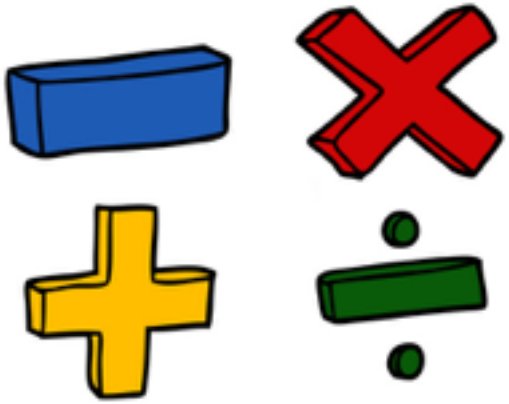
Blackmoor Park Infant School

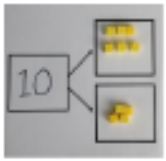
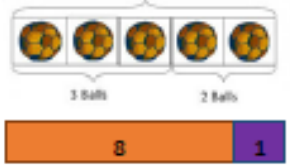
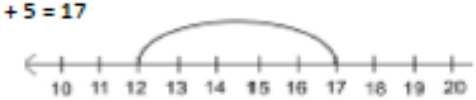
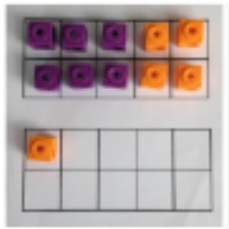
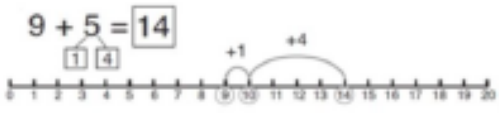
Calculation Policy



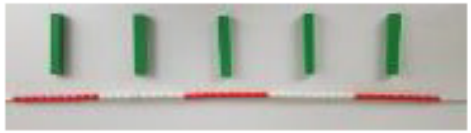
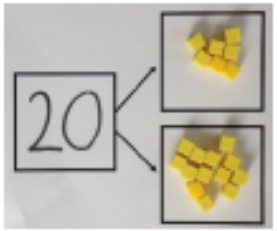
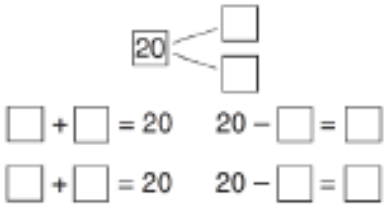
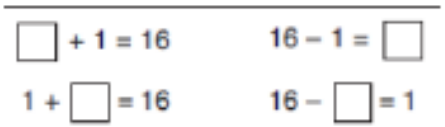
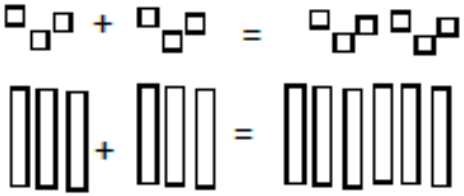
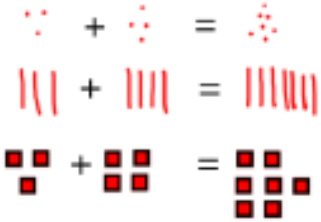
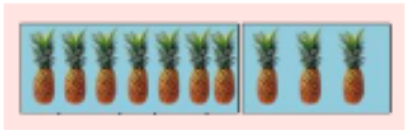
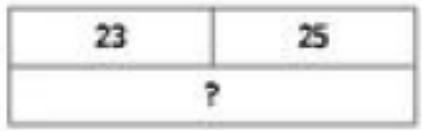
Updated 2019-20

This document has been largely adapted from the White Rose Calculation Policy with further relevant material and vocabulary added.

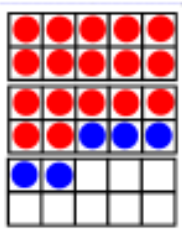
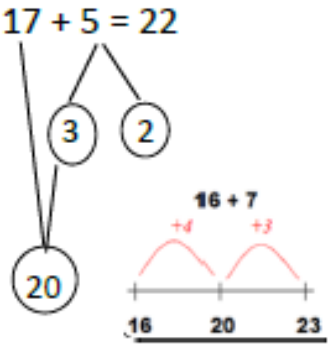
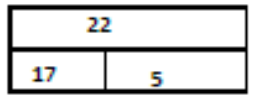
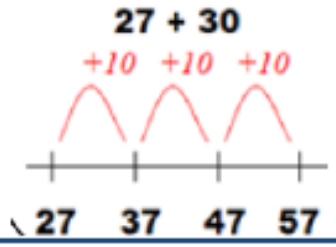
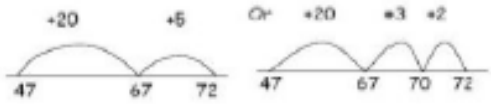
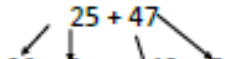
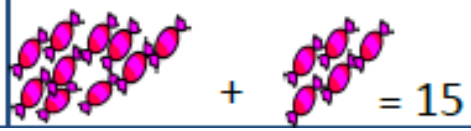
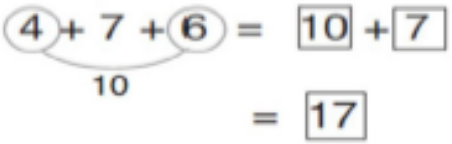
Year 1 Addition +

Objective & Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part- whole model	   Use part 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 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.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.
Regrouping to make 10. *This is an essential skill for column addition later.*	 6 + 5 = 11  Start with the bigger number and use the smaller number to make 10. Use ten frames.	 Use pictures or a number line. Regroup or partition the smaller number using the part part whole model 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?
Represent & use number bonds and related subtraction facts within 20	 2 more than 5.	 	Emphasis should be on the language *'1 more than 5 is equal to 6.'* *'2 more than 5 is 7.'* *'8 is 3 more than 5.'*

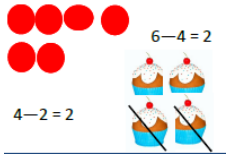
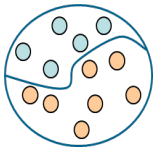
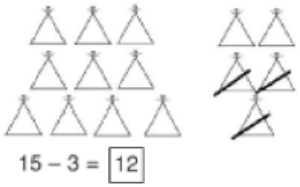
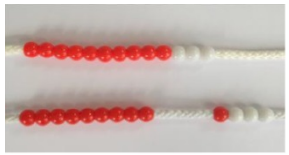
Year 2 Addition +

Objective & Strategy	Concrete	Pictorial	Abstract
Adding multiples of ten	50= 30 = 20  Model using dienes and bead strings	 Use representations for base ten.	20 + 30 = 50 70 = 50 + 20 40 + □ = 60
Use known number facts Part part whole	 Children explore ways of making numbers within 20		
Using known facts		 Children draw representations of H,T and O	3 + 4 = 7 *leads to* 30 + 40 = 70 *leads to* 300 + 400 = 700
Bar model	 3 + 4 = 7	 7 + 3 = 10	 23 + 25 = 48

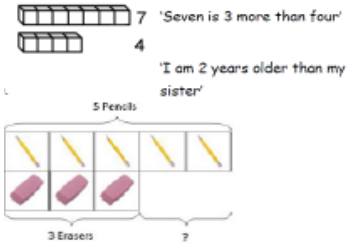
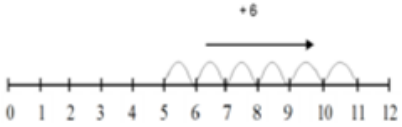
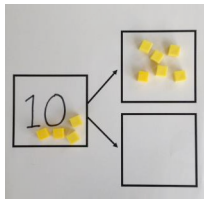
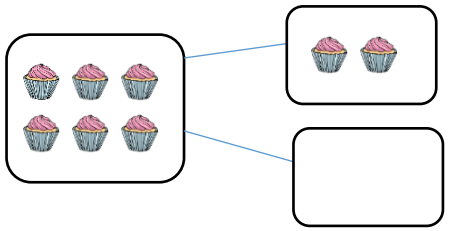
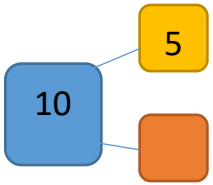
Year 2 Addition +

Objective & Strategy	Concrete	Pictorial	Abstract
Add a two digit number and ones	 17 + 5 = 22 Use ten frame to make 'magic ten Children explore the pattern. 17 + 5 = 22 27 + 5 = 32	Use part part whole and number line to model. 	17 + 5 = 22 Explore related facts 17 + 5 = 22 5 + 17 = 22 22—17 = 5 22—5 = 17 
Add a 2 digit number and tens	 25 + 10 = 35 Explore that the ones digit does not change		27 + 10 = 37 27 + 20 = 47 27 + □ = 57
Add two 2-digit numbers	 Model using dienes , place value counters and numicon	 Use number line and bridge ten using part whole if necessary.	 20 + 40 = 60 5+ 7 =12 60 + 12 = 72
Add three 1-digit numbers	 Combine to make 10 first if possible, or bridge 10 then add third digit	 Regroup and draw representation. 	 Combine the two numbers that make/ bridge ten then add on the third.

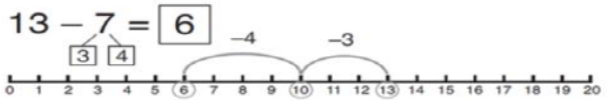
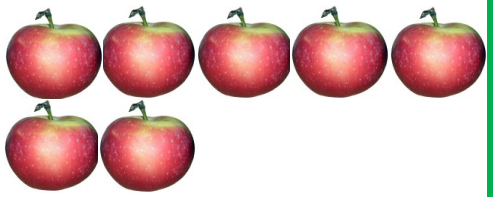
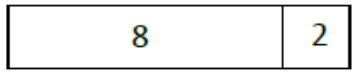
Year 1 Subtraction

Objective and Strategy	Concrete	Pictorial	Abstract
Taking away one	Pupils will need to use physical objects, counters, cubes etc to show how they can be taken away from the original number.   Seeing 12 as 5 and 7 Helps to see the related calculations; 5+7=12, 7+5=12, 12-7 = 5 and 12-5=7 as all in the same diagram 	Pupils to cross out objects to show what has been taken away from the original number.  Calculations should also be written as □ = 15 - 3	Pupils to write calculations. 12 – 3 = 18 – 7 =
Counting Back	 Moving objects away from the group, counting backwards. Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4 	 Count back in ones using a number line	Your starting number is 13, count back 4. What number are you at?

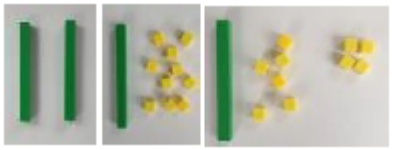
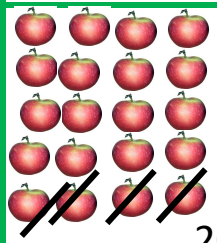
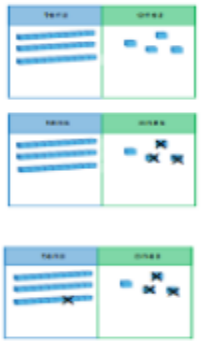
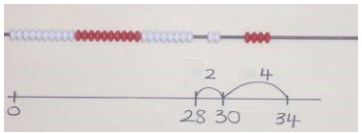
Year 1 Subtraction

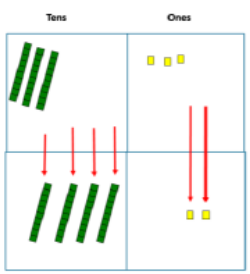
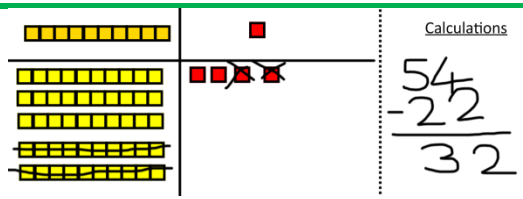
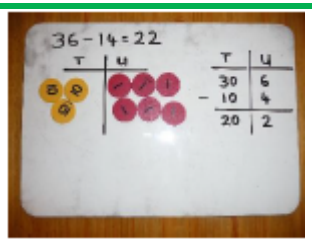
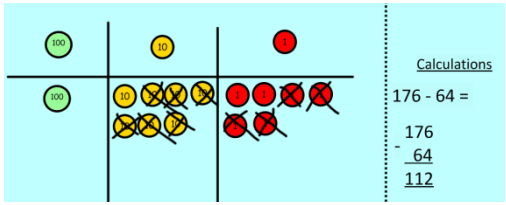
Objective and Strategy	Concrete	Pictorial	Abstract
Find the Difference	Pupils to compare objects and amounts  It would be beneficial to represent apparatus in bar model so children can visually count the difference.	Count on to find the difference. 	Sam has 14 stickers and his brother has 6. How many more does Sam have than his brother?
Represent and use number bonds and related subtraction facts within 20 Part Part Whole	 Link to addition- use the part whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part part whole model. 	 Move to using numbers within the part whole model.

Year 1 Subtraction

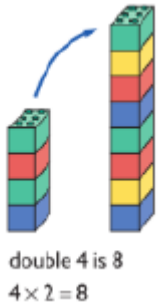
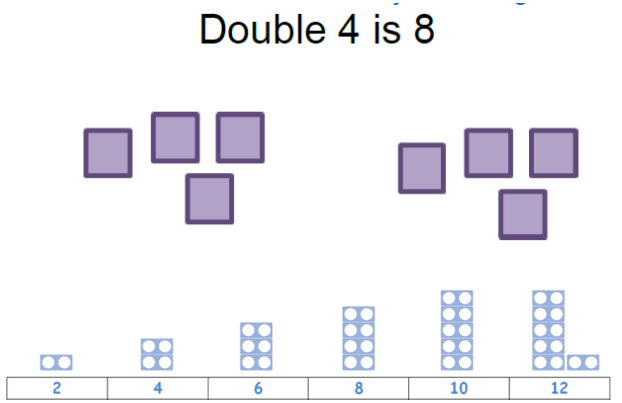
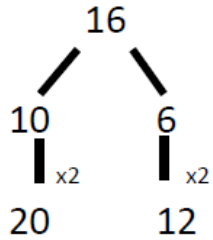
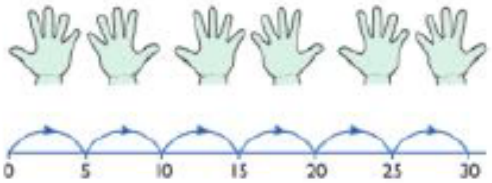
Objective and Strategy	Concrete	Pictorial	Abstract
Make 10	14 – 9  Make 14 on a ten frame. Take 4 away to make 10, then one more away so	 Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.	16 – 8= How many do we take off to reach the next 10? How many do we have left to take off?
Bar Model	5 – 2 = 3 		 10 = 8 + 2 10 = 2 + 8 10—2 = 8 10—8 = 2

Year 2 Subtraction

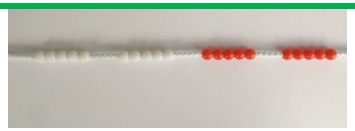
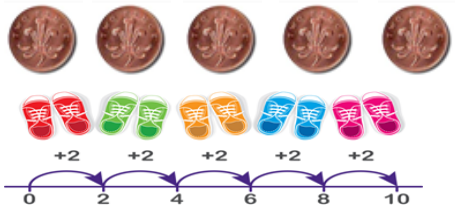
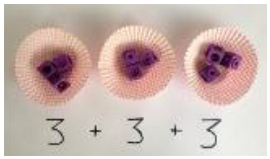
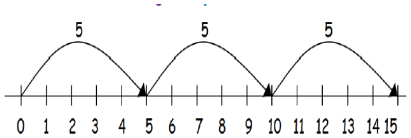
Objective and Strategy	Concrete	Pictorial	Abstract
Regroup a ten in to ten ones	 Use place value charts to show how to change a ten into ones – term to use 'take and make'	 20 – 4	20 – 4 = 16 20 – 16 = 4
Partitioning to subtract without regrouping	34 – 13 = 21 Use dienes to show how to partition the number when subtracting without regrouping. 	Pupils can draw representations of dienes or other Mathematical equipment and cross off accordingly.  43—21 = 22	43 – 21 =22 43 – 22 = 21
Make ten strategy Progression should be crossing one ten and then more than one ten, crossing hundreds.	Use bead bars or strings to model counting to next ten and the rest. 	Use a number line to count on to find the difference. Including discussion about counting on to the next ten first and then count in 10s until relevant  'counting on' to find 'difference'	93 – 76 =17

Objective and Strategy	Concrete	Pictorial	Abstract
Column subtraction without regrouping	 Use 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.	50 4 _ 20 2 30 2 32 Expanded This will lead to a clear written column subtraction.
Children should be encouraged to estimate their answers first.			54 _ 22 32

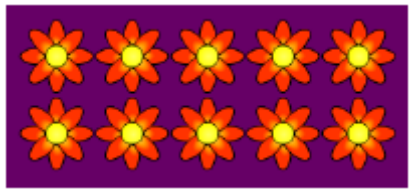
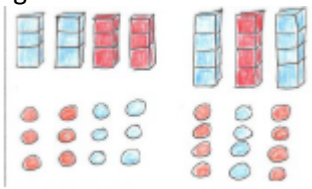
Year 1 Multiplication

Objective and Strategy	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  	Draw pictures to show how to double a number.  Use a number line or pictures to continue support in counting doubles.	 Partition a number and then double each part before recombining it back together. As well as the above, children should be taught known facts that could be doubled – double 15 and add 2
Counting in Multiples		 Use a number line or pictures to continue support in counting in multiples. This image can be expressed as:	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30

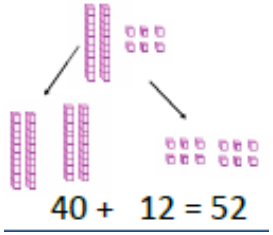
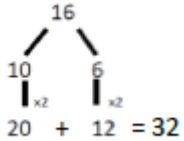
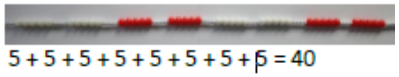
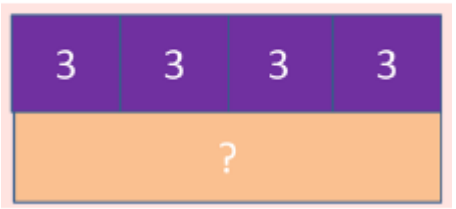
Year 1 Multiplication

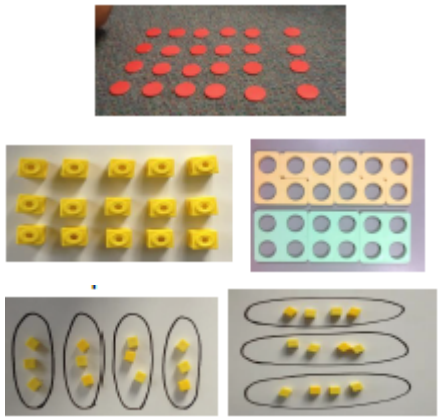
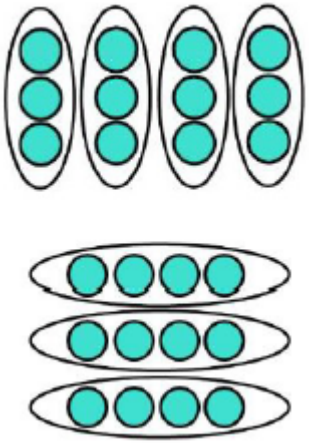
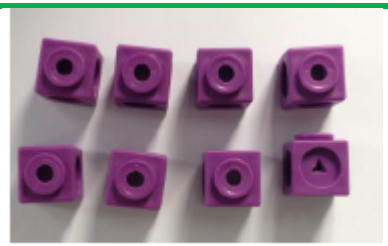
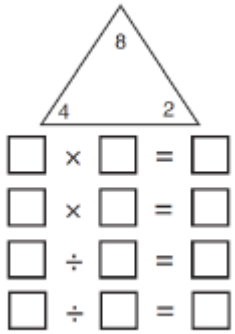
	 Count in multiples supported by concrete objects in equal groups.	 • 2 multiplied by 5 • two, five times • 5 groups of 2 • 5 lots of 2	
Repeated Addition	   Use different objects to add equal groups.	 Progress to a blank number line.  5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures. 

Year 1 Multiplication

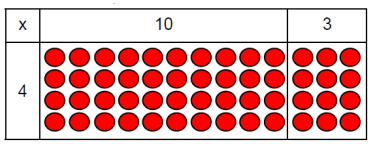
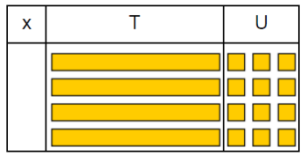
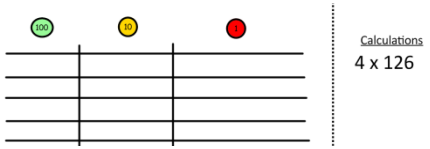
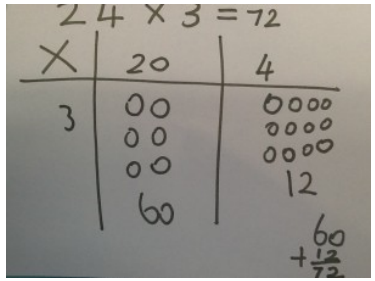
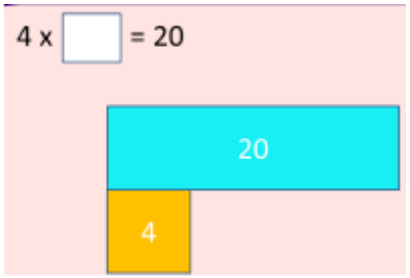
Understanding Arrays – showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences. 	Raw representations of arrays to show an understanding 	3 x 2 = 6 2 x 5 = 10

Year 2 Multiplication

Objective and Strategy	Concrete	Pictorial	Abstract
Doubling	Model doubling using dienes and PV counters  	Draw picutres and representation to show how to double numbers	Partition a number and then double each. Combine doubles back together through addition 
Counting in multiples of 2,3,4,5,10 from 0	Count the groups as children are skip counting, children may use any item that assists them to skip count. Use bar    models.	Number lines, counting sticks and bar models should be used to show representation of counting in multiples.   	Counting in numbers aloud. Write sequences of known multiples. Find missing numbers within sequences. 2,4,6,8,10 3,6,9,12,15  = 5 x 3

Multiplication is commutative	Create arrays using counters, cubes 	Use representation of arrays to show different calculations and explore commutativity. 	12 = 3 x 4 12 = 4 x 3 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
Using the Inverse This can be taught alongside division so pupils see the link and how they work together.			Showing all 8 related fact family sentences 2 x 4 = 8 4 x 2 = 8 8 ÷ 2 = 4 8 ÷ 4 = 2 8 = 2 x 4 8 = 4 x 2 2 = 8 ÷ 4 4 = 8÷ 2

Year 2 Multiplication

Objective and Strategy	Concrete	Pictorial	Abstract
Grid Method	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.  To further demonstrate this method.  	Children can represent the work they have done with place value counters in a way that they understand. They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below  Bar models are then used to explore missing numbers  	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. | ×	30	5
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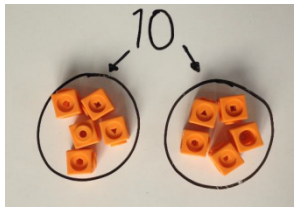
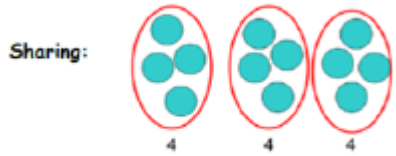
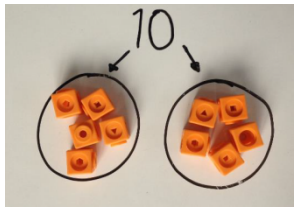
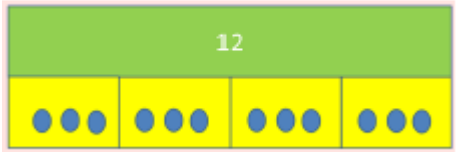
7	210	35	 **210 + 35 = 245** Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

Year 1 Division

Objective and Strategy	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 12 ÷ 3 = 4
Division by grouping	I have 10 cubes. How many groups of 2 can I make?	As above for sharing. Link to arrays to make groups.	Divide 12 sweets into groups of 2. How many groups have you made? 12 ÷ 2 = 6

Year 2 Division

Objective and Strategy	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 Children use bar modelling to show and support understanding.  12 ÷ 4 = 3	Share 9 buns between three people. 9 ÷ 3 = 3 12 ÷ 3 = 4
Division by grouping.	I have 10 cubes. How many groups of 2 can I make?	As above for sharing. Link to arrays to make groups.	Divide 12 sweets into groups of 2. How many groups have you made? 12 ÷ 2 = 6

	Progression across the year groups	
	Typical calculations addition	**Suitable methods**
Y1	U+U TU + U (to 20 including zero)	Practical Number line
Y2	TU + U TU + multiples of 10 TU + TU U + U + U	Practical Number line Expanded columnar
	Typical Calculations Subtraction	**Suitable methods**
Y1	U-U TU -U (to 20 including zero)	Practical Number line
Y2	TU -U TU -multiples of 10 TU -TU U -U -U	Practical Number line Expanded columnar

Progression across the year groups Multiplication		
	Typical Calculations	**Suitable methods**
Y1	U x U	Practical (repeated addition) Practical and pictorial arrays
Y2	U x U	Practical (repeated addition) Practical and pictorial arrays

Progression across the year groups Division		
	Typical calculations	**Suitable methods**
Y1	U ÷ U TU ÷ U	Practical sharing Number-line grouping
Y2	U ÷ U TU ÷ U	Practical sharing Number-line grouping