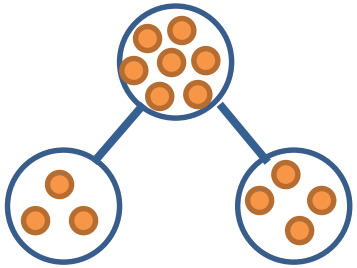
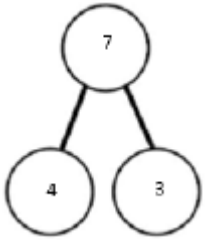
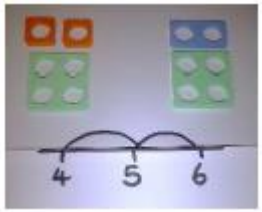
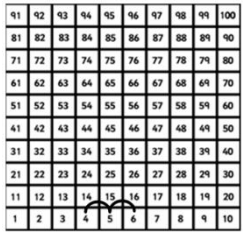
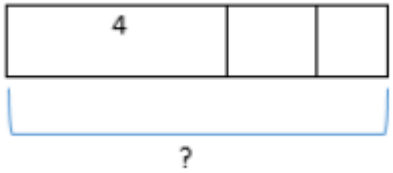
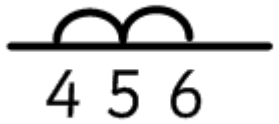
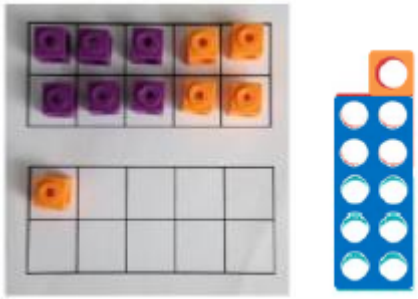
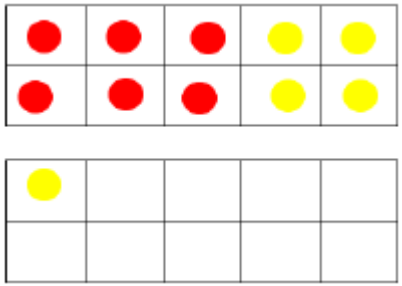
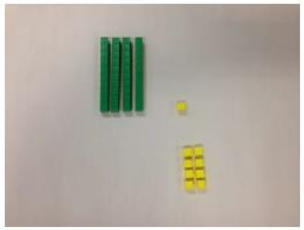
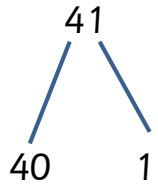
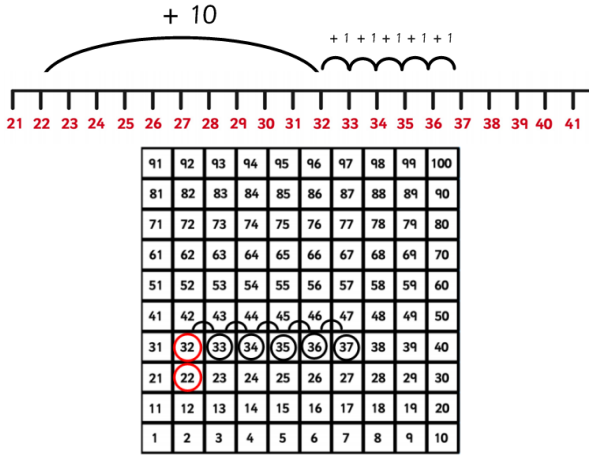
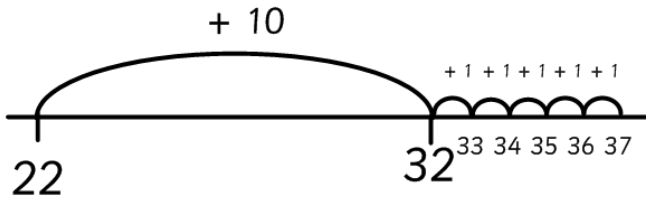
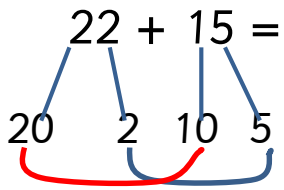
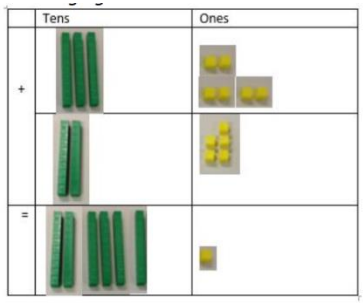
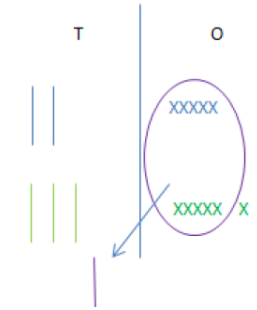
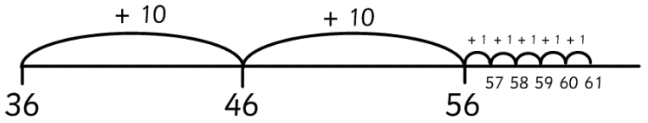
Addition

Key language: sum, total, parts and whole, plus, add, altogether, more than, is equal to, is the same as

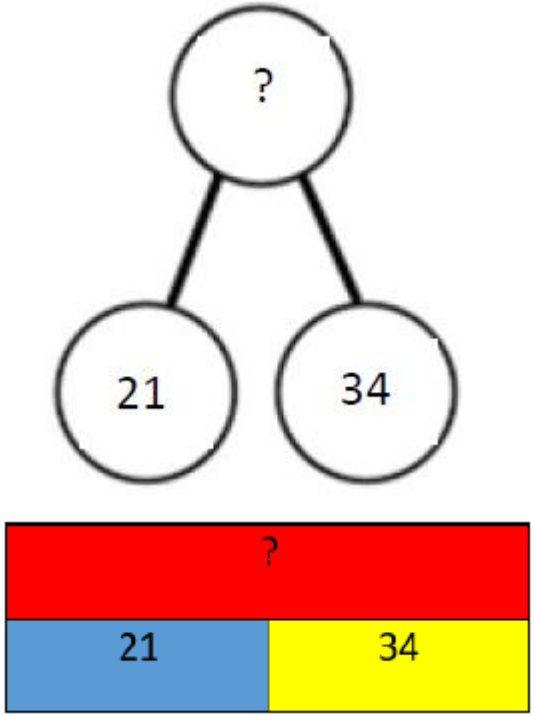
Concrete	Pictorial	Abstract
Combining two parts to make a whole (Use other resources as well e.g. teddy bears, little pigs, pinecones) 		4 + 3 = 7 (four is part, 3 is part and the whole is seven) 
Counting on using number lines or 100 squares by using cubes, Numicon   	A bar model which encourages the children to count on 	The abstract number line: What is 2 more than 4? What is the sum of 4 and 2? What's the total of 4 and 2? 4 + 2 

Concrete	Pictorial	Abstract
When adding 6 and 5, regrouping to make 10 by using ten frames and counters/cubes or using Numicon: 	Children to draw the ten frame and counters/cubes 	Children to develop an understanding of equality e.g. 6 + ☐ = 11 and 6 + 5 = 5 + ☐ 6 + 5 = ☐ + 4
Adding Tens Ones + Ones using Dienes Continue to develop understanding of partitioning and place value 41 + 8 	Children to represent the concrete using a particular symbol e.g. lines for tens and dot/crosses for ones 	Different ways to partition and recombine 41 + 8  1 + 8 = 9 40 + 9 = 49

Tens Ones + Tens Ones using number line or 100 square *Children are encouraged to use their understanding of place value with the resources* 22 + 15  	*Children draw an empty number line*   20 + 10 = 30 2 + 5 = 7 30 + 7 = 37	22 + 15 = 20 + 10 = 30 2 + 5 = 7 30 + 7 = 37 or 22 + 10 = 32 32 + 5 = 37 *Children are then encouraged to do this process mentally without writing down the steps*
Tens Ones + Tens Ones using dienes *Continue to develop understanding of partitioning and place value and use this to support addition* 36 + 25  	*This could be done one of two ways*   	36 + 25 = 30 + 20 = 50 6 + 5 = 11 50 + 11 = 61 or 36 + 20 = 56 56 + 5 = 61 *Children are then encouraged to do this process mentally without writing*

		down the steps

Mastery: different ways to ask children to solve e.g. 21 + 34



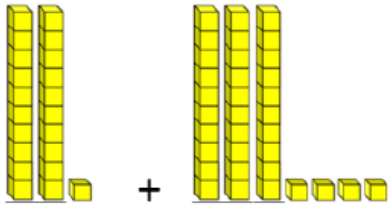
Sam saved £21 one week and £34 the next week. How much did he save in total?
21+34=55. Prove it!
(reasoning but the children need to be fluent in representing this)

21 + 34 =

□ = 21 + 34

What's the sum of twenty one and thirty four?

What's the total of twenty one and thirty four?



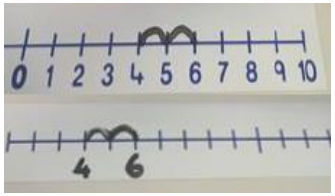
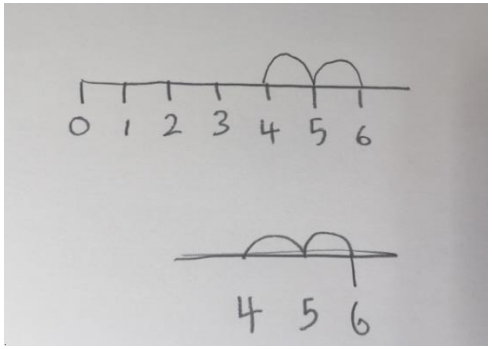
Ben and Sita count cars.

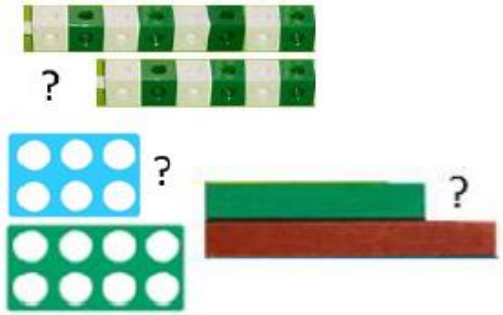
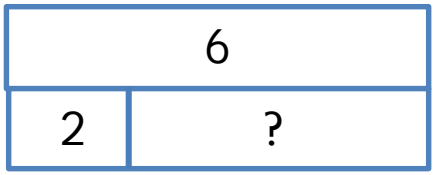
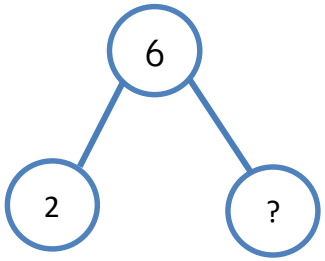
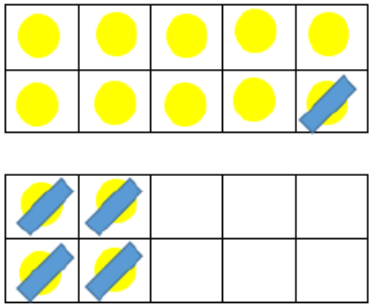
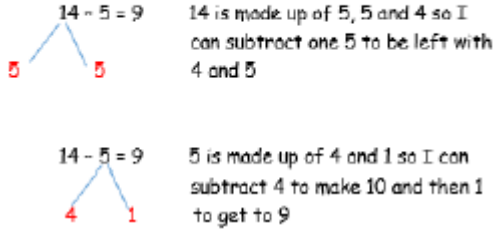
Ben counts 21 cars.
Sita counts 34 cars.

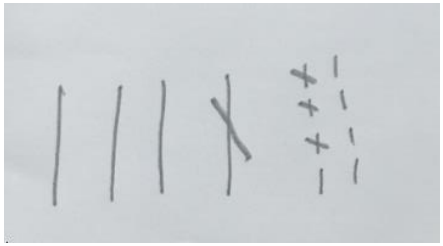
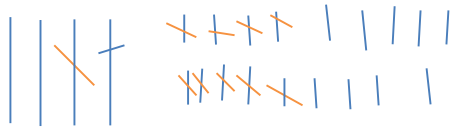
How many do they count altogether?

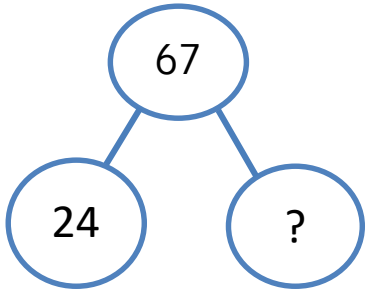
Subtraction

Key Language: take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3', the difference is four,

Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (using various objects) Rather than crossing out – children will physically remove the objects. E.g. 4 – 3 = 1 	Children to draw the concrete resources they are using and cross out.  Use of the bar model… 	4 – 3 = If I had four oranges and three rolled away, how many would I have left?
Counting back (Using number lines, number tracks or 100 squares)   	Children to represent what they see pictorially e.g.  	6 – 2 = 4 The abstract number line: What is 2 less than 6? What is two fewer than 6?

Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used) 	Children to draw the cubes / other concrete objects which they have used  	Find the difference between 8 and 6 8-6, the difference is…? Children to also explore why 9-7 = 8-6 (The difference of each digit, has changed by 1 so the difference is the same. This will help the children apply their knowledge to larger numbers, e.g. 90-70 = 80-60)
Using tens frames  The children physically move the counters	Children to present the ten frame pictorially 	14-5=9 You may also want the children to see related facts e.g. 9+5 =14 Children to represent how they have solved it e.g. 

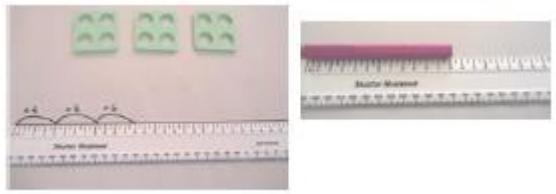
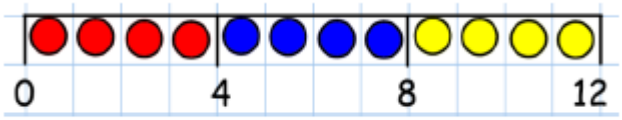
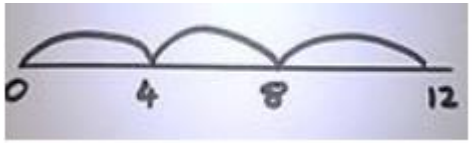
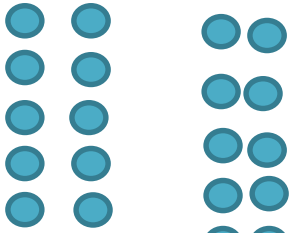
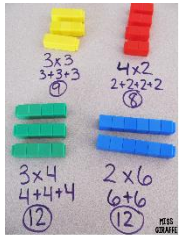
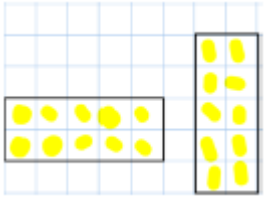
TO – TO using dienes 48- 13 	Drawing the Dienes as lines and dots 	Taking away the tens and ones: 48 – 13 48 – 10 = 38 38 – 3 = 35 The aim is for children to end up doing this stage mentally.
TO – TO using dienes crossing the 10's barrier. 48-19 	Drawing the Dienes as lines and dots. As you are unable to cross out 9 ones, you exchange a 10 diene for 10 ones. 	Taking away the tens and ones: 48 – 19 48 – 10 = 38 38 – 9 = 29

Mastery: different ways to ask children to solve e.g. 67 - 24:			
	Craig spent £67, Jonny spent £24. How much more did Craig spend? I had 67 metres to run. After 24 metres I stopped. How many metres do I have left to run?	☐ = 67 – 24 What is the inverse of 67 – 24 = ?	67 – 24 can't equal an even number. Is this statement true or false? Prove your answer.

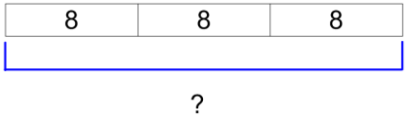
Multiplication

Key Language: double, times, multiplied by, the product of, groups of, lots of, 'is equal to', 'is the same as'

Concrete	Pictorial	Abstract
Repeated grouping / repeated addition (does not have to be restricted to cubes) 3 x 4 or 3 lots of 4 	Children to represent the practical resources In a picture e.g. XX XX XX XX XX XX Use of a bar model for a more structured method 	3 x 4 4 + 4 + 4

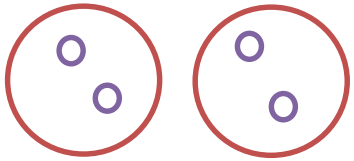
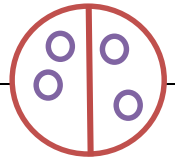
Use number lines to show repeated groups *e.g. 3 x 4* 	Represent this pictorially alongside a number line *e.g.* 	Abstract number line 3 x 4 = 12 
Use arrays to illustrate commutativity *(counters and other objects can also be used)* 2 x 5 = 5 x 2  	Children to draw arrays 	Children to be able to use an array to write a range of calculations *e.g.* 2 x 5 = 10 5 x 2 = 10 2 + 2 + 2 + 2 + 2 = 10 5 + 5 = 10 **+ Rote learning of times tables in year 2**

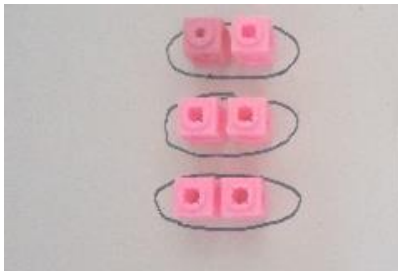
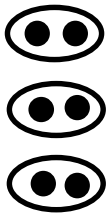
Mastery: *different ways to ask children to solve e.g. 3 x 8:*			
With the counters – prove that 3	*Jas has to swim 8 lengths, 3*	*Can you write this as a*	*One length of a swimming pool is*

x 8 = 24  Why is 3 x 8 = 8 x 3?	times a week. How many lengths does she swim in one week? Jamie saved 8 pounds three days a week. How much did he save in 1 week?	multiplication calculation? 8 + 8 + 8 =	8 metres. Kasim swims the length of the pool 3 times. Kasim works out how many metres he swims altogether. Circle the two calculations that Kasim could use. 3 + 8 3 x 8 8 + 8 + 8 3+ 3 + 3

Division

Key Language: share, group, divide, divided by, half, 'is equal to', 'is the same as'

Concrete	Pictorial	Abstract
Plate method 2 shared between 2 10 shared between 2  	Children to represent the practical resources In a picture e.g.  It can also be done with one plate split into sections: 	4 ÷ 2 = 2

Understand division as repeated grouping **6 ÷ 2 =** 	Children to draw groups of 2 until they have 6 in total: 6 ÷ 2 = 3 	Children to count in 2s until they get to 6. 2, 4, 6 They counted 3 2s so 6 ÷ 2 = 3

Mastery: different ways to ask children to solve e.g. 12 ÷ 2

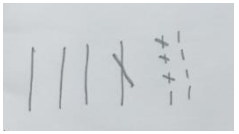
12 ÷ 2 = 2 Is this calculation correct? Can you prove what the correct answer is?	Pookie's Pet store has 12 bunny rabbits. They can only keep two in a hutch. How many hutches will they need?	Can you write a number sentence that makes the same total as the opposite side? 12 ÷ 2 = _____	Can you fill out the boxes with different calculations so that they make mathematical sense only using the numbers 12, 2 and 6? ☐ x ☐ = ☐ ☐ ÷ ☐ = ☐ ☐ x ☐ = ☐ ☐ ☐

			□ ÷ =

Glossary

Bar modelling

Dienes



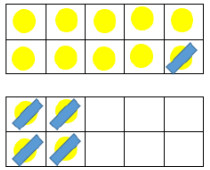
12

Multilink

Numicon

Inverse: The opposite calculations. The opposite of addition is subtraction (vice versa). The opposite of multiplication is division (vice versa).

Ten frame



Part part whole