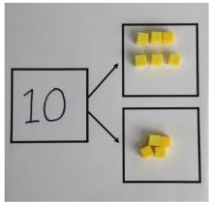
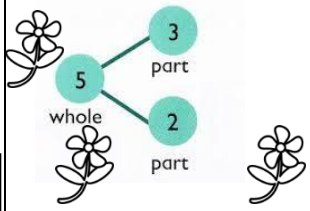
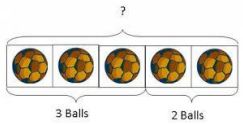
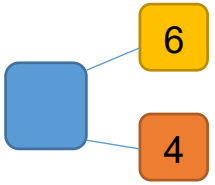
Woolston Infant School - Progression in Calculation

Addition

Objective 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.  or tens frame. 	  3 Balls 2 Balls Use pictures to add two numbers together as a group or in a bar.	4 + 3 = 7 10 = 6 + 4  10 | 6 | 4

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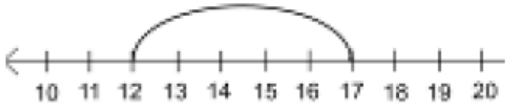
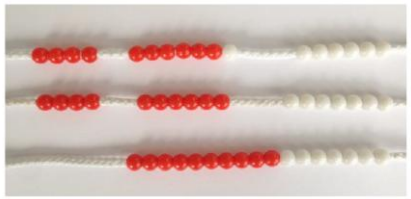
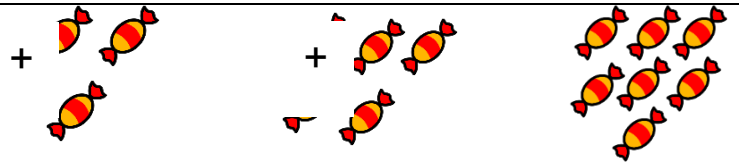
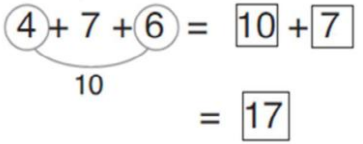
Starting at the bigger number and counting on	 Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	12 + 5 = 17  Start at the larger number on the number line and count on in ones or in one jump to find the answer. Then use empty number line.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.
Adding three single digits	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. Begin with largest number first.	 Combine the two numbers that make 10 and then add on the remainder. Or begin by using the largest number first, then count on in head.
Partition method- no regrouping	Add practically. 22 + 11 = 33 	Add with jottings 22 + 11 = 33 II .. I. = Addition of a two digit number to a two digit number, by partitioning the second number using a hundred square. Eg: 32 + 23 = 55, 32 + 20 + 3 = 55. 	22 + 11 = 33 20 +10 = 30 2 + 1 = 3 Combine the tens then the units in head.

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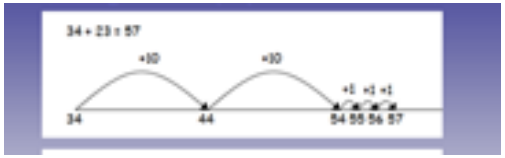
		Add with empty number line numbers partition the second number..  	
Partition method with regrouping	39 + 23 = Partition the tens 30 + 20 = 50  Add the units 9 + 3 = 12 50 + 12 = 62 	39 + 23 = 62 II :: + II .. :: . . Count tens then units. 39 + 23 = 30 + 20 = 50 9 + 3 = 12 50 + 12 = 62 50 + 10 =60 0 + 2 = 2 60 + 2 = 62	39 + 23 = 62 30 + 20 = 50 9 + 3 = 12 50 + 12 = 62 Leading to combining in head.

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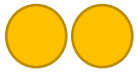
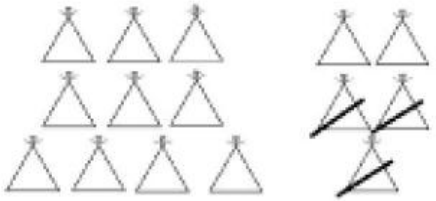
Subtraction

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.  15 – 3 = 12	18 -3= 15 8 – 2 = 6 Link to Singapore Bar model. Link to part part whole.

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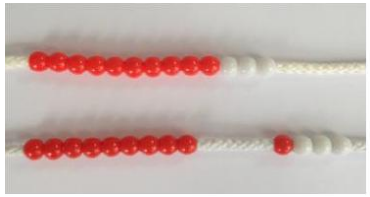
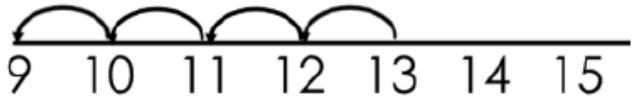
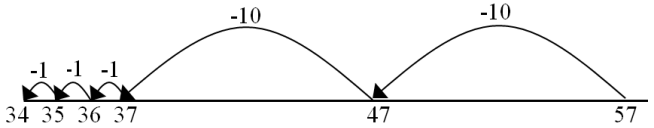
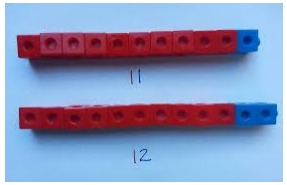
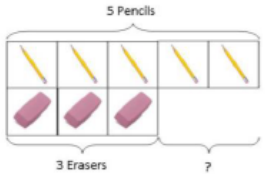
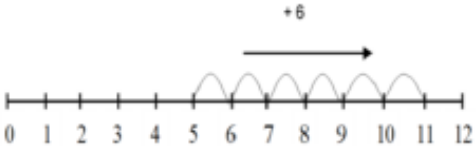
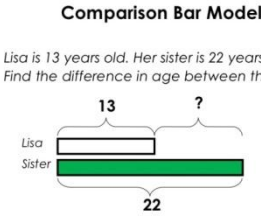
Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4  Use counters and move them away from the group as you take them away counting backwards as you go. 	Count back on a number line or number track  Start at the bigger number and count back the smaller number showing the jumps on the number line. Use empty number line. Begin with single digit numbers in year 1.  This can progress all the way to counting back using two 2 digit numbers in year 2.	Put 13 in your head, count back 4. Use your fingers to help if needed..
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.	Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches. 

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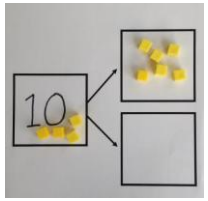
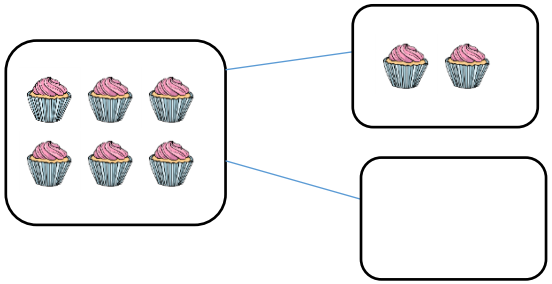
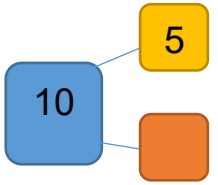
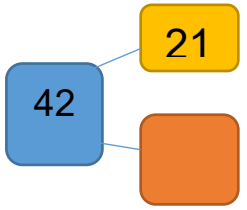
	Use Cuisenaire rods.		
Part Part Whole Model	 Link to addition- use the part whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part part whole model. 	 Move to using numbers within the part whole model. Link to Singapore Bar Model.
Partition method without regrouping	42 – 21 = 21  Take away practically.	42 – 21 = 21 II . II Partion second number in head then cross out jottings. Usethe empty number line partion the second number..	Link to Singapore bar. Link to part part whole 

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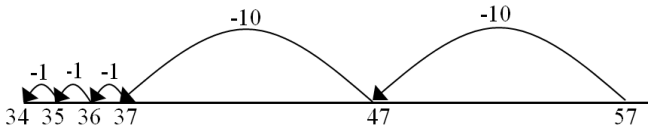
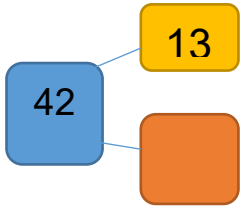
		57 – 23 = 34  Or on a hundred square.	42 21 |
Partition method with regrouping	Demonstrate to show need to regroup.	42 – 13 = 29 Partition second number. 42 – 10 = 32 II II .. 32 – 3 = 29 Subtraction of a two digit number to a two digit number, by partitioning the second number using a hundred square. Eg: 31 - 23 = 8, 31 - 20 - 3 = 62  Or an empty number line.	Link to Singapore bar. 42 13 | Link to part part whole 

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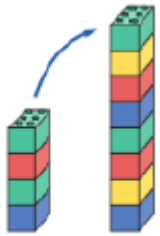
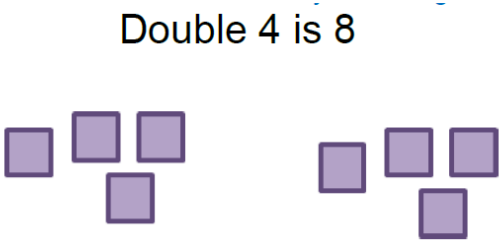
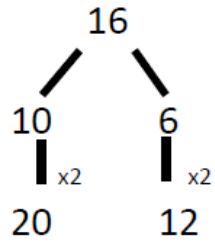
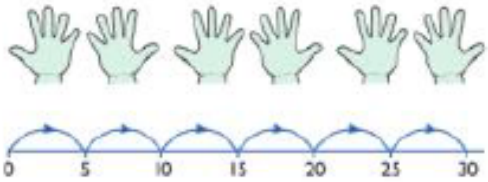
Multiplication (Begin with 2, 5, 10)

Objective and Strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  double 4 is 8 4 × 2 = 8	Draw pictures to show how to double a number.  Double 4 is 8	 16 10 x2 6 x2 20 12 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. Link to multiplication sign, groups of, lots of. Use Singapore bar. 20 5 5 5 5	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30 Multiplication number sentences.

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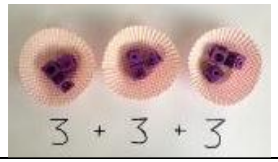
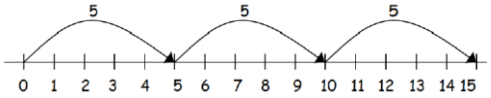
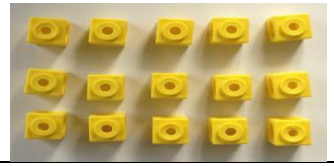
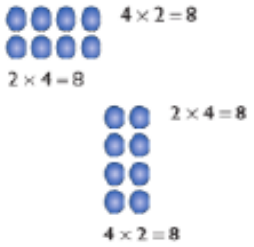
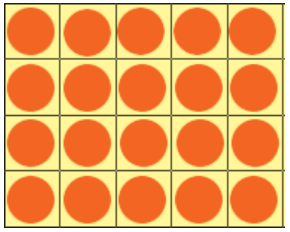
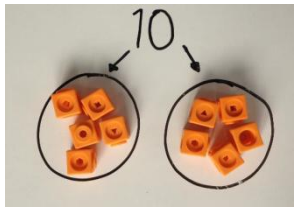
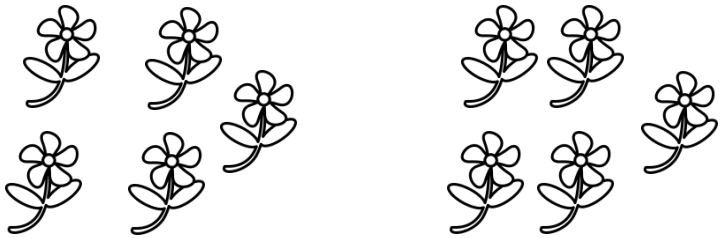
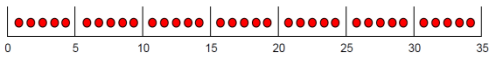
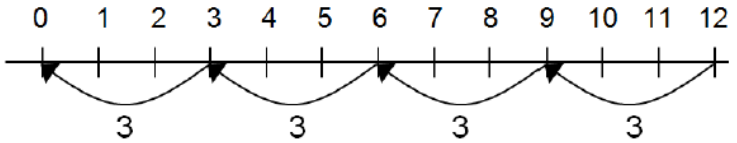
Repeated addition	   3 + 3 + 3 Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 add 2 add 2 equals 6  5 + 5 + 5 = 15  5 x 2 = 10 2 + 2 + 2 + 2 + 2 = 10	Change repeated addition sentences to multiplication and vice versa. Put numbers into a Singapore Bar.
Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.  4 × 2 = 8 2 × 4 = 8 2 × 4 = 8 4 × 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

Woolston Infant School - Progression in Calculation

Division

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.  10 ÷ 2 = 5	Share 8 buns between two people. 8 ÷ 2 = 3
Division as 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. 	20 ÷ 5 = 4 Divide 20 into 5 groups. How many are in each group?

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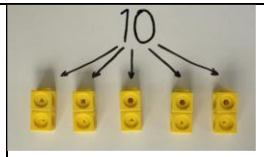
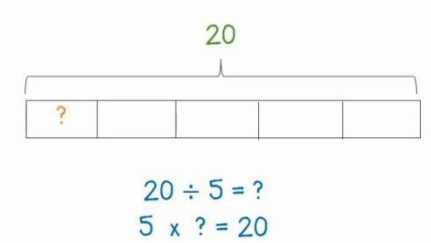
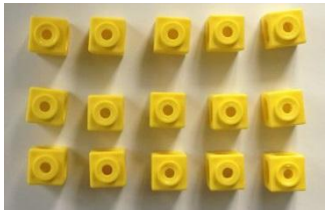
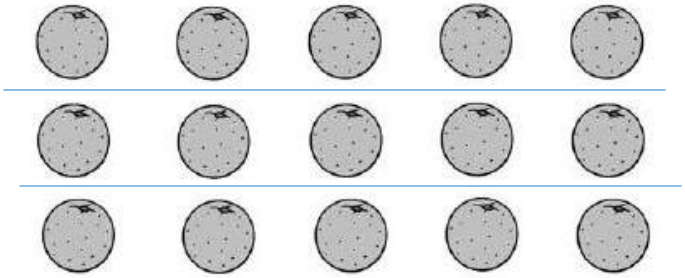
	 	Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 	
Division within arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 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. 5 x 4 = 25 4 x 5 = 25 25 ÷ 5 = 4 25 ÷ 4 = 5

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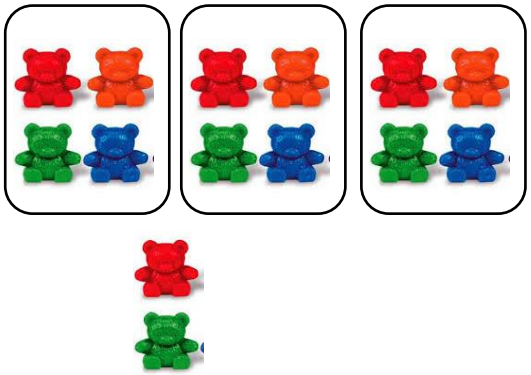
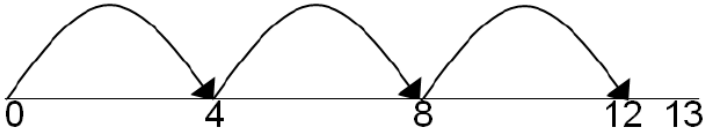
Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over 	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  Draw dots and group them to divide an amount and clearly show a remainder.  Complete written divisions and show the remainder using r. 	Reasoning problems.