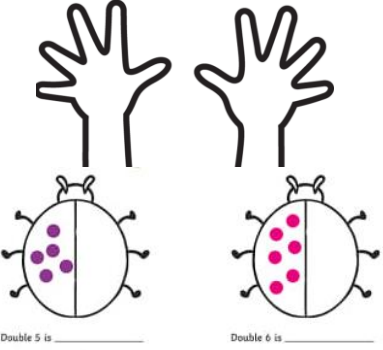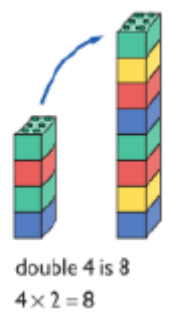# Calculation policy: Multiplication
Key language: double, groups of, lots of, equal groups, repeated addition, times, multiplied by, product, factor, multiplier, multiplicand

$$6 \times 3 = 18$$

Factor (or Multiplier) Factor (or Multiplicand) Product

EYFS
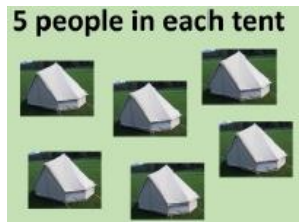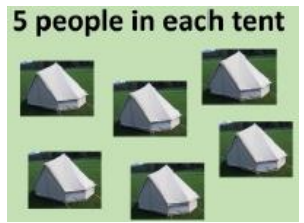
- solve problems including doubling

Concrete	Pictorial	Abstract
Use a range of familiar objects to understand the concept of doubling, e.g. socks, hands, gloves, fingers, cubes, lego, numicon, dominos	Paint on half a butterfly and fold it to see doubling. Draw pictures to show doubles. Double 5 is _____ Double 6 is _____	Singing Recall doubles

	Draw pictures to show how to double a number.	
double 4 is 8 $4 \times 2 = 8$	**Double 4 is 8**	

Band 1

- solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- count in 2s, 5s and 10s

Concrete	Pictorial	Abstract
Counting in multiplies Count in multiples supported by concrete objects in equal groups.	Use a counting stick, number line or pictures to continue support in counting in multiples. Splat the multiples on a hundred square	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30 Count with hidden groups of 2, 5 and 10.
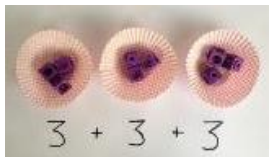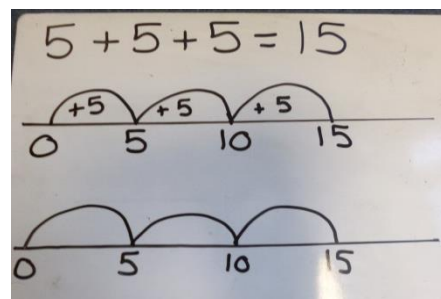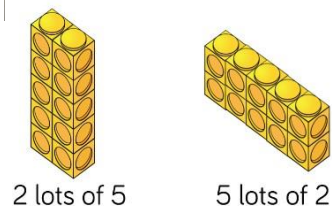
	``
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50
51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70
71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90
91 92 93 94 95 96 97 98 99 100
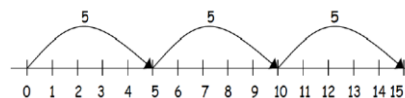```	
Repeated addition Children use different objects to add equal groups $3 + 3 + 3$	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? 2 add 2 add 2 equals 6 $5 + 5 + 5 = 15$ $5 + 5 + 5 = 15$ $5 + 5 + 5 = 15$	Write addition sentences to describe objects and pictures. $2 + 2 + 2 + 2 + 2 = 10$

Create arrays using children/counters/ cubes to show repeated addition as '….rows of…'. or …'lots of…' and commutativity.

4 rows of 5 is 20
5 rows of 4 is 20

2 lots of 5   5 lots of 2

Children to count in 2s, 5s or 10s when counting their total number in the array.

Draw arrays in different rotations to find **commutative** multiplication sentences.

.

Children to be able to use an array to write a range of calculations and understand the meaning of the equals sign e.g.

$2 + 2 + 2 + 2 + 2 = 10$
$10 = 5 + 5$

Band 2

- 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
- show 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.

Concrete	Pictorial	Abstract
Recognising equal groups Use a range of visuals to support understanding of equal groups and making equal groups 3 equal groups of 2	2 equal groups of 10	There are ___ equal groups with ___ in each group. There are three ____. ___ + ___ + ___ = 12

Recognising the relationship between multiplication and repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and use a bar model. 	3 × 4 = 12 4 + 4 + 4 = 12
Create arrays using children/counters/ cubes to show repeated addition, multiplication and commutativity. 4 rows of 5 is 20 4 x 5 = 20 5 rows of 4 is 20 5 x 4 = 20	Draw arrays in different rotations to find **commutative** multiplication sentences. .4 x 3 = 12 3 x 4 = 12 	Children to be able to use an array to write a range of calculations e.g. 10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5

Number lines to show repeated groups- 3×4 Cuisenaire rods can be used too.	Represent this pictorially alongside a number line e.g.: 	Abstract number line showing three jumps of four. $3 \times 4 = 12$
	Use bar model to show relationship between whole/ parts for multiplication and makes links to division. 4 x 3 = 12 12 ÷ 3 = 4 12 ÷ 4 = 3	Use of the triangle to identify the 4 linked number sentences. 4 x 3 = 12 3 x 4 = 12 12 ÷ 3 = 4 12 ÷ 4 = 3

Band 3

- 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.

Concrete	Pictorial	Abstract
Concrete resources to solve the number sentence, e.g. numicon, dienes, place value counters, **4 x 15 = 60**	Use bar model to show relationship between whole/ parts for multiplication and makes links to division. 4 x 15 = 60 60 ÷ 15 = 4 60 ÷ 4 = 15	Use of the triangle to identify the 4 linked number sentences. 15 x 4 = 60 4 x 15 = 60 60 ÷ 15 = 4 60 ÷ 4 = 15
Partition to multiply Partition to multiply with place value counters (dienes, numicon can also be used.)3×23 Multiply the parts knowing known multiplication facts. 2 colours show distributive law. 4 x 15 = 60	4 x 15 = 60	A blank number line can be drawn. 4 x 15 = 60

Grid method
Show the link with arrays to first introduce the grid method.

4 x 13 = 52

4 rows of 10
4 rows of 3

Move on to using dienes to move towards a more compact method.

4 rows of 13

Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.

Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.

4 x 13 = 52

Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

x	10	3
4	40	12

40 + 12 = 52

Formal expanded written method

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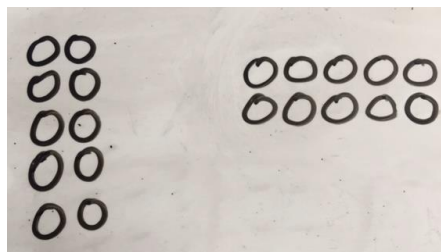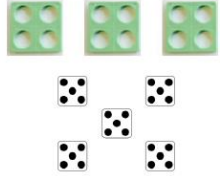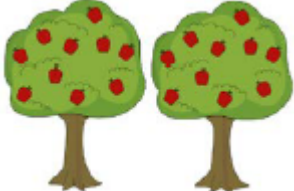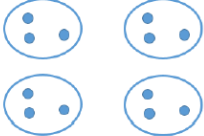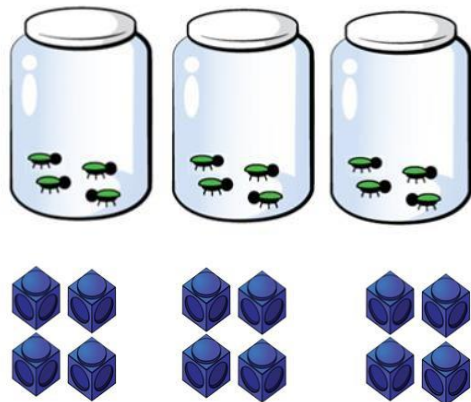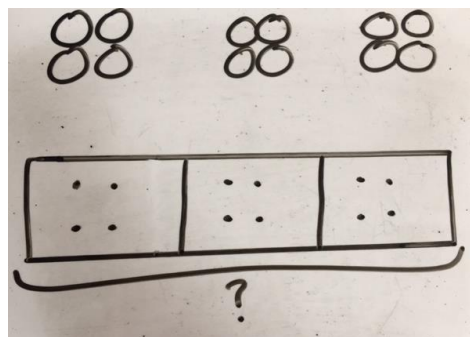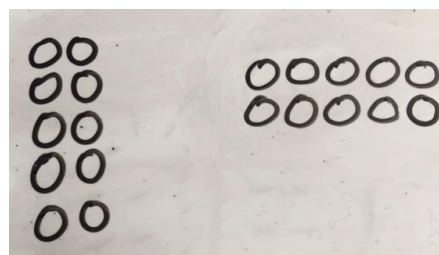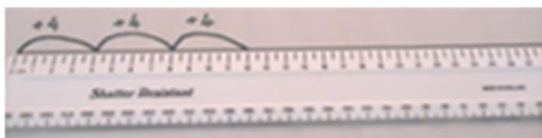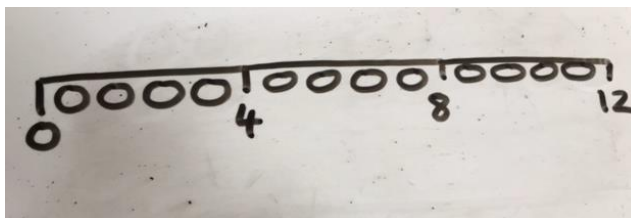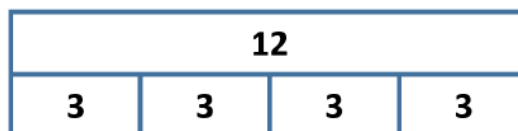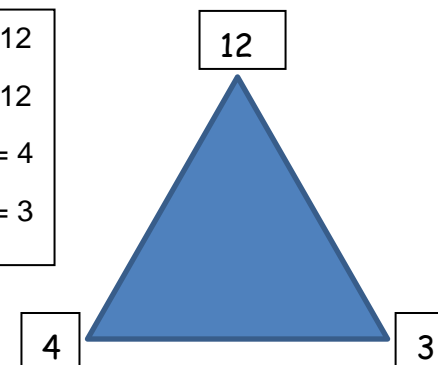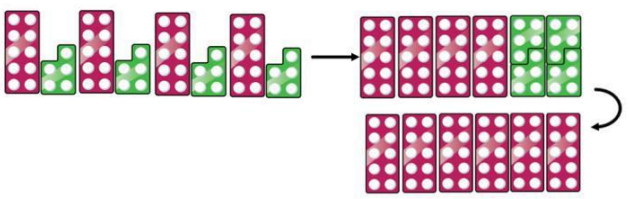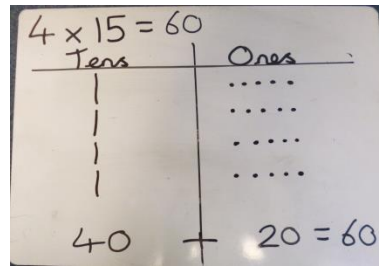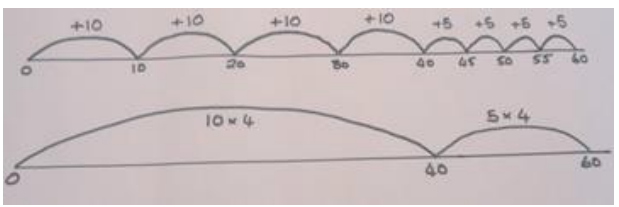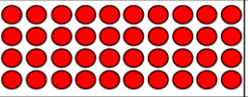      13
  X    4
      12  = 4 x 3
      40  = 4 x 10
      52  = 12 + 40
```

Band 4

Pupils should be taught to:
- recall multiplication and division facts for multiplication tables up to 12 × 12
- 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.

Concrete	Pictorial	Abstract
Grid method Use place value counters or dienes to support understanding, as seen in Band 3.	$263 \times 3 = 789$ |	**200**	**60**	**3** | |---|---|---|---| | **3** | 600 | 180 | 9 |	263 x3 789 1 **Formal expanded written method** 263 X 3 9 = 3 x 3 180 = 3 x 60 600 = 3 x 200 789 = 9 + 180 + 600

Band 5

- 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 (non-prime) 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
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- 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.

Concrete	Pictorial	Abstract
Grid method Use place counters to show how we are finding groups of a number. We are multiplying by 13, so we need 13 rows. 18 x 13 = 234 	Children can represent the work they have done with place value counters in a way that they understand. They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below. 18 x 13 = 234 <table><tr><td>x</td><td>10</td><td>8</td></tr><tr><td>10</td><td>100</td><td>80</td></tr><tr><td>3</td><td>30</td><td>24</td></tr></table> 130 + 104 = 234	**Formal written method** Expanded written method $\begin{array}{r} 18 \\ \times\ \ 13 \\ \hline 24 = 8 \times 3 \\ 30 = 3 \times 10 \\ 80 = 10 \times 8 \\ \underline{100} = 10 \times 10 \\ \underline{234} = 24 + 30 + 80 + 100 \end{array}$ Short column multiplication $\begin{array}{r} 18 \\ \underline{\times\ 13} \\ \underline{234} \\ 2 \end{array}$
		$\begin{array}{r} 264 \\ \underline{\times 8} \\ \underline{2112} \\ 53 \end{array}$

Band 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
- 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

Concrete	Pictorial	Abstract
See earlier bands for strategies to use.		

Conceptual variation; different ways to ask children to solve 6x23

23 23 23 23 23 23 ?	Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week? With the counters, prove that 6 x 23 = 138	Find the product of 6 and 23 $6 \times 23 =$ $= 6 \times 23$ $\begin{array}{r} 6 \\ \times\ 23 \\ \hline \end{array}$ $\begin{array}{r} 23 \\ \times\ 6 \\ \hline \end{array}$	What is the calculation? What is the product?