Mathematics Multiplication Calculations Policy 2022- 2023

'Working together to achieve success'
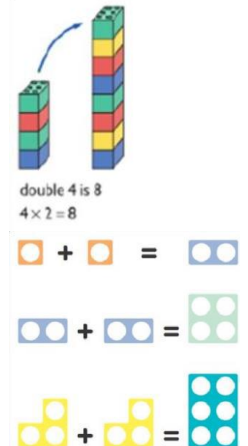
	Concrete	Pictorial	Abstract
Reception Multiplication			
	Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities involving equal sets or groups using a wide variety of equipment, e.g. small world play, role play, counters, cubes etc. They develop ways of recording calculations using pictures, etc. Children may also investigate putting items into resources such as egg boxes, ice cube trays and baking tins which are arrays.	Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of equipment, including small world play, role play, counters, cubes etc. A child's jotting showing the fingers on each hand as a double. They may develop ways of recording calculations using pictures, etc. A child's jotting showing double three as three cookies on each plate.	

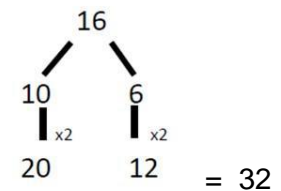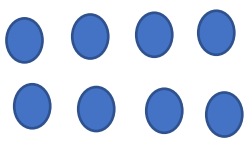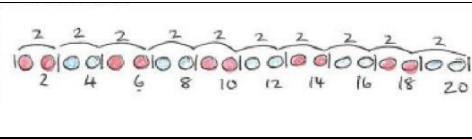| **Year 1 Multiplication**			
Doubling	Use practical activities with manipulatives including cubes ad Numicon to demonstrate doubling double 4 is 8 $4 \times 2 = 8$	Draw pictures to show to double numbers Double 4 is 8	Partition a number and then double each part before recombining it back together. 16 / 10 6 x2 x2 20 12 = 32
Counting in multiples	Count the groups as children are skip counting children may use their fingers as they are skip counting.	Children make representations to show counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10,, 15, 20, 25
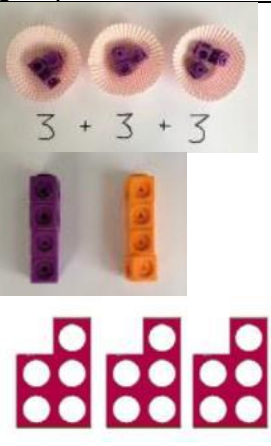
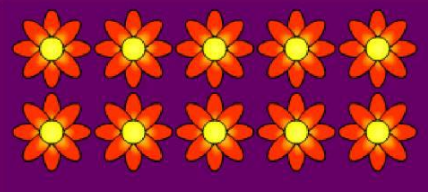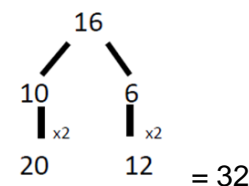|			
Making equal groups and counting the total	 Use manipulatives to create equal groups.	Draw ⊃< to show 2 x 3 = 6 Draw and make representations	2 x 4 = 8
Repeated Addition	 3 + 3 + 3 Use different objects to add equal groups.	Use pictorial including number lines to solve problems There are 3 sweets in one bag. How many sweets are in 5 bags altogether? 3+3+3+3+3 = 15 	Write addition sentences to describe objects and pictures 2 + 2 + 2 + 2 + 2 = 10
Understanding arrays	Use objects laid out in arrays to find the answers to 2 lots of 5, 3 lots of 2… 	Draw representations to show arrays to show understanding	3 x 2 = 6 How many eggs would we need to fill the egg box? How do you know?'2 x 5 = 10
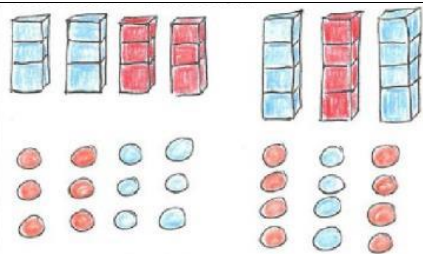
Year 2 Multiplication			
Doubling	Model doubling using dienes and place value counters	Draw pictures and representations to show how to double numbers.	Partition a number and then double each part before recombining it back together.
Counting in multiples of 2, 3, 5, 10 from 0	Count the groups as the children are skip counting, children may use their fingers Use bar models 5 + 5+ 5+ 5+ 5+ 5 + 5 + 5 = 40	Number lines, counting sticks and bar models should be used to show representations of counting in multiples	Count in multiples of a number aloud. Write number sequences with multiples of numbers 0,2,4,6,8,10 0,3,6,9,13 0, 5, 10, 25, 20
Multiplication is commutative	Create arrays using counters, cubes and numicon	Use representations of arrays to show different calculations and explore commutativity.	12 = 3 x 4 12 = 4 x 3
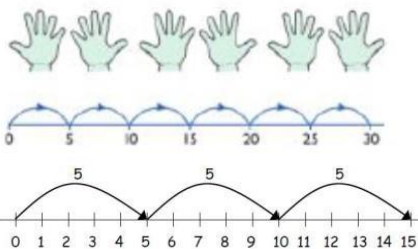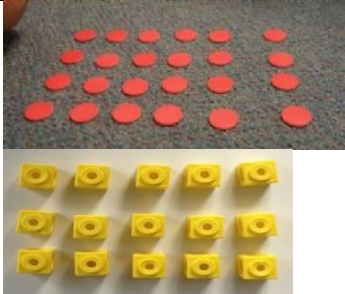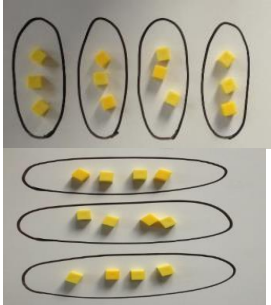
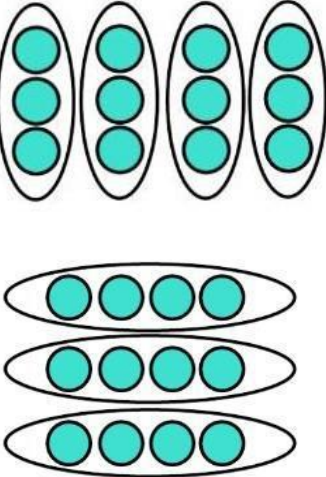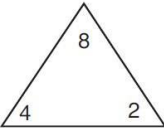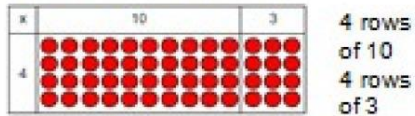|			
	  Children should know the array can show different equations 		Use an array to write multiplication sentences and reinforce repeated addition. $5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$ $3 \times 5 = 15$
Using the inverse **This is taught alongside division**		8 / 4 / 2 ☐ × ☐ = ☐ ☐ × ☐ = ☐ ☐ ÷ ☐ = ☐ ☐ ÷ ☐ = ☐	$2 \times 4 = 8$ $4 \times 2 = 8$ $8 \div 2 = 4$ $8 \div 4 = 2$ $8 = 2 \times 4$ $8 = 4 \times 2$ $2 = 8 \div 4$ $4 = 8 \div 2$
Year 3 Multiplication			
Use arrays	use apparatus to make the array	Children should continue to utilise multiplication as repeated addition linked to arrays **(as this knowledge will support with the development of the grid method)** and use jottings to support	$4 \times 7 = 28$ $7 \times 4 -= 28$

their calculation. These should be supported by the use of crosses on squared paper, e.g.

4 x 7 =

X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X	X	X	X	X

4 x 7 =   7 + 7 + 7 + 7 =   28

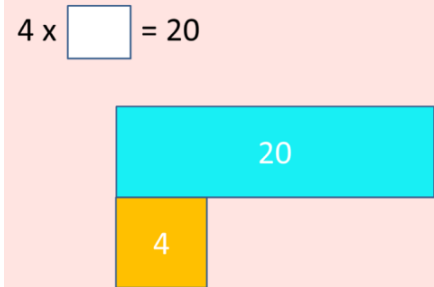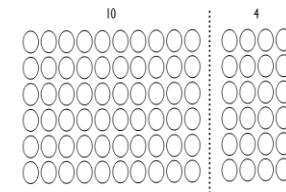| **Grid Method**	Show the array and introduce the grid method 4 rows of 10 4 rows of 3 Show it as base 10 4 rows Use place value counters within the grid Calculations 4 x 126	Children to represent their work using place value counters in a way they understand. Bar models are used t show missing numbers 4 x ☐ = 20 20 4	**TU x U** (Short multiplication – multiplication by a single digit) As they progress to multiplying a two-digit number by a single digit number, children should use their knowledge of partitioning two digit numbers into tens and units/ones to help them. For example, when calculating 14 x 6, children should set out the array, then partition the array so that one array has ten columns and the other four. 10 4 Partitioning in this way, allows children to identify that the first array shows 10 x 6 and the second array shows 4 x 6. These can then be added to calculate the answer: (6 x 10) + (6 x 4) = 60 + 24 = 84 NB There is no requirement for children to record in this way, but it could be used as a jotting to support development if needed.
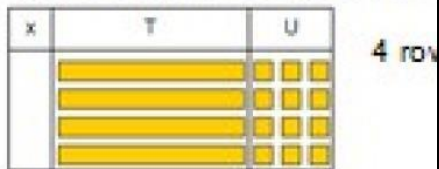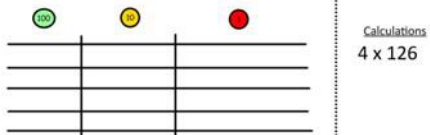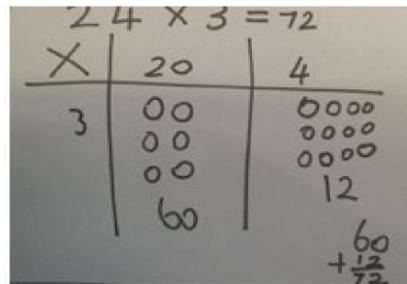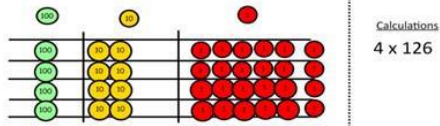
Calculations
4 x 126
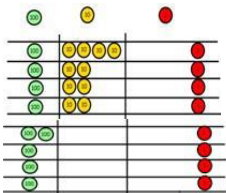
Add up each column starting with

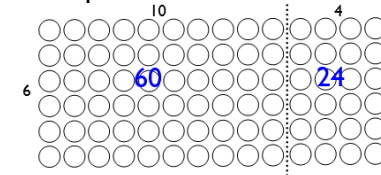Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

✗	30	5
7	210	35

210 + 35 = 245

the ones and exchanging where needed.

This method is the precursor step to the grid method. Using a two-digit by single digit array, they can partition as above, identifying the number of rows and the number of columns each side of the partition line.
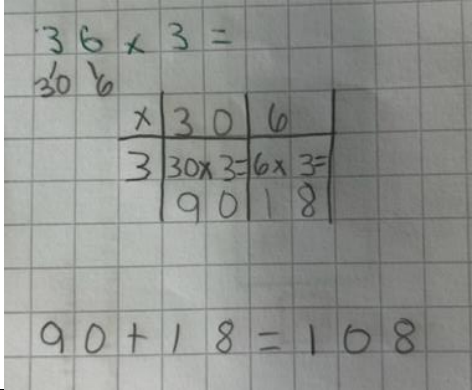

By placing a box around the array, as in the example below, and by removing the array, the grid method can be seen.

x	10	4
6	60	24

It is really important that children are confident with representing multiplication statements as arrays and understand the rows and columns structure before they develop the written method of recording.

From this, children can use the grid method to calculate two-digit by one-digit multiplication calculations, initially with two digit numbers less than 20. Children should be encouraged to set out their addition in a column at the side to ensure the place value is maintained. When children are working with numbers where they can confidently and correctly calculate the addition mentally, they may do so.

13 x 8

×	10	3
8	80	24

$$\begin{array}{r} 80 \\ +\ 24 \\ \hline 104 \end{array}$$

When children are ready, they can then progress to using this method with other two-dig

37 x 6

×	30	7
6	180	42

$$\begin{array}{r} 180 \\ +\ 42 \\ \hline 222 \end{array}$$

Children should also be using this method to solve problems and multiply numbers in the context of money or measures.

Year 4 Multiplication			
Grid method	Manipulatives may be used alongside the grid method	Children to represent their work using place value counters in a way they understand.	Children will move to Y4 using whichever method they were using as they transitioned from Y3. They will further develop their knowledge of the grid method to multiply any two-digit by any single-digit number, e.g. 79 x 8 × | 70 | 9 — 8 | 560 | 72 $$\begin{array}{r} 560 \\ +\ 72 \\ \hline 632 \end{array}$$ To support the grid method, children should develop their understanding of place value and facts that are linked to their knowledge of tables. For example, in the calculation above, children

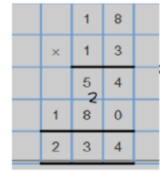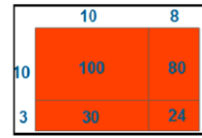|			should use their knowledge that 7 x 8 = 56 to know that 70 x 8 = 560.
			By the end of the year, they will extend their use of the grid method to be able to multiply three-digit numbers by a single digit number, e.g.
			346 x 8 	×	300	40	6	2400 + 320 + 48 2768 8	2400	320	48
			When children are working with numbers where they can confidently and correctly calculate the addition (or parts of the addition) mentally, they may do so.
			Children should also be using this method to solve problems and multiply numbers in the context of money or measures.

Year 5 Multiplication

Grid method continued for 2- and 3-digit numbers by 2-digit numbers	Manipulatives may be used alongside the grid method		Children should continue to use the grid method and extend it to multiplying numbers with up to four digits by a single digit number, e.g. 4346 x 8 	×	4 000	300	40	6	32000 + 2400 + 320 + 48 34768 8	32 000	2400	320	48 and numbers with up to four digits by a two-digit number, e.g. 2693 x 24 	×	2000	600	90	3	40000 + 8000 + 12000 + 2400 + 1800 + 360 + 60 + 12 64632 20	40000	12000	1800	60 4	8000	2400	360	12 When children are working with numbers where they can confidently and correctly calculate the

			addition (or parts of the addition) mentally, they may do so.
Start to then introduce short multiplication	Manipulatives may be still used with the long multiplication method alongside.		$$\begin{array}{c|c|c|c} \times & 300 & 20 & 7 \\ \hline 4 & 1200 & 80 & 28 \end{array}$$ $$\begin{array}{r} 327 \\ \times \quad 4 \\ \hline 28 \\ 80 \\ 1200 \end{array}$$ $$\begin{array}{r} 3\ 2\ 7 \\ \times \qquad 4 \\ \hline 1\ 3\ 0\ 8 \\ {}_1 \quad {}_2 \end{array}$$ This will lead to a compact method. 1308
Introduce decimal multiplication			4.9 x 3 $$\begin{array}{c|c|c} \times & 4 & 0.9 \\ \hline 3 & 12 & 2.7 \end{array}$$ $$\begin{array}{r} 12 \\ + \quad 2.7 \\ \hline 14.7 \end{array}$$ Use knowledge of place value and multiplication facts to divide related decimal numbers.

Year 6 Multiplication				
Column multiplication	Manipulatives may be still used with the long multiplication method alongside.			
Multiplying decimals up to 2 decimal places by a single digit				4.92 x 3 Moving to Multiply the decimal by 10,100 or 1000 to make it a whole then complete the calcualtion. Once complete divide by the same multiple. e.g 3.19 x 8 3.19 x 100 = 319 319 x 8 = 2,552 2,552 ÷ 100 = 25.52

Multiplication

multiply   product

groups of   lots of

times table

times

multiplied by