Perton Primary Academy

Calculation Policy

2023 -2024

Reception to Year 4

Maths calculation Policy 2022-2023

This policy supports the White Rose maths scheme used throughout the school alongside Numicon, Nrich and NCTEM.

Progression within each area of calculation is in line with the programme of study in the 2014 National Curriculum.

This calculation policy should be used to support children to develop a deep understanding of number and calculation. This policy has been designed to teach children through the use of concrete, pictorial and abstract representations.

Concrete representation— a pupil is first introduced to an idea or skill by acting it out with real objects. This is a 'hands on' component using real objects and is a foundation for conceptual understanding.

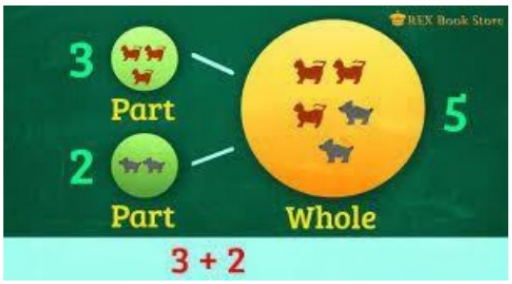
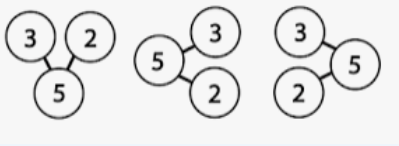
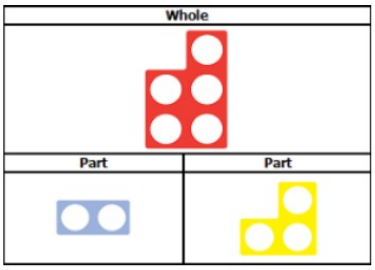
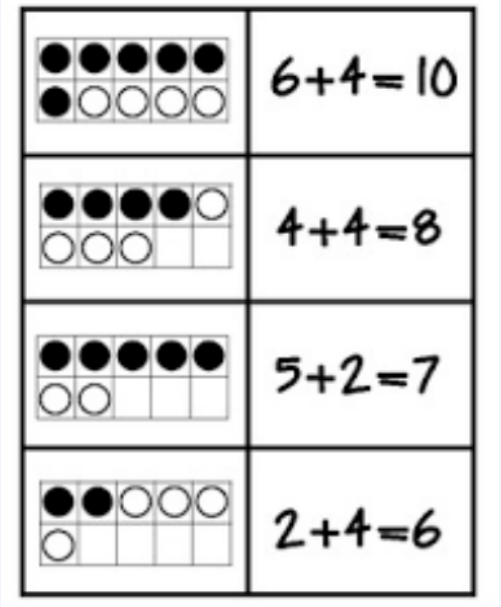
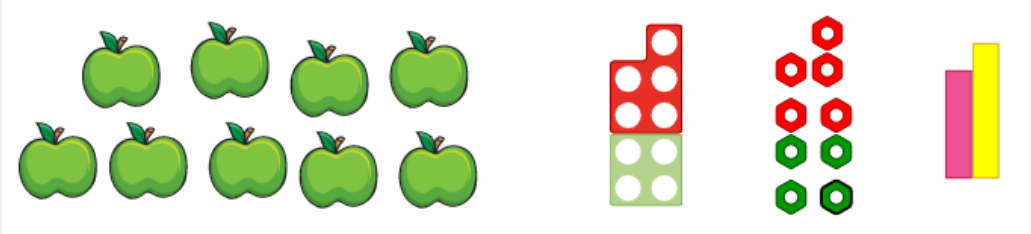
Pictorial representation – a pupil has sufficiently understood the 'hands on' experiences performed and can now relate them to representations , such as a diagram or picture of the problem.

Abstract representation—a pupil is now capable of representing problems by using mathematical notation, for example 12 x 2 = 24.

It is important that conceptual understanding , supported by the use of representation, is secure for all procedures. Reinforcement is achieved by going back and forth between these representations.

Reception

Addition (Reception)

Explore part part whole relationship—combining two parts to make a whole.	   
Using the ten frame and Numicon to support addition of single digits—counting all/ combining two groups. Children combine Numicon to look for known shapes.	 
Solving problems using concrete, pictorial images. Children use a range of concrete resources including counters, rods, numicon and	

Reception

Subtraction (Reception)

Using concrete strategies for counting.

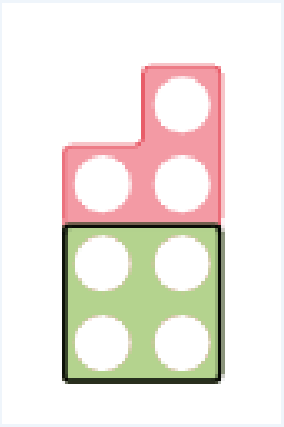
Subtraction by finding the difference.

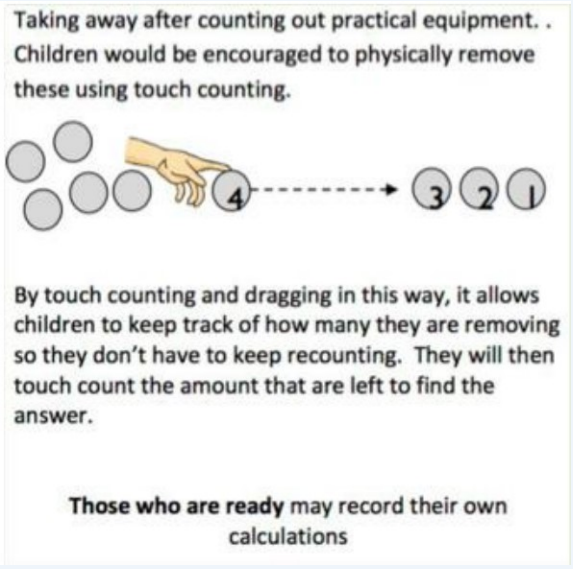
Step 1—Cover larger Numicon with smaller Numicon to find the difference.

Step 2—cover the holes you are subtracting.

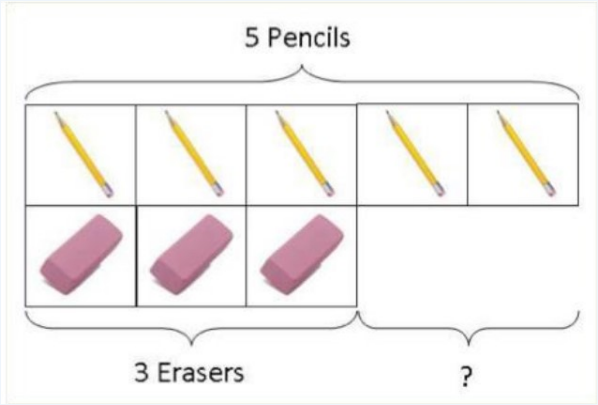
Step 3 -

Look for the shape and calculate the





Using the ten frames to support subtraction by taking away

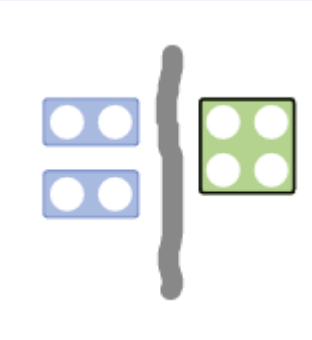


Reception

Multiplication (Reception)

Experiencing equal groups of objects

They will think about doubling when solving practical problems.



Division (Reception)

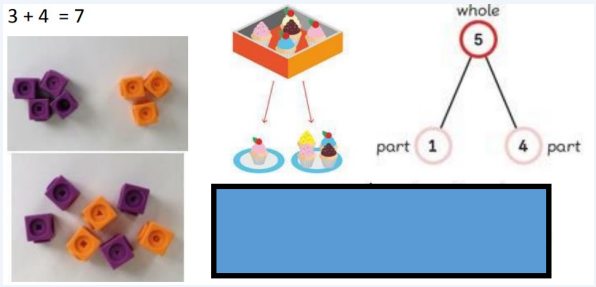
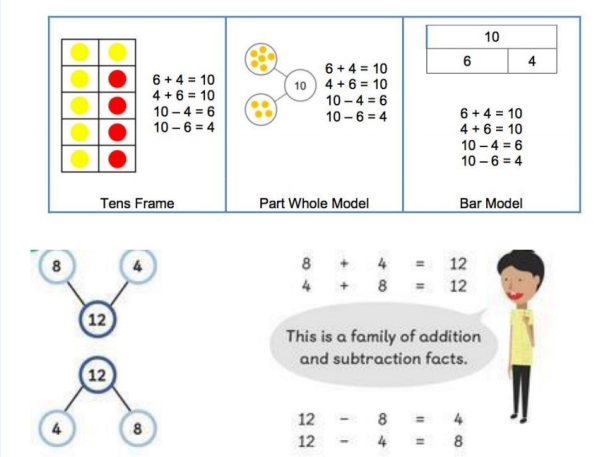
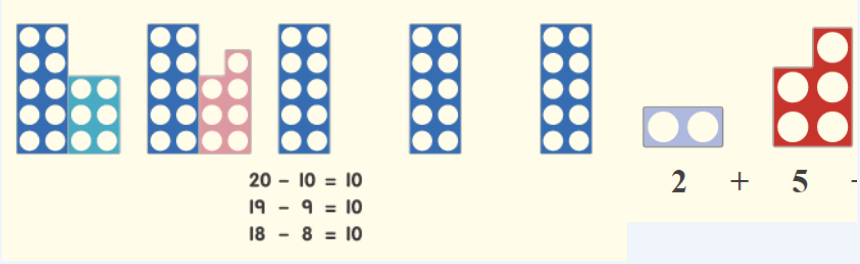
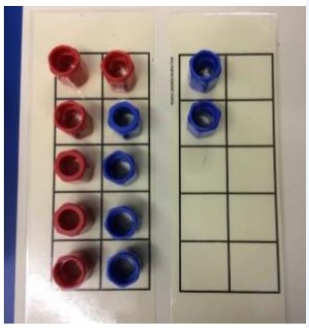
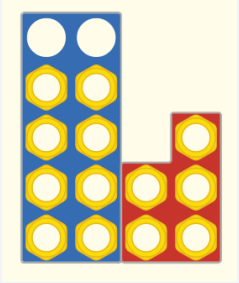
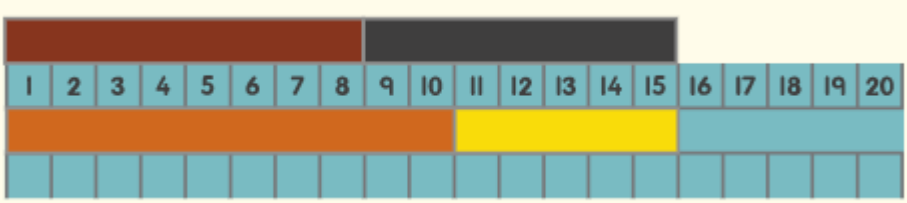
Sharing practical objects.

Finding half of a collection.

Hearing and being exposed to language to describe half and seeing visual representations.

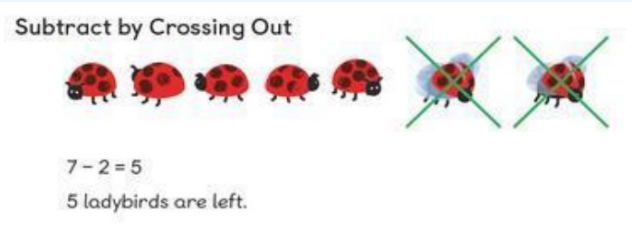
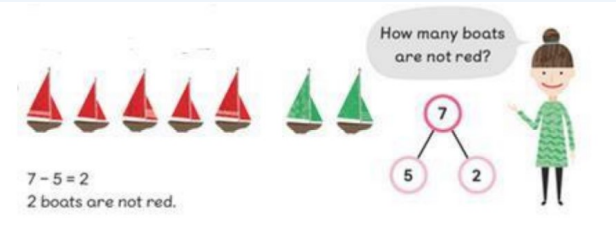
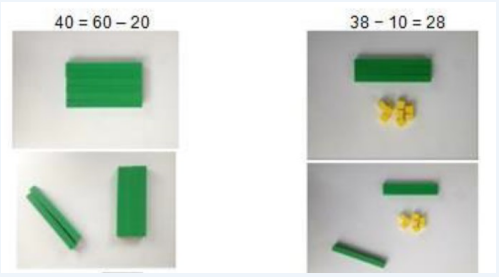
Year 1

Addition (Year 1)

Combining two parts to make a whole: part whole model. Joining two groups and then recounting all objects (lots of practice making 10 and numbers to 10 e.g. 6 + 4 = 10 or 3 + 5 = 8) Combining Numi-con	  
Number Bonds Learn number bonds to 20 and demonstrate related facts. Addition and subtraction taught alongside each other as pupils need to see the relationship between the facts.	
Add and subtract one digit numbers and two digit numbers to 20, including zero	
Bridging 10; 6 + 6 = 12 Make 9 in one and 3 in the other. Take one from the 3 to make the 9 into a ten….10+2 = 12 use ten frames, Singapore bars, Children should start with the larger number and add the smaller number seeing what makes ten.	  6 + 6 = 12 

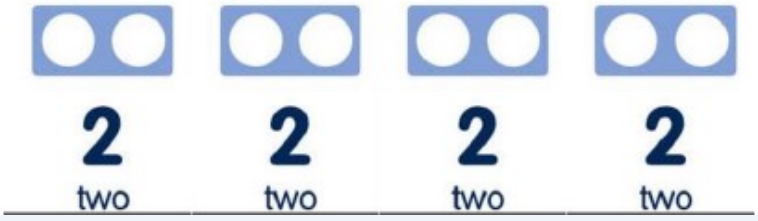
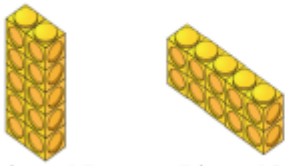
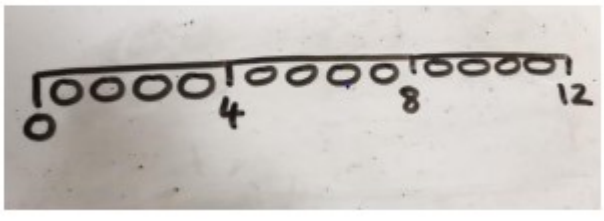
Year 1

Subtraction (Year 1)

Taking away should begin with physical objects: counters, cubes, Dienes etc Drawing Numicon.	
Subtracting a single digit number from a single digit number and a single digit from a two digit by crossing out pictures	 
Subtracting using the part part whole model (include problem solving with missing dig-its). ? - 5 = 2	
When subtracting using Dienes children should be taught to regroup (rename) a ten rod for 10 ones and then sub-tract from those ones	
Subtracting Multiples of 10. Using the vocabulary of 1 ten, two tens, etc, alongside 10, 20, 30 is important	

Year 1

Multiplication (Year 1)

Counting in Multiples of 2, 5 and 10 from zero. Children should count the number of groups on their fingers as they are skip counting.	2 4 6 8 4 groups of 2 = 8 4 x 2 = 8  2 × 4 = 8  2 two 2 two 2 two 2 two
When moving to pictorial/written calculations the language is important	**Use arrays to illustrate commutativity** counters and other objects can also be used. 2 × 5 = 5 × 2  2 lots of 5 5 lots of 2
Solving Multiplication Problems using repeated addition	3 × 4  Represent this pictorially alongside a number line e.g.: 

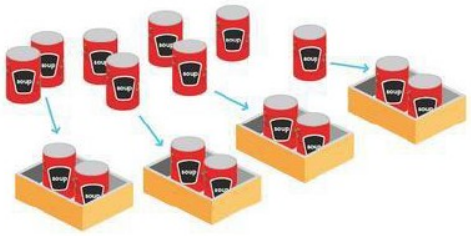
Year 1

Division (Year 1)

Pupils should be taught to divide by working practically and the sharing should be shown below the whole to familiarise children with the concept of the whole.

10 ÷ 2 = 5

1 There are 8 cans.

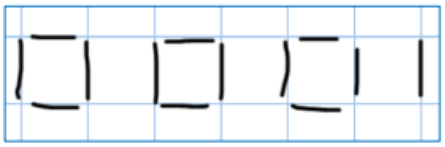


There are 4 boxes of 2 cans.

Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.

There are 3 whole squares, with 1 left over.

Children to represent the lollipop sticks pictorially.

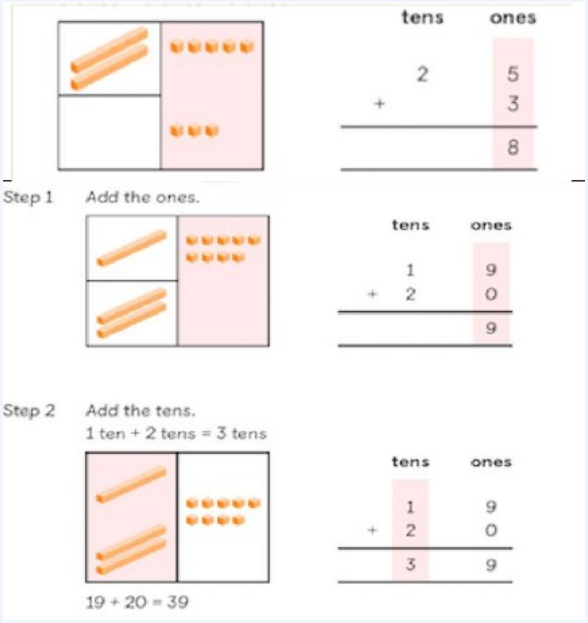


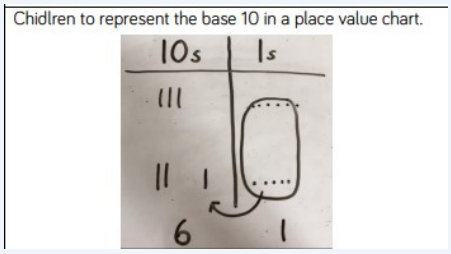
There are 3 whole squares, with 1 left over.

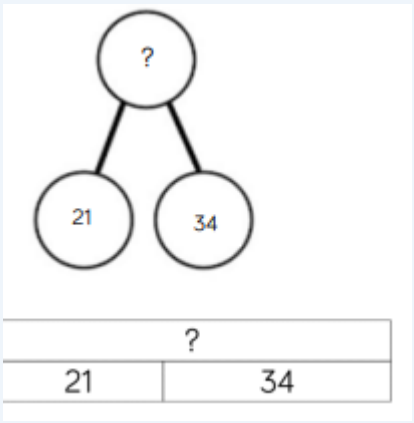
Year 2

Addition (Year 2)

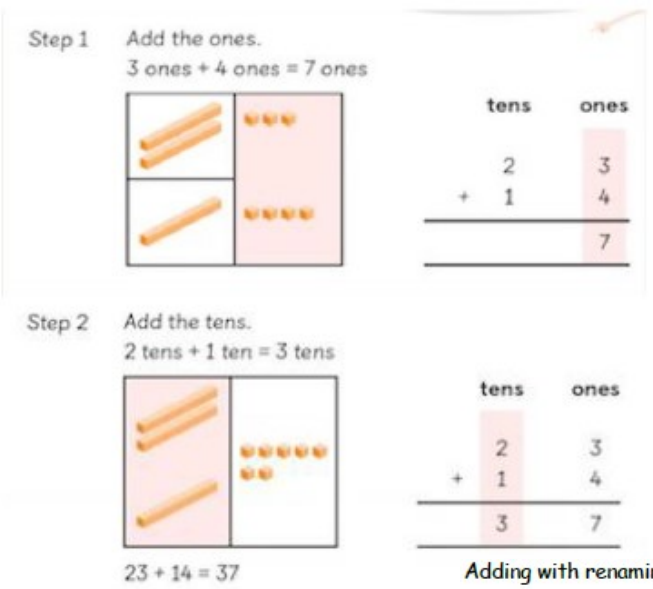
Using concrete and pictorial representations to add a 2 digit number to a 1 digit number and a 2 digit number to a tens number.

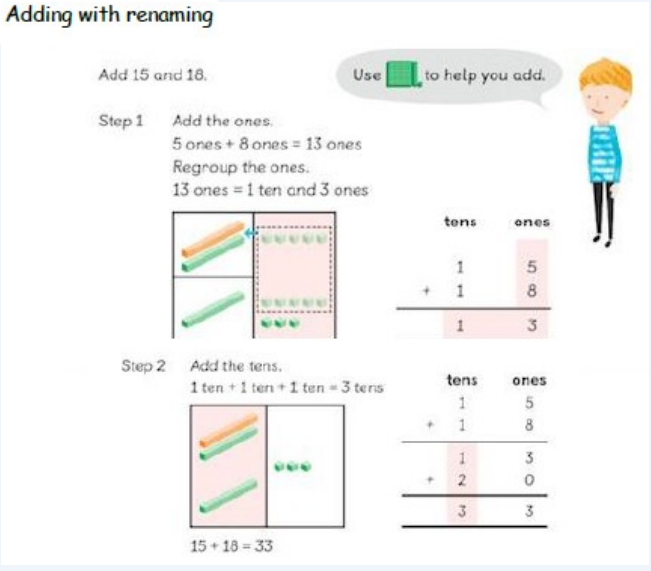






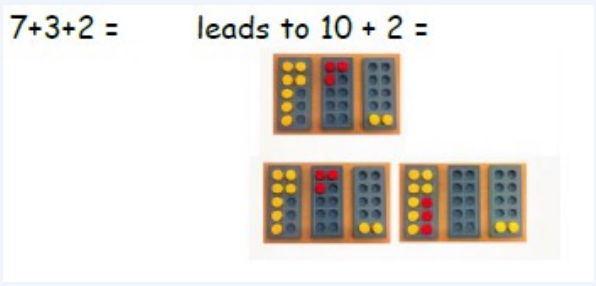
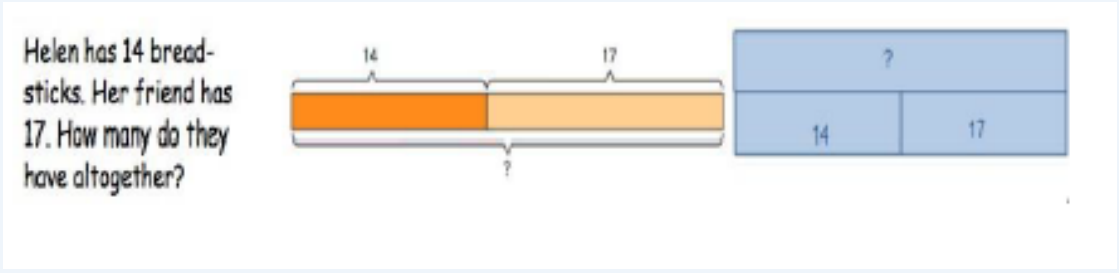
Using concrete and pictorial representations to add two 2 digit numbers.





Year 2

Addition (Year 2)

Using concrete and pictorial representations to add 3 single digit numbers.	 
Using the bar model to find missing digits: It is important for the children to use the bar model in this way to encourage the use of it to aid problem solving.	

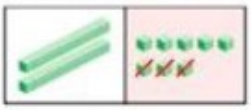
Year 2

Subtraction (Year 2)

Using concrete and pictorial representations to subtract a 1 digit number from a 2 digit number

Step 1 Subtract the ones.

8 ones − 3 ones = 5 ones



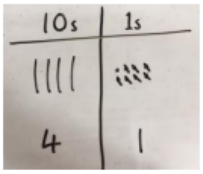
	tens	ones
	2	8
−		3
		5

Step 2 Subtract the tens.

	tens	ones
	2	8
−		3
	2	5

28 − 3 = 25

Children to represent the base 10 pictorially.

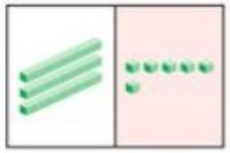


Column method or children could count back 7.

	4	8
−		7
	4	1

Using concrete and pictorial representations to subtract a 2 digit number from a tens number

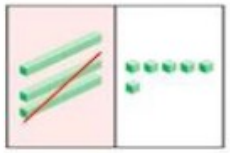
Step 1 Subtract the ones.



	tens	ones
	3	6
−	2	0
		6

Step 2 Subtract the tens.

3 tens − 2 tens = 1 ten



	tens	ones
	3	6
−	2	0
	1	6

36 − 20 = 16

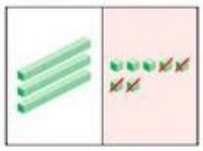
Using concrete and pictorial representations to subtract a 2 digit number from a 2 digit number

Subtract 24 from 37.

Use  to help you subtract.

Step 1 Subtract the ones.

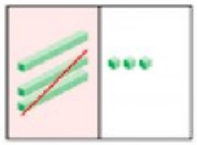
7 ones − 4 ones = 3 ones



	tens	ones
	3	7
−	2	4
		3

Step 2 Subtract the tens.

3 tens − 2 tens = 1 ten



	tens	ones
	3	7
−	2	4
	1	3

37 − 24 = 13

Recognise and use the inverse relationship between addition and subtraction.

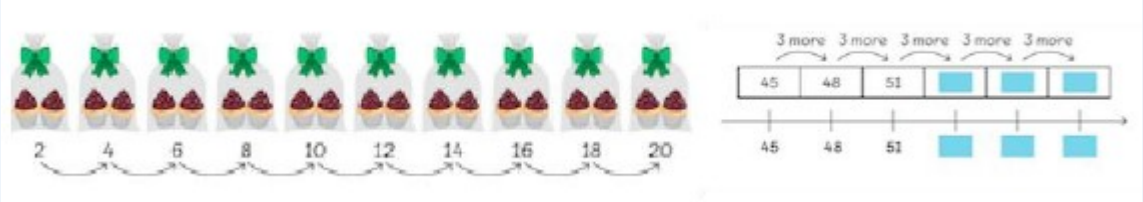
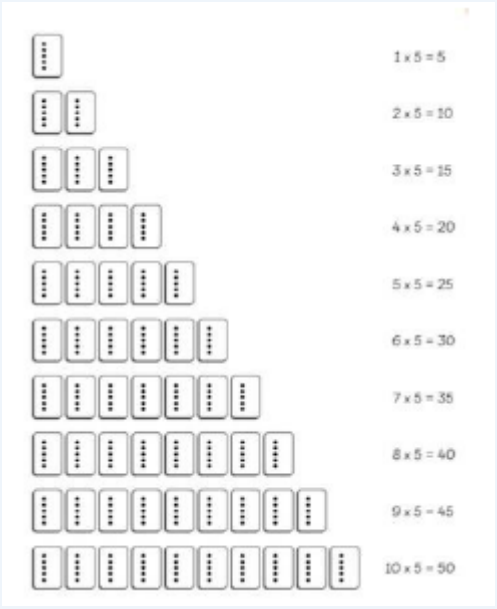
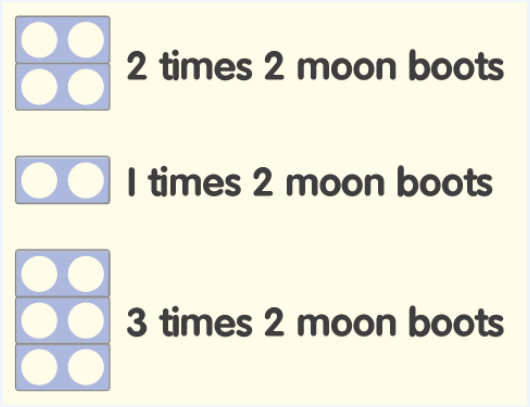
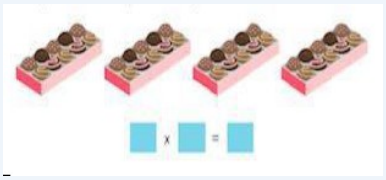
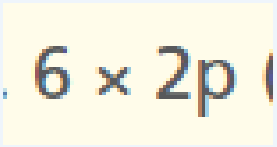
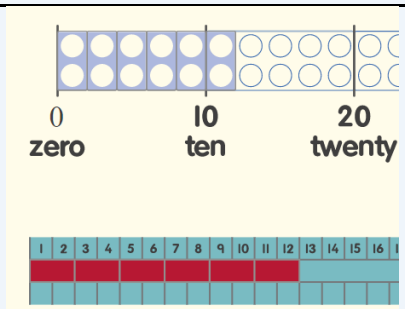
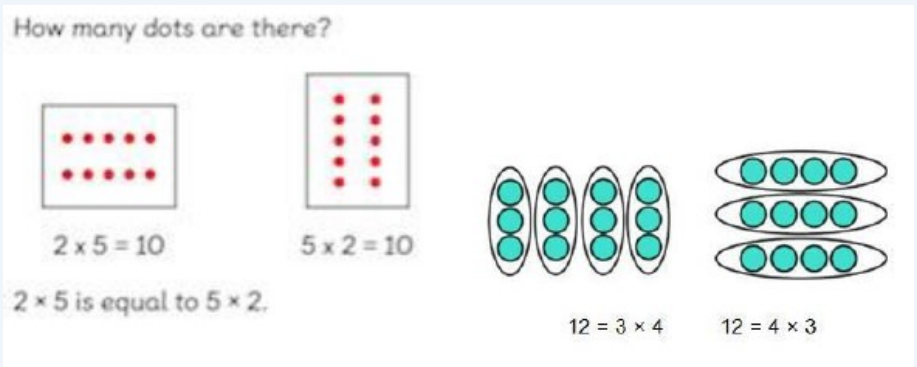
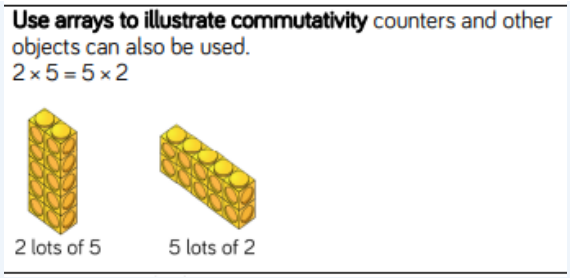
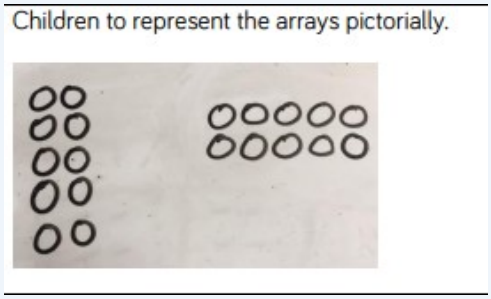
?	
23	53

76	
23	?

Use this to check calculations and solve missing number problems.

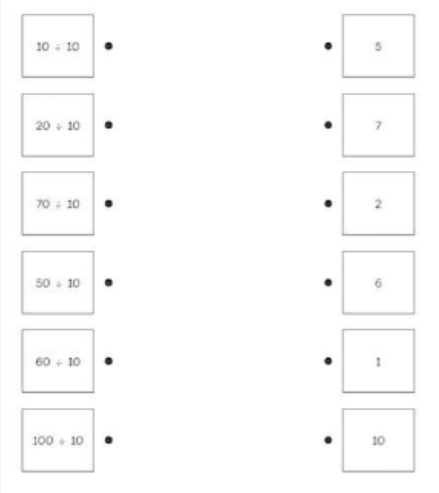
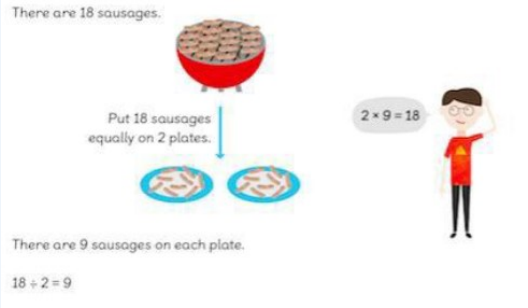
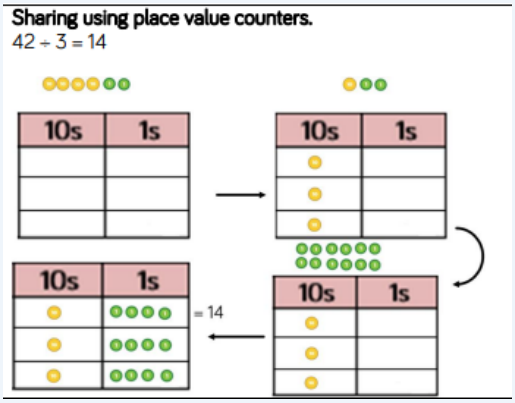
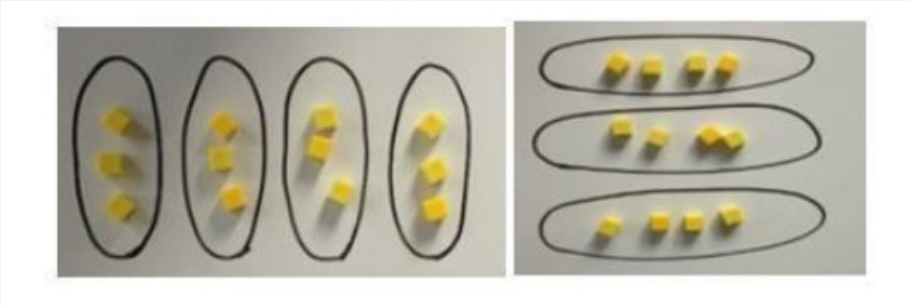
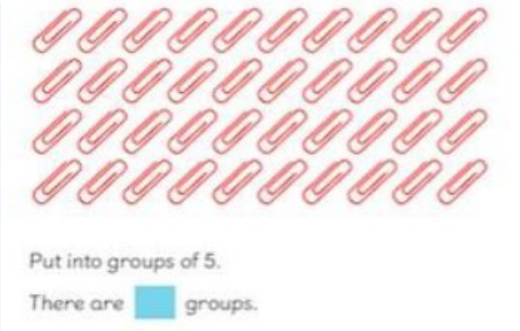
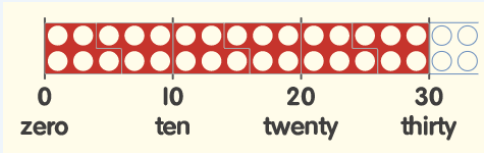
Year 2

Multiplication (Year 2)

Skip counting in multiples of 2, 3, 5 and 10 from zero.	
Recall and reuse multiplication facts for the 2, 5 and 10 times tables.	 
Use multiplication sign (X) and equals sign (=) when writing out multiplication tables.	  
Understand that multiplication is commutative Pupils should understand that an array can represent different equations and that as multiplication is commutative the order doesn't affect the answer.	  

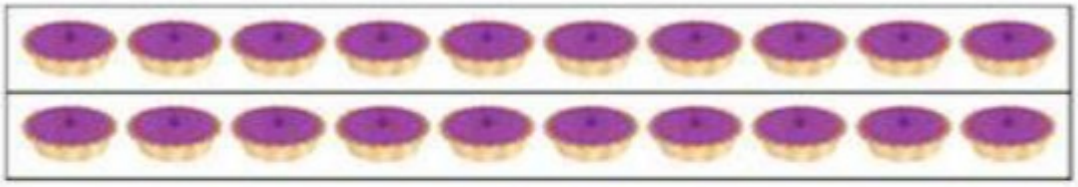
Year 2

Division (Year 2)

Recall and use the division facts for 2, 5 and 10 multiplication tables.	
Solve division problems in context by using concrete objects by sharing.	 
Solve division problems in context using arrays.	
Solve division using grouping.	  

Year 2

Division (Year 2)

Use the inverse This should be taught alongside both multiplication and division.	Make a family of multiplication and division facts.  2 x 10 = 20 ——— 20 ÷ 10 = ☐ 10 x 2 = 20 ——— 20 ÷ 2 = ☐