Yatton Schools Calculation Policy

Summary

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Saying which number is one more than a given number. Finding the total number of items in two groups by counting all of them. Finding the total by starting at the bigger number and counting on.	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on. Regrouping to make 10	Adding three single digits. Column method – no regrouping.	Column method – regrouping. (Up to 3 digits)	Column method – regrouping. (Up to 4 digits)	Column method – regrouping. (with more than 4 digits) Decimals – with the same amount of decimal places	Column method – regrouping. Decimals – with the different amounts of decimal places
Subtraction	Taking away using objects or drawing and crossing out. Saying which number is one less than a given number. Subtracting two single digit numbers by counting back.	Taking away ones Counting back Find the difference Part whole model Make 10	Counting back Finding the difference Part whole model Make 10 Column method – no regrouping	Column method – regrouping. (Up to 3 digits)	Column method – regrouping. (Up to 4 digits)	Column method – regrouping. (with more than 4 digits) Decimals – with the same amount of decimal places	Column method – regrouping. Decimals – with the different amounts of decimal places
Multiplication	Doubling	Doubling Counting in multiples	Doubling Counting in multiples Repeated addition Arrays – showing commutative multiplication	Counting in multiples Repeated addition Arrays – showing commutative multiplication; Grid method (2 digit by 1 digit multiplication)	Column multiplication (2 and 3 digit multiplied by 1 digit)	Column multiplication (up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication (multi digit numbers multiplied by a 2 digit number)

Division	Halving and sharing	Sharing objects into groups Division as grouping	Division as grouping Division within arrays	Division within arrays Division with a remainder Short Division (2 digits by 1 digit concrete and pictorial)	Division within arrays Division with a remainder Short Division (up to 3 digits by 1 digit- concrete and pictorial)	Short Division (up to 4 digits by a 1 digit number interpret remainders appropriately for the context)	Short division Long division (up to 4 digits by a 2 digit number interpret remainders as whole numbers, fractions as required)

Concrete manipulatives used to support learning:

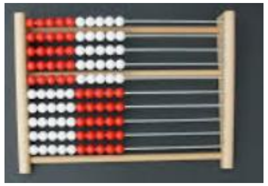

Bead strings

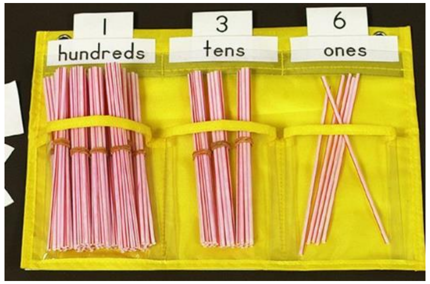

Multilink/cubes


Dienes/Base 10


Counters/Place value counters

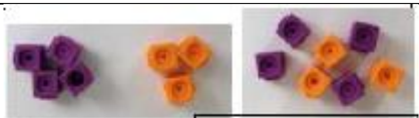
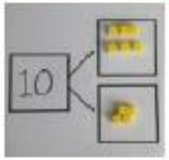
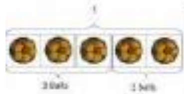
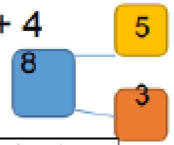
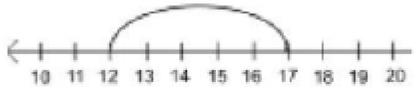
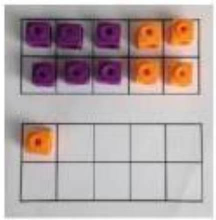
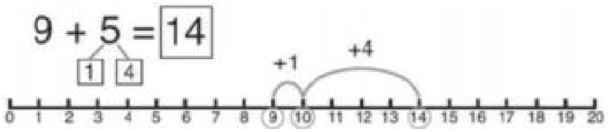

Numicon

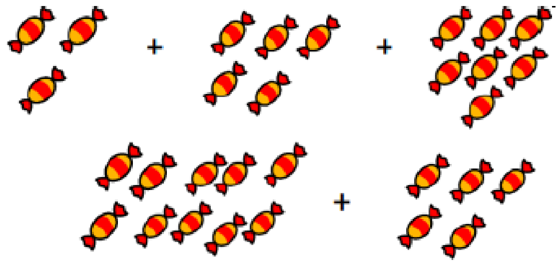
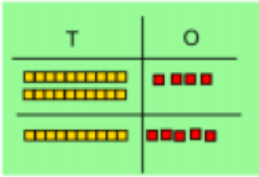
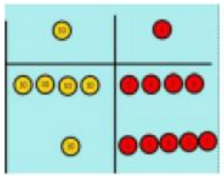
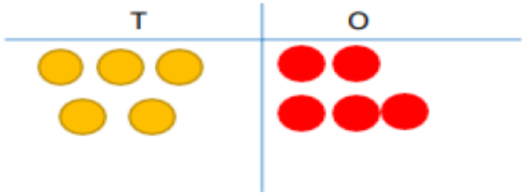
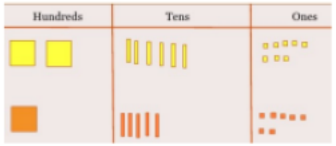
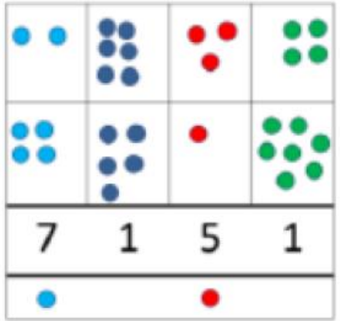

abacus



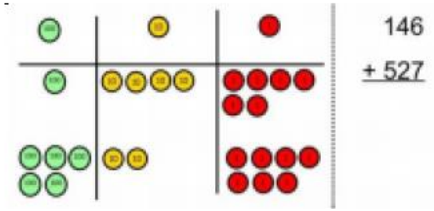
bundles of straws

Addition

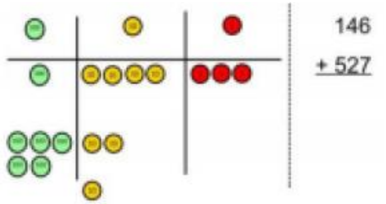
Objectives and strategies	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-whole model	  Use cubes to add two numbers together as a group or in a bar. 	  Use pictures to add two numbers together as a group or in a bar.  	4 + 3 = 7 10= 6 + 4  Use the part-part whole diagram as shown above to move into the abstract.
Starting at the bigger number and counting on	 Start with the larger number on the bead string, and then count on to the smaller number one by one to find the answer.	**12 + 5 = 17**  Start at the larger number on the line, and count in ones or in one jump to find the answer.	**12 + 5 = 17** Hold the larger number in your head and count on the smaller number to reach your answer.
Regrouping to make 10	**6 + 5 = 11**  Start with the bigger number and use the smaller number to make 10. 	 3 + 9 = Use pictures or a number line. Regroup or partition the smaller number to make 10.  	**7 + 4 = 11** If I am at 7, how many more do I need to make 10? How many more do I add now? 7 + 3 = 10 so 7 + 3 + 1 = 11

Adding three single digits	**4 + 7 + 6 = 17**  Put 4 and 6 together to make 10. Add on 7.	Add together three groups of objects. Draw a picture to recombine the groups to make 10. 	$\underbrace{4+7+6}_{10} = \boxed{10}+\boxed{7}$ $= \boxed{17}$ Combine the two numbers that make ten, and add on the number left over.
Column method without regrouping	First, add together the ones, then add the tens. Use Dienes, straws or Multilink to support understanding, before moving on to place value counters. **24 + 15** **44 + 15**  	After practically using the Dienes and place value counters, children can draw the Dienes or counters using a place value frame to help them to solve additions. **32 + 23 =**  	Add the ones first, then the tens, then the hundreds. $\begin{array}{r} 2\ 2\ 3 \\ +\ 1\ 1\ 4 \\ \hline 3\ 3\ 7 \end{array}$
Column method with regrouping	This process should first be modelled with the Dienes to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100. Add, re-group 10 ones for a ten and 10 tens for a hundred.  ▼ ...continued	Children draw a pictorial representation of the place value frame and counters to further support their learning and understanding re-grouping the ten underneath the equals line.  	Start by partitioning the numbers before moving on to formal written methods clearly show the re-grouping. **25 + 48** $\begin{array}{lll} 20 & + & 5 \\ 40 & + & 8 \\ \hline 60 & + & 13 = 73 \end{array}$ ▼ ...continued

This can then be modelled using place value counters in place of the Dienes.

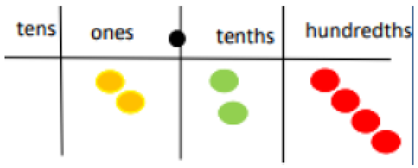


Add up the ones and re-group 10 ones for one 10.



Add up the rest of the columns, re-grouping the 10 counters from one column for the next place value column until every column has been added.

As children move on to decimals, money and decimals place value counters can be used to support learning.



Add the ones first, then the tens, then the hundreds.

```
 H T O
 536
+ 85
 621
 1 1
```

As the children move on, introduce decimals with the same number of decimal places and different places. Money can be used here.

```
  72.8
+ 54.6
 127.4
 1 1
```

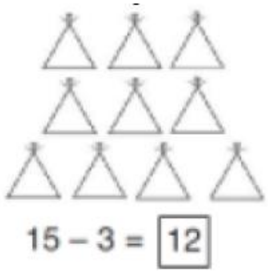
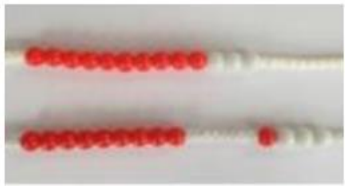
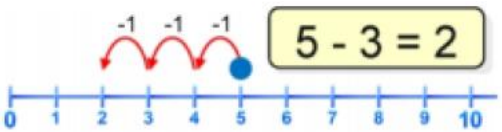
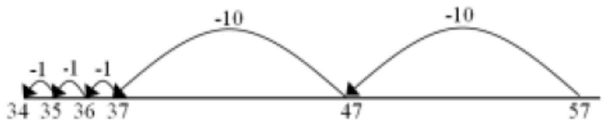
```
  £ 2 3 . 5 9
+ £   7 . 5 5
  £ 3 1 . 1 4
    1 1   1
```

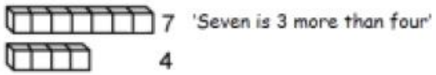
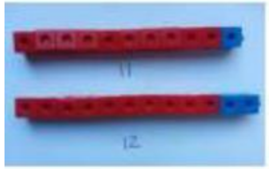
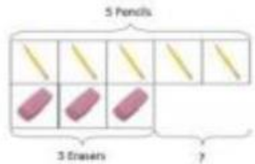
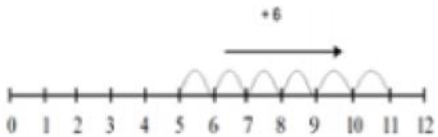
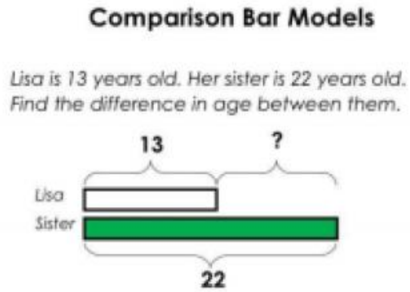
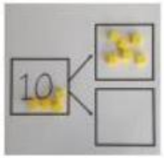
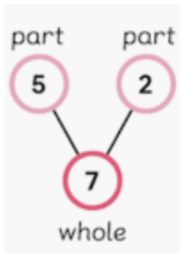
```
  8 1,0 5 9
    3,6 6 8
  1 5,3 0 1
+ 2 0,5 5 1
1 2 0,5 7 9
 1 1 1 1
```

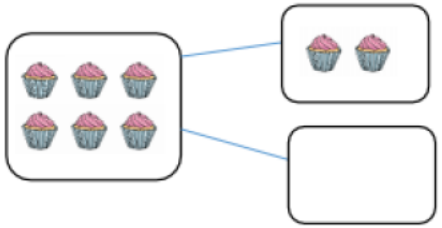
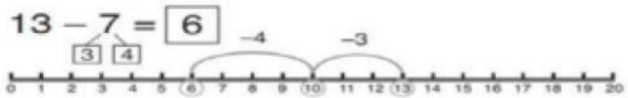
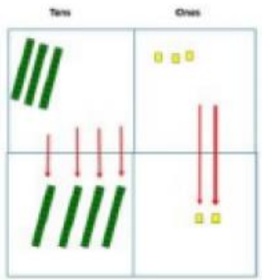
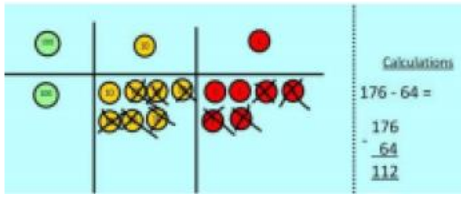
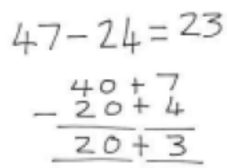
Insert zeros for place holders.

```
  2 3 . 3 6 1
    9 . 0 8 0
  5 9 . 7 7 0
+   1 . 3 0 0
  9 3 . 5 1 1
  2 1   2
```

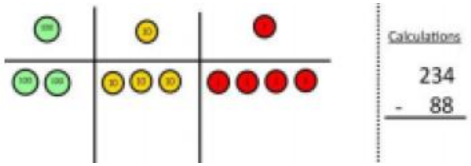
Subtraction

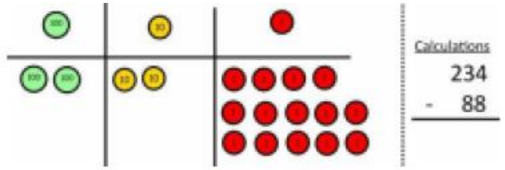
Objectives and strategies	Concrete	Pictorial	Abstract
Taking away ones	Use physical objects, counters, cubes etc to show how objects can be taken away. **6 – 4 = 2** 	Cross out drawn objects to show what has been taken away. 	7 – 4 = 3 6 = 8 – 2 18 – 3 = 15
Counting back	**7 – 2 = 5** Move objects away from the group, counting backwards.  Make the larger number in your subtraction. Move the beads along the bead string as you count backwards in ones. 	Count back in ones using a number line.  This can progress all the way to counting back using two 2 digit numbers. 	**13 – 4 = 9** Put 13 in your head, count back 4. What number are you at?

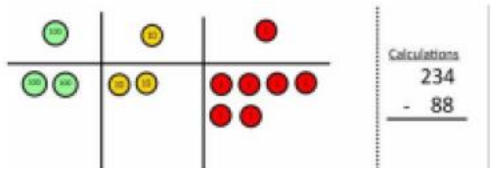
Find the difference	Compare amounts and objects to find the difference.   Use cubes to build towers or make bars to find the difference  Use basic bar models with items to find the difference	Count on using a number line to find the difference.  Draw bars to find the difference between 2 numbers. 	Hannah has 23 sweets, her sister has 15 sweets. Find the difference between the number of sweets. Ben has 12 marbles and his brother has 5. How many more marbles does Ben have than his brother?
Part-whole model	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? 10 – 6 =	Use a pictorial representation of objects to show the part whole model. 	Move to using numbers within the part whole model. 

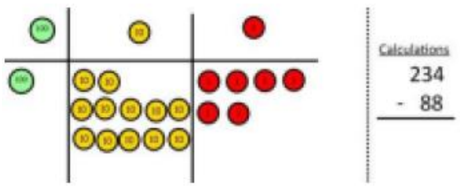
			
Make 10	**14 – 5 = 9** Make 14 on the tens frame. We will partition the 5. Take away the 4 first to make 10 and then take away 1 more so you have taken away 5. 	**13 – 7 = 6** Use a number line. Start at 13. Partition the 7 into a 3 and a 4 so can take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. 	**16 – 8 = 8** Partition the 8 (to 6 and 2). 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 the Dienes to make the bigger number then take the smaller number away.  Show how you partition numbers to subtract. Again make the larger number first. 	Draw the Dienes or place value counters alongside the written calculation to support understanding.  	Intermediate step of partitioning.  This will lead to a clear written column subtraction. T O 4 7 – 2 4 2 3
Column method	Use Dienes to start with before moving onto place value counters. Start with one regrouping before moving onto	Use Dienes or place value counters and cross off.	Children can start their formal written method by partioning

<table>
<tr>
<td>with regrouping</td>
<td>subtractions with 2 regroupings then onto 3.

Make the larger number with the place value counters


Start with the ones, can I take 8 from 4? I need to regroup one of my tens for 10 ones.


Now subtract the ones.


Now look at the tens, can I take away 8 tens? I need to regroup 1 hundred for 10 tens.

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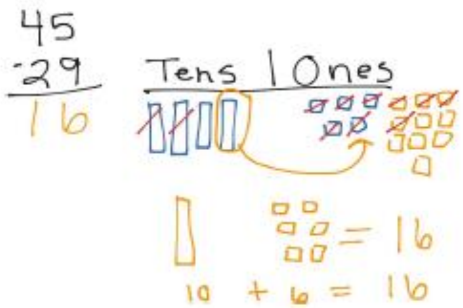
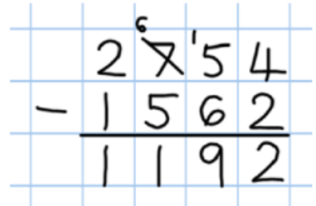
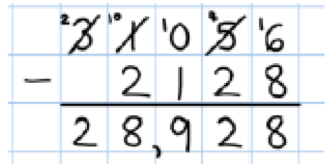
<td>
</td>
<td>the number into clear place value columns:

234 – 18

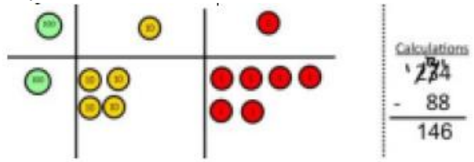
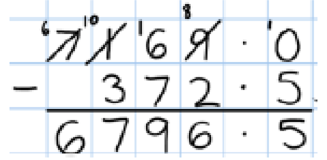
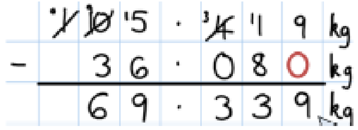
H T O
200 $^{20}\cancel{30}$ $^{1}4$
– 10 8
200 10 6

Then progress to formal written methods:
H T O
2 $^{2}\cancel{3}$ $^{1}4$
– 1 8
2 1 6

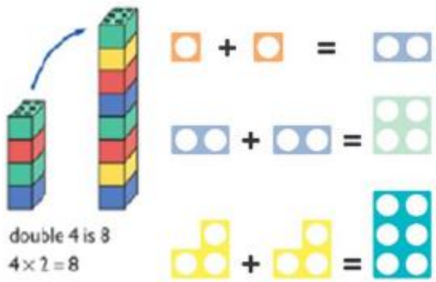
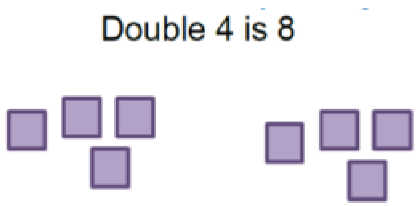
This will lead to subtracting any number:


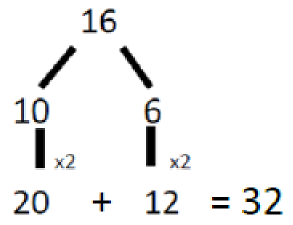
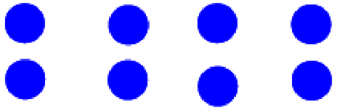
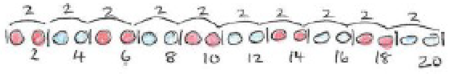
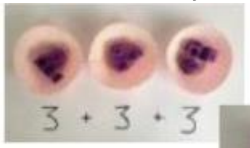
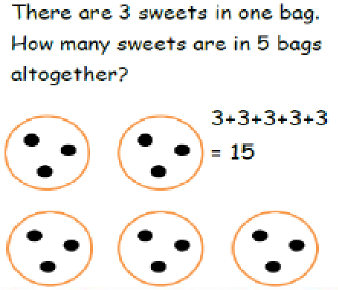
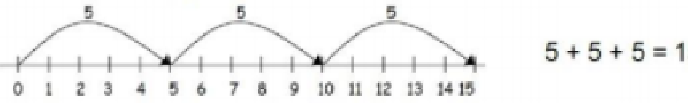


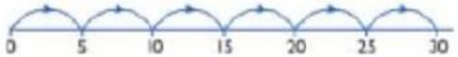
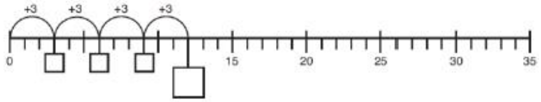
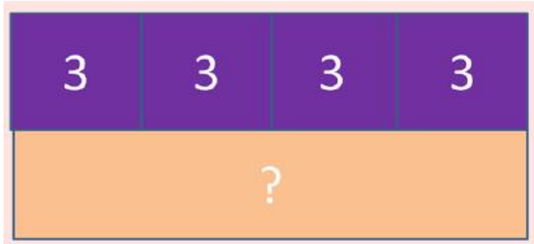
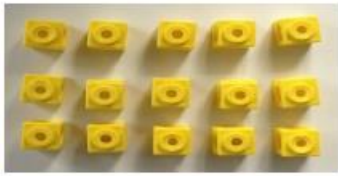
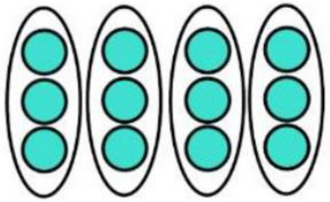
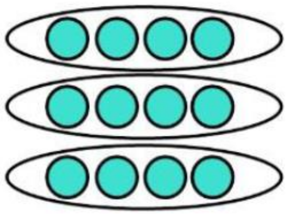
Use zeros for place holders:</td>
</tr>
</table>

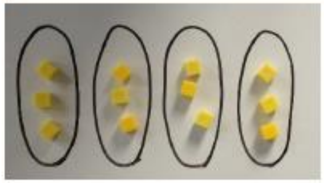
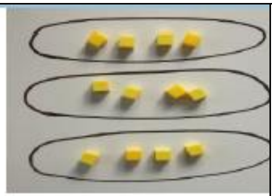
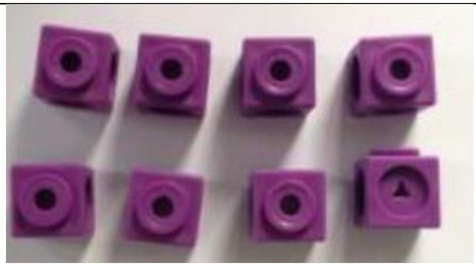
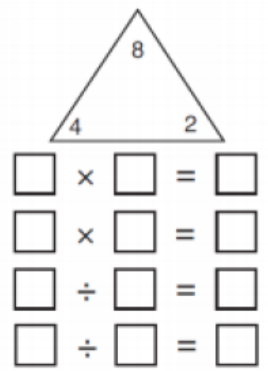
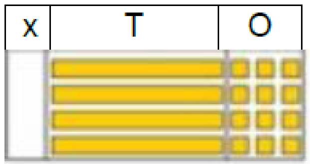
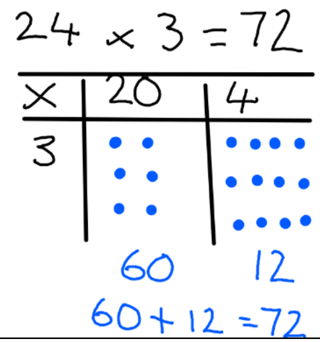
	Now I can take away 8 tens and complete my subtraction.  Show how the concrete method links to the written abstract method alongside your workings. Cross out the numbers when regrouping and show where and how we write the new amount.		 

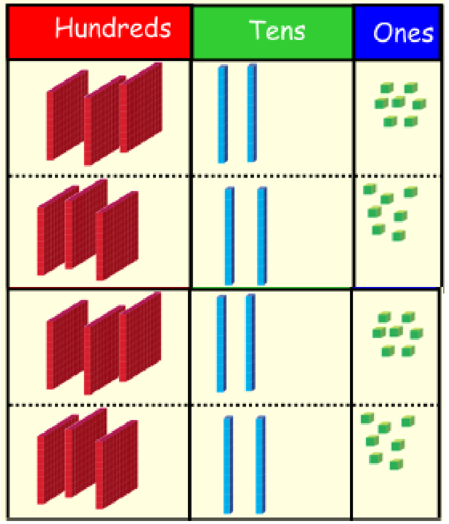
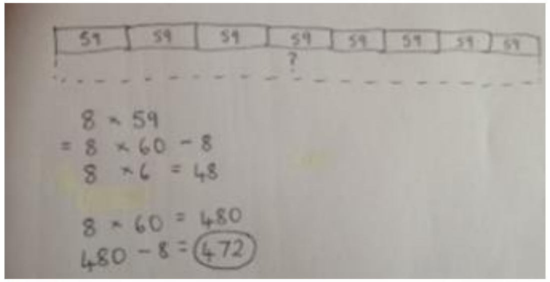
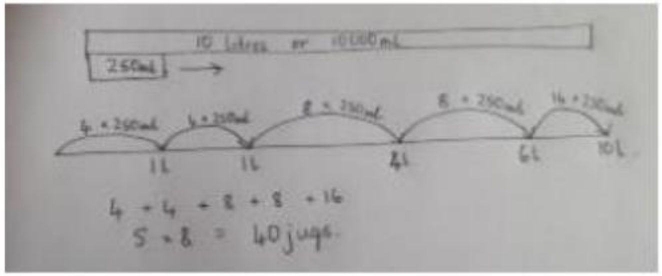
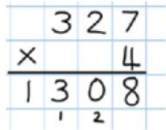
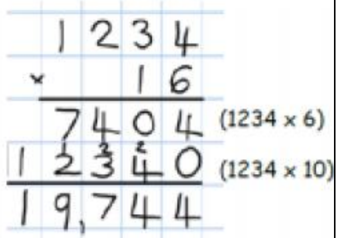
Multiplication

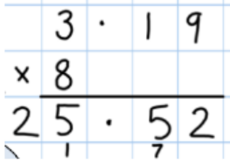
Objectives and strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number. Use Numicon, Dienes, bricks etc 	Draw pictures to show how to double a number. 	Partition a number and then double each part before recombining it back together.

			
Counting in multiples	Skip count in multiples supported by concrete objects in equal groups.  	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 , 30 …
Repeated addition	Use different objects to add equal groups   	Use pictorial including number lines to solve problem  	Write addition sentences to describe objects and pictures. 
Counting in multiples from 0 (repeated addition)	Count the groups as children skip count. Use bar models.	Number lines, counting sticks and bar models should be used to show representation of counting in multiples.	Count out loud in multiples of a number. Write sequences with multiples of numbers: 0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15

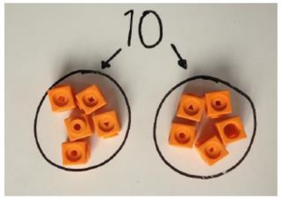
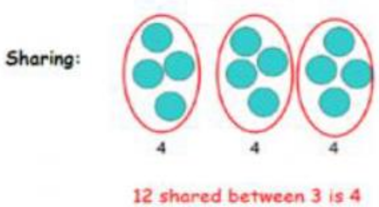
	 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40  	   	0, 5, 10, 15, 20, 25, 30 Write multiplication number sentences: 4 X 3 = 12
Arrays showing commutative multiplication	Create arrays using counters and cubes and Numicon.    Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.	Use representations of arrays to show different calculations and explore commutativity. 4 X 3 = 12 and 3 X 4 = 12   Link to area of rectangles.	12 = 4 X 3 12 = 3 X 4 Use an array to write multiplication number sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

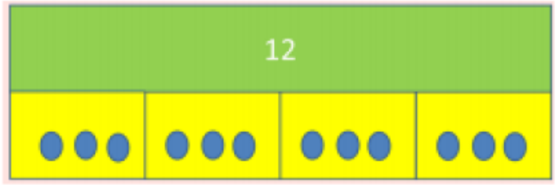
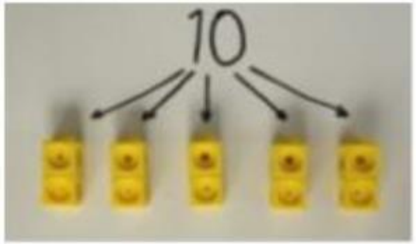
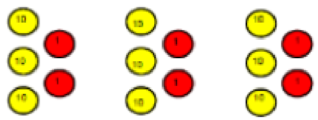
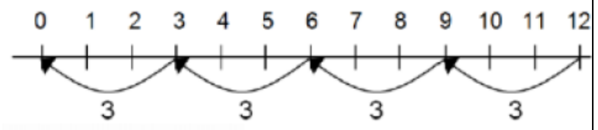
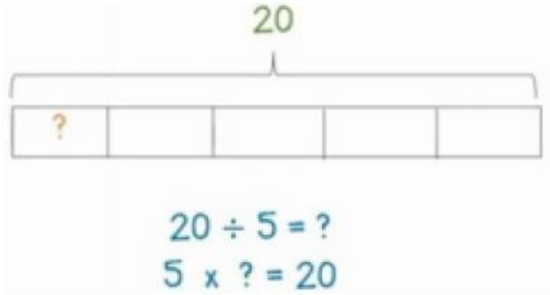
	 		
Use the inverse	 Use cubes/counters to support the visual representation.		Show all 4 related fact family sentences. 4 X 2 = 8 2 X 4 = 8 8 ÷ 2 = 4 8 ÷ 4 = 2
Partitionin g/ Grid method	Use Dienes to move towards a more compact method. 4 x 13 = 	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking: 	Children use partitioning and use the multiplication facts that they know to help them by making numbers 10 x smaller to multiply then make them 10 x bigger in the answer. 24 x 3 = 20 x 3 = 60 3 x 4 = 12 160 + 12 = 72
Column multiplication	Children continue to be supported by Dienes equipment. This is initially done where there is no regrouping e.g. 321 x 2 =	Bar models and number lines can support learners when solving problems with multiplication alongside the formal written methods.	Start with long multiplication, reminding children about lining up their numbers clearly in columns.

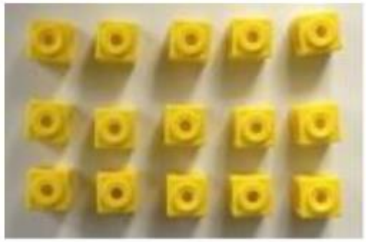
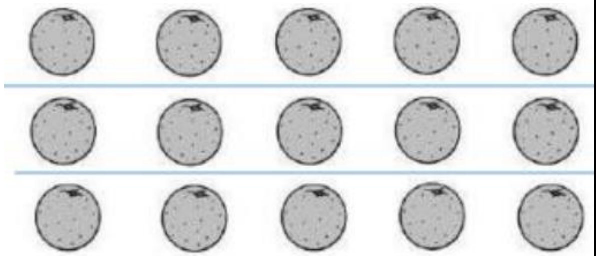
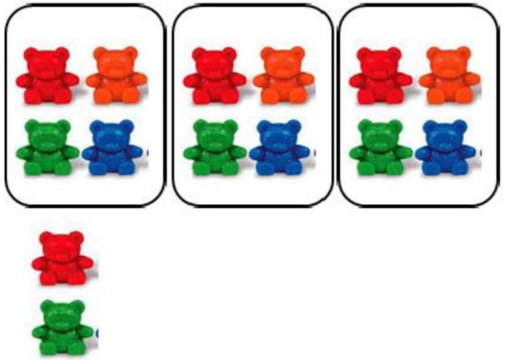
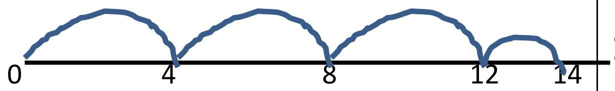
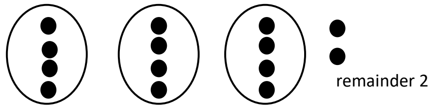
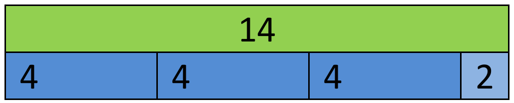
	Progressing to re-grouping, always multiply the ones column first. The corresponding long multiplication is modelled alongside. ▾ ...continued **327 X 4**  It is important at this stage that they always multiply the ones first.	▾ ...continued  	Initially, Children to write out what they are solving next to their answer to help them understand the process. 327 x 4 28 (7 X 4) 80 (20 X 4) 1200 (300 X 4) 1308  This may lead to a compact method.  Multiplying decimals up to 2 decimal places by a single digit. Remind children that the single digit belongs to the ones column. Line up the decimal points in the question and the answer.

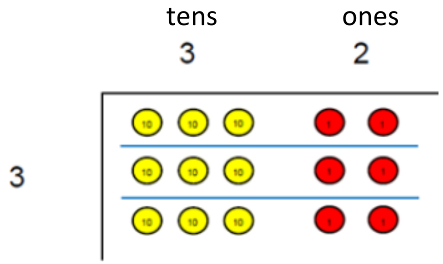
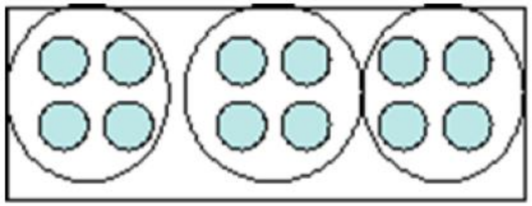
			

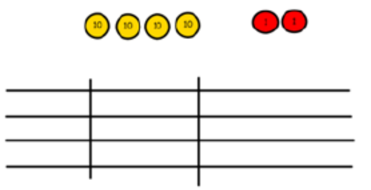
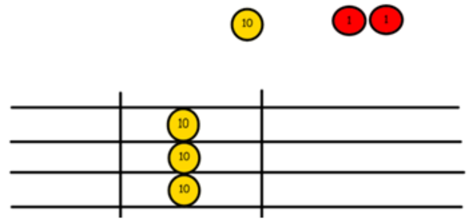
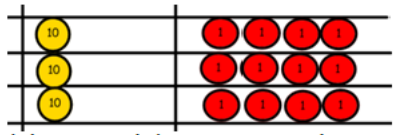
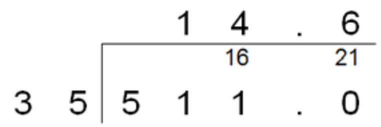
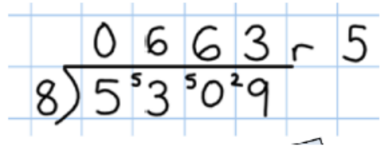
Division

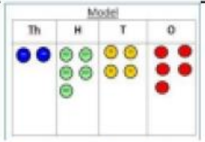
Objectives and strategies	Concrete	Pictorial	Abstract
Division as sharing	*I have 10 cubes, can you share them equally into 2 groups?*   	Children use pictures or shapes to share quantities.  8 ÷ 2 = 4  Children use bar modelling to show and support understanding.	8 flowers shared between 2 people is 4 12 shared between 3 is 4 then… 12 ÷ 3 = 4

		 12 ÷ 4 = 3	
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.  Use the Base Ten equipment or place value counters: 24 divided into groups of 6 = 4 96 ÷ 3 = 32 	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.  	**28 ÷ 7 = 4** Divide 28 into 7 groups. How many are in each group?

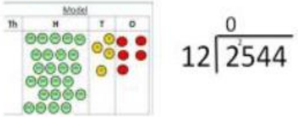
<table>
<tr>
<td>Division as arrays (see multiplication above)</td>
<td>Link division to multiplication by creating an array and thinking about the number sentences that can be created.

e.g.
15 ÷ 3 = 5
15 ÷ 5 = 3
5 X 3 = 15
3 X 5 = 15</td>
<td>Draw an array and use lines to split the array into groups to make multiplication and division sentences.
</td>
<td>Find the inverse of multiplictaion and division sentences by creating four linking family number sentences.
e.g.
15 ÷ 3 = 5
15 ÷ 5 = 3
5 X 3 = 15
3 X 5 = 15</td>
</tr>
<tr>
<td>Division with a remainder</td>
<td>14 ÷ 3 =
Divide objects between groups and see how much is left.
</td>
<td>Jump forward in equal jumps on a number line, then see how many more you need to jump to find a remainder:

Draw dots and group them to divide an amount to clearly show a remainder:

Use bar models to show remainders:
</td>
<td>Complete written division number sentences and show the remainder using ‘r’.
14 ÷ 3 = 4 r 2</td>
</tr>
</table>

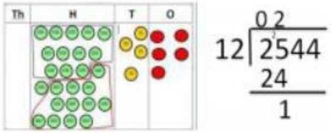
Short division	**96 ÷ 3**  ▾ ...continued	Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.  Encourage them to move towards counting in multiples to divide more efficiently. ▾ ...continued	Begin with divisions that divide equally with no remainder. $\begin{array}{r\|lll} & 2 & 1 & 8 \\ \hline 4 & 8 & 7 & {}^{3}2 \end{array}$ Move onto divisions with a remainder. $\begin{array}{r\|lll} & & 8 & 6 \text{ r } 2 \\ \hline 5 & 4 & {}^{3}3 & 2 \end{array}$ ▾ ...continued

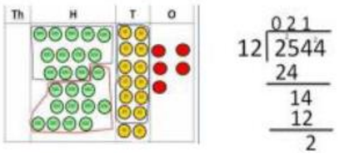
	Use place value counters to divide using the bus stop method alongside  Calculations 42 ÷ 3 42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.  We exchange this ten for ten ones and then share the ones equally among the groups.  We look how much in 1 group so the answer is 14.		Finally move into decimal places to divide the total accurately.  

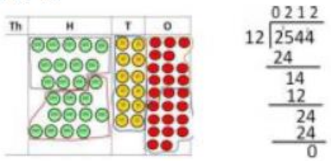
<table>
<tr>
<td>Long division</td>
<td>


2544 ÷ 12
How many groups of 12 thousands do we have?
None

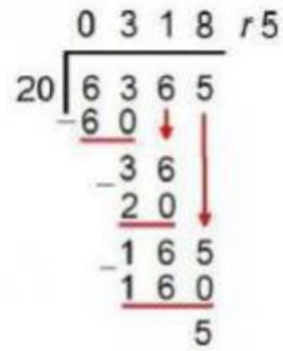
Regroup 2 thousands for 20 hundreds.


How many groups of 12 are in 25 hundreds? 2 groups. Circle them.
We have grouped 24 hundreds so can take them off and we are left with one.


Regroup the 1 hundred for 10 tens so now we have 14 tens. How many groups of 12 are there in 14? 1 remainder 2.


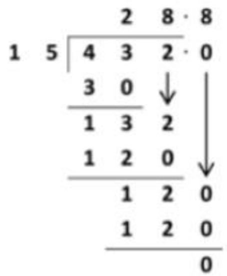
Regroup the 2 tens for 20 ones so now we have 24 ones. How may groups of 12 are in 24? 2


</td>
<td>Instead of using physical counters, children can draw counters and circle the groups on a whiteboard or in books.

Use this method to explain what is happening. As soon as they have understood what, move on to the abstract method as this can be a time-consuming process.</td>
<td>


Express remainders as fractions

Express remainders as decimals

432 ÷ 15 becomes


Answer: 28·8
</td>
</tr>
</table>