Bradley Primary School

Multiplication Calculation Policy

Written November 2022

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This policy has been adapted from the White Rose Calculation Policy with additional material added.

This policy is written in line with the National Curriculum (2014) expectations and it should be used to support children in developing a deep understanding of number and calculation. It works alongside our school vision of mastery for mathematics. We aim for children to become confident and fluent mathematicians. Children should progress through the stages working towards formal written methods (where appropriate). After a method has been taught, children should be able to make their preferred choice for the most appropriate, efficient and accurate method for them. Previous strategies may need to be revisited to consolidate understanding when introducing a new strategy. As each new strategy is introduced, children should have the opportunity to explore them, alongside methods they are secure with, to make connections and identify the similarities and differences.

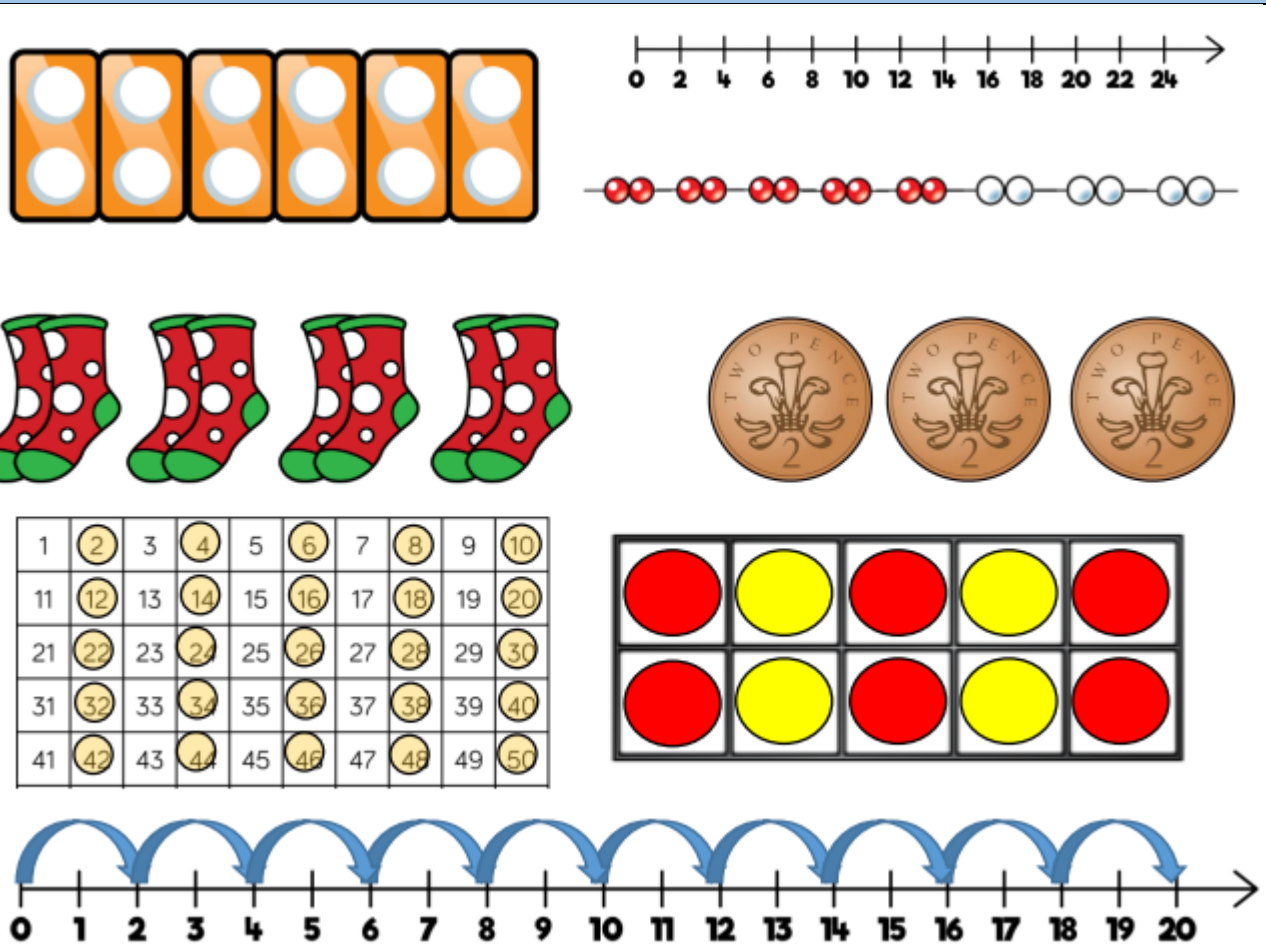
Concrete, Pictorial, Abstract (CPA) Approach

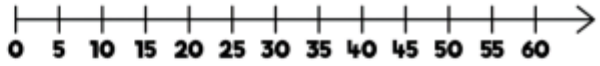
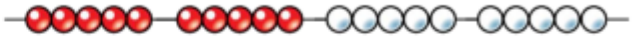
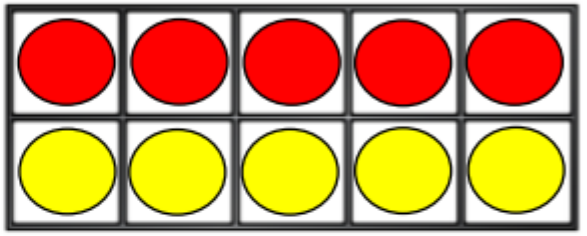
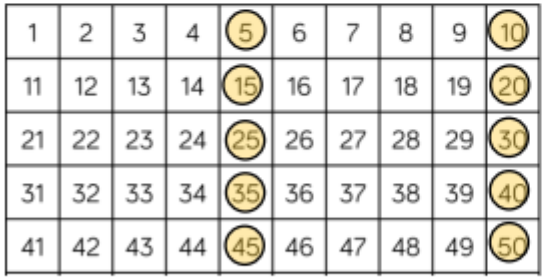
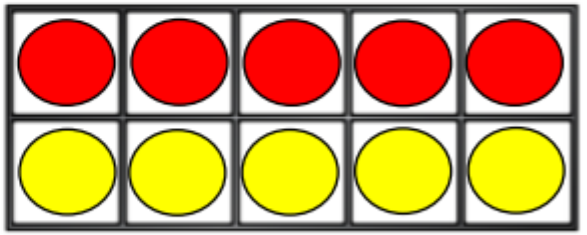
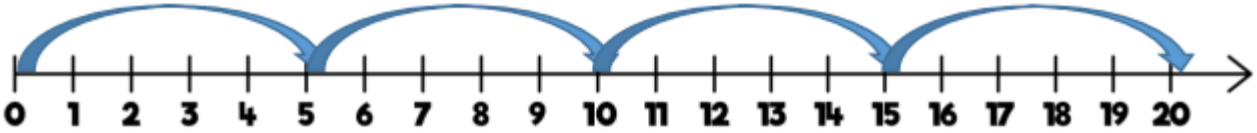
Children of all ages are first introduced to new mathematical learning by using real objects (concrete resources). They are offered a 'hands on' experience with manipulatives to support their fundamental knowledge as a foundation for their conceptual understanding. This is then followed by a pictorial representation which reflects the concrete manipulatives previously used. The children then make connections between the concrete resources and the pictorial representations. After sufficient foundation knowledge is gained, the pupils move onto an abstract representation using mathematical notations. To begin with, this concept is used parallel with the pictorial and concrete representations to secure the children's knowledge of all procedures. These skills are reinforced through all representations being used throughout school, irrespective of the year group.

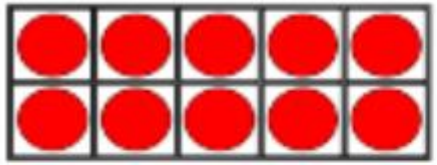
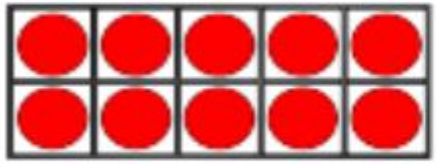
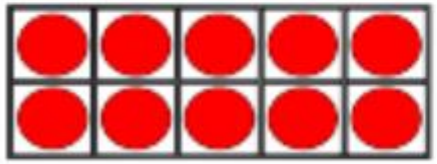
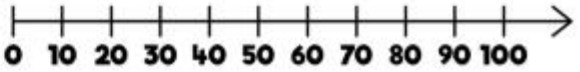
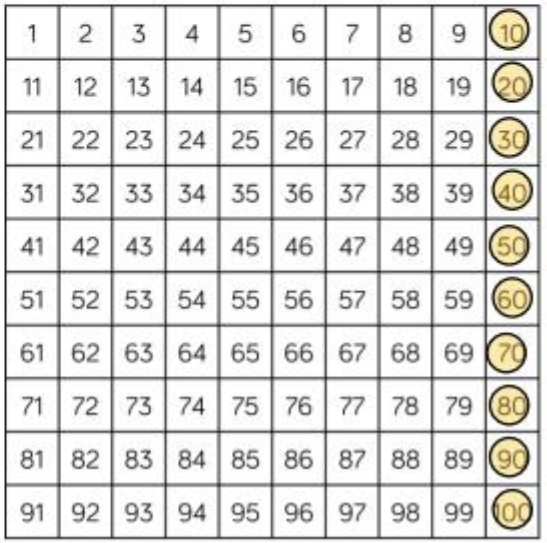
Reasoning and Problem Solving

Children are regularly exposed to reasoning and problem solving questions to embed their understanding of the skills gained within a topic. They use their learning in real-life contexts to solve complex and abstract problems, considering skills gained in previous areas of learning.

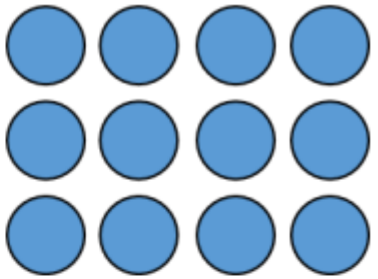
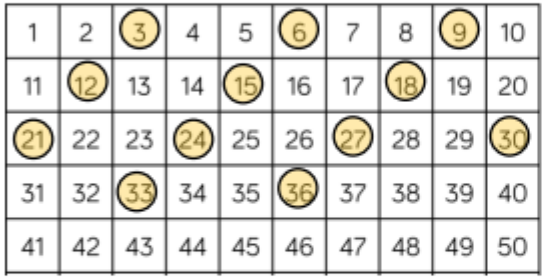
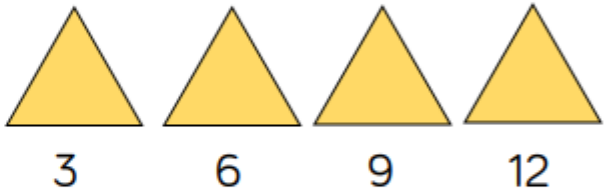
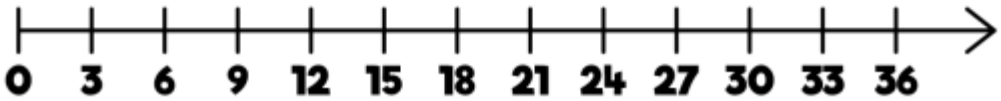
Times Tables

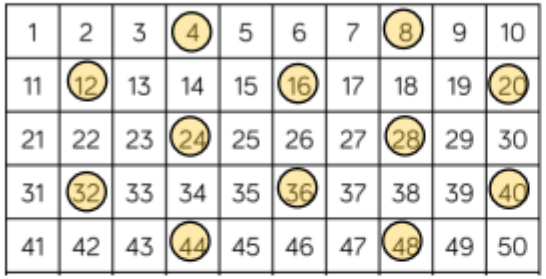
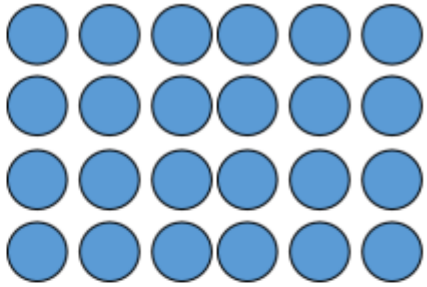
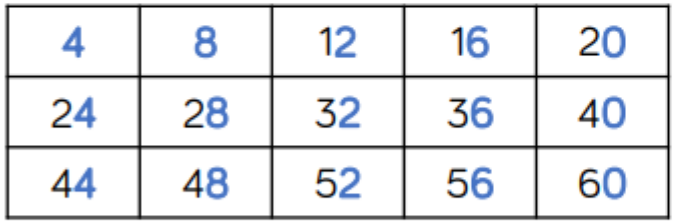
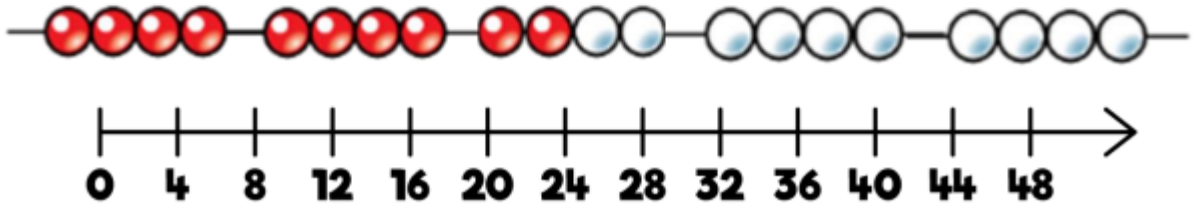
Year 2		
Recall and use multiplication and division facts for the 2 times table.		Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the two times table, using concrete manipulatives to support. Notice how all the numbers are even and there is a pattern in the ones. Use different models to develop fluency.

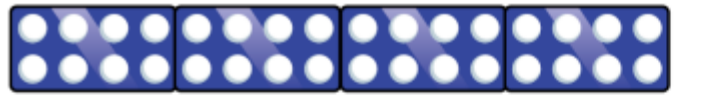
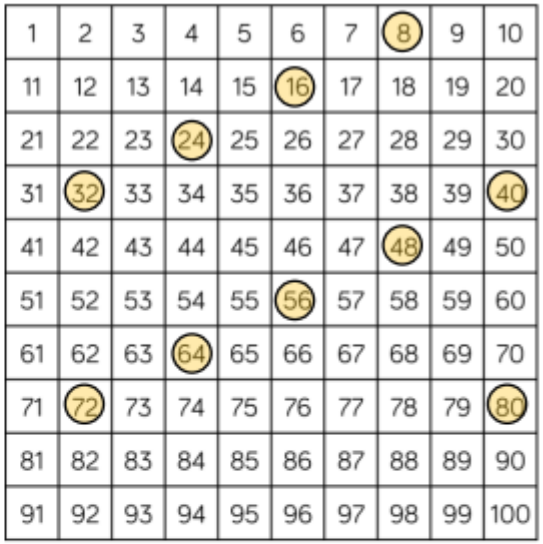
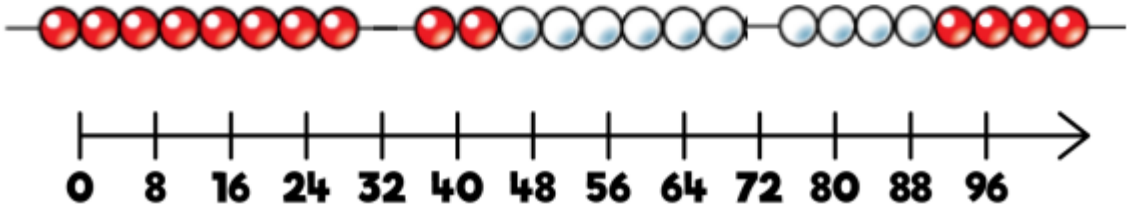
Recall and use multiplication and division facts for the 5 times table.	        	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the five times table, using concrete manipulatives to support. Notice the pattern in the ones as well as highlighting the odd, even, odd, even pattern.

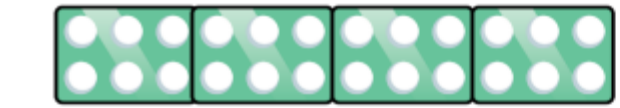
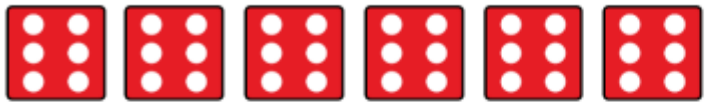
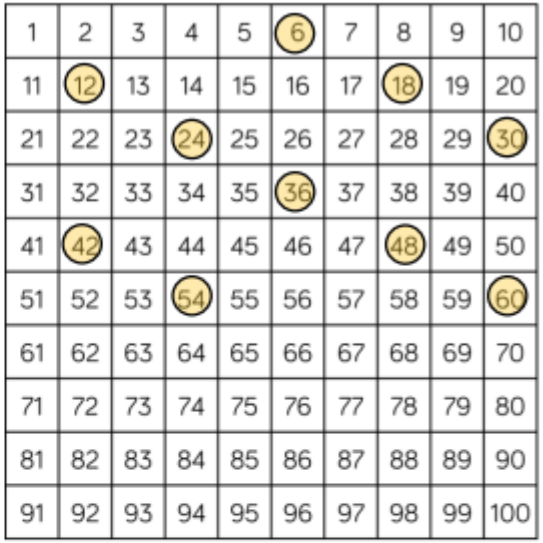
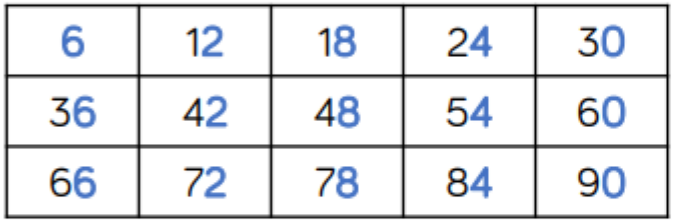
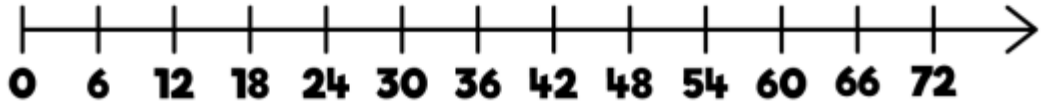
Recall and use multiplication and division facts for the 10 times table.	        	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the ten times table, using concrete manipulatives to support. Notice the pattern in the digits - the ones are always 0, and the tens increase by 1 ten each time.

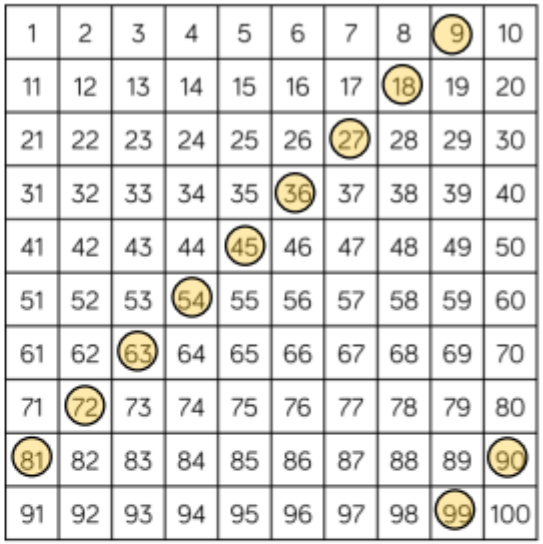
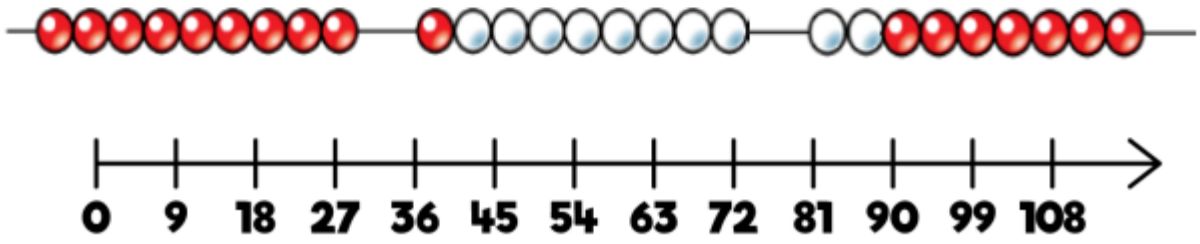
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Year 3		
Recall and use multiplication and division facts for the 3 times table.	     	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the three times table, using concrete manipulatives to support. Notice the odd, even, odd, even pattern using Numicon shapes to support. Highlight the pattern in the ones using a hundred square.

Recall and use multiplication and division facts for the 4 times table.	     	Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the four times table, using manipulatives to support. Make links to the 2 times table, seeing how each multiple is double the twos. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using Numicon shapes to support.

Recall and use multiplication and division facts for the 8 times table.	  8 16 24 32  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 8 16 24 32 40 48 56 64 72 80  0 8 16 24 32 40 48 56 64 72 80 88 96	Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the eight times table, using manipulatives to support. Make links to the 4 times table, seeing how each multiple is double the fours. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using Numicon shapes to support.

Year 4		
Recall and use multiplication and division facts for the 6 times table.	     	Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the six times table, using manipulatives to support. Make links to the 3 times table, seeing how each multiple is double the threes. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using Numicon shapes to support.

Recall and use multiplication and division facts for the 9 times table.	   	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the nine times table, using concrete manipulatives to support. Notice the pattern in the tens and ones using the hundred square to support as well as noting the odd, even pattern within the multiples.

9	18	27	36	45
54	63	72	81	90

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

Recall and use multiplication and division facts for the 7 times table.	 | 7	14	21	28	35
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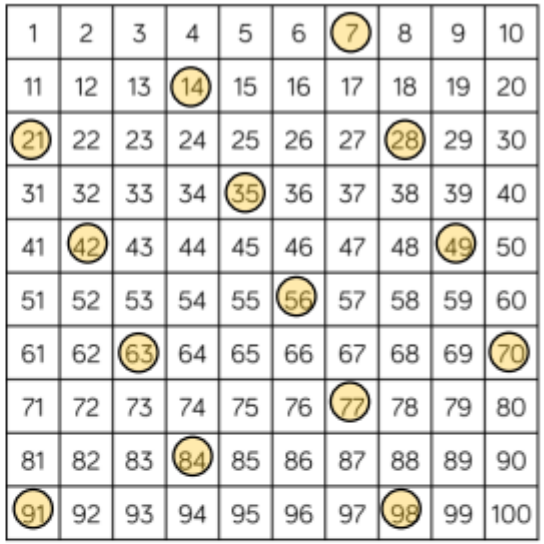
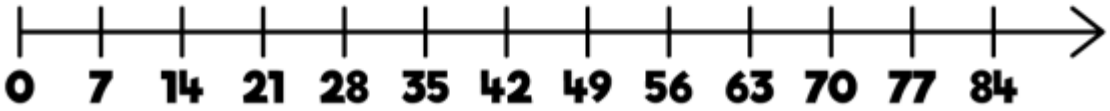
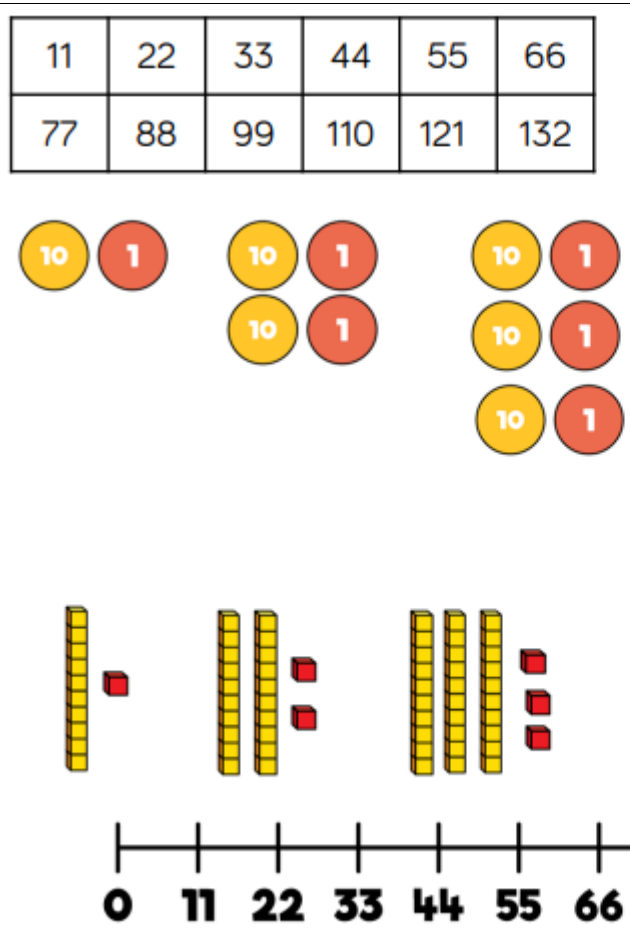
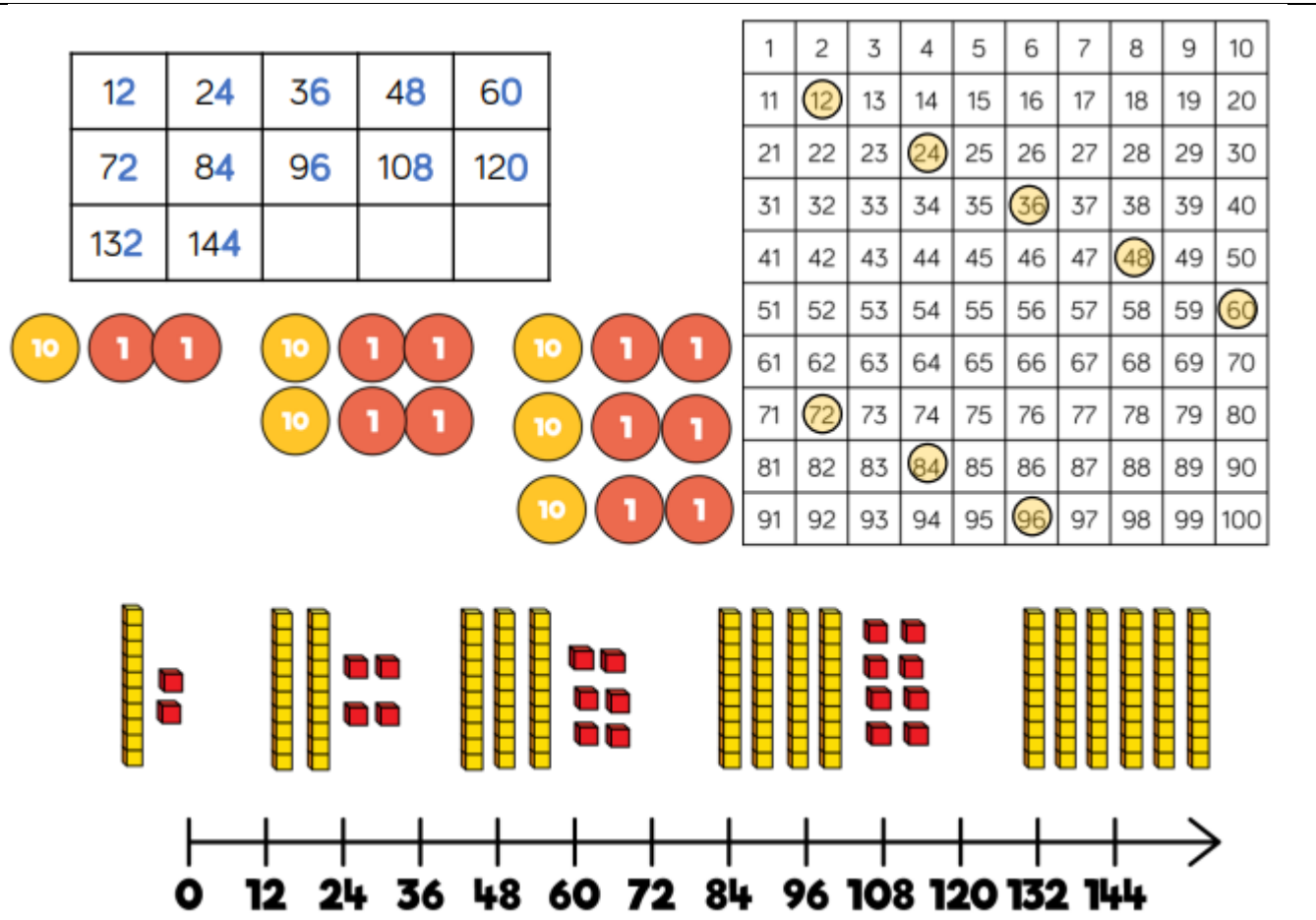
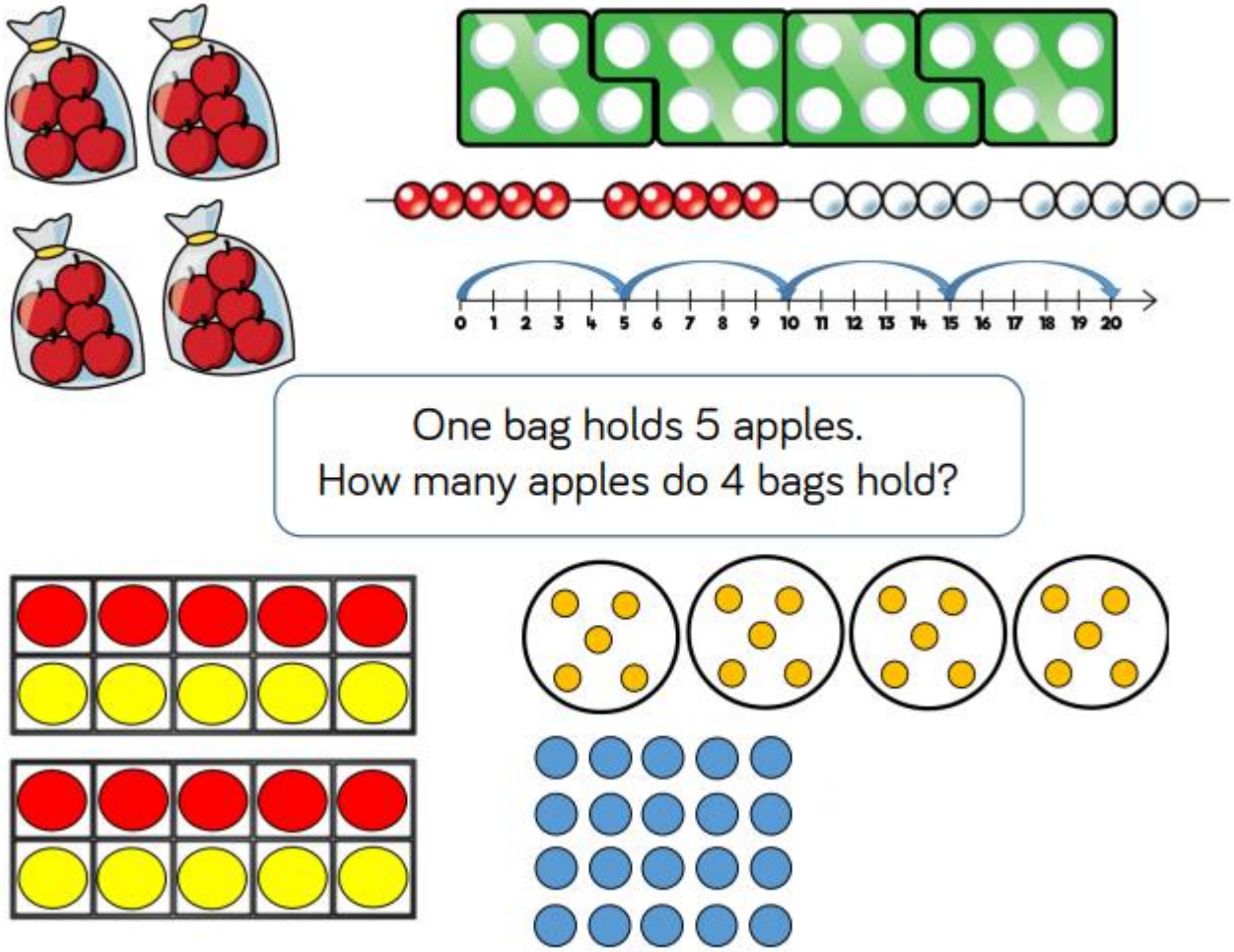
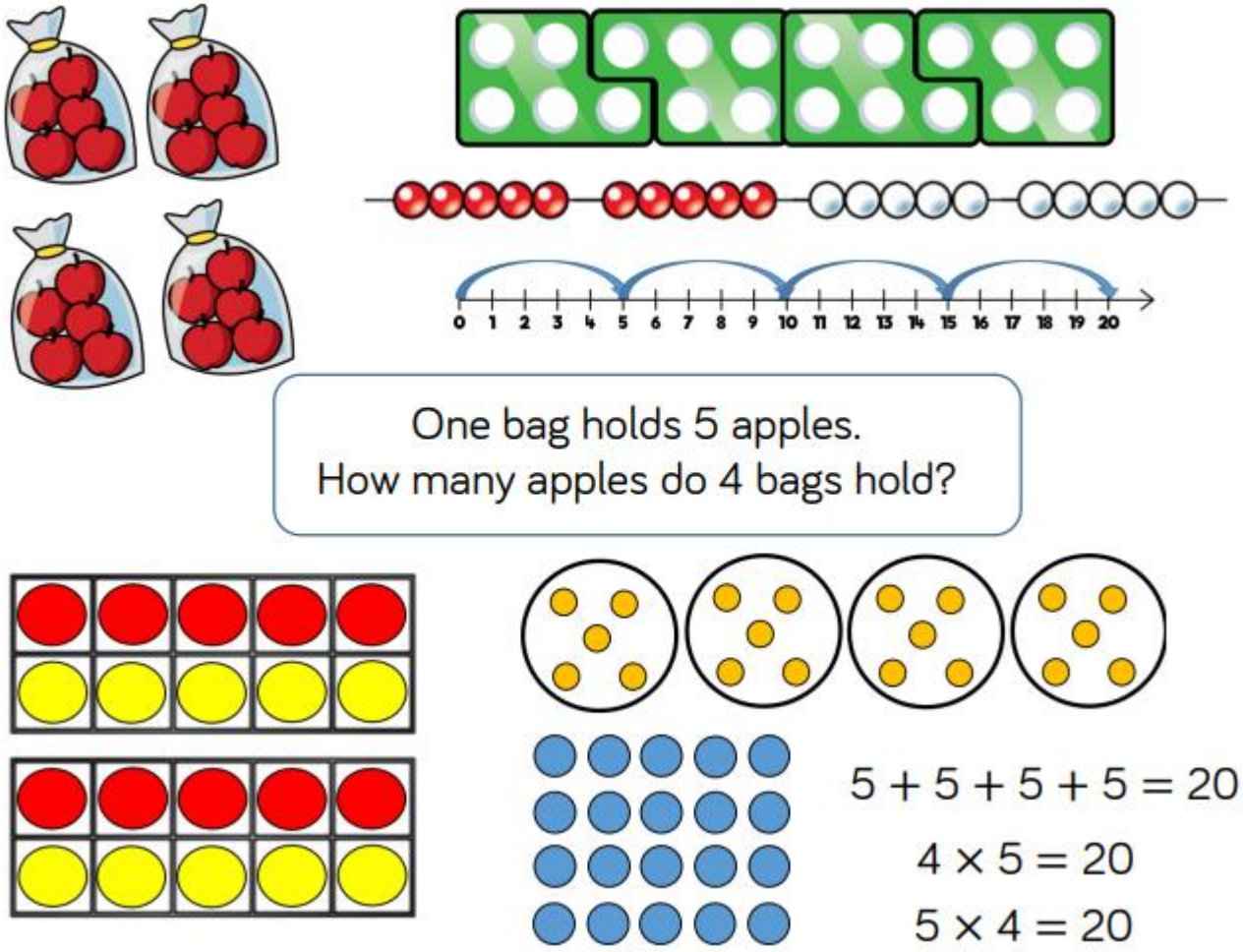
42	49	56	63	70 |    	Encourage daily counting in multiples both forwards and backwards, supported by a number line or a hundred square. The seven times table can be trickier to learn due to the lack of obvious pattern in the numbers, however they already know several facts due to commutativity. Children can still see the odd, even pattern in the multiples using Numicon shapes to support.

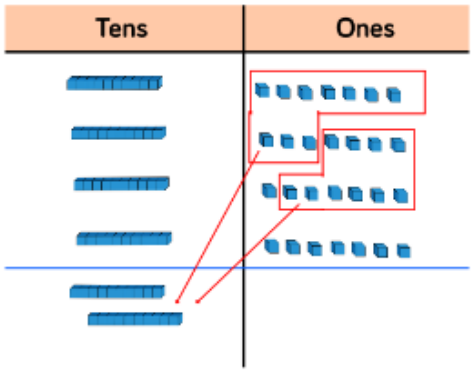
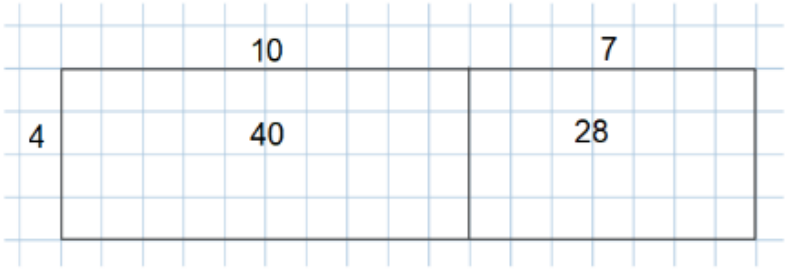
Recall and use multiplication and division facts for the 11 times table.		Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the eleven times table, using concrete manipulatives to support. Notice the pattern in the tens and ones using the hundred square to support. Also, consider the pattern after crossing 100. Use a 200 square to support this.

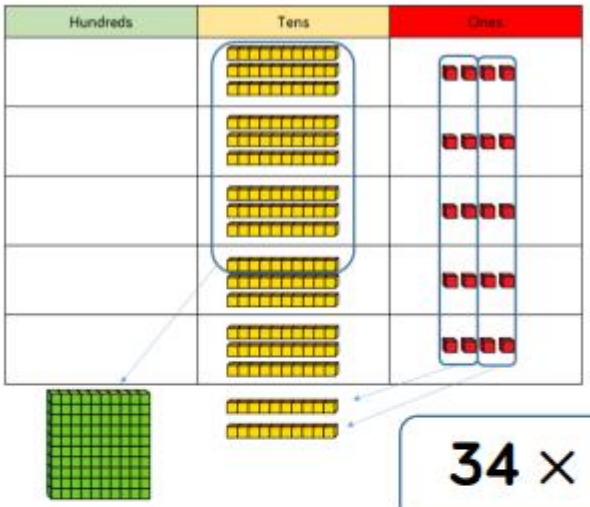
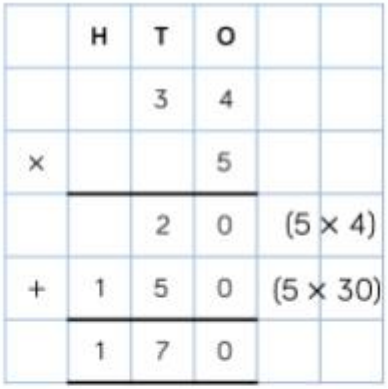
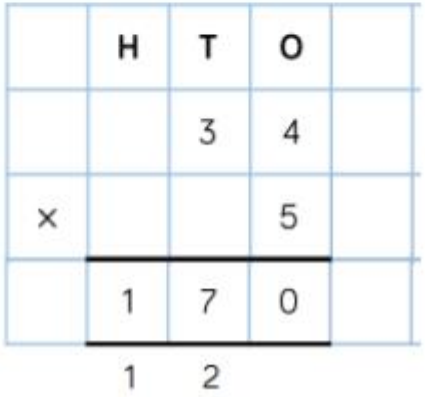
Recall and use multiplication and division facts for the 12 times table.		Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the 12 times table, using manipulatives to support. Make links to the 6 times table, seeing how each multiple is double the sixes. Notice the pattern in the ones within each group of five multiples. The hundred/two hundred square can support in highlighting this pattern.

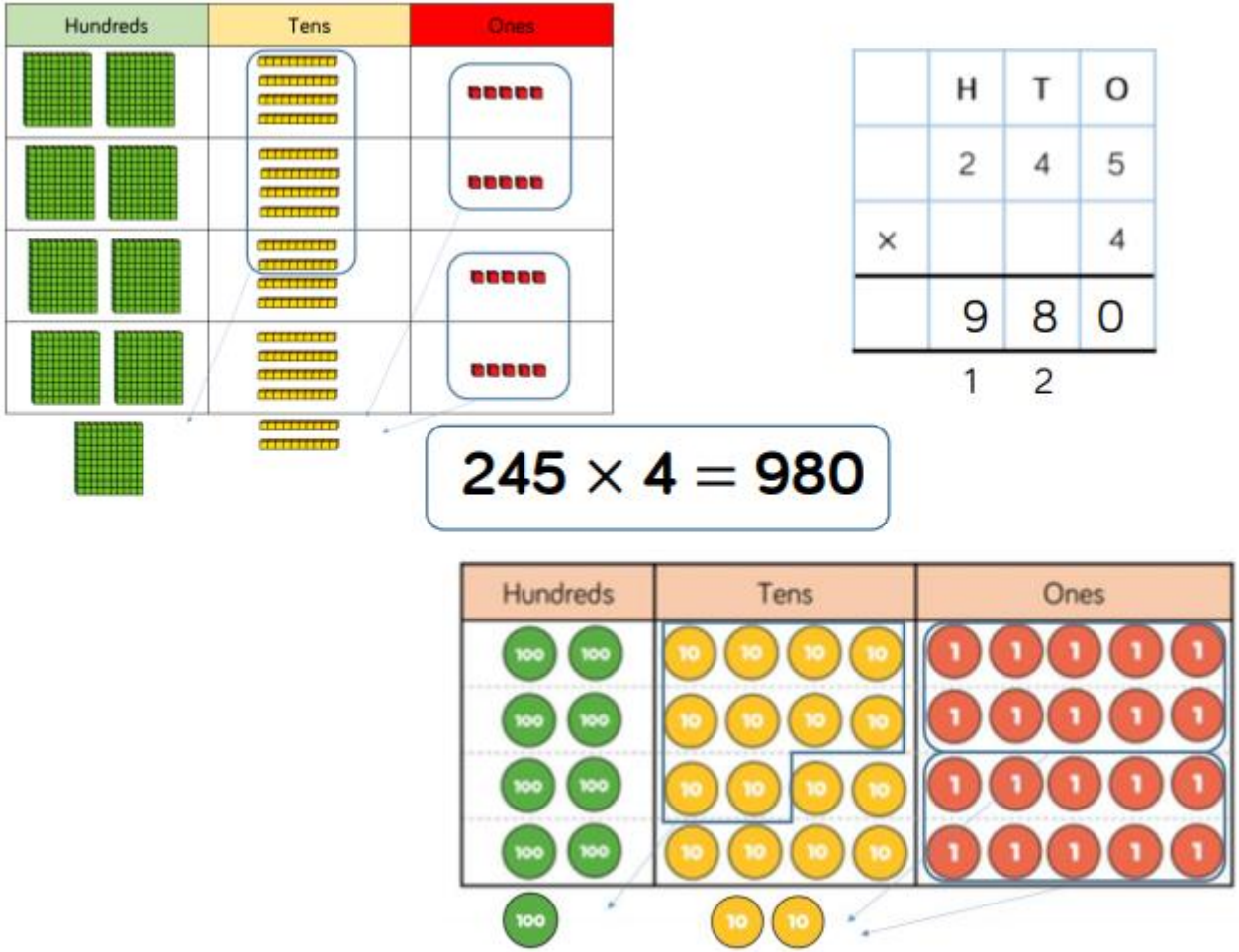
Multiplication

Year 1		
To solve 1 step problems involving multiplication and division.		Children represent multiplication as repeated addition in many different ways. In Year 1, children use concrete and pictorial representations to solve problem with the support of an adult. They are not expected to record multiplication formally.

Year 2		
To solve 1 step problems involving multiplication and division.		Children represent multiplication as repeated addition in many different ways. In Year 2, children are introduced to the multiplication symbol.

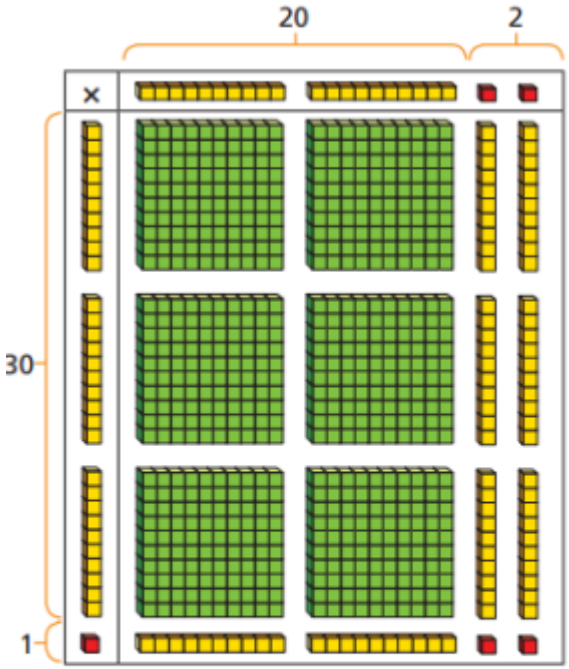
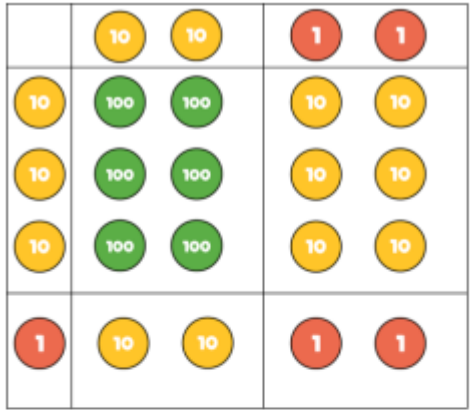
Year 3		
Multiply 1 and 2 digit numbers by a one-digit number.	**17 x 4 = 68**   1 7 x 4 2 8 + 4 0 6 8 x | 10 | 7 4 | 40 | 28 40 + 28 = 68	Children should continue to represent calculations using the Year 2 representations. They should progress towards jottings using squared paper and then the grid method. Some children will then progress to the expanded short method.

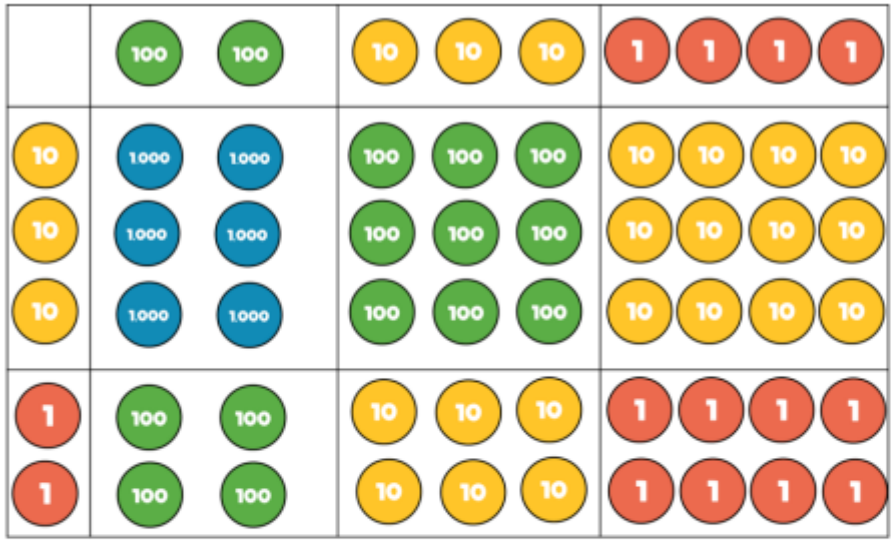
Year 4		
Multiply a 2-digit number by a 1-digit number.	  $34 \times 5 = 170$  	Informal methods and the expanded method are used in Year 3 before moving on to the short multiplication method in Year 4. Place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge.

Multiply a 3-digit number by a 1 digit number.		When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method. Base 10 and place value counters continue to support the understanding of the written method. Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.

Year 5/6

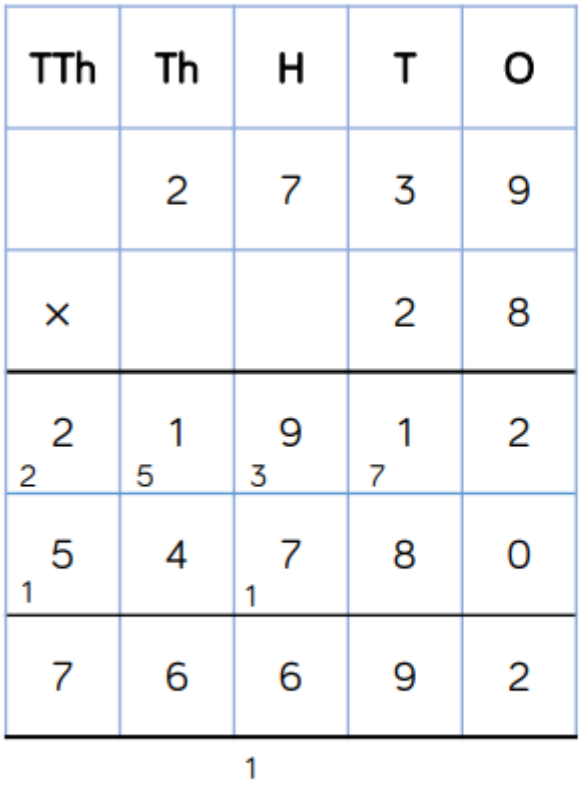
Multiply a 4-digit number by a 1 digit number.	 $1{,}826 \times 3 = 5{,}478$ 		Th	H	T	O
---	---	---	---	---
	1	8	2	6
×				3
	5	4	7	8
	2		1			When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method. If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.

Multiply a 2-digit number by a 2 digit number.	  | × | 20 | 2 | |---|---|---| | 30 | 600 | 60 | | 1 | 20 | 2 | | | H | T | O | |---|---|---|---| | | | 2 | 2 | | × | | 3 | 1 | | | | 2 | 2 | | | 6 | 6 | 0 | | | 6 | 8 | 2 | $22 \times 31 = 682$	When multiplying a multi-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the Base 10. The grid method matches the area model as an initial written method before moving on to the formal written multiplication method.

Multiply a 3-digit number by a 2-digit number	 **234 × 32 = 7,488**	Children can continue to use the area model when multiplying 3- digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers. Children should now move towards the formal written method, seeing the links with the grid method. In **Year 6** the same methods should be applied when multiplying a **decimal number** with up to 2 places by a whole number.

Th	H	T	O
	2	3	4
×		3	2
	4	6	8
$^{1}7$	$^{1}0$	2	0
7	4	8	8

×	200	30	4
30	6,000	900	120
2	400	60	8

Multiply a 4-digit number by a 2-digit number.		When multiplying 4-digits by 2-digits, children should be confident in using the formal written method. If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.