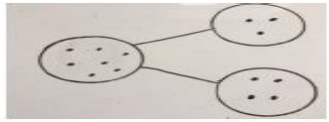
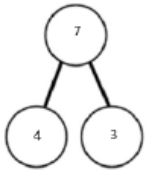
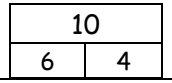
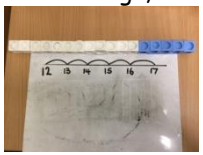
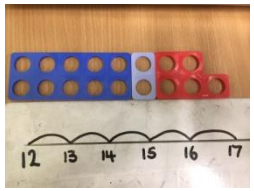
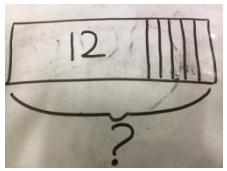
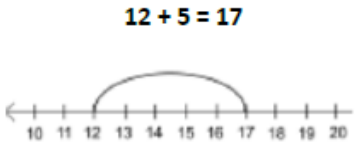
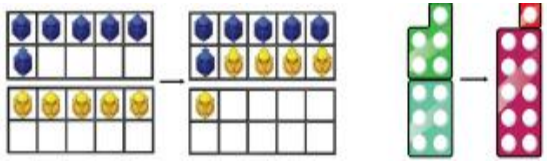
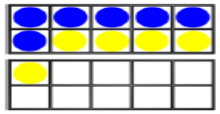
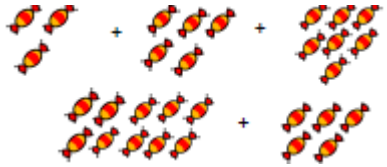
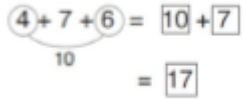
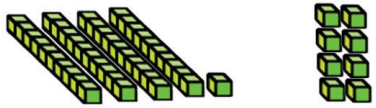
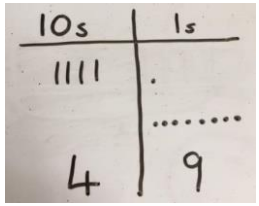
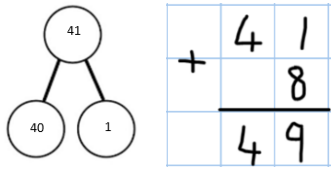
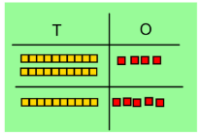
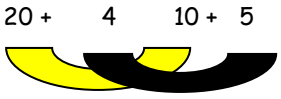
Addition

Year 1

Strategies	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-whole model	Using a wide range of different resources: cubes, cars, teddies, acorns, etc 	Objects are represented by pictures, dots or crosses 	Use the part-part whole model to move into the abstract  
Starting at the bigger number and counting on	Start with the larger number and count on using bead strings, cubes or numicon   	A bar model that encourages the children to count on rather than count all 	Using a number line – starting at the largest number and counting on 
Re-grouping to make 10	Using tens frames and counters/cubes or using numicon – start with the biggest number and use the smaller number to regroup to make 10. 	Children draw the tens frame and add counters/cubes  Children draw pictures, dots or crosses and regroup to make 10 	Children develop an understanding of equality $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$

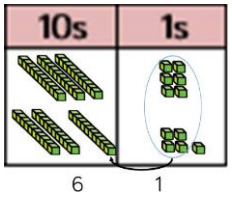
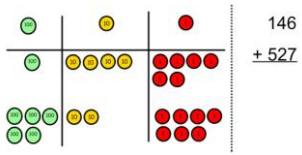
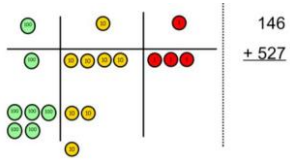
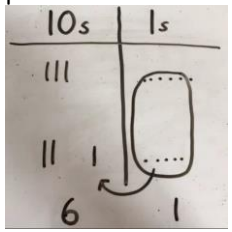
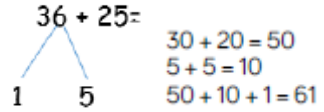
Addition

Year 2

Strategies	Concrete	Pictorial	Abstract
Add three single digits	4 + 7 + 6 = 17 Use number bonds to add 4+ 6 = 10 + 7 = 17  (Always make 10 with two of the digits where possible)	Add together three groups of objects.  Draw a picture to recombine the groups to make 10.	Combine the 2 numbers that make 10 and add on the remainder. 
Use of base 10 to combine 2 numbers (TO + O)	Continue to develop understanding of partitioning and place value 41 + 8 	Children represent the base 10 pictorially ie lines for the 10's and dots/crosses/squares for the 1's. 	41 + 8 =  1 + 8 = 9 40 + 9 = 49
Use of base 10 to combine 2 numbers (TO + TO)	Continue to develop understanding of partitioning and place value. 24 + 15 = 	Jottings 33 + 24 	Formal method using partitioning: 24 + 15 =  30 + 9 = 39

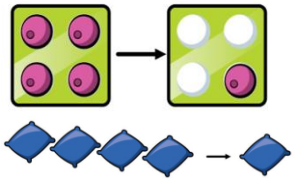
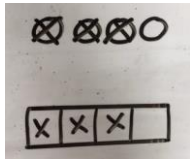
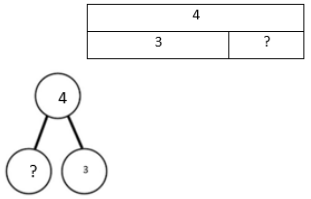
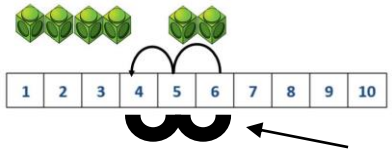
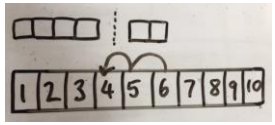
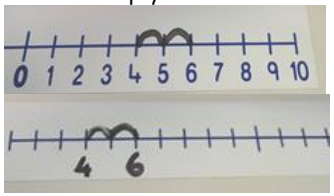
Addition

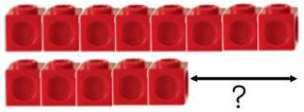
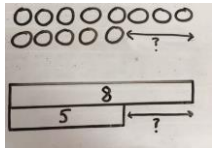
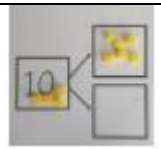
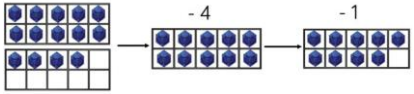
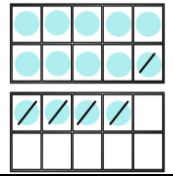
Year 3/4

Strategies	Concrete	Pictorial	Abstract
Year 3 **Use of base 10 and place value counters to combine 2 numbers – up to 3 digits.** **With re-grouping** **Year 4** **As above but up to 4 digit numbers.** **With re-grouping**	Continue to develop understanding of partitioning and place value. 36 + 25 =   Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.  	Children represent the base 10 in a place value chart.  Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.	Looking for ways to make 10.  Formal method – partitioning 30 + 6 + 20+ 5 50 + 11 = 60 +1 =61 Start by partitioning the numbers before moving on to clearly show the exchange below the addition. <u>Expanded column</u> 124 + 673 _____ 7 90 700 _____ 797 <u>Compact column</u> 324 +673 ____ 997 Extend to use of method crossing tens

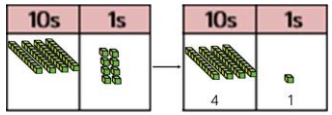
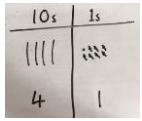
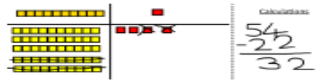
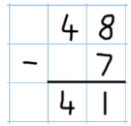
Subtraction

Year 1

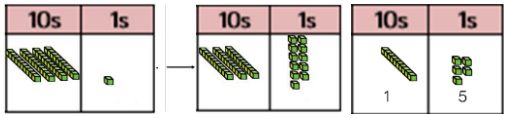
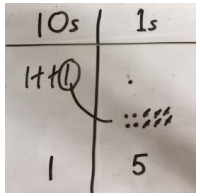
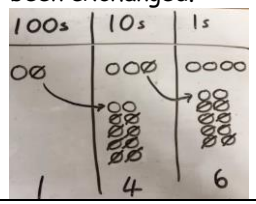
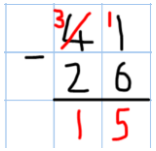
Strategies	Concrete	Pictorial	Abstract
Taking away ones	4 – 3 = 1  Physically taking away and removing objects from the first whole number – using beanbags, numicon and other concrete objects.	 Children draw the concrete objects that they are sing and cross out the correct amount.	 4 – 3 = ☐ = 4 - 3
Counting back	Counting back using number lines or number tracks. 6 – 2 = 4 Children start at 6 and count back 2.  **When counting back show jumps below the line not above (counting on)**	Children represent what they see pictorially. 	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line 

Find the difference	Calculate the difference between 8 and 5. Use cubes, numicon or other concrete objects.  	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.  	Find the difference between 8 and 5. 8 – 5, the difference is ☐ ***Children to explore why 9 – 6 = 8 – 5 = 7 – 4 have the same difference.***
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.
Make 10 using the ten frame	14 – 5 =  	Children to present the ten frame pictorially and discuss what they did to make 10. 	Children to show how they can make 10 by partitioning. 14 - 5 = 9 4 1 14 – 4 = 10 10 – 1 = 9

Year 2

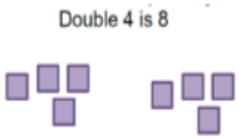
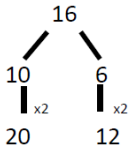
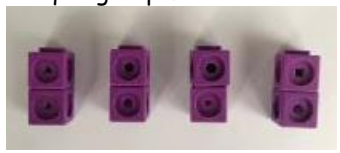
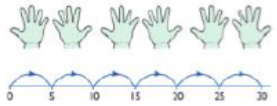
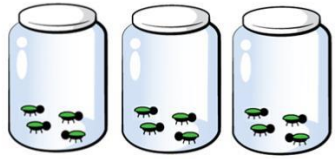
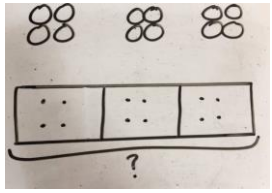
Strategies	Concrete	Pictorial	Abstract
Use of base 10 **No exchange** **(TO – O) and (TO – TO)**	Column method using base 10 48 – 7 = 41  	Children represent the base 10 pictorially.  54 – 22 = 32 Draw the base 10 alongside written calculation.  36 – 14 = 22  43 -18 =  10-8 =  so =25	Column method or children could count back 7.  54 – 22 = 32 50 + 4 -20 + 2 30 + 2

Year 3/4

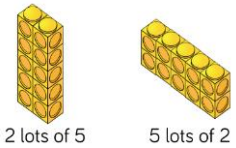
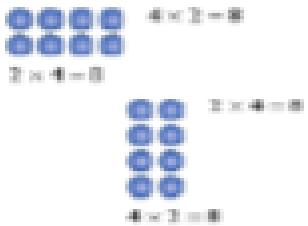
Strategies	Concrete	Pictorial	Abstract
Year 3 **Column method – up to 3 digits with exchange** **Year 4** **Column method – up to 4 digits with exchange**	**Using base 10** Column method using base 10 and having to exchange. 41 – 26 = 15 	Represent the base 10 pictorially, remembering to show the exchange.  Represent the place value counters pictorially; remembering to show what has been exchanged. 	Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11.  Formal column method. Children must understand what has happened when they have crossed out digits. 2 1 2 3 4 – 8 8 6

Multiplication

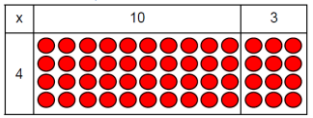
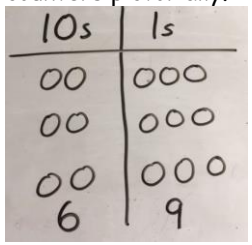
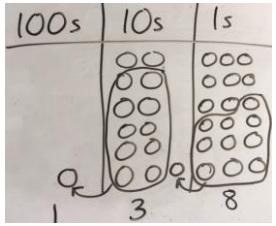
Year 1

Strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  	Draw pictures to demonstrate how to double a number.  	Partition a number and then double each part before recombining it back together. 
Counting in multiples – using cubes, numicon and other objects.	Count in multiples supported by concrete objects in equal groups. 	Use a number line or pictures to continue support for counting in multiples.  	Count in numbers of multiples aloud. Continue sequences of multiples of numbers. **2 , 4 , 6 , 8**
Recognising and making equal groups – Repeated grouping/repeated addition	Repeated grouping/repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group.  	Children to represent the practical resources in a picture and use a bar model.  	3 × 4 = 12 4 + 4 + 4 = 12

Year 2

Strategies	Concrete	Pictorial	Abstract
Arrays - showing commutative multiplication.	Use arrays to illustrate commutativity counters and other objects can also be used. 2 × 5 = 5 × 2  	Draw arrays in different rotations to find commutative multiplication sentences. 	Children to be able to use an array to write a range of calculations e.g. 10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5

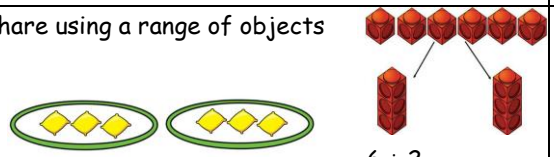
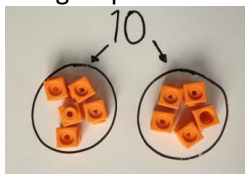
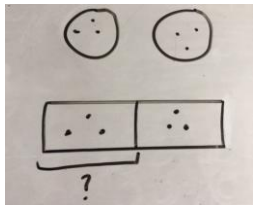
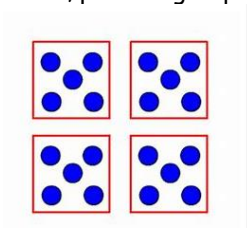
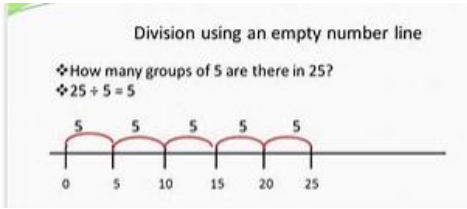
Year 3/4

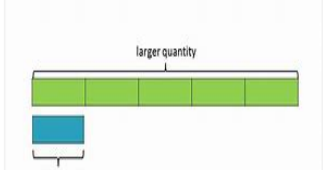
Strategies	Concrete	Pictorial	Abstract
Formal column method - The grid method **Year 3 (2 digit by 1 digit)** **Year 4 (2 digit by 1 digit/2 digit by 2 digit)**	Show the link with arrays to first introduce the grid method.  13 x 4 Move on to using base 10/place value counters for a more compact method.	Children to represent the counters pictorially.  Children to represent the counters/base 10, pictorially e.g. the image below.  	Children to record what it is they are doing to show understanding 3 × 23 3 × 20 = 60 3 × 3 = 9 60 + 9 = 69 Children then record using the formal grid method. 13 x4 10 3 4 40 12 = 52 Formal written grid method Eg 23 x 24 20 3 20 400 60 4 80 12 So 400 + 60+80 +12 = 552

			Formal method expanded 23 X6 ___ 18 120 _____ 138 Compact method 5 2 8 X 7 196

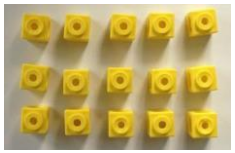
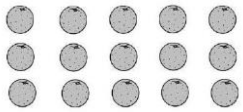
Division

Year 1

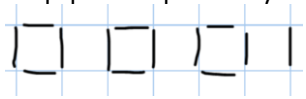
Strategies	Concrete	Pictorial	Abstract
Sharing objects into groups	Share using a range of objects  6 ÷ 2 I have 10 cubes, can you share them equally in 2 groups? 	Represent the sharing pictorially 	6 ÷ 2 = 3 3 | 3 Children should also be encouraged to use their 2 times tables facts.
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding. 20 ÷5, put into groups of 5 	Use a number line to show jumps in groups. The number of jumps equals the number of groups. 	

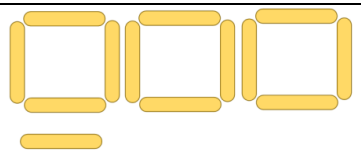
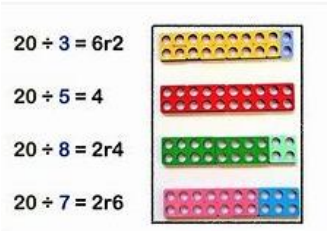
		Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 	

Year 2

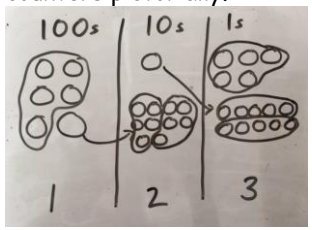
Strategies	Concrete	Pictorial	Abstract
Division with arrays – linking to multiplication	Link division to multiplication by creating an array and thinking about the number sentences that can be created.  3 x 5 = 15 5 x 3 = 15 15 ÷ 3 = 5 15 ÷ 5 = 3	Draw an array and use lines to split the array into groups 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

Year 3

Strategies	Concrete	Pictorial	Abstract
Division with a remainder	2d ÷ 1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. 13 ÷ 4 Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.	Children to represent the lollipop sticks pictorially. 	13 ÷ 4 = 3 remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. '3 groups of 4, with 1 left over'

	 There are 3 whole squares, with 1 left over. 	There are 3 whole squares, with 1 left over. 23 ÷7 = 3 r 2 3 lots of 7 7 7 7 2 left 	
Larger 2 digit numbers by 1 digit using 'chunking' on a number line		86 ÷8 = 10 r 6 10 x 8 6 left over 	**Chunking 2 digit by 1 digit** **67 ÷7** **(7 x 9 = 63)** **4 left over** **= 9 r 4** **Chunking 3 digit by 1 digit** 872 ÷8 (8 x100) =800 (8 x9) = 72 So = 109

Year 4 +

Strategies	Concrete	Pictorial	Abstract
Intermediate step of long division		Represent the place value counters pictorially.  	1 2 3 5 ⟌ 615 5 — 1 1 10 — 15 1 5 — 0
Short division (up to 3 digits by 1 digit)			Then move onto short division scaffold. 123 5 ⟌ 6¹1¹5