West Park CE Primary School

PROGRESSION THROUGH CALCULATION GUIDANCE

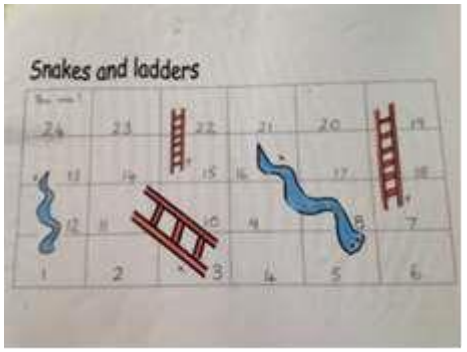
This policy has been developed from the White Rose Calculation Policy and Surrey Calculation policy on our INSET Day October 2016

CALCULATION GUIDANCE: Number Recognition

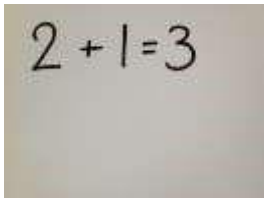
Year Group	Objective	Concrete	Pictorial	Abstract
RECEPTION	Nominal Knowing the name Numbers 40-60 Selects the correct numeral to represent 1-5 Then 1-10 objects	Spotting numbers in the environment   	Number flash cards Number tiles Magnetic Numbers Number Fans     	Number formation rhymes  Knowing a number 4 bus isn't the 4th bus

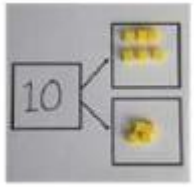
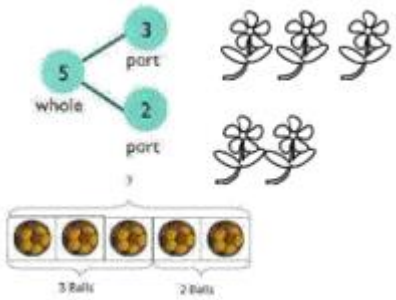
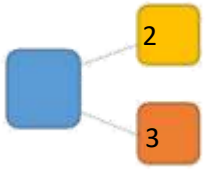
CALCULATION GUIDANCE: Counting

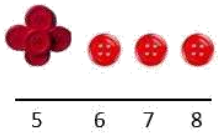
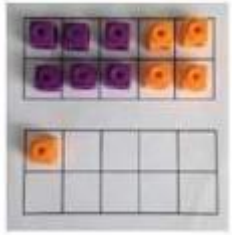
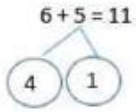
Year Group	Objective	Concrete	Pictorial	Abstract
RECEPTION	Counting Cardinal Numbers Children count reliably with numbers from 1 - 20	Counting cubes, bears, fingers, pegs.  1:1 touching objects as you say the number. Know that the last number is the biggest e.g. 1 – 2 – 3. When counting out from a larger group organise objects in a linear way. 	Matching dots to a given quantity e.g. dominoes, pegs.   	Recognising by sight, not always having to count. Recognising patterns on dominoes or dice.  

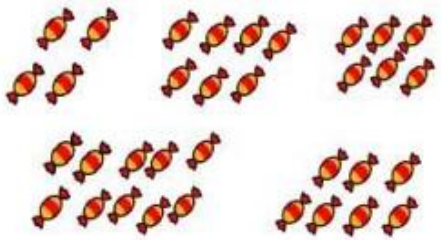
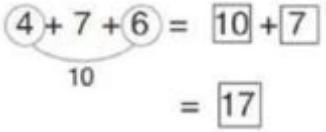
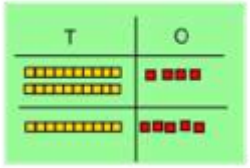
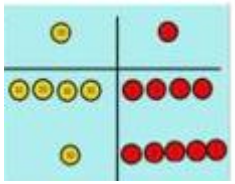
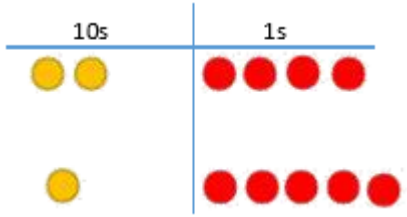
	Place numbers in order	Number tiles Number line  Number matching activities   Using fingers	Numicon 	Saying the numbers in order  Number songs Games – hide and seek – saying numbers

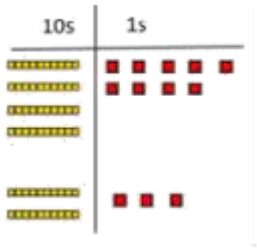
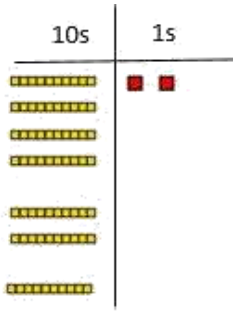
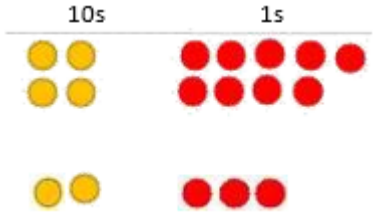
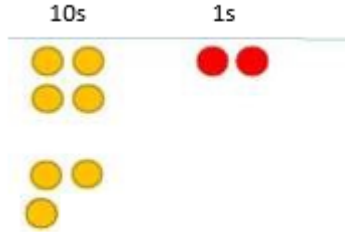
CALCULATION GUIDANCE: Addition

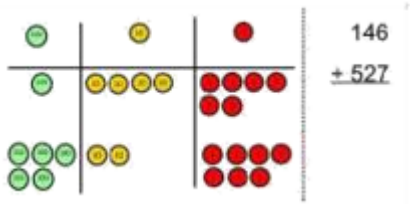
Year Group	Objective	Concrete	Pictorial	Abstract
RECEPTION	One more than from a group of up to 5 objects then 10. Building to a given number to 20	Sorting objects into 2 groups then combining 2 groups of objects e.g. cubes, bears, fingers, pegs. (Total, all, together)	IWB resources tesiboard Addition stories 	Using symbols, numerals and their names 
	Using objects to add two single digit numbers	Sorting objects into 2 groups then combining 2 groups of objects e.g. cubes, bears, fingers, pegs. (Total, all, together)	IWB resources tesiboard Addition stories	Using symbols, numerals and their names
	Count on	Number line and counters Board Games	Number line without counters	Put in your head and count on
	Solve Problems	Role Play	Picture Cards	Is it a sensible answer/ Simple estimating

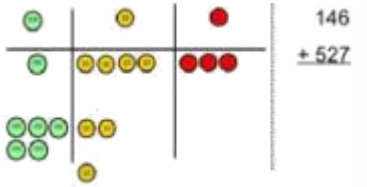
Year 1	Number bonds of 5, 6, 7, 8, 9 and 10	Using cubes to add two numbers together as a group or in a bar   	 Use pictures to add two numbers together as group or in a bar 3 2	2 + 3 = 5 3 + 2 = 5 5 = 3 + 2 5 = 2 + 3  Use part whole diagram as shown to move into the abstract

Year 1	Counting	 Start with a larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer 	Use a number line to count on in ones 	5 + 3 = 8
	Regrouping to make 10	 6 + 5 = 11 Start with the bigger number and use the smaller number to make 10. 	  6 + 4 =10 10 + 1 = 11	6 + 5 = 11

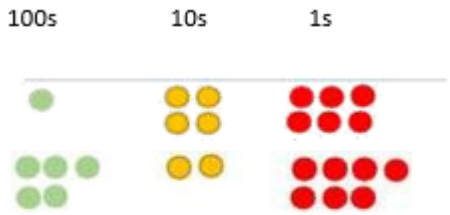
Year 2	Adding 3 single digit numbers	4 + 7 + 6 = 17 Put 4 and 6 together to make 10. Add on 7.  Following on from making 10, make 10 with 2 digits (if possible) then add on the third digit.	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	 Combine the two numbers that make 10 and then add on the remainder
	Column Method without regrouping	Add together the ones first, then add the tens. Use Base 10 blocks first before moving onto place value counters. 24 + 15 =  44 + 15 = 	After physically using the base 10 blocks and place value counters, children can draw the counters to help them solve additions 	24 + 15 = 39 24 + 15 39

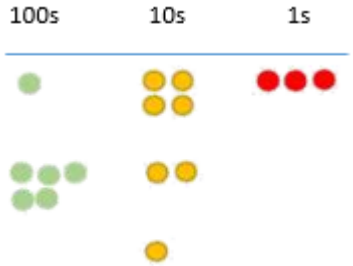
Year 2	Column method with regrouping	Make both numbers on a place value grid.  Add up the ones and exchange 10 ones for 1 ten.  	Using place value counters, children can draw the counters to help them solve additions.   	40 + 9 20 + 3 60 + 12 = 72 49 + 23 72 1

<table>
<tr>
<td>Year 3/4</td>
<td>Column method with regrouping</td>
<td>Make both numbers on a place value grid
 

Add up the ones and exchange 10 ones for 1 ten.
 

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

NB By Year 4 children will progress on to adding 4 digit numbers.</td>
<td> 

Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.

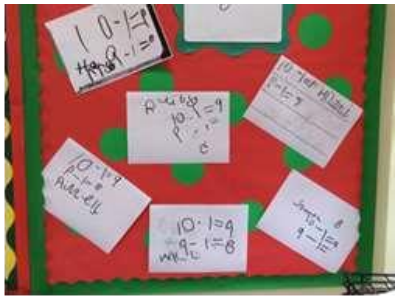
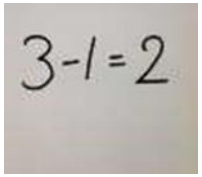
NB Addition of money needs to have £ and p added separately.</td>
<td>100 + 40 + 6
500 + 20 + 7
600 + 70 + 3
10

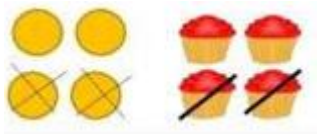
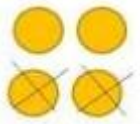
As the children progress, they will move from the expanded to the compact method.

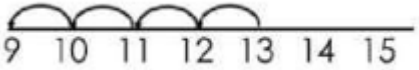
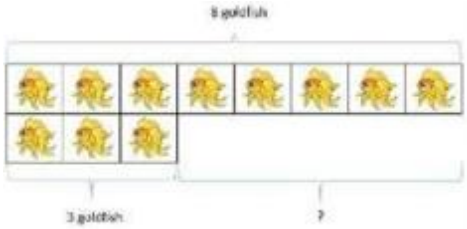
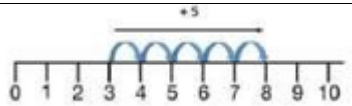
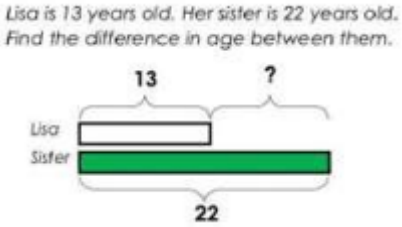
146
+ 527
673
1

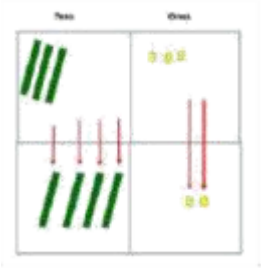
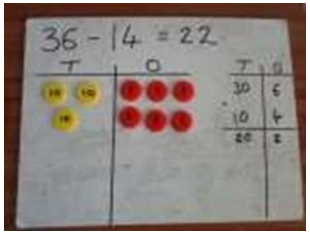
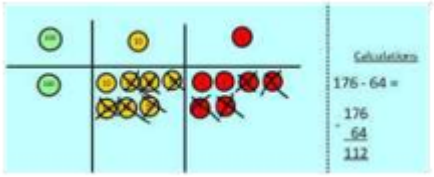
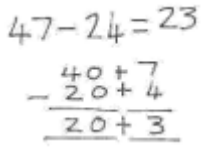
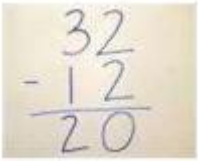
As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.</td>
</tr>
<tr>
<td>Year 5/6</td>
<td>Column method without regrouping</td>
<td colspan="3">Consolidate understanding using numbers with more than 4 digits and extend by adding numbers with up to 3 decimal places.</td>
</tr>
</table>

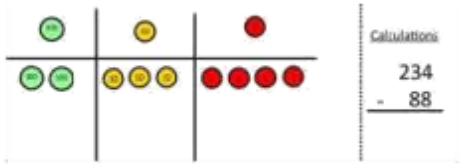
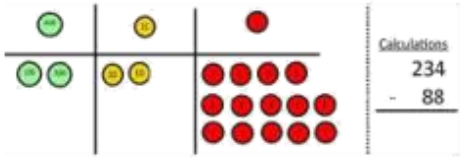
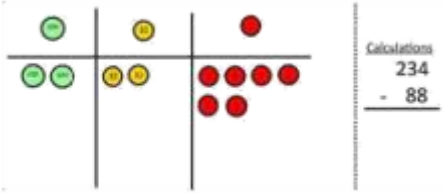
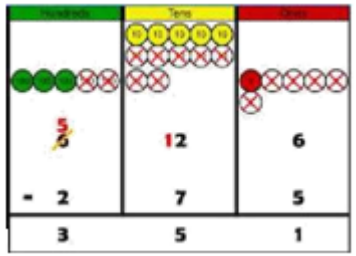
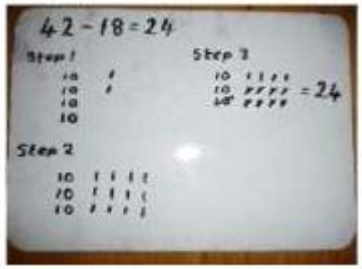
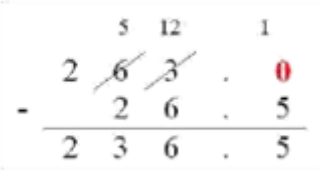
CALCULATION GUIDANCE: Subtraction

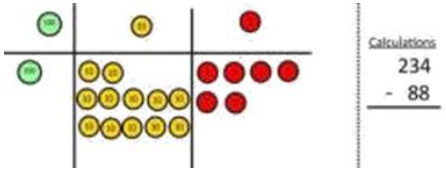
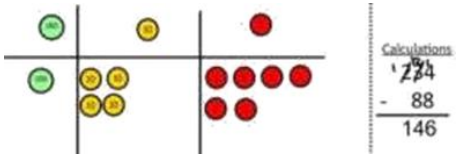
Year Group	Objective	Concrete	Pictorial	Abstract
Reception	'One less than' from a group of up to 5 objects then 10, building to a given number to 20	Practical moving objects from a larger group e.g. eating fruit 	Crossing out pictures.  IWB resources e.g. tesiboard subtraction stories.	Using symbols, numerals and their names. 
	Using objects to subtract 2 single digit numbers (fewer)	Practical moving objects from a larger group e.g. eating fruit	Crossing out pictures.  IWB resources e.g. tesiboard subtraction stories.	Using symbols, numerals and their names. 

Reception	Count back	Number line and counter  Specialist subtraction boards	Number line without counters.	Pu it in your head and count back.
	Solve problems	Role play with objects e.g. Little Red Riding Hood dropping objects from her basket	Picture Cards	Is it a sensible answer? Simple Estimating. Numicon
Year 1	Ones taking away	Use physical objects, counters cubes etc. to show how objects can be taken away.  4 – 2 = 2	Cross out drawn objects to show what has been taken away.  4 – 2 = 2	4 – 2 = 2

Year 1	Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.  13 – 4 = 9	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.	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 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 to find the difference.  Draw bars to find the difference between 2 numbers.	Hannah has 8 goldfish. Helen has 3 goldfish. Find the difference between the number of goldfish the girls have.

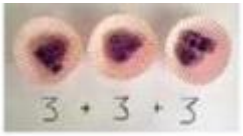
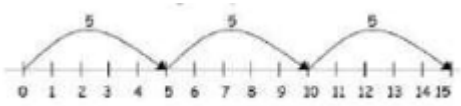
Year 2	Column Method without regrouping	75 – 42 = 33  Use Base 10 to make bigger number then take the smaller number away. Show how you partition numbers to subtract.  Again make the larger number first.	 Draw the Base 10 or place value counters alongside the written calculation to help show working.  	 This will lead to clear written column subtraction.  2 1 ~~3~~2 - 14 18

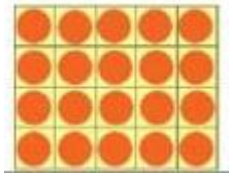
Year 3 onwards	Column method with regrouping	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. Make the larger number with the place value counters  Start with the ones, can I take away 8 from 4 easily? I need to exchange 1 of my tens for 10 ones.  Now I can subtract my ones.  	 Draw the counters onto a place value grid and show qhat 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. 

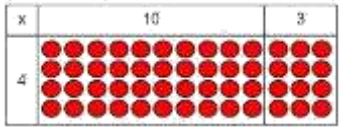
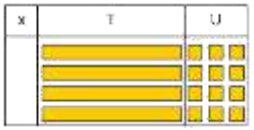
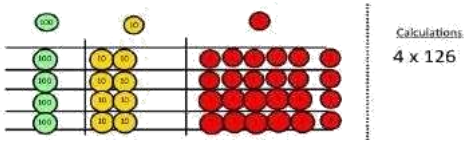
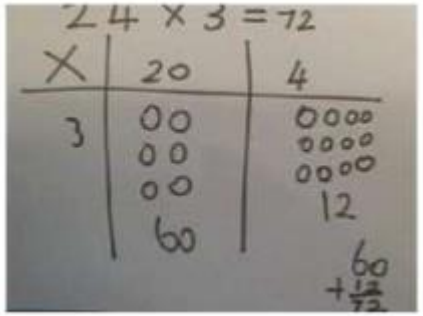
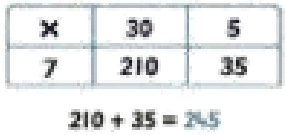
		Now look at the tens, can I take away 8 tens easily? I need to exchange 1 hundred for 10 tens.  Now I can take away 8 tens and complete my subtraction.  Show children how concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.		

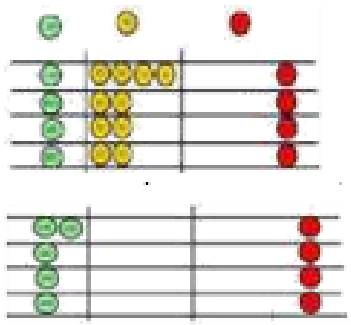
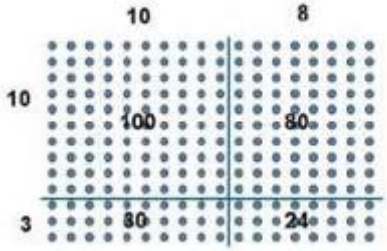
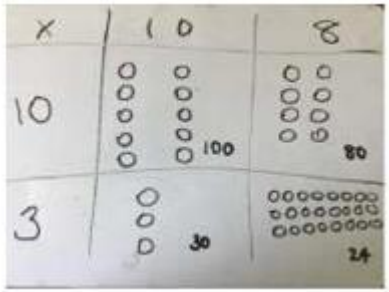
CALCULATION GUIDANCE: Multiplication

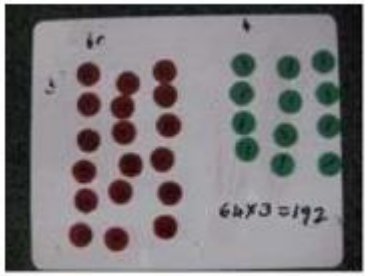
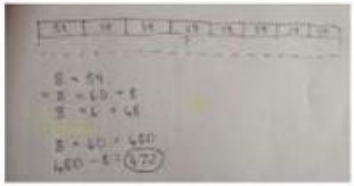
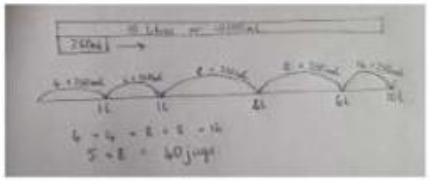
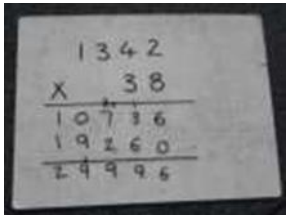
Year Group	Objective	Concrete	Pictorial	Abstract
Reception	Solve problems including doubling	Multilink  Counting bears  Pegs 	Number pictures Fingers Counting in 2s, 5s and 10s with numicon   	Using symbols, numerals and their names 2 + 2 = 4 4 + 4 = 8 Counting in 2s, 5s and 10s Rhymes and stories

Year 1/2	Repeated addition	   Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 + 2 + 2 = 6  5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures.  2 + 2 + 2 = 6

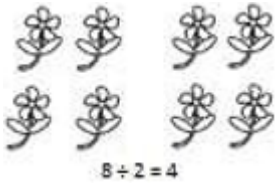
Year 1/2	Arrays – showing commutative multiplication	Create arrays using counters/cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.  4 x 2 = 8 2 x 4 = 8  2 x 4 = 8 4 x 2 = 8 Link arrays to area of rectangles. 	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

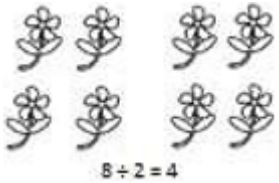
Year 3/4	Grid method	Show the link with arrays to first introduce the grid method.  4 rows of 10 4 rows of 3 Move on to using Base 10 to move towards a more compact method.  4 rows of 13 Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows. Fill each row with 126.  Add up each column, starting with the ones making any exchanges needed.	Children can represent the work they have done with place value counters in a way that they understand. They can draw counters, using colours to show different columns to show their thinking as shown below.  	Start with multiplying by one digit numbers and showing the clear addition alongside the grid.  Move forward, multiply by a 2 digit number showing the different rows within the grid method. 35 X 7 245 3

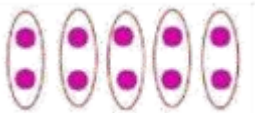
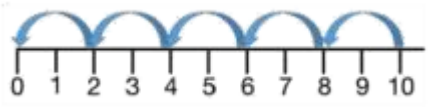
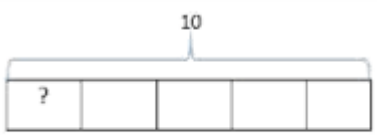
		 4 x 126 = 504		
Year 3/4	Expanded method	Show the link with arrays to first introduce the expanded method. 		Start with long multiplication, reminding the children about lining up their numbers clearly in columns. 18 x 13 24 (3 x 8) 30 (3 x 10)) 80 (10 x 8) 100 (10 x 10) 234

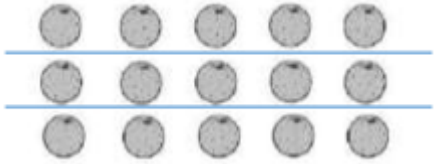
Year 5/6	Compact method	Children can continue to be supported by place value counters at the stage of multiplication.  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens, which they note below.	Bar modelling and number lines can support 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.  This moves to the more compact method. 

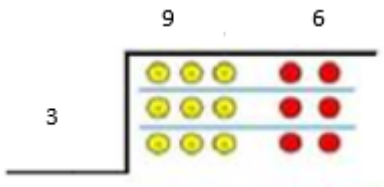
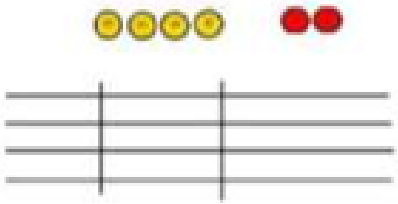
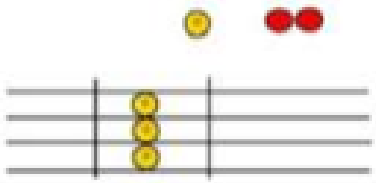
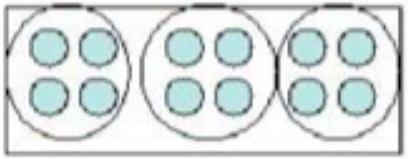
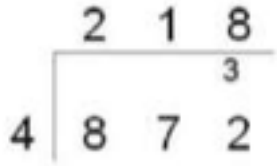
CALCULATION GUIDANCE: Division

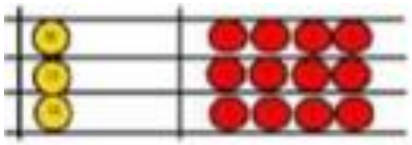
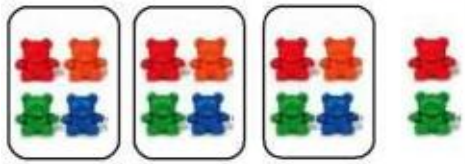
Year Group	Objective	Concrete	Pictorial	Abstract
Reception	Sharing	I have 8 cubes, can you share them equally between two people?  	Children use pictures or shapes to share quantities.  	Share 8 buns between two people. 8 ÷ 2 = 4

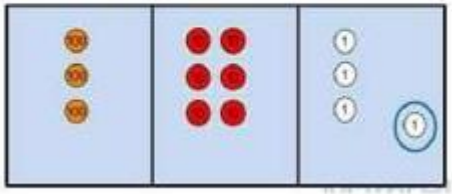
Year 1/2	Sharing	I have 8 cubes, can you share them equally between two people?  	Children use pictures or shapes to share quantities.  	Share 8 buns between two people. 8 ÷ 2 = 4

Year 1/2	Grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.  	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 how many would be within each group.  10 ÷ 5 = ? 5 x ? = 10	10 ÷ 5 = 2 Divide 10 into 5 groups. How many are in each group?

Year 3/4	Division with arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created. E.g. 15 ÷ 3 = 15 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. 3 x 5 = 15 5 x 3 = 15 15 ÷ 5 = 3 15 ÷ 3 = 15

Year 3/4	Short Division	Use place value counters to divide using the short division method alongside. 96 ÷ 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. 	Pupils 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. 

		We exchange this ten for 10 ones and then share the ones equally among groups.  We look at how many are in each group.		
Year 5/6	Division with remainders	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 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.  List table facts to support division e.g. 5, 10, 15, 20, 25

Year 5/6	Short division with remainders	364 ÷ 3 = 121 rem 1 3 | 364 		Move onto division with a remainder. Once children understand remainders, begin to express as a fraction or decimal according to context. 8 6 r 2 3 5 | 4 3 2 1 8 6 1/5 5 | 9 4 3 3 1 1 4 . 6 16 21 3 5 | 5 1 1 . 0
Year 6	Long division			Children will use short division method and multiples to help divide numbers with up to 4 digits by a 2 digit number.