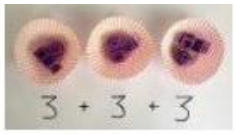
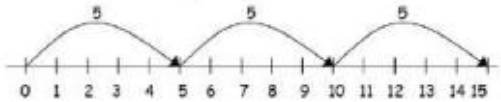
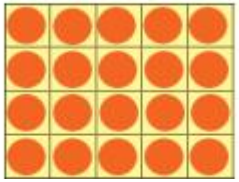
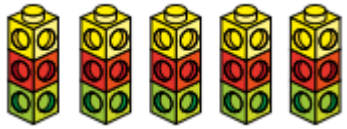
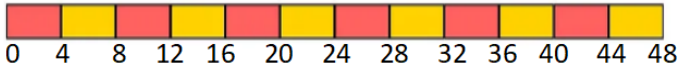
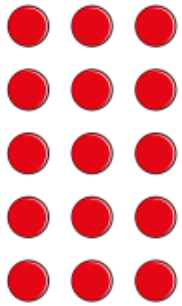
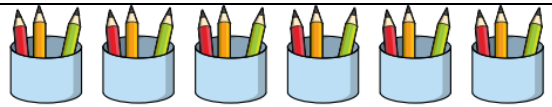
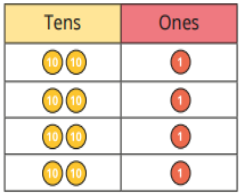
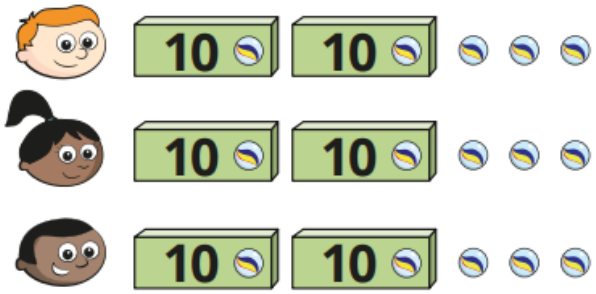
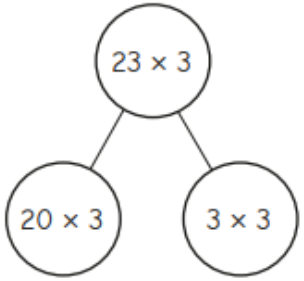
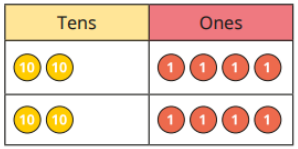
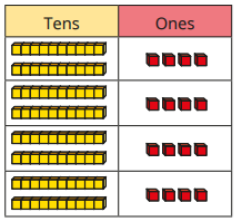
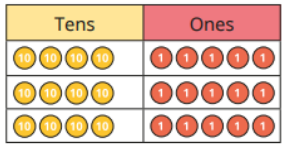
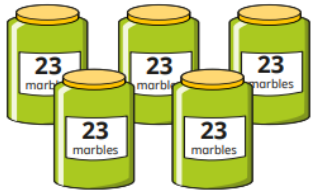
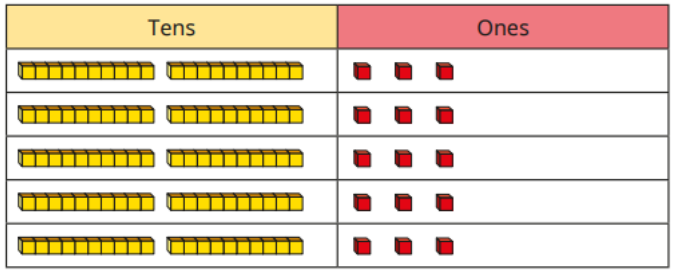
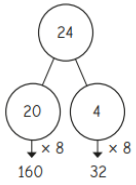
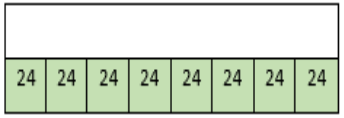
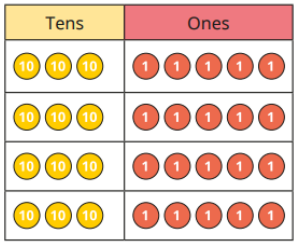
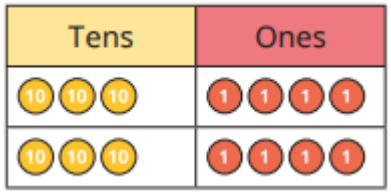
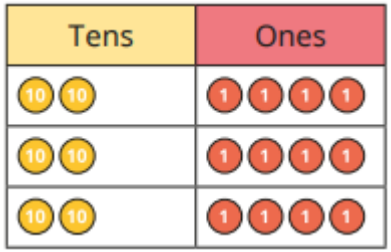
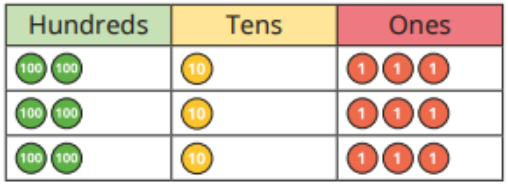
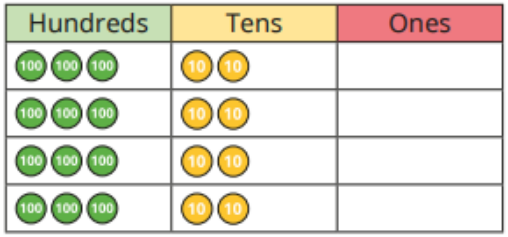
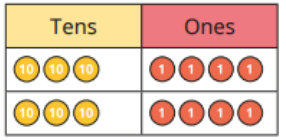
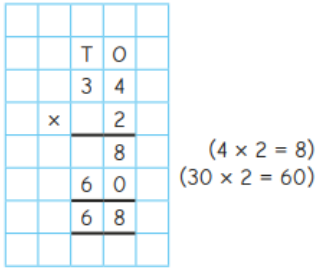
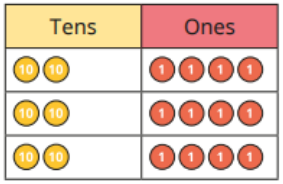
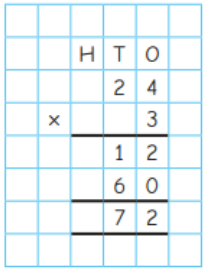
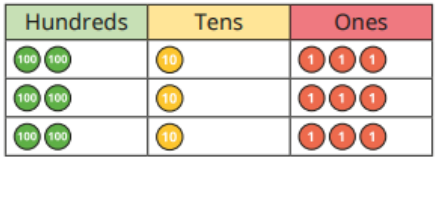
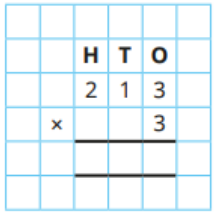
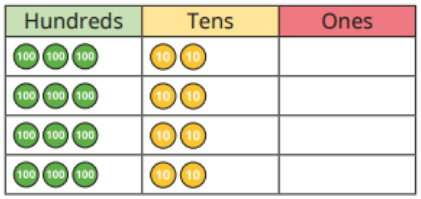
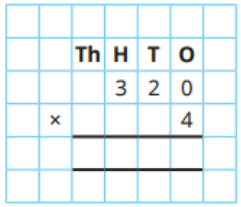
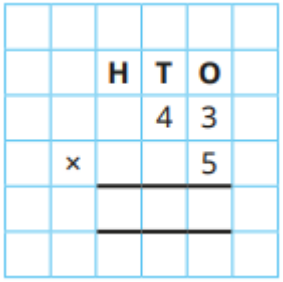
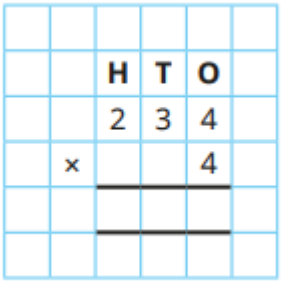
Multiplication

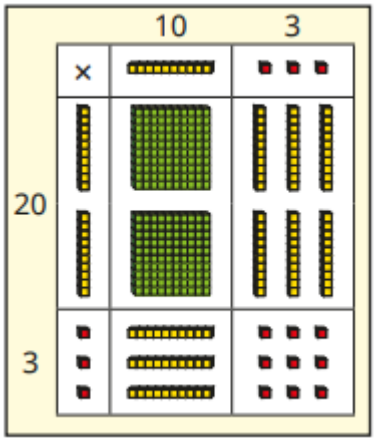
Year	Objective	Concrete	Pictorial	Abstract
1 and 2	Repeated addition	   Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 + 2 + 2 = 6  5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures.  2 + 2 + 2 = 6
1 and 2	Arrays to show commutative multiplication	Create arrays using counters/cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.  4 × 2 = 8 2 × 4 = 8  2 × 4 = 8 4 × 2 = 8 Link arrays to area of rectangles. 	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

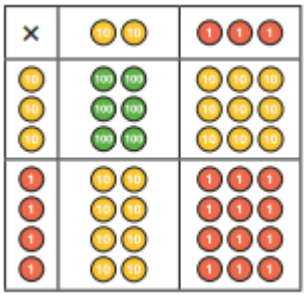
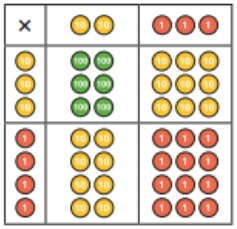
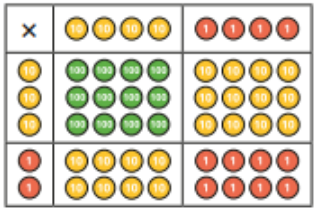
2, 3 and 4	Times tables	Children can use cubes to make equal groups and explore the relationship between repeated addititon and multiplication.  There are 5 towers. Each tower has 3 cubes. There are 5 equal groups with 3 in each group. There are 15 altogether. 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15	Counting sticks to support counting in multiples.   Use the array to write 2 multiplication sentences. 5 x 3 = 15 3 x 5 = 15 The commutative rule can be reinforced. Bar models can be used to show relationship between repeated addition and multiplication.  There are 3 vases. There are 9 flowers in each vase.  How many flowers are there in total?  There are ___ bags of apples. There are ___ apples in each bag. There are ___ apples in total.	 Use pictorial representations to show repeated addition and multiplication. 3 + 3 + 3 + 3 + 3 + 3 = 18 6 x 3 = 18 Once children are secure with repeated addition and the concept of multiplication, multiplication sentences can be used. 6 x 3 = 18 3 x 6 = 18 Missing number problems can be introduced once fluency is secure: 3 x ___ = 18 By the end of year 2, children should be able to recall multiplication facts for the 2, 5 and 10 times tables. By the end of year 3, children should be able to recall multiplication facts for the 3, 4 and 8 times tables. By the end of year 4, children should be able to recall multiplication facts for all times tables up to 12 x 12.

3	Multiply 2-digit number by 1 digit (no exchange). Working towards expanded method	Use base 10 to show what is happening when multiplying a 2-digit number.  3 tens × 2 = _____ tens 2 ones × 2 = _____ ones _____ + _____ = _____ 32 × 2 = _____ Children should progress to using place value counters.  2 tens × 4 = _____ tens 1 one × 4 = _____ ones _____ + _____ = _____ 21 × 4 = _____	Ron, Sam and Mo each have 23 marbles.  When using pictorial representations, encourage children to start with ones and then move on to tens. 3 x 3 ones = 9 There are 9 single marbles. 3 x 2 tens = 6 tens. 6 tens = 60 60 + 9 = 69 3 x 23 = 69 Part whole and bar models can be used to support the progression from pictorial representations to abstract.  20 × 3 = 60 3 × 3 = 9 23 × 3 = 69 69 23 | 23 | 23	Whilst conceptual understanding is developing, pictorial representations can be used with the stages of calculations broken down. Complete the number sentences.  2 × 4 = ☐ 2 × 20 = ☐ ☐ + ☐ = ☐ 2 × 24 = ☐ Children can then use their methods to solve multiplication sentences presented to them: 33 x 3 = At this stage, children are not using a formal method.

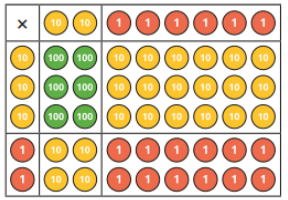
3	Multiply 2-digit number by 1 digit (with exchange). Working towards expanded method	Use base 10 to show what is happening when multiplying a 2-digit number and when exchanging.  2 tens × 4 = _____ tens 4 ones × 4 = _____ ones 24 × 4 = _____ + _____ = _____ 24 × 4 = _____ Children should progress to using place value counters. Use the place value chart and counters to work out 45 × 3  4 tens × 3 = _____ tens 5 ones × 3 = _____ ones _____ + _____ = _____ 45 × 3 = _____	When using pictorial representations, encourage children to start with the ones and then move onto tens. There are 23 marbles in a jar. There are 5 jars.   5 x 3 ones = 15 5 x 2 tens = 10 tens 15 + 100 = 115 23 x 5 = 115 Work out 4 × 15  4 × 5 = ☐ 4 × 10 = ☐ ☐ + ☐ = ☐ 4 × 15 = ☐ Part whole and bar models can be used to support the progression from pictorial representations to abstract.  160 + 32 = 192 24 x 8 = 192  	Whilst conceptual understanding is developing, pictorial representations can be used with the stages of calculations broken down.  ☐ × ☐ = ☐ ☐ × ☐ = ☐ ☐ + ☐ = ☐ 35 × 4 = ☐ Children can then use their methods to solve multiplication sentences presented to them: 4 x 24 = At this stage, children are not using a formal method.

4	Multiply 2-digit and 3-digit numbers by 1 digit. Expanded to formal method for short multiplication.	Use place value counters initially to revisit what is happening when multiplying. Firstly, with no exchanges and then with exchanges: 34 x 2  24 x 3  213 x 3  320 x 4  	Show expanded method alongside pictorial representation. Firstly with no exchanges and then with: Dora uses place value counters alongside the written multiplication to work out 34 × 2   (4 × 2 = 8) (30 × 2 = 60) Jo uses place value counters to work out 24 × 3   (4 × 3) (20 × 3)     	Children will then move on to using the formal method for short multiplication. They should have plentiful opportunities to see this method done alongside pictorial representations. Reinforce starting with the ones.  

<table>
<tr>
<td>5</td>
<td>Area model for multiplying a 2-digit by 2-digit number.</td>
<td>Base 10 can be used to show the how the calculation can be broken down.
23 x 13
 

Place value counters can then be used:
34 x 23
  </td>
<td>Pictorial representations can be used to show the stages of the calculation alongside the area model.
 
34 × 23
= 600 + 90 + 80 + 12 = 782
 

×	40	4
30	1,200	120
2	80	8

</td>
<td>Pictorial representations should be used initially to support children’s understanding:
 

×	20	6
30		
2		

26 × 32 = ☐
Once secure with the stages, children can use the model without pictorial representations alongside:
27 × 16 = ☐

×		

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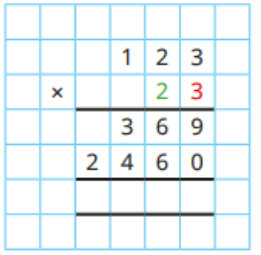
<tr>
<td>5 and 6</td>
<td>Expanded to formal method for long multiplication</td>
<td></td>
<td>Initially, the area model can be used alongside a written expanded method.

×	10	3
30	300	90
2	20	6

300 + 90 + 20 + 6 = 416
 
</td>
<td>Children use the formal layout with the multiplication sentences writtent next to each part to show multiplying by the ones and multiplying by the tens.
 
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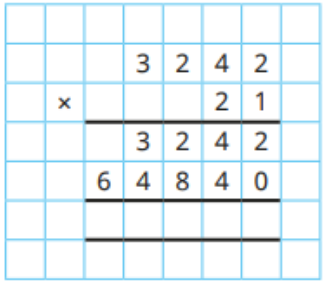
				Children should then be able to use the formal method for long multiplication, remembering the stages needed: 
NB	Be mindful that concrete and pictorial representation will continue to support conceptual understanding at all stages of learning and are good for retrieval. Some learners in higher year groups will still need to use concrete resources and pictorial representations so adaptive practice will be needed to ensure all children can access the learning in all lessons.			