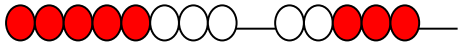
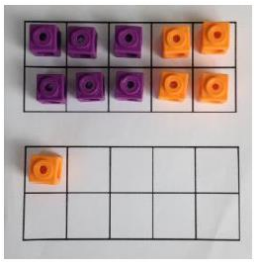
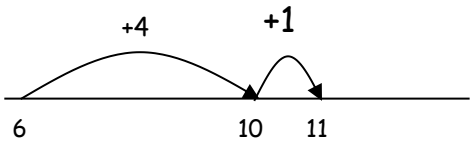
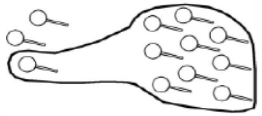
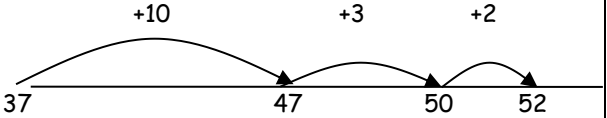
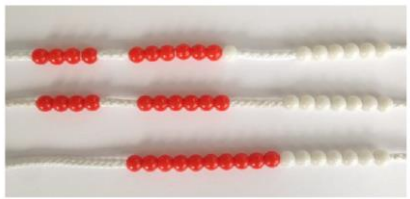
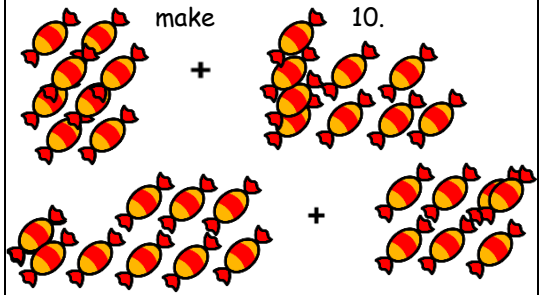
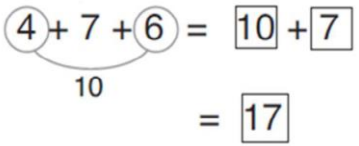
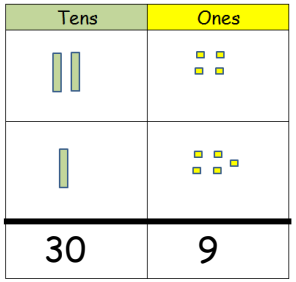
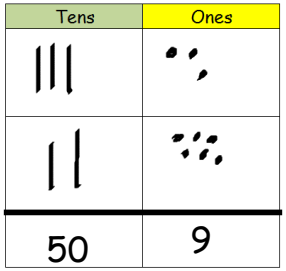
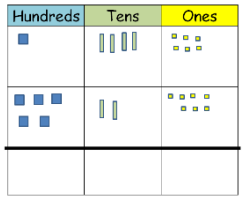
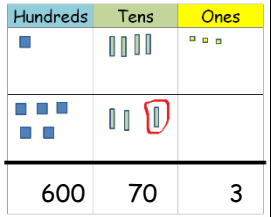
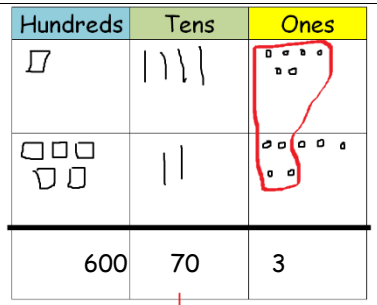
Calculation Policy

Addition		
Skill	**Year**	**Representation and models**
Add two 1-digit numbers to 10	1	Part-whole model Bar model Number shapes Ten frames (within 10) Bead strings Number tracks
Add 1 and 2-digit numbers to 20	1	Part-whole model Bar model Number shapes Ten frames (within 20) Bead strings (20) Number tracks Number lines (labelled) Straws
Add three 1-digit numbers	2	Part-whole model Bar model Ten frames (within 20) Number shapes
Add 1 and 2-digit numbers to 100	2	Part-whole model Bar model Number lines (labelled) Number lines (blank) Straws Hundred square
Add two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Base 10 Place value counters Straws
Add with up to 3-digits	3	Part-whole model Bar model Column addition Base 10 Place value counters
Add with up to 4-digits	4	Part-whole model Bar model Column addition Base 10 Place value counters
Add with more than 4 digits	5	Part-whole model Bar model Place value counters Column addition
Add with up to 3 decimal places	5	Part-whole model Bar model Place value counters Column addition

Addition

	Concrete	Pictorial	Abstract
Regrouping to make 10	Start with the bigger number and use the smaller number to make 10. Bead strings or 10 frames and objects can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.   **5 + 6 = 11**	Use pictures or a number line. Regroup or partition the smaller number to make 10. 6 + 5 = 11 4 1   3 + 9 =	Bridging through ten can help children become more efficient. 37 + 15 = 52 
Adding 3 single digit	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7.  Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	Add together three groups of objects. Draw a picture to recombine the groups to make 10. 	Combine the two numbers that make 10 and then add on the remainder. 

Addition

	Concrete	Pictorial	Abstract
Column, no regrouping	Add together the ones first then add the tens. Use the Base 10 blocks first *before moving onto place value counters.* 24 + 15 = 	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 33 + 26 = 	Children use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies. They begin to use an expanded layout that underpins the standard written method. 85 = 80 + 5 + 46 40 + 6 120 + 11 = 131
Column with regrouping	Make both numbers on a place value grid, *this example is completed using place value counters.*  146 Add + 527 nits and exchange 10 ones for one 10.  Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.	Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding.  Once drawn, the children group any series of counters which are greater than ten. They should circle ten of the counters before adding onto the next column (like the exchange in the previous example).	Start by partitioning the numbers before moving on to clearly show the exchange below the addition. 20 + 5 40 + 8 60 + 13 = 73 Children will consolidate the above and move on to carrying below the line. 625 + 48 = 673 (1) 783 + 42 = 825 (1) 367 + 85 = 452 (11)

National Curriculum Guidance	***Addition and subtraction***

789 + 642 becomes

$$\begin{array}{rccc} & 7 & 8 & 9 \\ + & 6 & 4 & 2 \\ \hline 1 & 4 & 3 & 1 \\ \hline & {\scriptstyle 1} & {\scriptstyle 1} & \end{array}$$

Answer: 1431

874 – 523 becomes

$$\begin{array}{rccc} & 8 & 7 & 4 \\ - & 5 & 2 & 3 \\ \hline & 3 & 5 & 1 \\ \hline \end{array}$$

Answer: 351

932 – 457 becomes

$$\begin{array}{rccc} & {\scriptstyle 8} & {\scriptstyle 1\,2} & {\scriptstyle 1} \\ & \cancel{9} & \cancel{3} & 2 \\ - & 4 & 5 & 7 \\ \hline & 4 & 7 & 5 \\ \hline \end{array}$$

Answer: 475

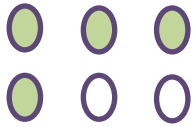
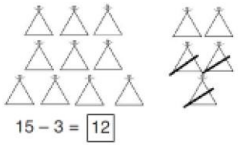
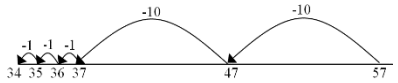
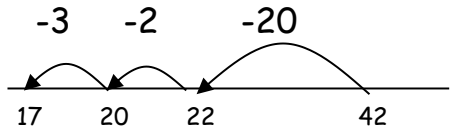
932 – 457 becomes

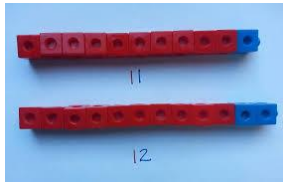
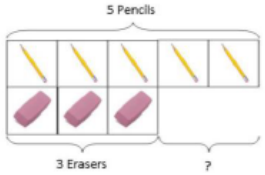
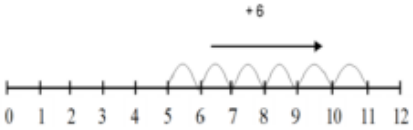
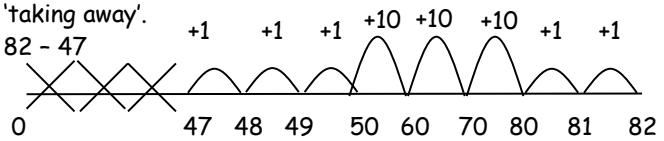
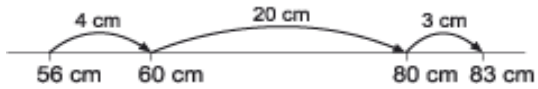
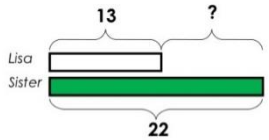
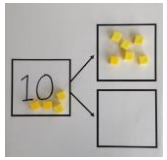
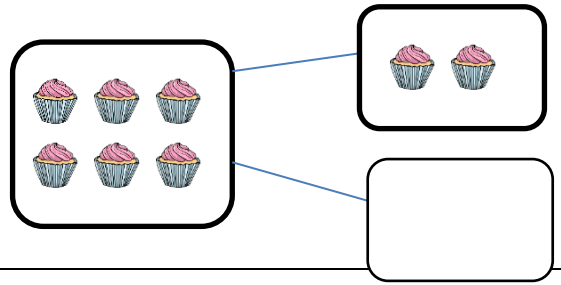
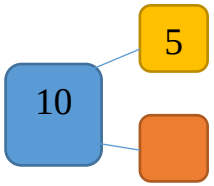
$$\begin{array}{rccc} & & {\scriptstyle 1} & {\scriptstyle 1} \\ & 9 & 3 & 2 \\ - & \cancel{4} & \cancel{5} & 7 \\ & {\scriptstyle 5} & {\scriptstyle 6} & \\ \hline & 4 & 7 & 5 \\ \hline \end{array}$$

Answer: 475

Subtraction		
Skill	**Year**	**Representation and models**
Subtract two 1-digit numbers to 10	1	Part-whole model Bar model Number shapes Ten frames (within 10) Bead strings Number tracks
Subtract 1 and 2-digit numbers to 20	1	Part-whole model Bar model Number shapes Ten frames (within 20) Bead strings (20) Number tracks Number lines (labelled) Straws
Subtract 1 and 2-digit numbers to 100	2	Part-whole model Bar model Number lines (labelled) Number lines (blank) Straws Hundred square
Subtract two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Straws Base 10 Place value counters
Subtract with up to 3-digits	3	Part-whole model Bar model Column subtraction Base 10 Place value counters
Subtract with up to 4-digits	4	Part-whole model Bar model Column subtraction Base 10 Place value counters
Subtract with more than 4 digits	5	Part-whole model Bar model Place value counters Column subtraction
Subtract with up to 3 decimal places	5	Part-whole model Bar model Place value counters Column subtraction

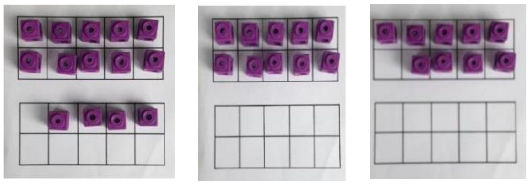
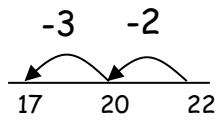
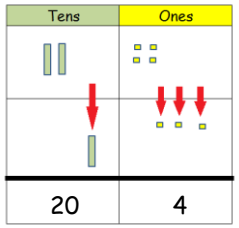
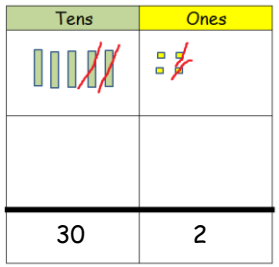
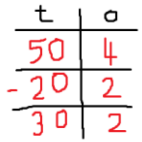
Subtraction

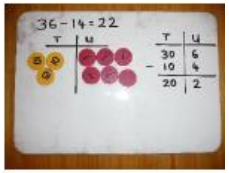
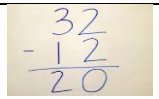
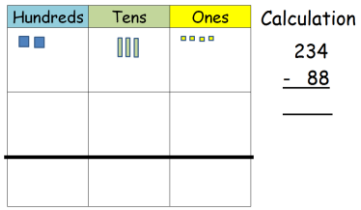
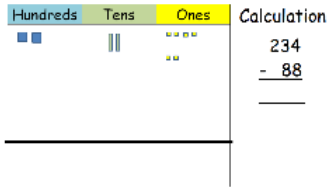
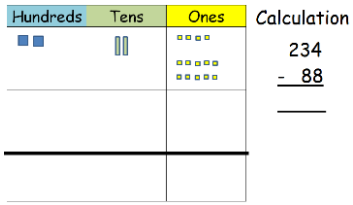
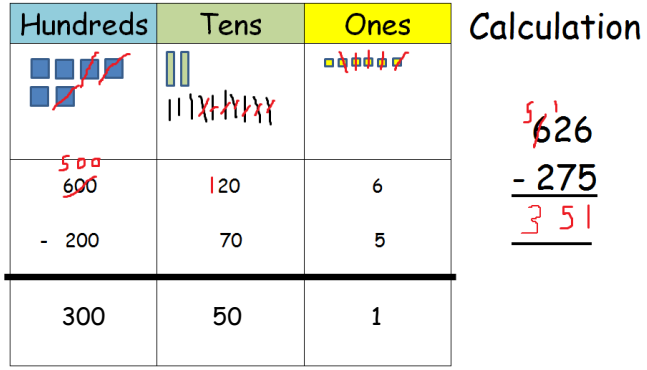
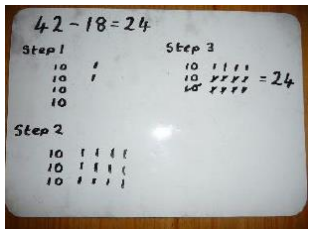
	Concrete	Pictorial	Abstract
Taking away ones	Use physical objects, counters, cubes etc., to show how objects can be taken away. 	**Cross out drawn objects to show what has been taken away.**  15 – 3 = 12	18 - 3 = 15 8 - 2 = 6
Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4 = 11 Use counters and move them away from the group as you take them away counting backwards as you go. 	**Children to also use number lines to count back.** 10 and 4 less Start at the bigger number and count back the smaller number showing the jumps on the number line.  This can progress all the way to counting back using two 2 digit numbers. Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 – 3 = 4). Subtracting the tens in one jump and the units in one jump. Bridging through ten can help children become more efficient. 42 – 25 = 173  	18 - 3 = 15 8 - 2 = 6

Counting on – finding the difference	Compare amounts and objects to find the difference. Use cubes to build towers or make bars to find the difference.  Use basic bar models with items to find the difference.  A teddy costs 50p and doll costs 20p. How much more does the teddy cost? 	Using a number line to count on.  11 – 5 = 6 When dealing with larger numbers, the number line should still show 0 so children can cross out the section from 0 to the smallest number. They then associate this method with 'taking away'.   **Using the bar method.**  	18 - 3 = 15 8 - 2 = 6
Part part whole	Link to addition- use the part whole model to help explain the inverse between addition and subtraction.  If 10 is the whole and 6 is one of the parts. What is the other part?	Use a pictorial representation of objects to show the part-part whole model. 	Move to using numerals within the part whole model. 

	10 - 6 = ?		

Subtraction

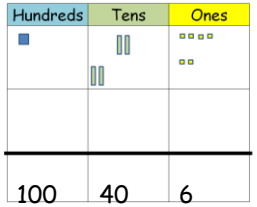
	Concrete	Pictorial	Abstract
Make 10	Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9. 14 – 5 = 9 	Using a numberline whilst partitioning the number you re subtracting. Start at 22. Take away 2 to reach 20. Then take away the remaining 3 so you have taken away 5 altogether. You have reached your answer. 22 – 5 = 17 3 2 	16 – 8 = How many do we take off to reach the next 10? How many do we have left to take off?
Column method without regrouping	Use Base 10 to make the bigger number then take the smaller number away. Always write the calculation alongside, as seen in the example below. 37 – 13 = 	Draw the Base 10 or place value counters alongside the written calculation to help to show working.  	*Initially, the children will be taught using examples that do not need the children to exchange.* Partitioning and decomposition. e.g. 89 = 80 + 9 - 57 - 50 + 7 30 + 2 = 32 This will eventually lead to:

	Show how you partition numbers to subtract. Again make the larger number first. 		
Column method with regrouping	Use Base 10 to start with before moving on to *place value counters*. Start with one exchange before moving onto subtractions with 2 exchanges.  Make the larger number with the place value counters  Start with the ones, can I take away 8 from 4 easily? I need to exchange one of the tens for ten ones. Now I can subtract the ones.  Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten	Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.  When confident, children can find their own way to record the exchange/regrouping. Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup. 	**Partitioning and decomposition** Children can start their formal written method by partitioning the number into clear place value columns. 754 = - 86 H T O Step 1 700 + 50 + 4 - 80 + 6 H T O Step 2 700 + 40 + 14 *(exchange T-O)* - 80 + 6 H T O Step 3 600 + 140 + 14 *(exchange H-T)* - 80 + 6 600 + 60 + 8 = 668 This would be recorded by the children as 600 140

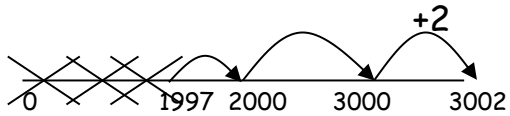
<table>
<tr>
<td></td>
<td>tens. Now I can take away eight tens and complete the subtraction.

Show the written methods beside to gather understanding.

Calculation
234
- 88

Calculation
234
- 88
146</td>
<td>Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc., counting on using a number line should be used.

 
</td>
<td>700 + 50 + 14
- 80 + 6
600 + 60 + 8 = 668

Decomposition
When children are secure with the previous method they move on to decomposition.

614 1
754
- 86
668</td>
</tr>
<tr>
<td>National Curriculum Guidance</td>
<td colspan="3">Addition and subtraction
789 + 642 becomes

7 8 9
+ 6 4 2
1 4 3 1
1 1

Answer: 1431

874 – 523 becomes

8 7 4
– 5 2 3
3 5 1

Answer: 351

932 – 457 becomes

8 12 1
9 3 2
– 4 5 7
4 7 5

Answer: 475

932 – 457 becomes

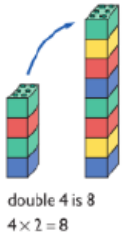
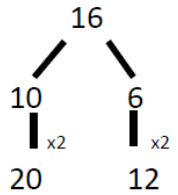
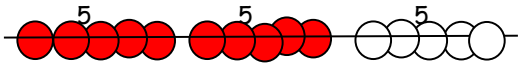
1 1
9 3 2
– 4 5 7
5 6
4 7 5

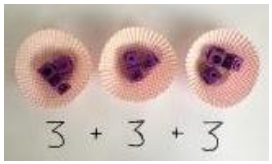
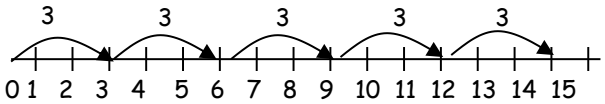
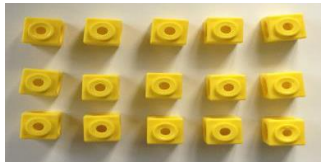
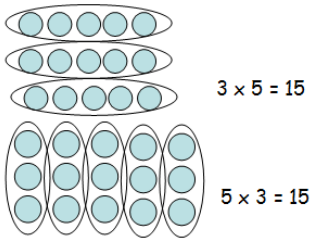
Answer: 475</td>
</tr>
</table>

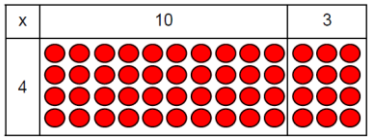
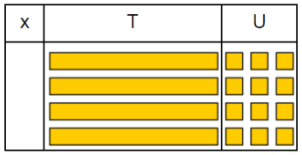
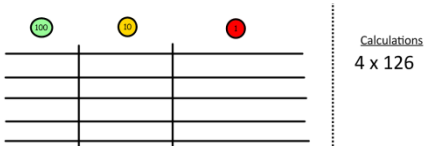
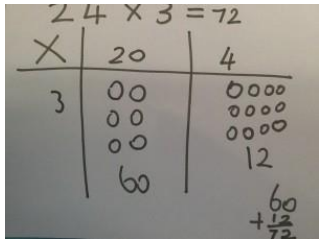
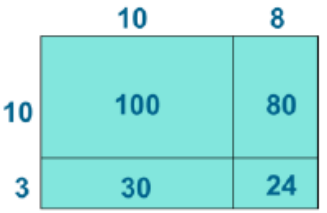
Multiplication		
Skill (times table facts)	Year	Representation and models
Recall and use multiplication and division facts for the 2-, 5- and 10-times table	2	Bar model Number shapes Counters Money Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 3- and 4-times table	3	Hundred square Number shapes Counters Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 8-times table	3	Hundred square Number shapes Everyday objects Bead strings Number tracks
Recall and use multiplication and division facts for the 6-times table	4	Hundred square Number shapes Everyday objects Bead strings Number tracks
Recall and use multiplication and division facts for the 7-times table	4	Hundred square Number shapes Bead strings Number lines
Recall and use multiplication and division facts for the 9-times table	4	Hundred square Number shapes Bead strings Number lines
Recall and use multiplication and division facts for the 11-times table	4	Hundred square Base 10 Place value counters Number lines
Recall and use multiplication and division facts for the 12-times table	4	Hundred square Base 10 Place value counters Number lines

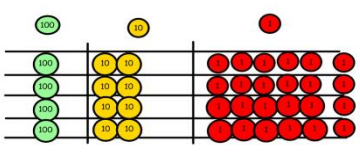
Multiplication		
Skill	Year	Representation and models
Solve one-step problems with multiplication	1/2	Bar model Number shapes Counters Ten frames Bead strings Number lines
Multiply 2-digit by 1-digit numbers	3/4	Place value counters Base 10 Short written method Expanded written method
Multiply 3-digit by 1-digit numbers	4	Place value counters Base 10 Short written method
Multiply 4-digit by 1-digit numbers	5	Place value counters Base 10 Short written method
Multiply 2-digit by 2-digit numbers	5	Place value counters Base 10 Short written method Grid method
Multiply 2-digit by 3-digit numbers	5	Place value counters Grid method Short written method
Multiply 2-digit by 4-digit numbers	5/6	Formal written method

Multiplication

	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  	Draw pictures to show how to double a number. Double 8 	Partition a number and then double each part before recombining it back together. 
Counting in multiples	Count in multiples supported by concrete objects in equal groups (**commutativity**). Show on bead bar or on a number line: 3 x 5 = 5 + 5 + 5  	Use a number line or pictures to continue support in 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, 30

Repeated addition	Use different objects to add equal groups. 	Children will develop their understanding of multiplication and use jottings to support calculation: Repeated addition can be shown easily on a number line: 5 x 3 = 3+3+3+3+3 (5 lots of 3) 	Using symbols to stand for unknown numbers to complete equations using inverse operations □ x 5 = 20 3 x △ = 18 □ x ○ = 32
Arrays – Showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences. 	Children should be able to model a multiplication calculation using an array. Arrays can be drawn in different rotations to find **commutative** multiplication sentences. 	Use an array to write multiplication sentences and reinforce repeated addition. e.g. 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

Grid method – NOT in national curriculum	Show the link with arrays to first introduce the grid method. e.g. 13 x 4 =  4 rows of 10 4 rows of 3 Move on to using Base 10 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.  	This can be followed by the formal written grid method. **TU x TU** 72 x 38 Children will approximate first: 72 x 38 is approximately 70 x 40 = 2800 | x	70	2
---	---	---
30	2100	60
8	560	16	 2100 + 560 + 60 + 16 2736 1 *Grid method used for area work.* 

	Fill four rows with 126.  Add them together making any appropriate exchanges (see addition section).		
Column multiplication	***Short multiplication*** 24 × 6 becomes **2 4** **× 6** **1 4 4** 2 Answer: 144 342 × 7 becomes **3 4 2** **× 7** **2 3 9 4** 2 1 Answer: 2394 2741 × 6 becomes **2 7 4 1** **× 6** **1 6 4 4 6** 4 2 Answer: 16 446		

Long multiplication

24 × 16 becomes

$$\begin{array}{rrr} & {\scriptstyle 2} & \\ & \mathbf{2} & \mathbf{4} \\ \times & \mathbf{1} & \mathbf{6} \\ \hline \mathbf{2} & \mathbf{4} & \mathbf{0} \\ \mathbf{1} & \mathbf{4} & \mathbf{4} \\ \hline \mathbf{3} & \mathbf{8} & \mathbf{4} \\ \hline \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{rrrr} & {\scriptstyle 1} & {\scriptstyle 2} & \\ & \mathbf{1} & \mathbf{2} & \mathbf{4} \\ \times & & \mathbf{2} & \mathbf{6} \\ \hline \mathbf{2} & \mathbf{4} & \mathbf{8} & \mathbf{0} \\ & \mathbf{7} & \mathbf{4} & \mathbf{4} \\ \hline \mathbf{3} & \mathbf{2} & \mathbf{2} & \mathbf{4} \\ \hline {\scriptstyle 1} & {\scriptstyle 1} & & \end{array}$$

Answer: 3224

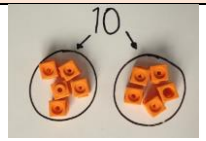
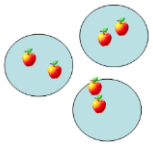
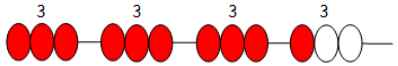
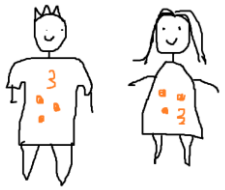
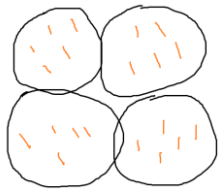
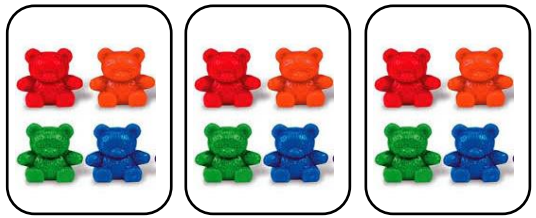
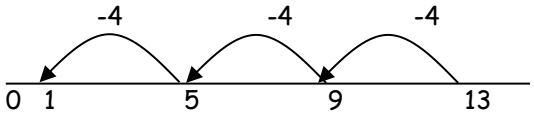
124 × 26 becomes

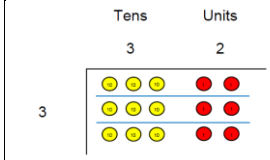
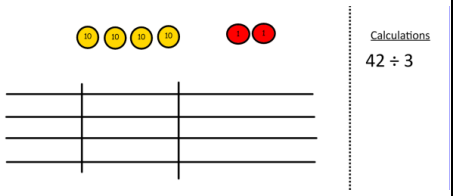
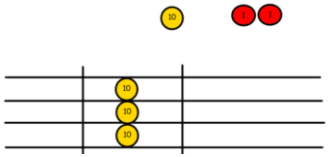
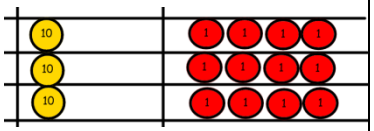
$$\begin{array}{rrrr} & {\scriptstyle 1} & {\scriptstyle 2} & \\ & \mathbf{1} & \mathbf{2} & \mathbf{4} \\ \times & & \mathbf{2} & \mathbf{6} \\ \hline & \mathbf{7} & \mathbf{4} & \mathbf{4} \\ \mathbf{2} & \mathbf{4} & \mathbf{8} & \mathbf{0} \\ \hline \mathbf{3} & \mathbf{2} & \mathbf{2} & \mathbf{4} \\ \hline {\scriptstyle 1} & {\scriptstyle 1} & & \end{array}$$

Answer: 3224

Division		
Skill	**Year**	**Representation and models**
Solve one-step problems with division (sharing)	1/2	Bar model Real life objects Arrays Counters
Solve one-step problems with division (grouping)	1/2	Real life objects Number shapes Bead strings Counters Ten frames Number lines Arrays
Divide 2-digits by 1-digit (no exchange/regrouping – sharing structure)	3	Straws Base 10 Bar model Place value counters Part-whole model
Divide 2-digits by 1-digit (sharing with exchange/regrouping)	3	Straws Base 10 Bar model Place value counters Part-whole model
Divide 2-digits by 1-digit (sharing with remainders)	3/4	Straws Base 10 Bar model Place value counters Part-whole model
Divide 2-digits by 1-digit (grouping)	4/5	Place value counters Counters Place value grid Written short division
Divide 3-digits by 1-digit (sharing with exchange/regrouping)	4	Base 10 Bar model Place value counters Part-whole model
Divide 3-digits by 1-digit (grouping)	4/5	Place value counters Counters Place value grid Written short division
Divide 4-digits by 1-digit (grouping)	5	Place value counters Counters Place value grid Written short division
Divide multi-digits by 2-digits (short division)	6	Written short division List of multiples
Divide multi-digits by 2-digits (long division)	6	Written short division List of multiples

Division

	Concrete	Pictorial	Abstract
Sharing into groups	 Children will understand equal groups and share items out in play and problem solving.  e.g., 6 ÷ 3 = 	Children will develop their understanding of division and use jottings to support calculation. e.g., 6 ÷ 2 =   **20 ÷ 4 =**	Share 9 buns between three people. 9 ÷ 3 = 3 Using symbols to stand for unknown numbers to complete equations using inverse operations □ ÷ 2 = 4 20 ÷ □ = 4 □ ÷ □ = 4
Division with a remainder	Divide objects between groups and see how much is left over. E.g. 14 ÷ 3 = 4 remainder 2.  	**Children may use an empty number line to support their calculation. Children should also move onto calculations involving remainders.** 13 ÷ 4 = 3 r 1  Draw dots and group them to divide an amount and clearly show a remainder. 	Complete written divisions and show the remainder using r. 32 ÷ 5 = 6r2

Short division	Use place value counters to divide using the bus stop method. Place the counters in the bus stop, partitioning the tens and ones. Then place them into groups. For example; 96 ÷ 3 = 3 rows of 30 and 3 rows of 2.  	42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.   We exchange this ten for ten ones and then share the ones equally among the groups. We look how much in 1 group so the answer is 14. 	

Short and long division

Short division

98 ÷ 7 becomes

```
     1  4
   ------
   2
7 | 9  8
```

Answer: 14

432 ÷ 5 becomes

```
       8  6  r 2
   ---------
   3
5 | 4  3  2
```

Answer: 86 remainder 2

496 ÷ 11 becomes

```
       4  5  r 1
   ---------
   5
1  1 | 4  9  6
```

Answer: $45\frac{1}{11}$

Long division

432 ÷ 15 becomes

```
        2  8  r 12
   ---------
1  5 | 4  3  2
      3  0  0
      ---------
      1  3  2
      1  2  0
      ---------
         1  2
```

Answer: 28 remainder 12

432 ÷ 15 becomes

```
        2  8
   ---------
1  5 | 4  3  2
      3  0  0   15×20
      ---------
      1  3  2
      1  2  0   15×8
      ---------
         1  2
```

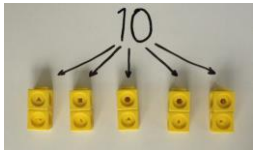
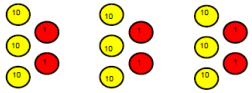
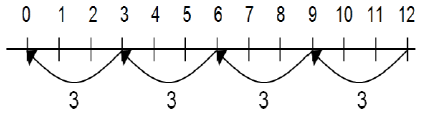
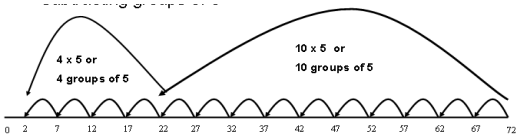
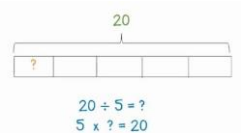
$\frac{\cancel{12}}{\cancel{15}} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

432 ÷ 15 becomes

```
        2  8 · 8
   ---------
1  5 | 4  3  2 · 0
      3  0
      ---------
      1  3  2
      1  2  0
      ---------
         1  2  0
         1  2  0
         ---------
               0
```

Answer: 28·8

Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.  96 ÷ 3 = 32  	Use a number line to show jumps in groups. The number of jumps equals the number of groups (repeated subtraction).   For bar method, split it into the number of groups you are dividing by and work out how many would be within each group.