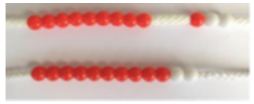
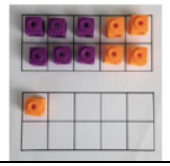
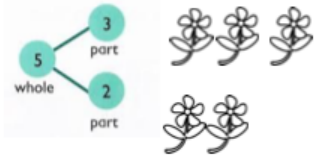
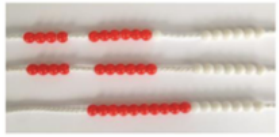
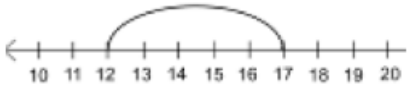
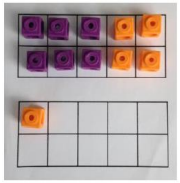
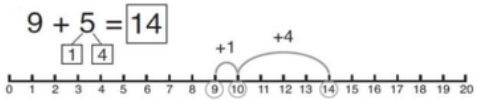
Henbury View First School Calculation Policy

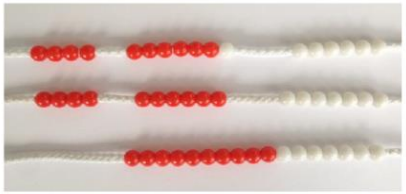
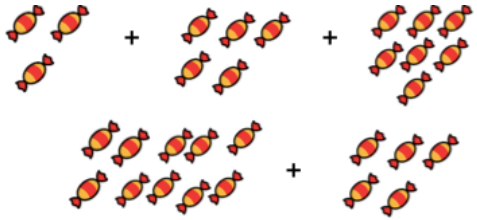
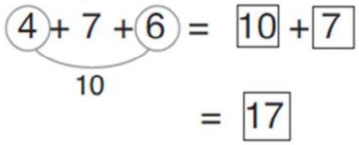
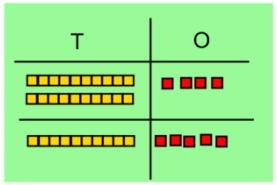
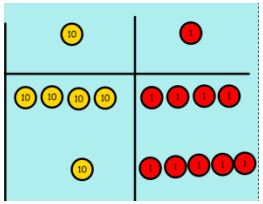
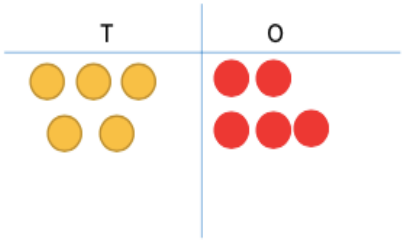
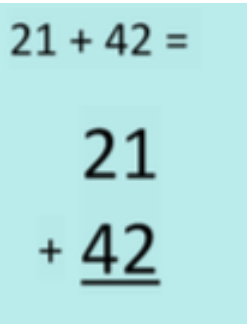
This policy shows the progression children need to move through to become efficient mathematicians. It is not split into year groups or key stages; this policy shows the methods used to develop the required skills to ultimately work abstractly with number. It is important that this guidance is used alongside Year Group Expectations to ensure correct content is taught. Do not move into higher year group expectations but if children are working below expected you can use the principles of previous years to help them gain a greater understanding, using concrete resources and taking the concept back a step.

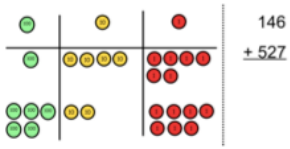
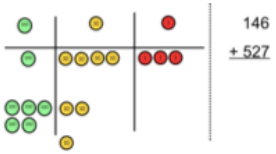
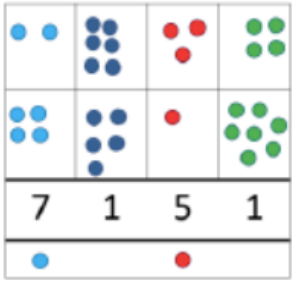
Children should move from concrete to pictorial to abstract. In KS2 if children are already competent with abstract (you are sure they fully understand and haven't just learnt a process) there is no need to make them go back to concrete, however it is important that they can use the concrete as these will often be needed in more complex problem-solving activities. All examples of calculations should be moved onto children finding missing numbers within the calculation.

ANY NEW CONCEPT SHOULD ALWAYS BE INTRODUCED WITH CONCRETE RESOURCES.

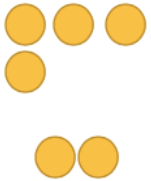
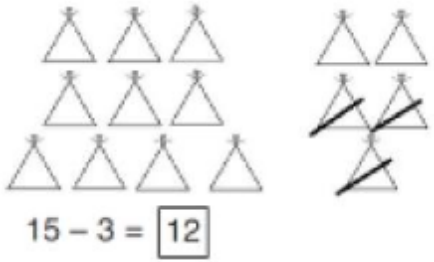
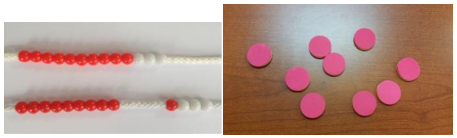
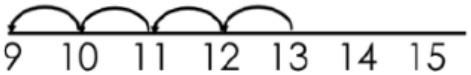
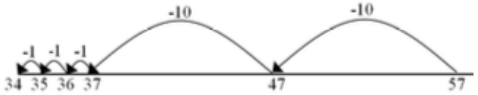
Addition

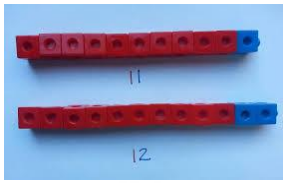
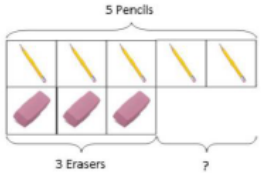
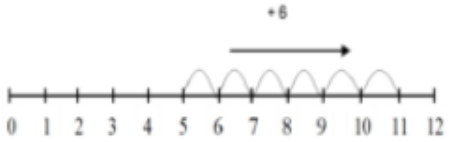
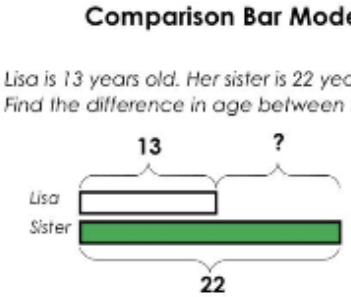
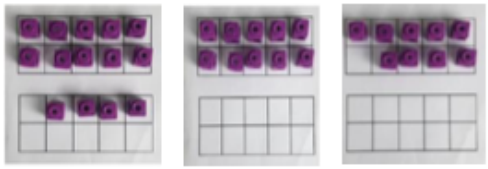
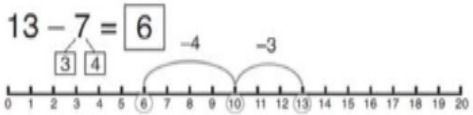
National Curriculum Objective and Strategies	Concrete	Pictorial	Abstract
Combining 2 parts to make a whole	 Use cubes to add two numbers together as a group or in a bar 	Use pictures to add two numbers together as a group or in a bar 	Use the part-part whole diagram as shown above to move into the abstract 4 + 3 = 7 10= 6 + 4 
Counting on using number lines- starting at the bigger number	Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer 	12 + 5 = 17 Start at the larger number on the number line and count on in ones or in one jump to find the answer. 	Place the larger number in your head and count on the smaller number to find your answer
Regrouping to make 10	6 + 5 = 11  Start with the bigger number and use the smaller number to make 10	Use pictures or a number line. Regroup or partition the smaller number to make 10 	7 + 4= 11 If I am at seven, how many more do I need to make 10. How many more do I add on now?

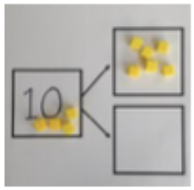
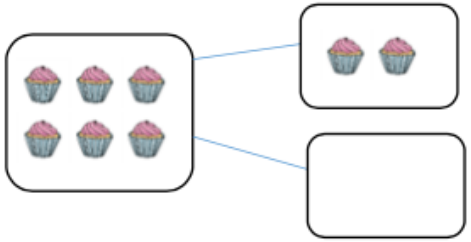
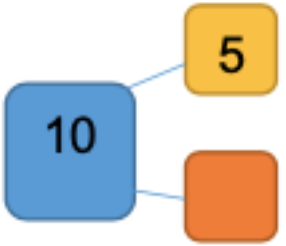
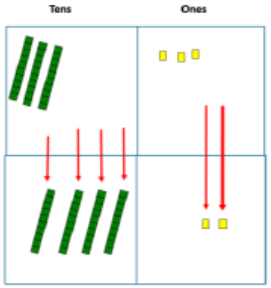
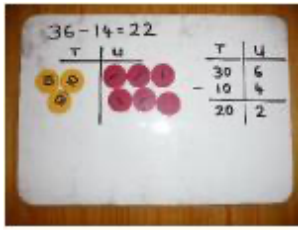
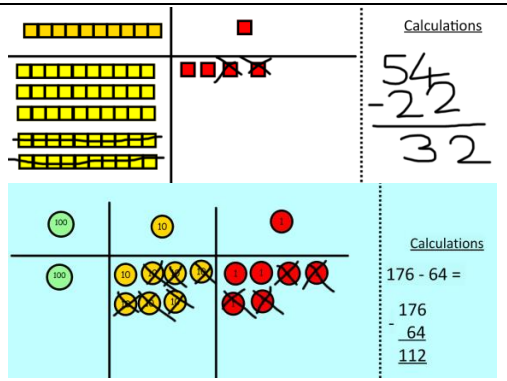
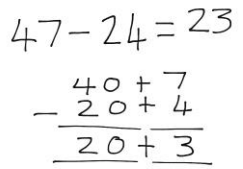
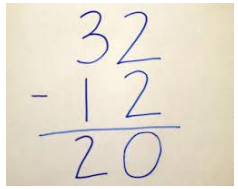
Adding 3 single digit numbers	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7. Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit. 	Add together three groups of objects. Draw a picture to recombine the groups to make 10. 	 Combine the two numbers that make 10 and then add on the remainder.
Column method (no regrouping)	24 + 15= Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.  44+15= 	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 	
Column method (with regrouping)	Make both numbers on a place value grid.	Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.	Start by partitioning the numbers before moving on to clearly show the exchange below the addition.

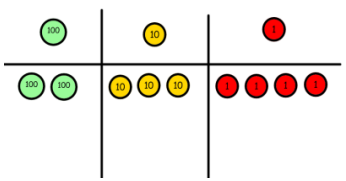
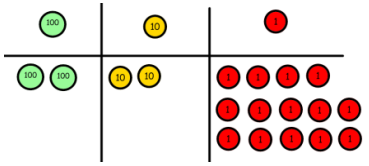
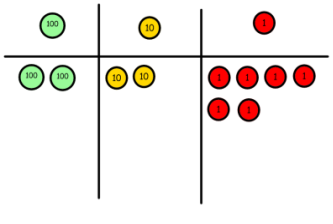
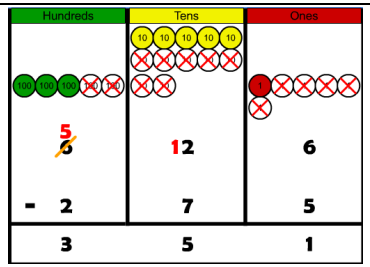
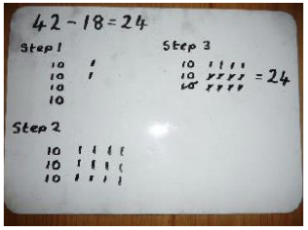
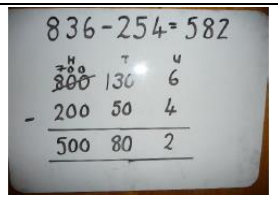
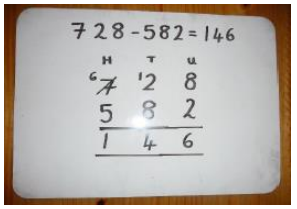
	 Add up the units and exchange 10 ones for one 10.  Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added. This can also be done with Base 10 to help children clearly see those 10 ones equal 1 ten and 10 tens equal 100. As children move on to decimals, money and decimal place value counters can be used to support learning.		$\begin{array}{rcrl} 20 & + & 5 & \\ \underline{40} & + & \underline{8} & \\ 60 & + & 13 & = 73 \end{array}$ As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here. $\begin{array}{r} 536 \\ +\ 85 \\ \hline 621 \\ \hline 1\ 1 \end{array}$ $\begin{array}{r} 72.8 \\ +\ 54.6 \\ \hline 127.4 \\ \hline 1\ 1 \end{array}$ $\begin{array}{rrrrrrr} & £ & 2 & 3 & . & 5 & 9 \\ + & £ & & 7 & . & 5 & 5 \\ \hline & £ & 3 & 1 & . & 1 & 4 \\ \hline & & 1 & 1 & & 1 & \end{array}$

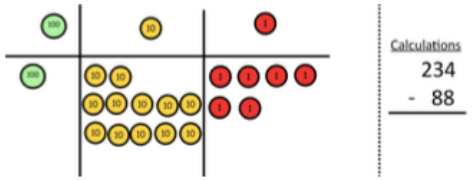
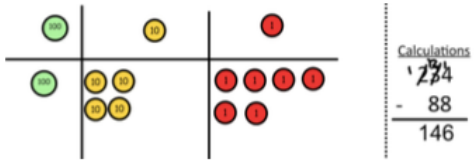
Subtraction

National Curriculum Objective and Strategies	Concrete	Pictorial	Abstract
Taking away ones	Use physical objects, counters, cubes etc to show how objects can be taken away. 6–2=4 	Cross out drawn objects to show what has been taken away  	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 Use counters and move them away from the group as you take them away counting backwards as you go. 	Count back on a number line or number track  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.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.
Find the difference	Compare amounts and objects to find	Count on to find the difference.	Hannah has 23 sandwiches; Helen has 15 sandwiches. Find the difference

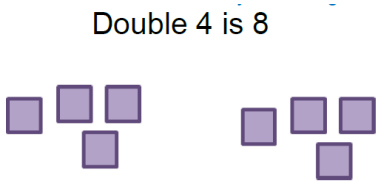
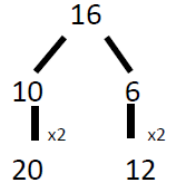
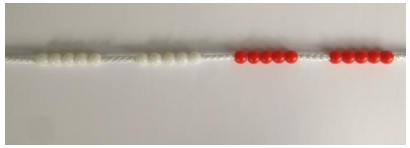
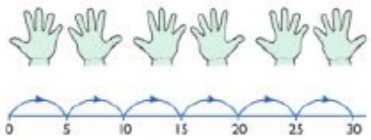
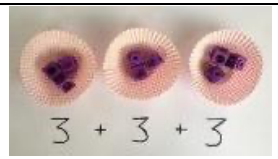
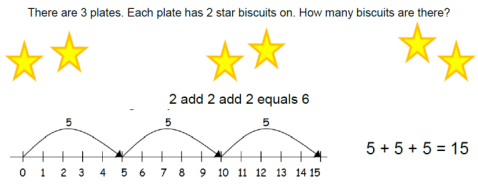
	the difference. Use cubes to build towers or make bars to find the difference Use basic bar models with items to find the difference   	 Draw bars to find the difference between 2 numbers.  	between the number of sandwiches.
Making 10	Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9. 	Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.  	16 – 8= How many do we take off to reach the next 10? How many do we have left to take off?
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	Use a pictorial representation of objects to show the part whole model.	Move to using numbers within the part whole model.

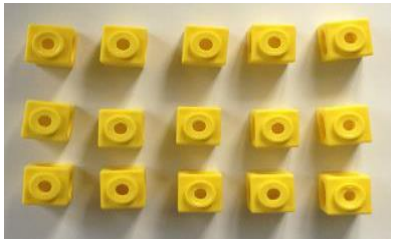
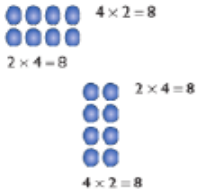
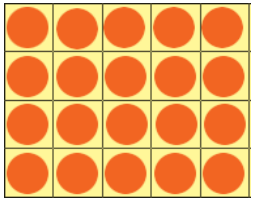
	parts. What is the other part? 10 – 6 =  		
Column method (no regrouping)	se Base 10 to make the bigger number then take the smaller number away.  Show how you partition numbers to subtract. Again make the larger number first.  	 Draw the Base 10 or place value counters alongside the written calculation to help to show working.	 This will lead to a clear written column subtraction. 

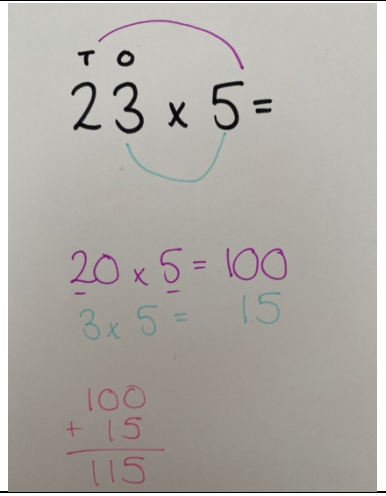
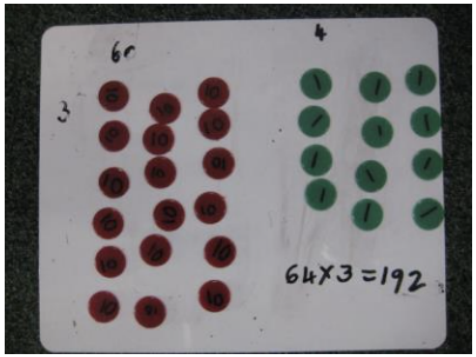
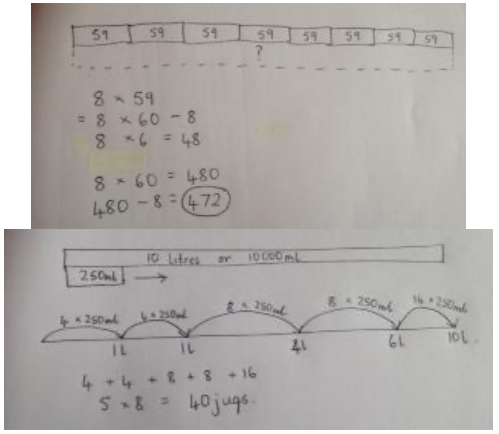
Column method (with regrouping)	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. Make the larger number with the place value counters.  Calculations 234 - 88 Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.  Calculations 234 - 88 Now I can subtract my ones.  Calculations 234 - 88 Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.	 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. 	 Children can start their formal written method by partitioning the number into clear place value columns.  Moving forward the children use a more compact method. This will lead to an understanding of subtracting any number including decimals.

	 Now I can take away eight tens and complete my subtraction  Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.		

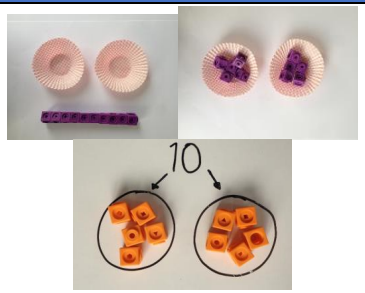
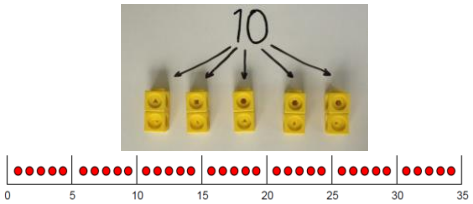
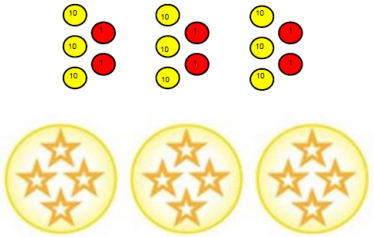
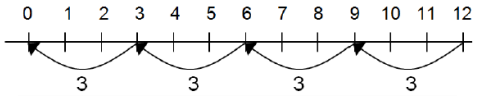
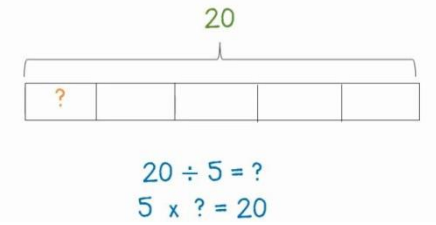
Multiplication

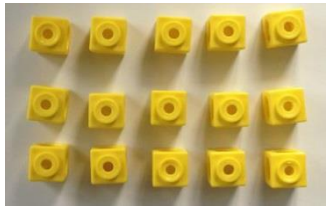
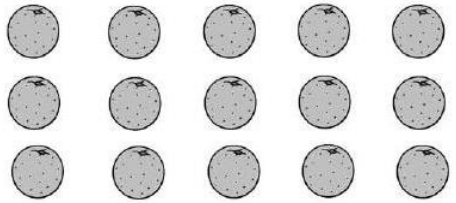
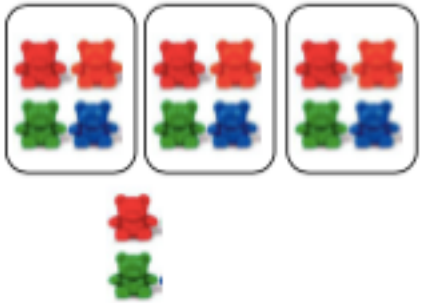
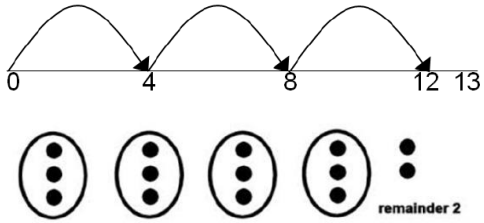
National Curriculum Objective and Strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  	Draw pictures to show how to double a number.  	 Partition a number and then double each part before recombining it back together.
Counting in multiples	  Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in counting in multiples. Counting stick used during times tables teaching  	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	 	 	Write addition sentences to describe objects and pictures. 

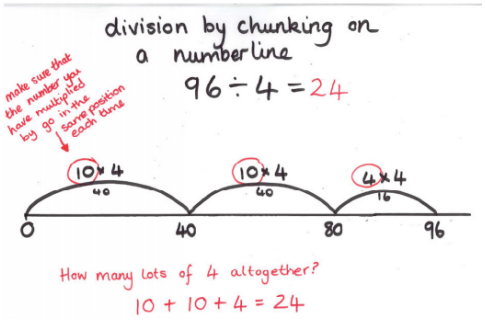
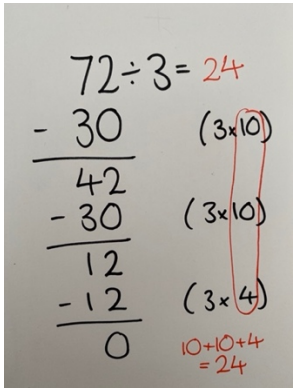
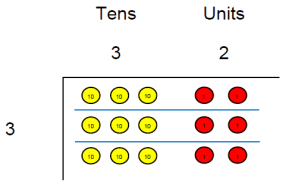
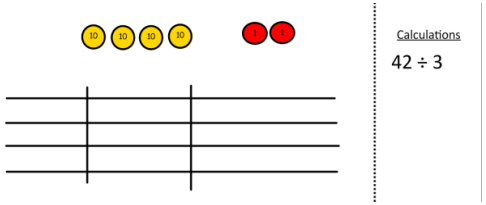
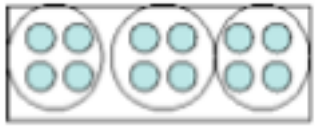
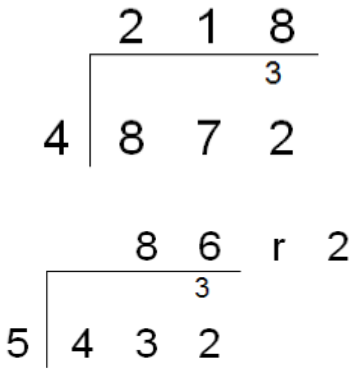
	  Use different objects to add equal groups		
Arrays (to illustrate commutativity)	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find commutative multiplication sentences.  Link arrays to area of rectangles (area model) 	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

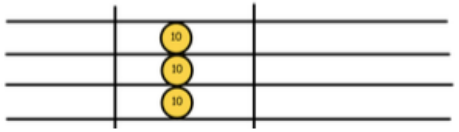
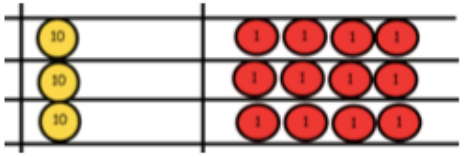
Over and Under method	Use counters/objects to create groups of the number that is being multiplied 11x4= 	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.	
Column method	Children can continue to be supported by place value counters at the stage of multiplication.  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods. 	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer. 34 × 5 20 + 150 170 This moves to the more compact method. 4 8 7 x 9 4 3 9 3 7 8

Division

National Curriculum Objective and Strategies	Concrete	Pictorial	Abstract
Sharing objects into groups	 I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities. 8÷2 = 4 	Share 9 buns between three people. 9 ÷ 3= 3
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. 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?

Division within arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. E.g. 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7
Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over 	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 and clearly show a remainder. 	Complete written divisions and show the remainder using r. 

Chunking	Use place value counters/dienes to represent the number being divided and partition into groups	Use a number line to action repeated subtraction 	
Short Division (bus stop)	 Use place value counters to divide using the bus stop method alongside  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.	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.	Begin with divisions that divide equally with no remainder. Move onto divisions with a remainder. 

	  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.		