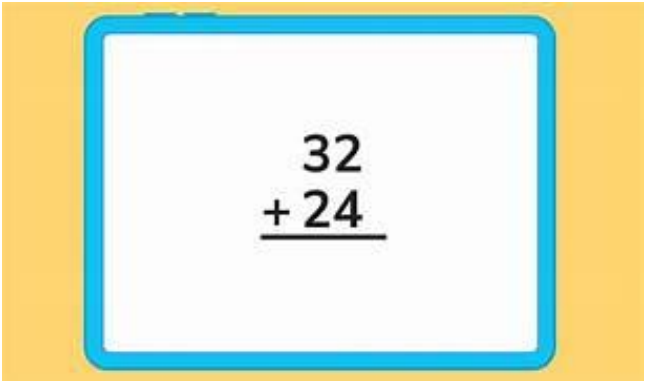
Mathematics
at
St John's CE Primary Academy

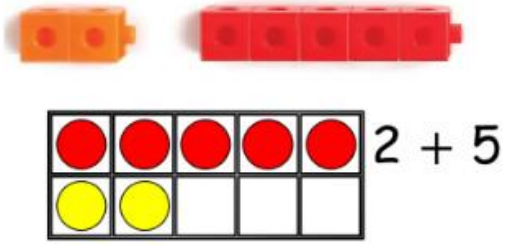
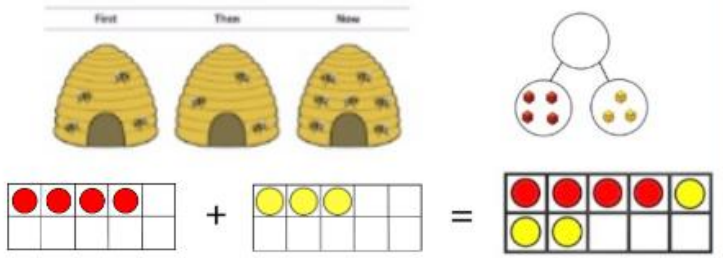
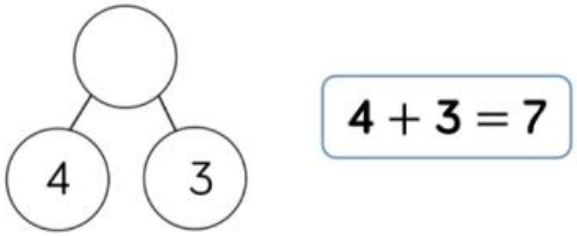
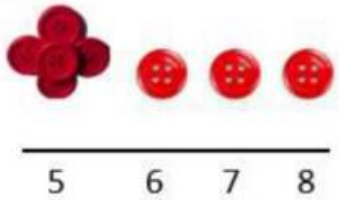
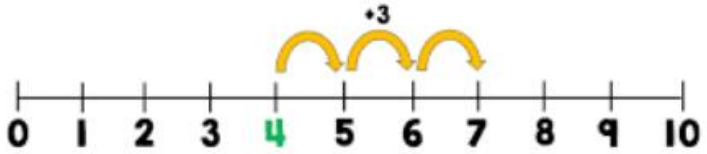
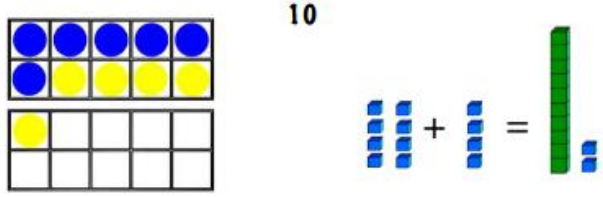
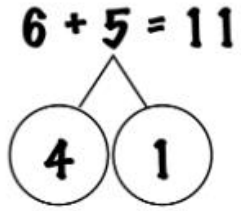
'Life in all its Fullness' – John 10:10

Progression in Calculation

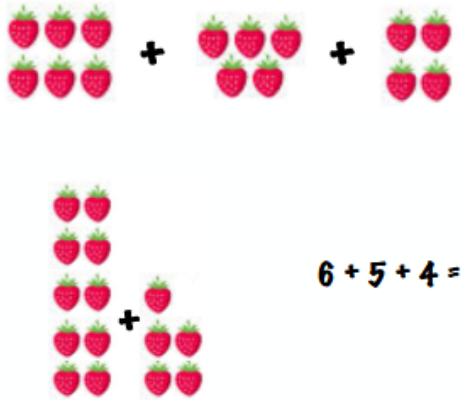
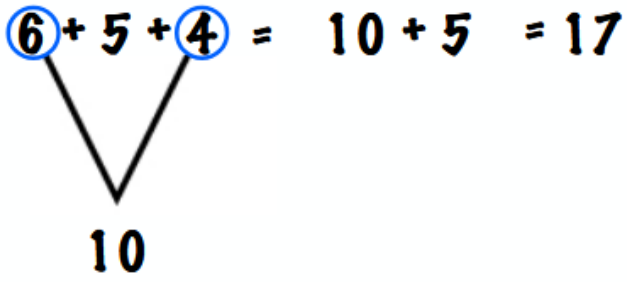
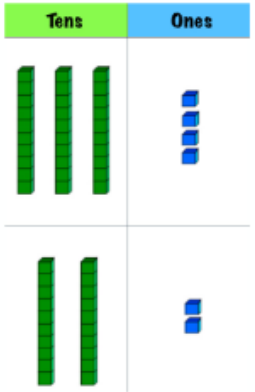
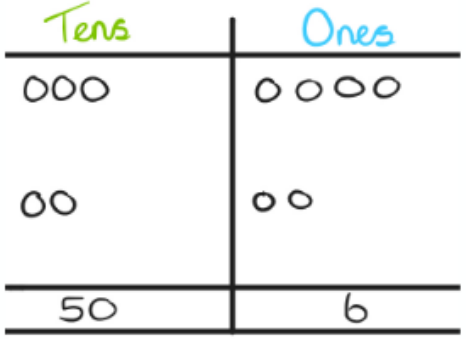
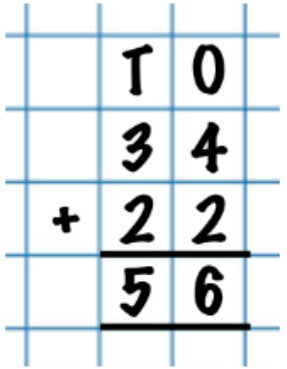
Addition



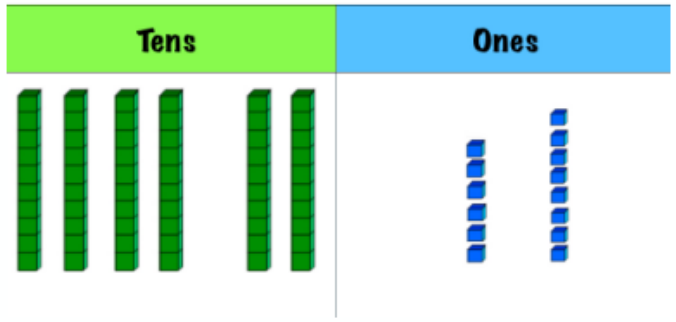
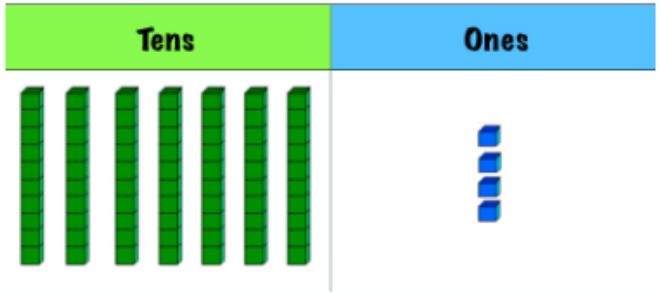
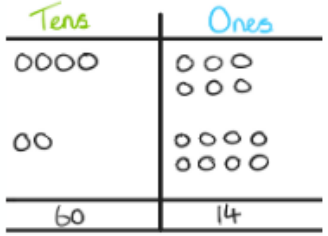
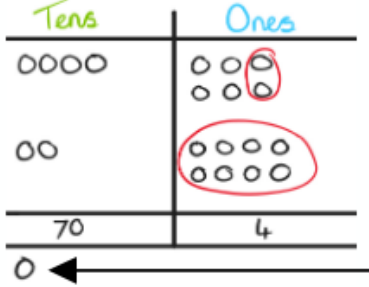
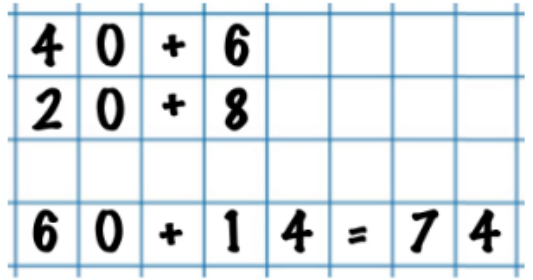
Year 1 Addition

Objective	Concrete	Pictorial	Abstract
Number bonds	Use concrete objects to add 2 numbers together 	Use pictures to add 2 numbers together as a group or bar 	Use part - part- whole model to move into abstract 
Counting	Start with larger number and count on to find the answer 	Use a number line to count on in ones 	4 + 3 = 7
Regrouping to make 10	Start with the bigger number and use the smaller number to make 10 	 	6 + 5 = 11

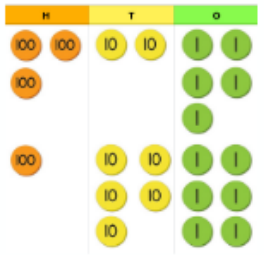
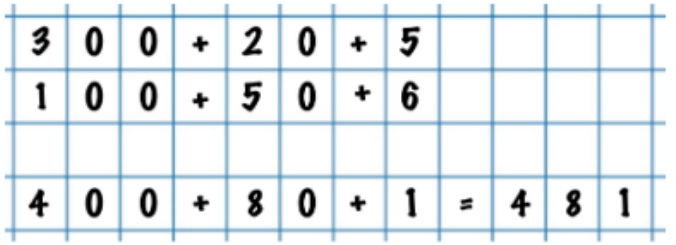
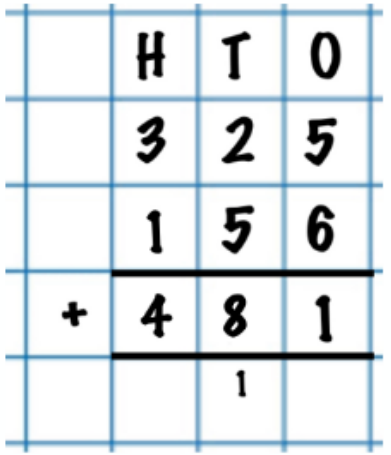
Year 2 Addition

Objective	Concrete	Pictorial	Abstract
Adding 3 single digit numbers	If possible, identify number bond to 10 and then add third digit  6 + 5 + 4 = 15	Regroup to make 10 and draw representation  6 + 5 + 4 = 15	Combine the 2 digits that make 10 and then add the third digit  6 + 5 + 4 = 10 + 5 = 17 10
Column method without regrouping	Add together the ones first and then add the tens. Use base 10 before moving onto place value counters. 34 + 22 = 56  	Draw counters to help solve additions 34 + 22 = 56  	34 + 22 = 56 

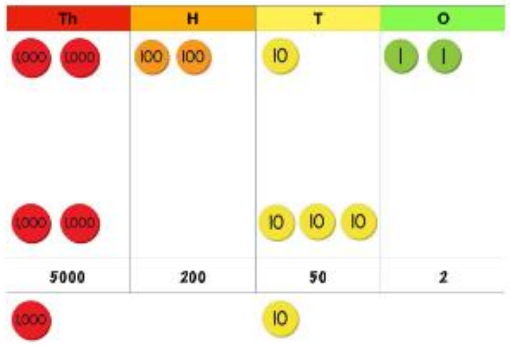
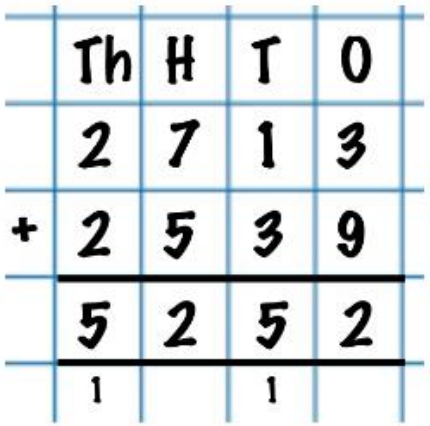
Year 2 Addition

Objective	Concrete	Pictorial	Abstract
Column method with regrouping	46 + 28 = ?  Add the ones and exchange 10 ones for 1 ten  70 + 4 = 74	for 1 ten  46 + 28 = ?  Exchange 10 ones for 1 ten  Place the 1 ten underneath 70 + 4 = 74	

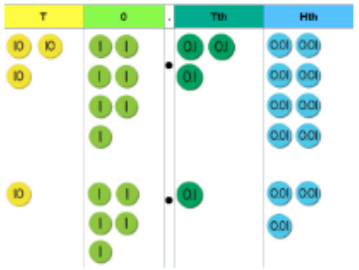
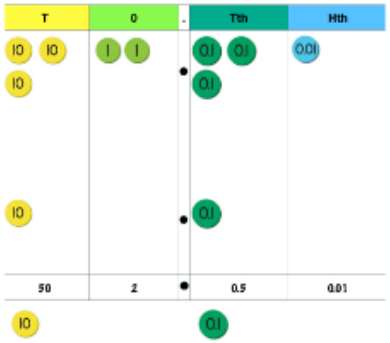
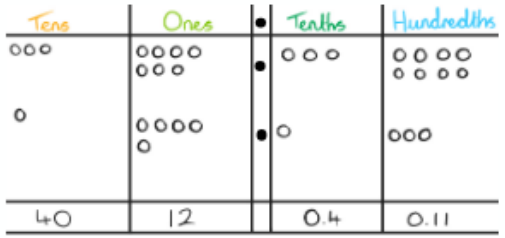
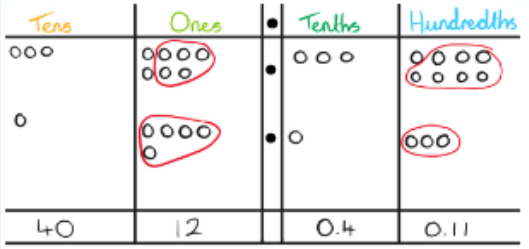
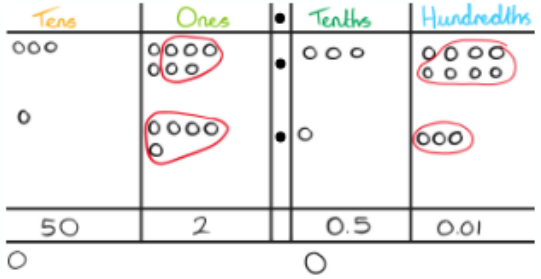
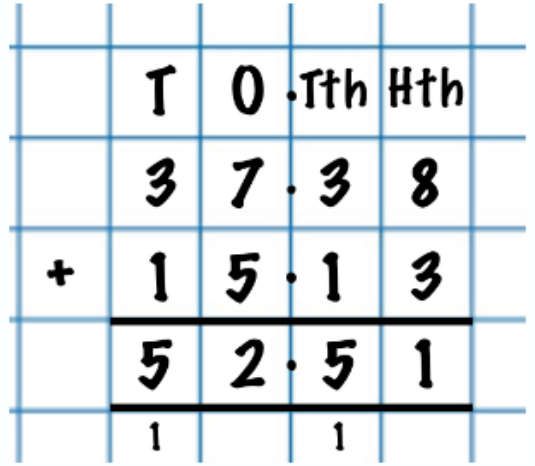
Year 3 & 4 Addition

Objective	Concrete	Pictorial	Abstract
Column method with regrouping	Make both numbers on a place value grid. 325 + 156 = ?  Add the ones and then exchange 10 ones for 1 ten.  Place the 1 ten underneath 400 + 80 + 1= 481 Year 4 children will progress to 4 digit numbers. When adding decimals and money, decimal place value counters can be used to support learning.	Draw pictorial representations of a place value grid and counters  325 + 156 = ? Exchange 10 ones for 1 ten Place the 1 ten underneath 400 + 80 + 1= 481 When adding money, pounds and pence need to be added separately.	 As children progress, they will move from the expanded method to formal method. 

Year 3 & 4 Addition

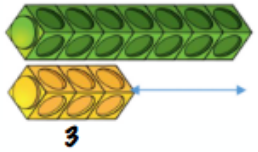
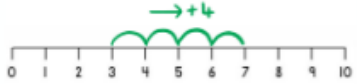
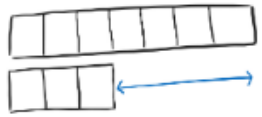
Objective	Concrete	Pictorial	Abstract
Column method with regrouping	Children continue to use base 10 and place value counters. 2713 + 2539 = ?  Show the necessary exchanges by placing the counter underneath.  5000 + 200 + 50 + 2 = 5252	Draw pictorial representations of a place value grid and counters.  2713 + 2539 = ? Show the necessary exchanges by placing the counter underneath. 5000 + 200 + 50 + 2 = 5252	 Relate to money and measures.

Year 5 & 6 Addition

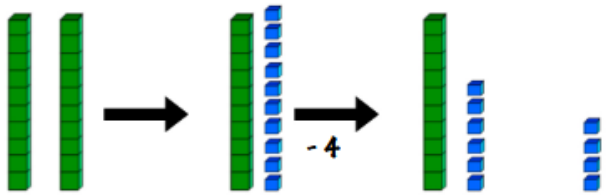
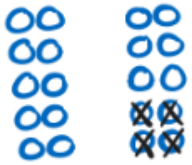
Objective	Concrete	Pictorial	Abstract
Column method with regrouping	Consolidate understanding using numbers with more than 4 digits and extend numbers with up to 3 decimal places. 37.38 + 15.13 = ?  Show the necessary exchanges by placing the counter underneath.  50 + 2 + 0.5 + 0.01 = 52.51	 37.38 + 15.13 = ?   Show the necessary exchanges by placing the counter underneath. 50 + 2 + 0.5 + 0.01 = 52.51	 T O . Tth Hth 3 7 . 3 8 + 1 5 . 1 3 5 2 . 5 1 1 1

Subtraction

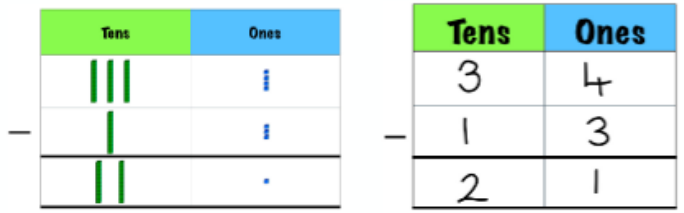
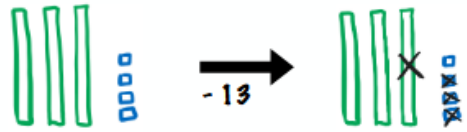
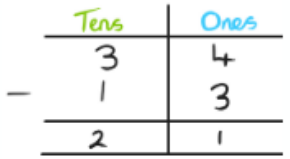
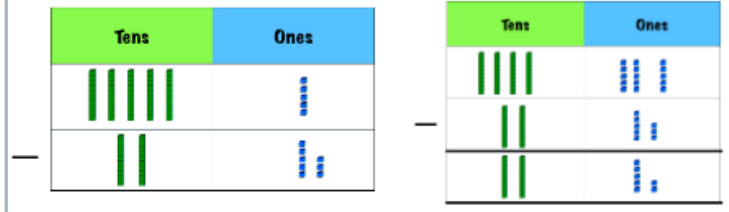
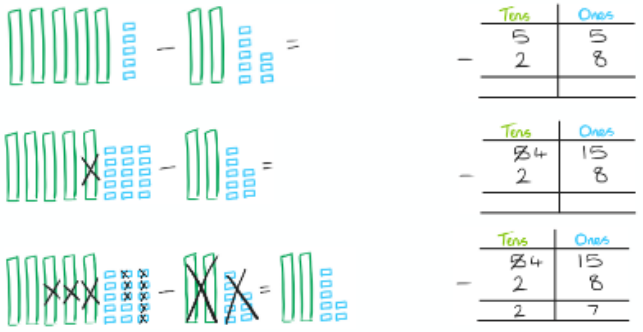
Year 1 Subtraction

Objective	Concrete	Pictorial	Abstract
Taking away ones	Use concrete objects to show how objects can be taken away. 6 - 2 = 4 	Draw total amount of objects.  Cross out objects to show what has been taken away. 	6 - 2 = 4
Counting back	Make the larger number. Move the beads along the string and count backwards in ones. 10 - 6 = 4 	Count back on a number line. 10 - 6 = 4  Start at the bigger number and count back to the smaller number. Jumps to be shown underneath the number line.	Put the bigger number in your head and count back the number being taken away. What number did you get to?
Find the difference	Compare amounts and objects to find the difference. 7  3 Use cubes to build bars to find the difference. Use basic bar models with items to find the difference.	Count on to find the difference.  Draw bar models to find the difference between 2 numbers. 	George has 3 stickers. Emily has 7 stickers. Find the difference between the number of stickers that the children have.

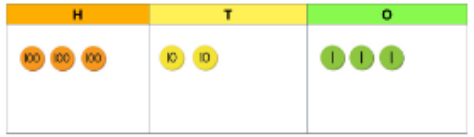
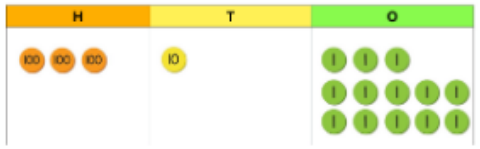
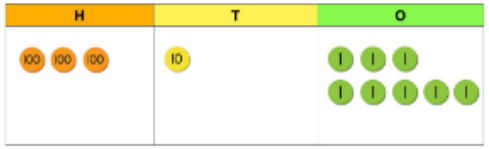
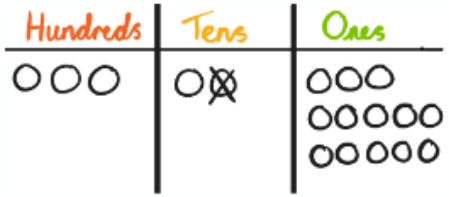
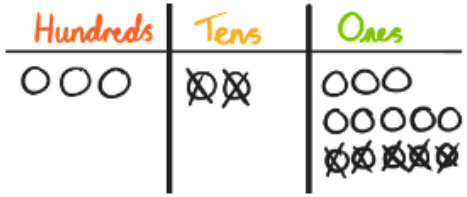
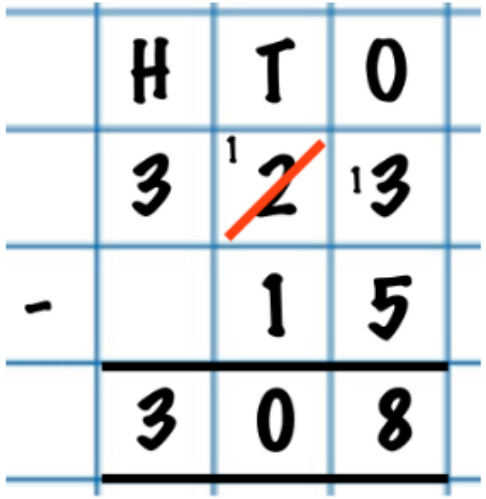
Year 1 Subtraction

Objective	Concrete	Pictorial	Abstract
Regroup a ten into ones	Use base 10 to show how to exchange a ten into ten ones. Then continue with the subtraction. 20 - 4 = 16 	Draw total amount and organise into groups of ten.  Then cross out the amount that is being taken away. 	20 - 4 = 16

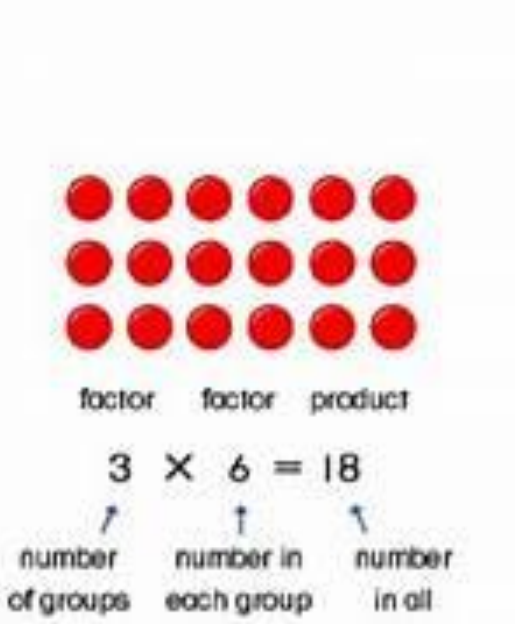
Year 2 Subtraction

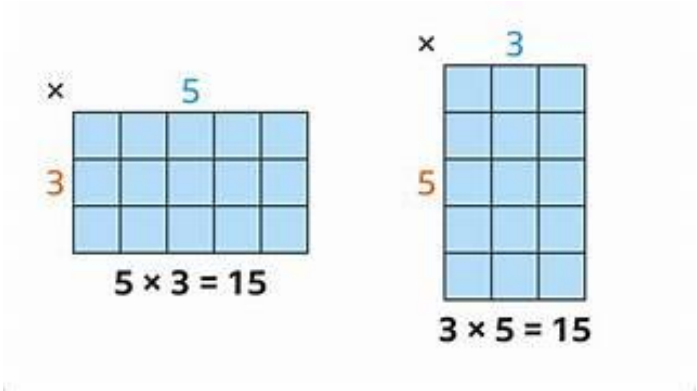
Objective	Concrete	Pictorial	Abstract
Partition to subtract without regrouping	Use Base 10 to make the bigger number and take the smaller number away. Show how to partition the number when subtracting without regrouping. 34 - 13 = 21 	Draw representation of Base 10 or place value counters. Then cross out the amount that is being taken away. Show alongside written calculation. 34 - 13 = 21  	34 - 13 = 21 30 + 4 = 34 − 10 + 3 = 13 20 + 1 = 21 This will lead to column subtraction.
Subtraction with regrouping	Use Base 10 to make the bigger number. Exchange 1 ten for 10 ones. Then continue with the subtraction. 55 - 28 = 27 	Draw representation of Base 10 or place value counters. Exchange 1 ten for 10 ones. Then continue with the subtraction. Show alongside written calculation. 	55 - 28 = 27 50 + 5 = 55 − 20 + 8 = 28 40 + 15 = 55 − 20 + 8 = 28 20 + 7 = 27

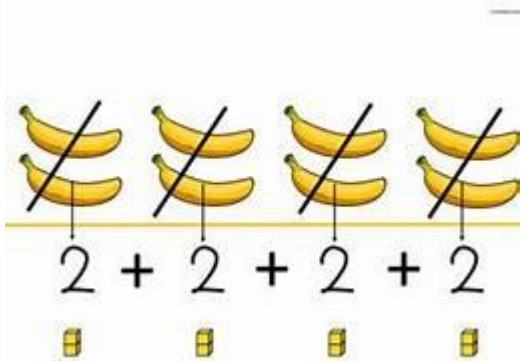
KS2 Subtraction

Objective	Concrete	Pictorial	Abstract
Subtracting with regrouping. Column method	Use Base 10 before moving on to place value counters. Show written method alongside place value counters. Start with one exchange.  Exchange 1 ten for 10 ones.  Subtract  H T O 3 2 3 - 1 5	Draw place value counters  Exchange 1 ten for 10 ones.  H T O 3 2 3 - 1 5 Subtract  	Children to move onto formal written method.  This will lead to an understanding of subtracting any number including decimals.

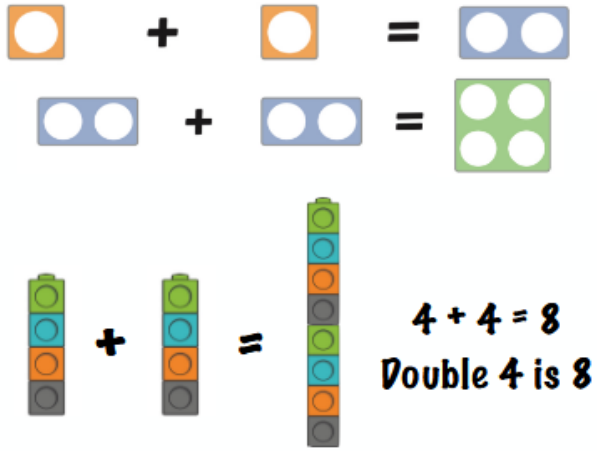
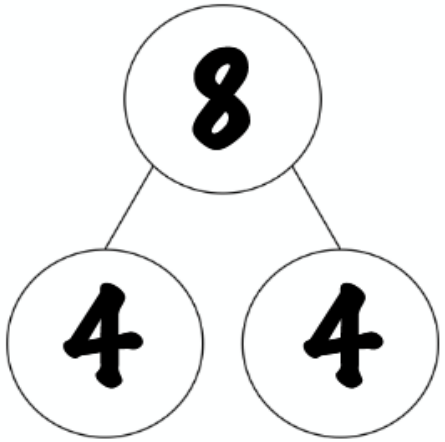
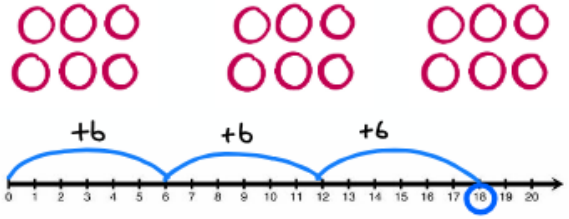
Multiplication



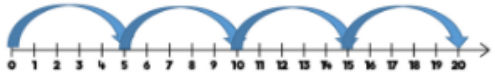
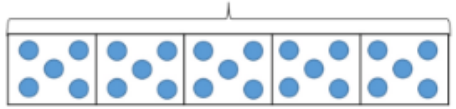
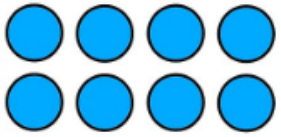




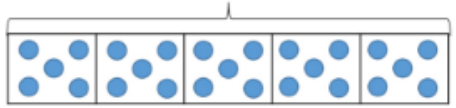
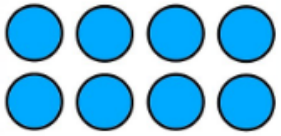
KS1 Multiplication

Objective	Concrete	Pictorial	Abstract
Doubling	Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling.  4 + 4 = 8 Double 4 is 8	Draw pictures to show how to double numbers. 4 + 4 = 8 Double 4 is 8 	Partition a number and then 
Repeated Addition	Use different objects to add equal groups.  6 + 6 + 6 = 18	Use pictorials and number lines. 6 + 6 + 6 = 18  	Write addition sentences to describe objects and pictures.  6 + 6 + 6 = 18

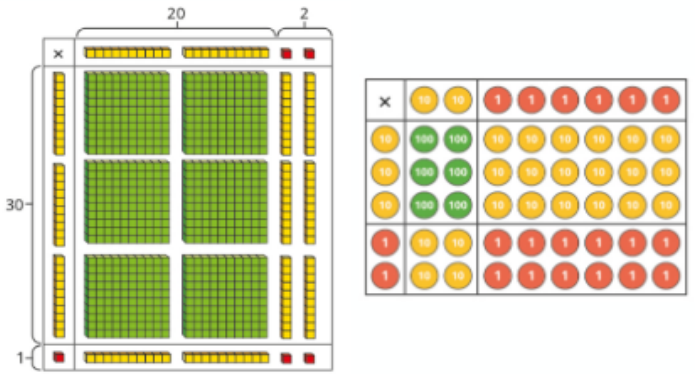
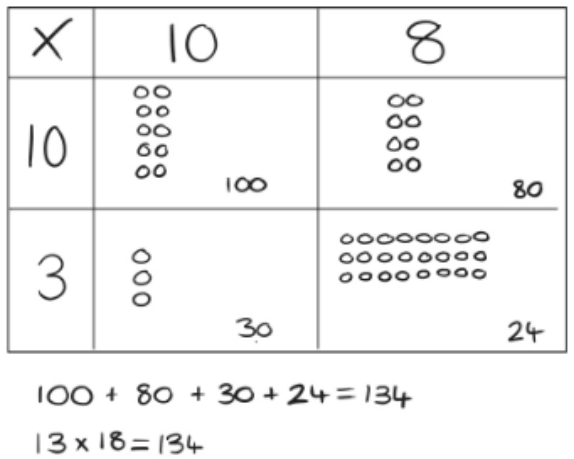
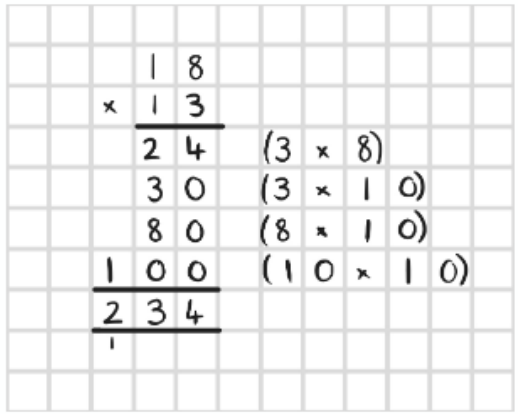
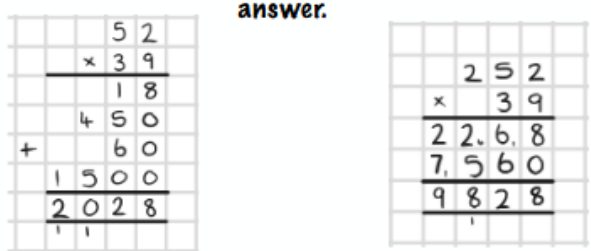
KS1 Multiplication

Objective	Concrete	Pictorial	Abstract
Counting in multiples of 2, 5 and 10	Children can use bead string to count forwards and backwards in multiples, moving the beads as they count.  Numicon can support children's understanding of multiplication as repeated addition. 	Labelled number lines and bar models can support children when counting in multiples.  4 × 5 = 20 5 × 4 = 20 ? 	Count in multiples of a number aloud. 2, 4, 6, 8 ... 5, 10, 15, 20, 25 ....
Arrays - showing commutative multiplication	Create arrays using counters or cubes to show multiplication sentences. 	Draw arrays in different rotations to find commutative multiplication sentences. 2 x 4 = 8   4 x 2 = 8	Use arrays to write multiplication sentences and reinforce repeated addition.  4 x 2 = 8 2 x 4 = 8 2 + 2 + 2 + 2 = 8 4 + 4 = 8

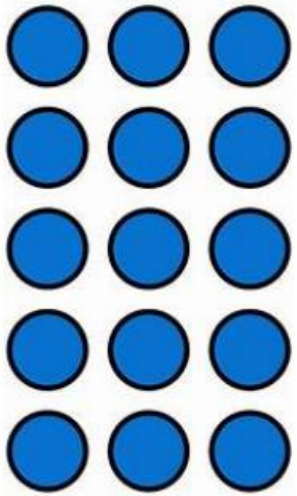
LKS2 Multiplication

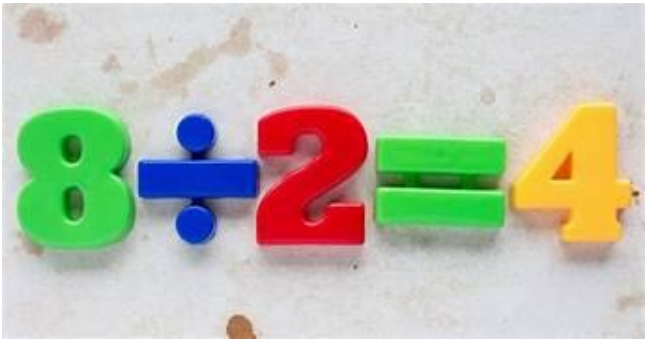
Objective	Concrete	Pictorial	Abstract
Counting in multiples of 2, 5 and 10	Children can use bead string to count forwards and backwards in multiples, moving the beads as they count.  Numicon can support children's understanding of multiplication as repeated addition. 	Labelled number lines and bar models can support children when counting in multiples.  4 × 5 = 20 5 × 4 = 20 ? 	Count in multiples of a number aloud. 2, 4, 6, 8 ... 5, 10, 15, 20, 25 ....
Arrays - showing commutative multiplication	Create arrays using counters or cubes to show multiplication sentences. 	Draw arrays in different rotations to find commutative multiplication sentences. 2 x 4 = 8   4 x 2 = 8	Use arrays to write multiplication sentences and reinforce repeated addition.  4 x 2 = 8 2 x 4 = 8 2 + 2 + 2 + 2 = 8 4 + 4 = 8

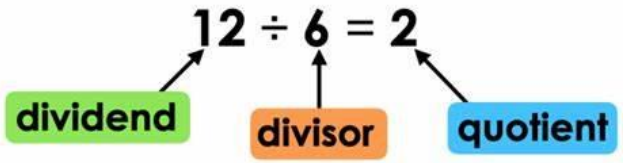
UKS2 Multiplication

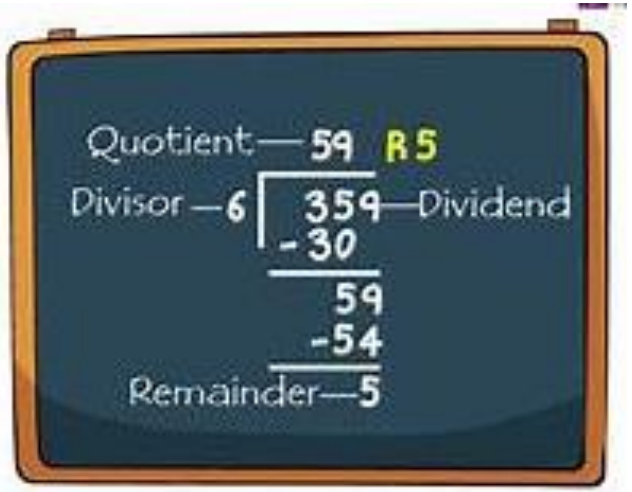
Objective	Concrete	Pictorial	Abstract
Expanded method	Use area model to first introduce the expanded method. Move onto to place value counters. 		Start with long multiplication, reminding the children about lining up their numbers clearly in columns. 
Compact method	Children can continue to be supported by place value counters. 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. Children can write out what they are solving next to their answer. 

Division

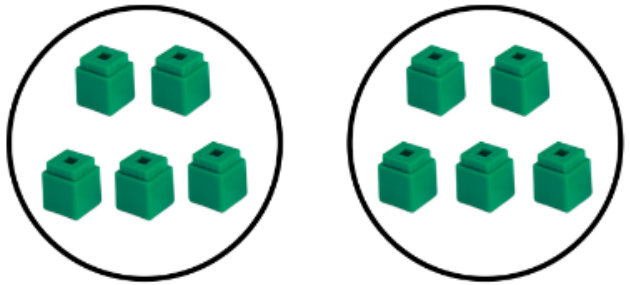
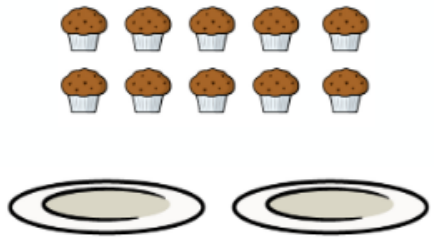
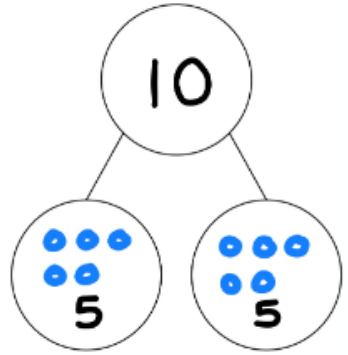
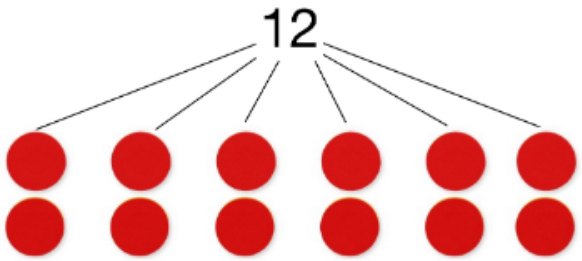



8÷2=4

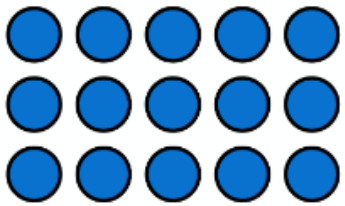
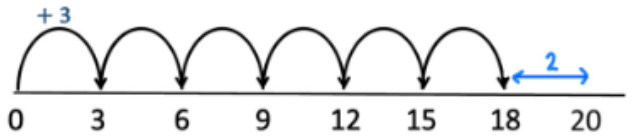
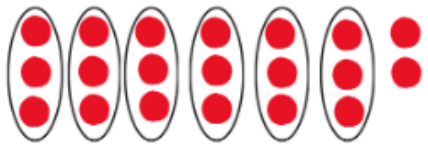

12 ÷ 6 = 2
dividend
divisor
quotient


Quotient—59 R5
Divisor—6
359—Dividend
-30
59
-54
Remainder—5

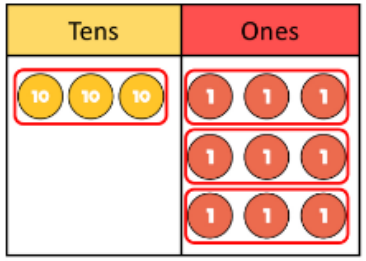
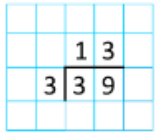
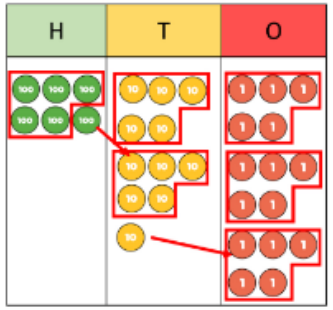
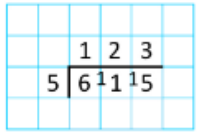
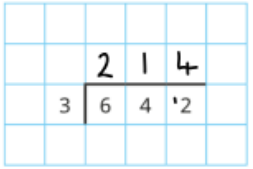
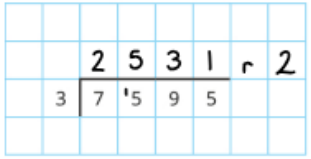
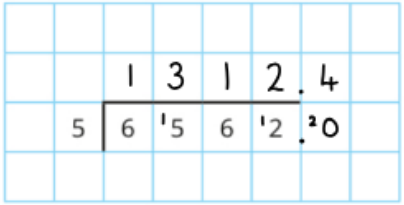
KS1 Division

Objective	Concrete	Pictorial	Abstract
Sharing	Children to use concrete objects and share them equally between groups. 	Children use pictures or shapes to share quantities.  10 ÷ 2 = 5	10 ÷ 2 = 5 
Grouping	Divide quantities into equal groups using concrete objects to aid understanding. 	Children use a number line to show jumps in groups. The number of jumps equals the number of groups. 12 ÷ 2 = ☐  How many groups of 2?	12 ÷ 2 = 6 Divide 12 into 2 groups. How many are in each group?

LKS2 Division

Objective	Concrete	Pictorial	Abstract
Division with arrays	Link division to multiplication by creating an array.  3 x 5 = 15 5 x 3 = 15 15 ÷ 3 = 5 15 ÷ 5 = 3	Draw an array and use lines to split the array into groups. Use this 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 ÷ 3 = 5 15 ÷ 5 = 3
Division with remainders	Divide objects between groups. How many are left over? 20 ÷ 3 = 	Jump forward in equal jumps on a number line then see how many more you need to jump to find the remainder.  Draw dots, group them to divide an amount and clearly show the remainder. 	Complete the divisions and show the remainder using r. 20 ÷ 3 = 6 r 2 dividend divisor quotient remainder

UKS2 Division

Objective	Concrete	Pictorial	Abstract
Short division	Use place value counters to divide using the short division method alongside. Start with the biggest place value and exchange if needed.     	Children can continue to use drawn diagrams with dots and circles to help them divide numbers into equal groups.  Encourage children to move towards counting in multiples to divide more efficiently.	Begin with divisions that divide equally with no remainder  Move onto divisions with remainders.  Once children understand remainders, introduce decimal places to divide the total accurately. 

UKS2 Division

Objective	Concrete	Pictorial	Abstract
Long division	Children will use long division to divide numbers with up to 4 digits by 2 digit numbers.		

		4	6
13	5	9	8
–	5	2	0
		7	8
–		7	8
			0

		5	7
13	6 7	1 4	1
–	6	5	0
		9	1
–		9	1
			0

		2	4
22	5	4	0
–	4	4	↓
	1	0	0
–		8	8
		1	2

EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Tens Frames Cubes Counters Bead Strings to 10 Numicon Compare Bears	Tens Frames Cubes Counters Bead Strings to 20 Numicon	Base 10 (10s, 1s) Cubes Counters Bead Strings to 100 Numicon	Base 10 (100s,10s, 1s) Place Value Counters 100s, 10s, 1s Cubes Counters Numicon	Base 10 (1000s, 100s,10s, 1s) Place Value Counters 1000s, 100s, 10s, 1s, 0.1s, 0.01s Cubes Counters Numicon	Place Value Counters 1000s, 100s, 10s, 1s, 0.1s, 0.01s, 0.001s Cubes Counters Numicon	Place Value Counters 1000s, 100s, 10s, 1s, 0.1s, 0.01s, 0.001s Cubes Counters Numicon
Cuisenaire Rods Fraction Cubes Pattern Blocks Peg Boards Geo Boards 2D and 3D Shapes Money Clocks						