

Girnhill Infant School

Written Calculation

Policy for

Mathematics





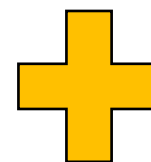
# Addition

Children need to understand the concept of addition as:

- Combining two or more groups to give a total or sum.
- Increasing an amount

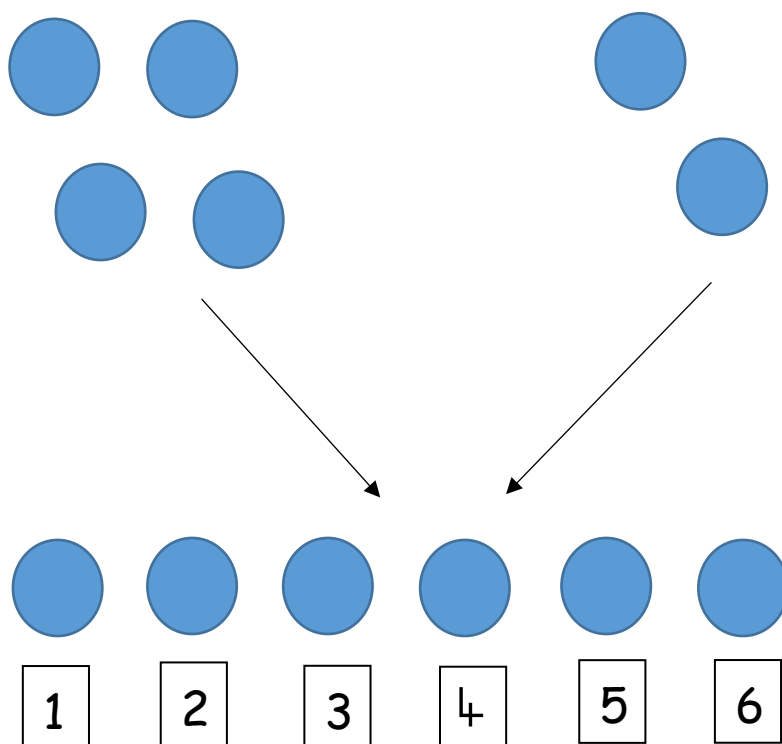
They also need to understand and work with certain principles:

- Inverse of subtraction
- It is commutative -  $5 + 3 = 3 + 5$
- It is associative -  $5 + 3 + 7 = 5 + (3+7)$



## Stage 1 – Counting altogether – EYFS

Children should count two sets of quantities and find how many altogether.

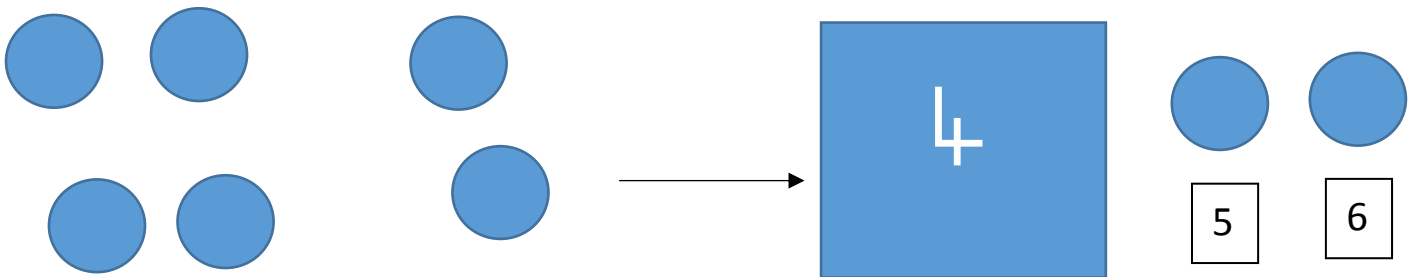


Children are taught that addition is combining of two or more amounts. They begin by counting all of the items in the groups. Children are encouraged to think of a mental image of the size of numbers.



## Stage 2 – Counting On (EYFS/Y1)

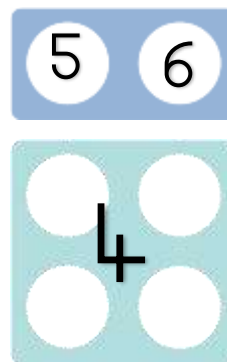
Children should count two sets by covering the larger amount. They should then count on the other amount.



### Success Criteria

- Start with the largest number
- Count on
- Find the solution

Other resources can be used to demonstrate counting on. Numicon is very helpful for children to recognise the value of the number



Children learn to think about addition as combining amounts in practical, real life situations. They begin to record addition number sentences.

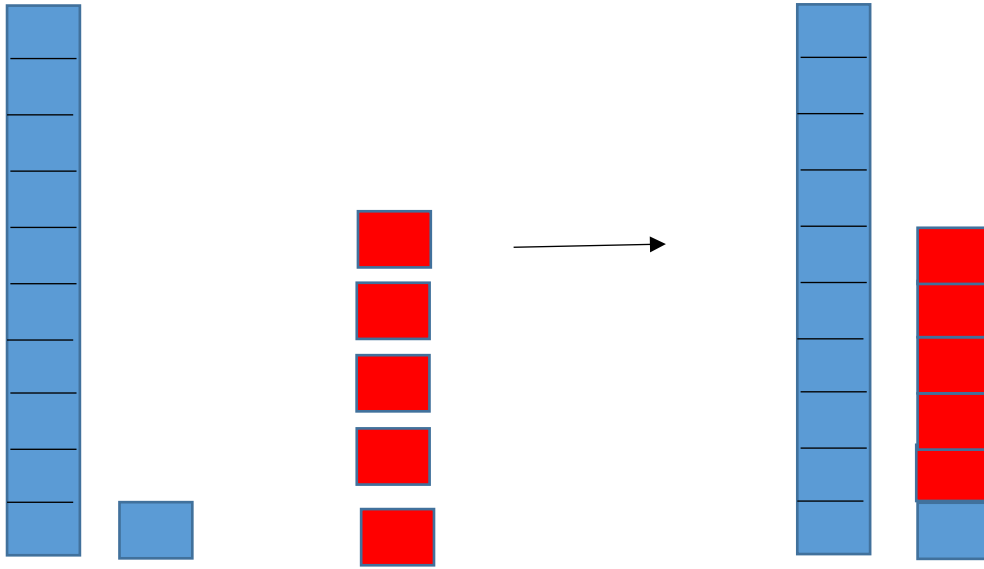
$$\text{e.g. } 4 + 2 = 6$$



### Stage 3 – Using Base 10 (Y1)

Children then need to move on to using Base 10 equipment to support their developing understanding of addition.

e.g.  $11 + 5 =$

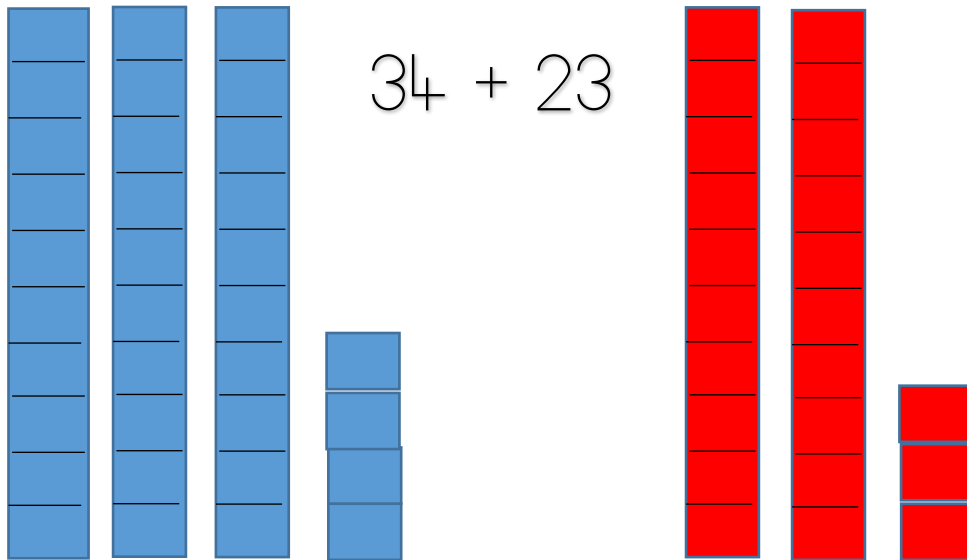


11 cubes are lined up (1 ten and 1 unit/one), 5 cubes are added to the line of 11 giving a total of 16.

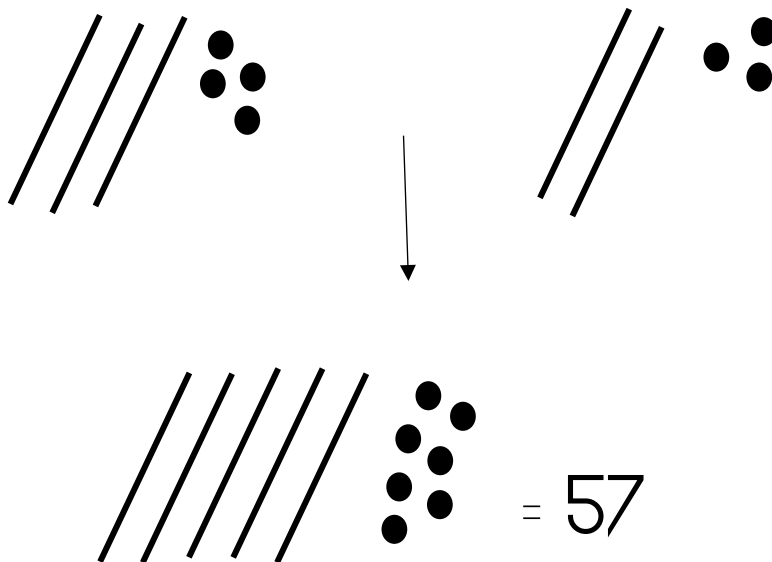


## Stage 4 - Using Base 10 - not crossing the boundary (Y2)

Children continue using base 10 equipment to support their calculations.



Children should draw diagram as shown below:



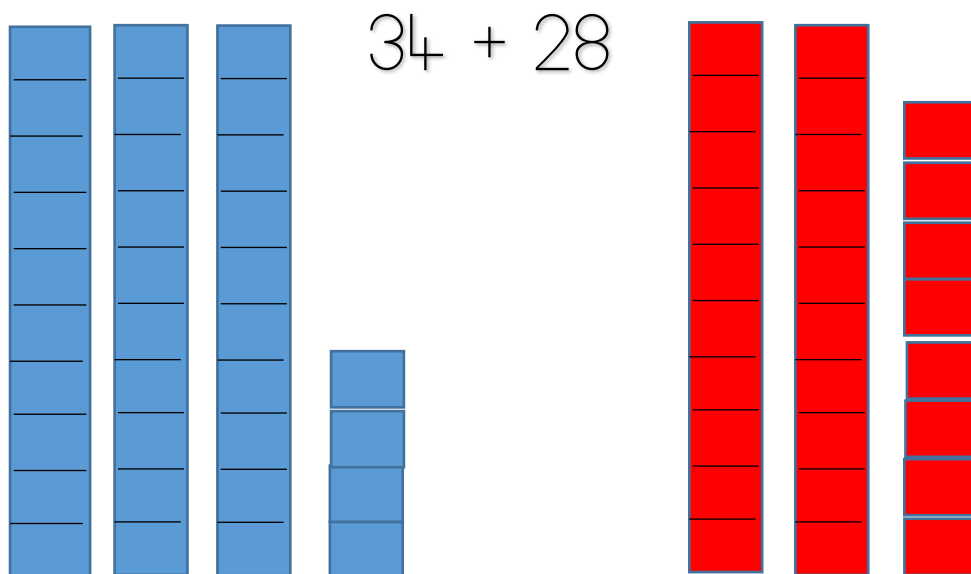
### Success Criteria

- Count the ones first
- Count the tens
- Add the tens and the ones together
- Find the solution

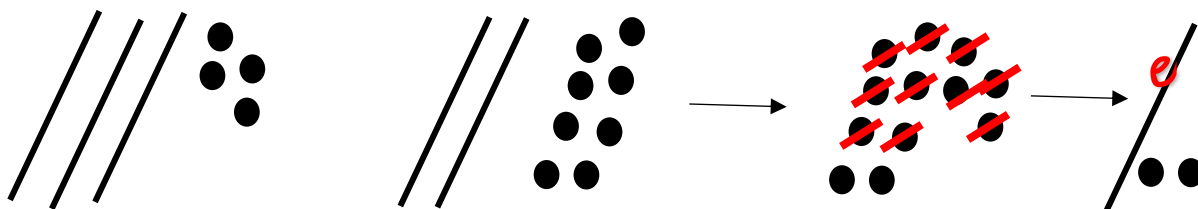
Children should record their own drawings of base 10 equipment using lines for tens and dots for ones.



## Stage 5 - Using Base 10 - crossing the boundary (Y2)



Children will need to exchange up and swap 10 ones/units for a ten piece.



Once children have exchanged the ones for a ten, they then need to follow the success criteria.

$$4 \text{ rods and } 2 \text{ units} = 62$$

### Success Criteria

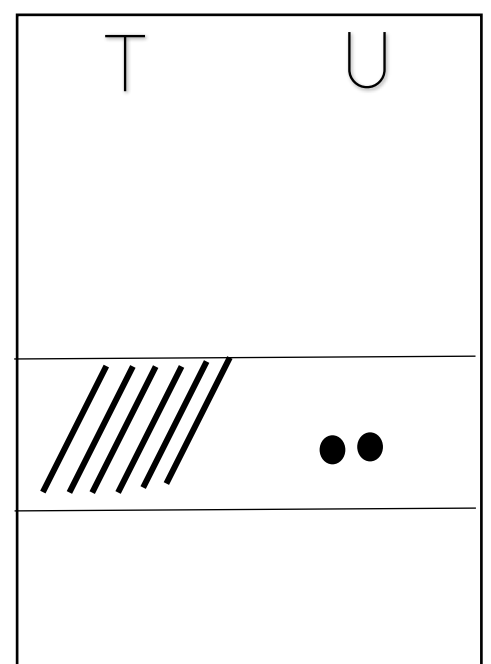
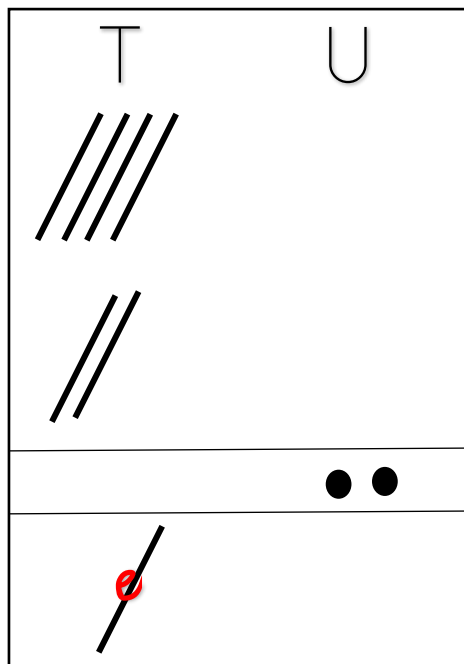
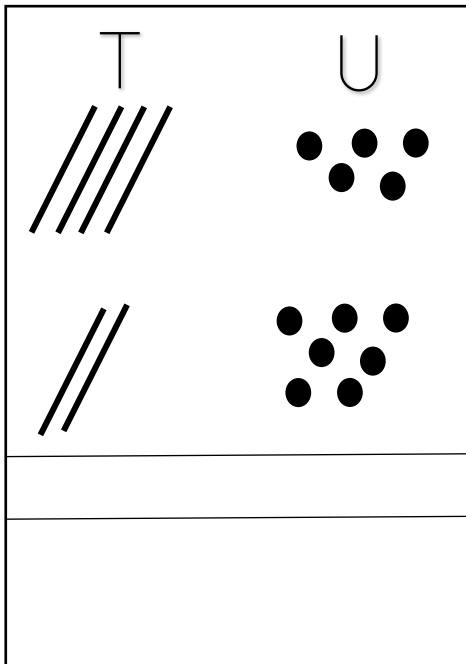
- Count the ones first
- Exchange up the ones for a ten
  - Count the tens
- Add the tens and the ones together
- Find the solution



## Stage 6 – beginning to use the column method (Y3)

Children are applying prior learning of partitioning into writing the addition in the column method.

$$45 + 27$$



### Written Method

Step One

	T	U
	4	5
+	2	7
<hr/>		
<hr/>		

Step Two

	T	U
	4	5
+	2	7
<hr/>		
		2
<hr/>		
	1	

Step Three

	T	U
	4	5
+	2	7
<hr/>		
	7	2
<hr/>		
	1	





# Subtraction

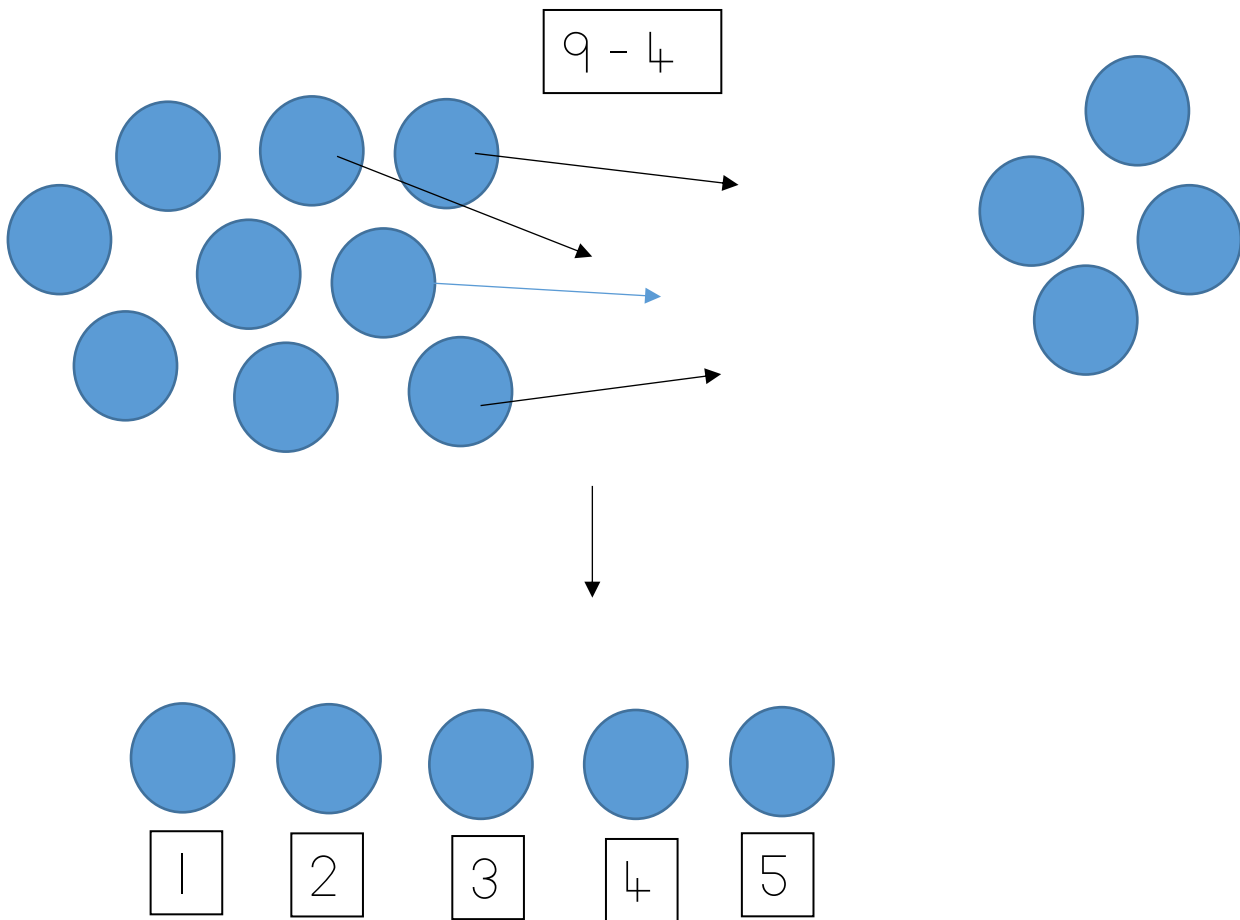
Children need to understand the concept of subtraction as:

- Removal of an amount from a larger group (take away)
- Comparison of two amounts (difference)

They also need to understand and work with certain principles:

- Inverse of addition
- It is NOT commutative -  $5 - 3 \neq 3 - 5$
- It is NOT associative -  $(9 - 3) - 2 \neq 9 - (3 - 2)$

## Stage 1 - Taking Away (EYFS)

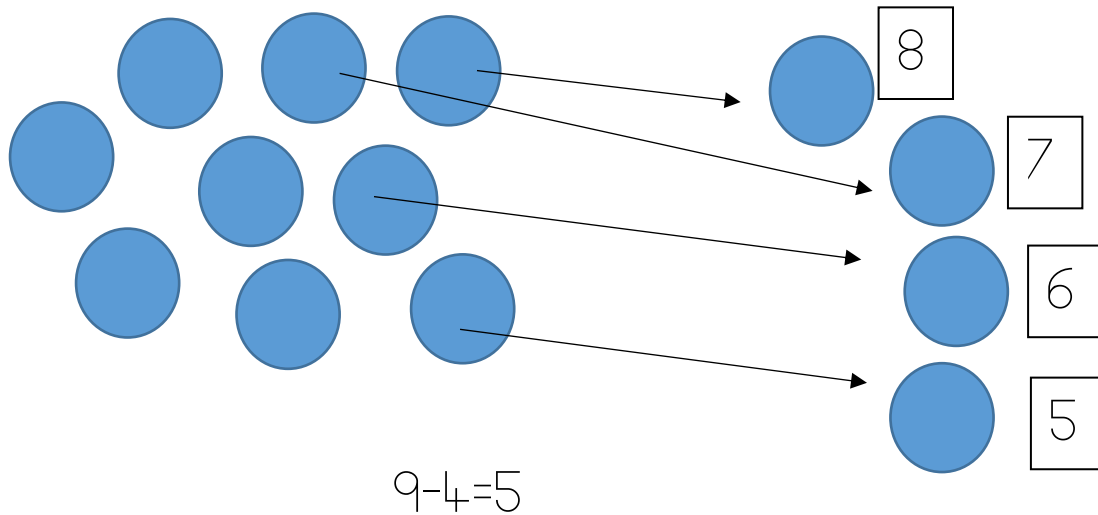


Children will take four items away by taking one at a time. Children will then count how many items are left.

Children are encouraged to think of a mental image of the size of numbers.

## Stage 2 – Counting Back (Y1)

Children will develop the skill of taking away by counting back in sequence as they 'take away' an item.

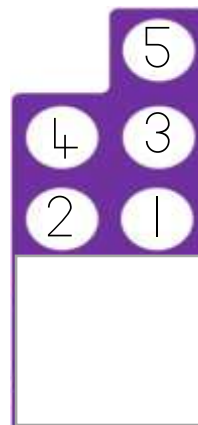


Children learn to think about subtraction as 'take away' in practical real life situations. They begin to record number sentences as above.

### Success Criteria

- Start with the largest number
- Take one item away at a time
- Say out loud the number each time you count back

Numicon is a valuable resource that can be used to support counting back.

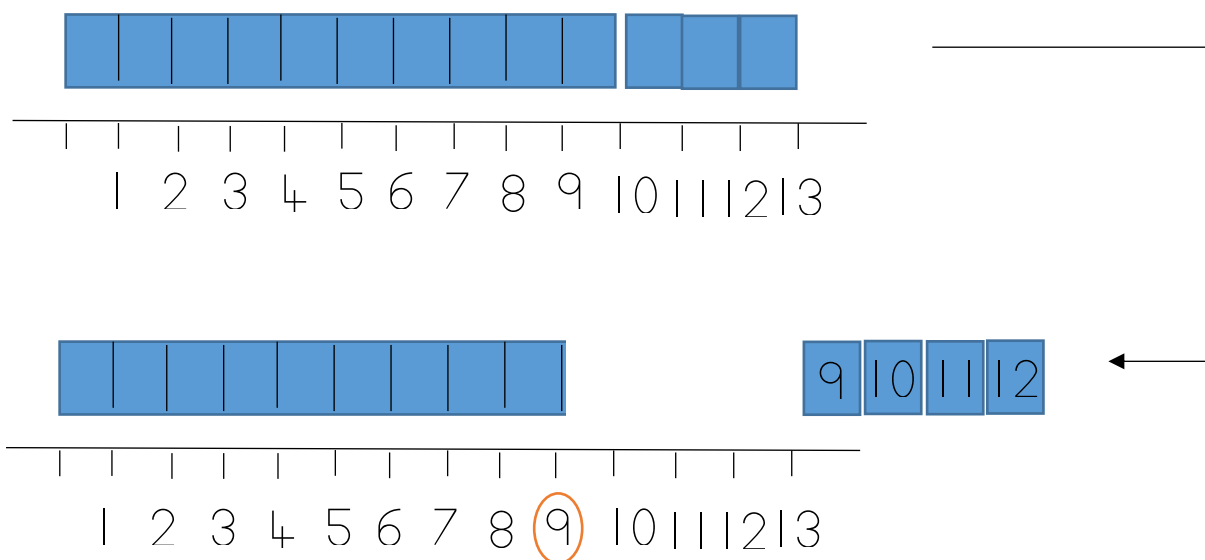


Cover are used to show the removal of the number

### Stage 3 – Using Base 10 and Number Lines (Y1)

Children move onto using Base 10 equipment alongside a number track to develop their understanding of subtraction.

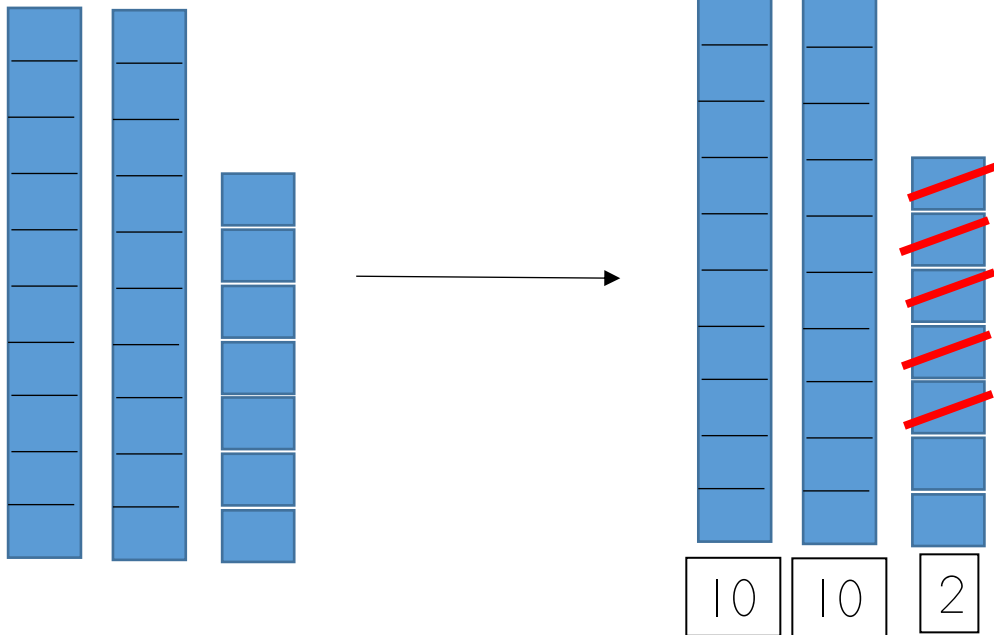
$$13 - 4 = ?$$



13 cubes are lined up. 4 cubes are removed from the end of the line. Children are encouraged to count back through the sequence of numbers each time they remove one cube. The number track supports learning as the children can use this to check they have counted back to the correct number.

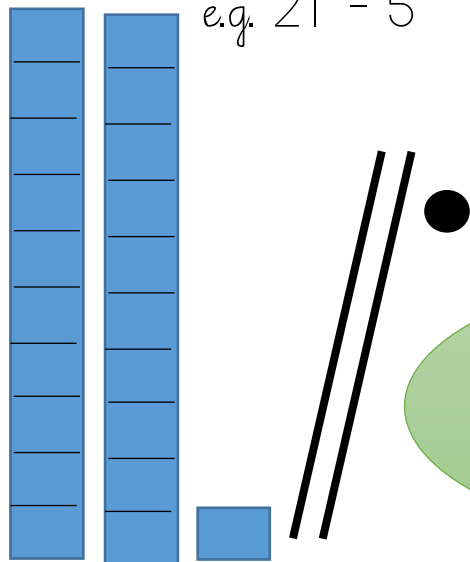
## Stage 4 - Using Base 10 - 2 digit number and ones (Y2)

$$27 - 5 = ?$$



It becomes more difficult for children when crossing the boundary.

e.g.  $21 - 5$

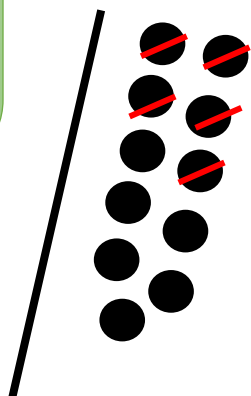


Children need to draw the base 10 as shown here. Using a line for a ten and a dot for a one.

1-5 becomes confusing for children so a ten needs exchanging down for 10 ones

### Success Criteria

- Start with ones
- Exchange a ten down if needed
- Subtract ones
- Subtract tens

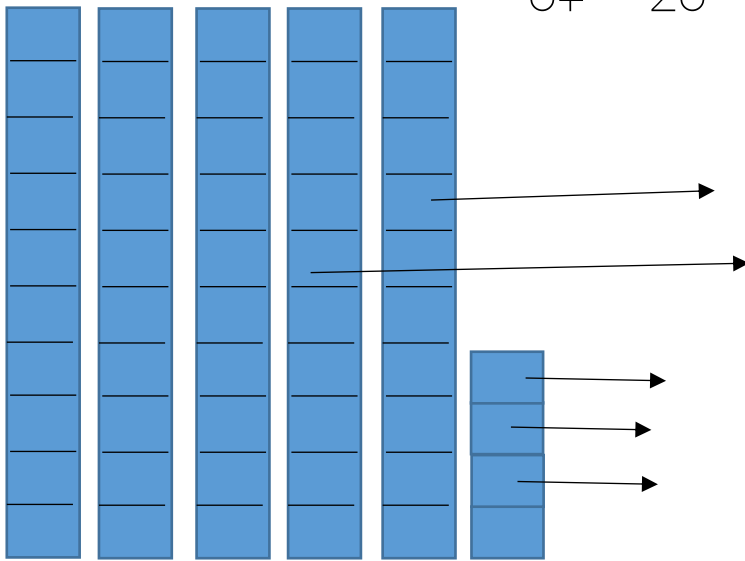


= 1 ten and 6 ones

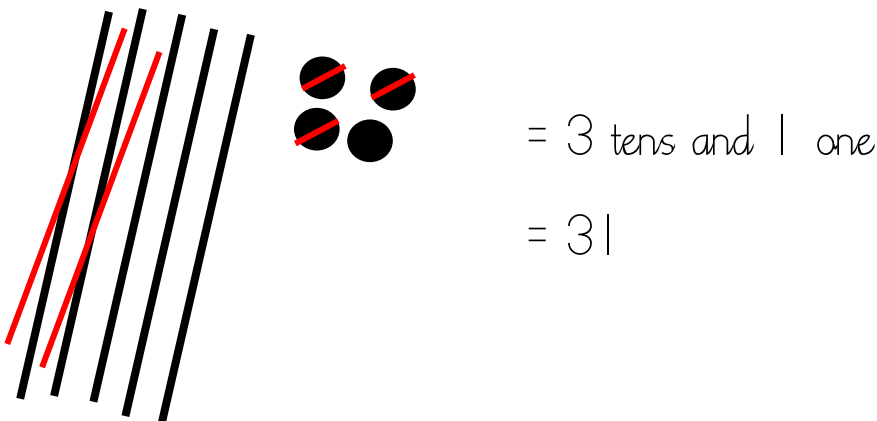
= 16

## Stage 5 - Using Base 10 - Two 2 Digit Numbers (Y2)

$$54 - 23 = ?$$



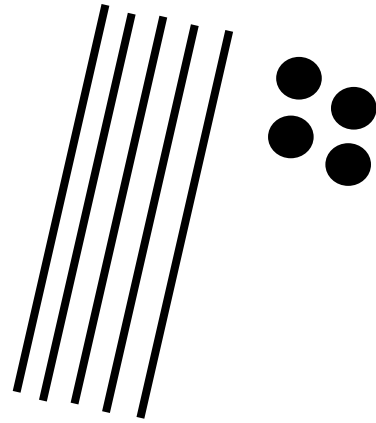
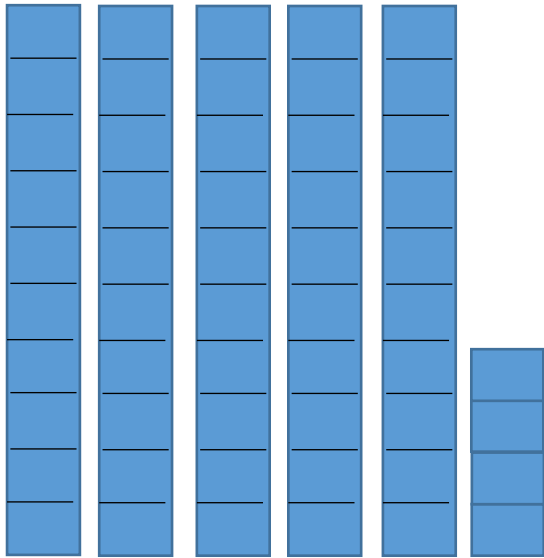
Children are encouraged to use jottings and diagrams to support them.



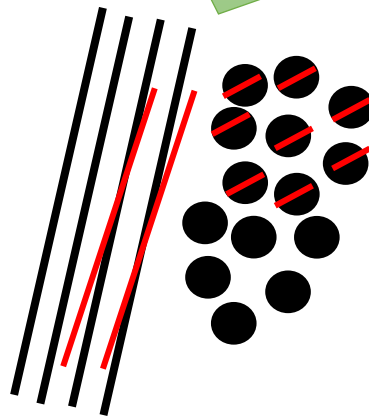
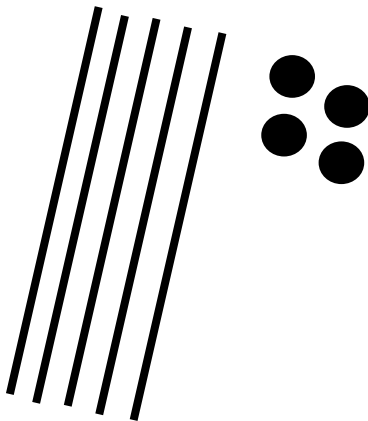
This becomes more difficult for children when they have to cross the boundary. This is shown on the next page.

Stage 6 - Using Base 10 - crossing the boundary (Y2)

$$54 - 28$$



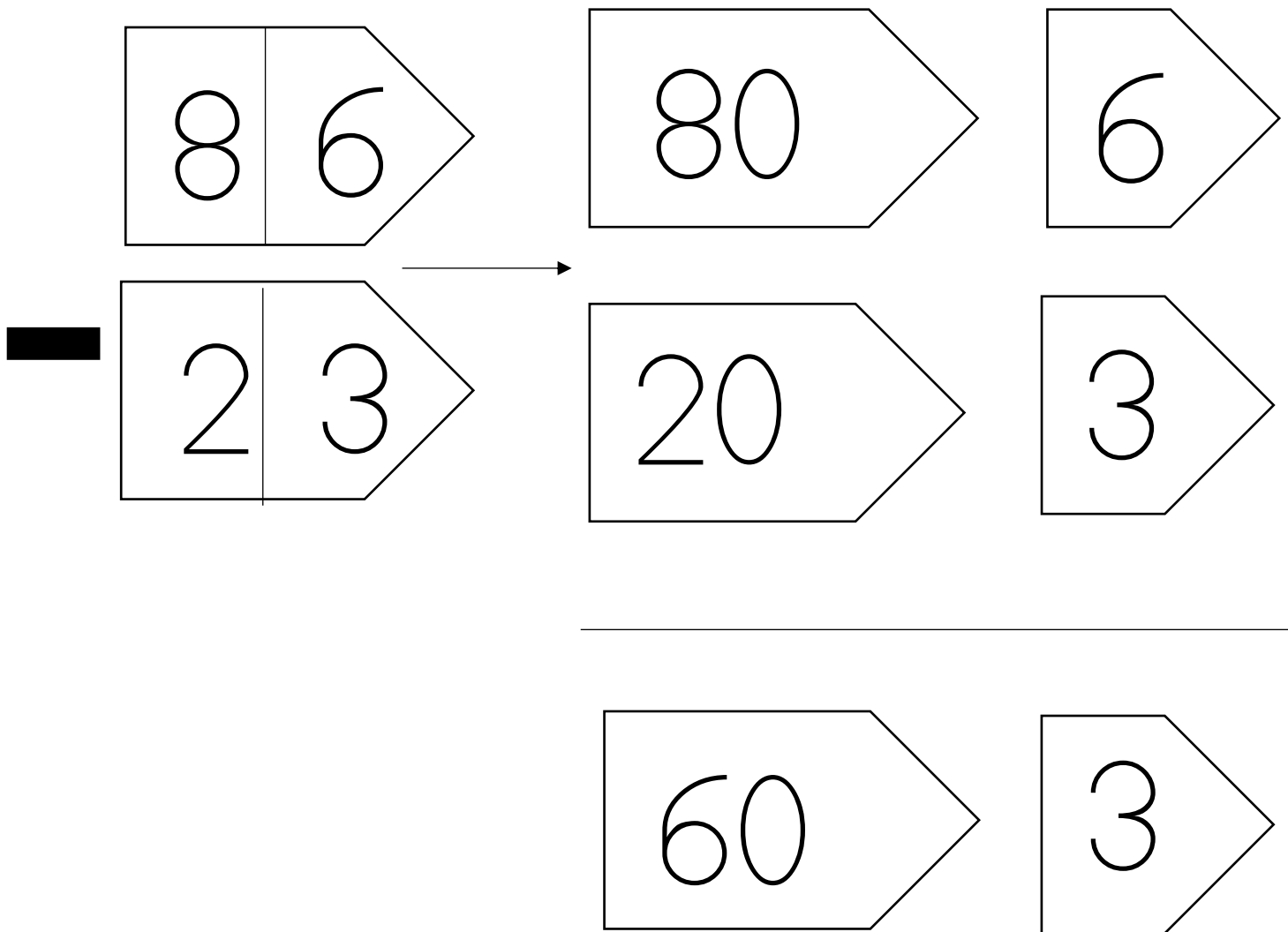
Here we need to exchange 1 ten for 10 ones so it becomes  $14 - 8$ , rather than  $4 - 8$ .



= 2 tens  
and 6 ones  
= 26

Stage 7 - Beginning column subtraction - expanded (Y3)

Arrow cards are really useful when beginning to teach column method.



This would then progress onto the numbers being wrote as 63.  
Rather than partitioned into tens and ones.



# Multiplication



Children need to understand the concept of multiplication as:

- Repeated addition
- Can be represented as an array

They also need to understand and work with certain principles:

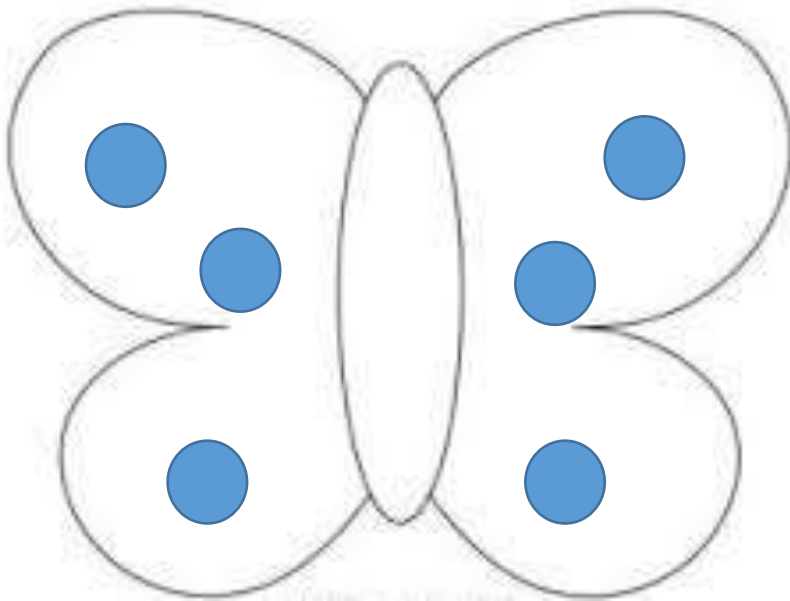
- It is the inverse of division
- It is commutative
- It is associative



## Stage 1 – Doubling (EYFS)

Children begin learning about the concept of multiplication through doubling. These will be practical, real life situations.

e.g. The butterfly has the same number of spots on both sides of the wings.



3 Spots on one side and 3 spots on the other side.

$$3 + 3 = 6 \text{ or Double } 3 \text{ is } 6.$$

Children are encouraged to develop a mental image of the size of numbers. They can begin to record these situations using pictures and diagrams.

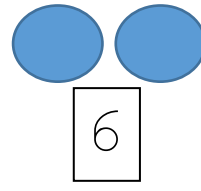
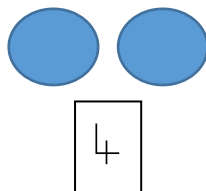
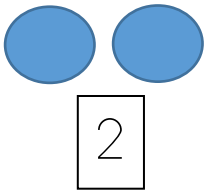
Numicon can be used on the wings to demonstrate doubles.

## Stage 2 – Repeated Addition (Y1)

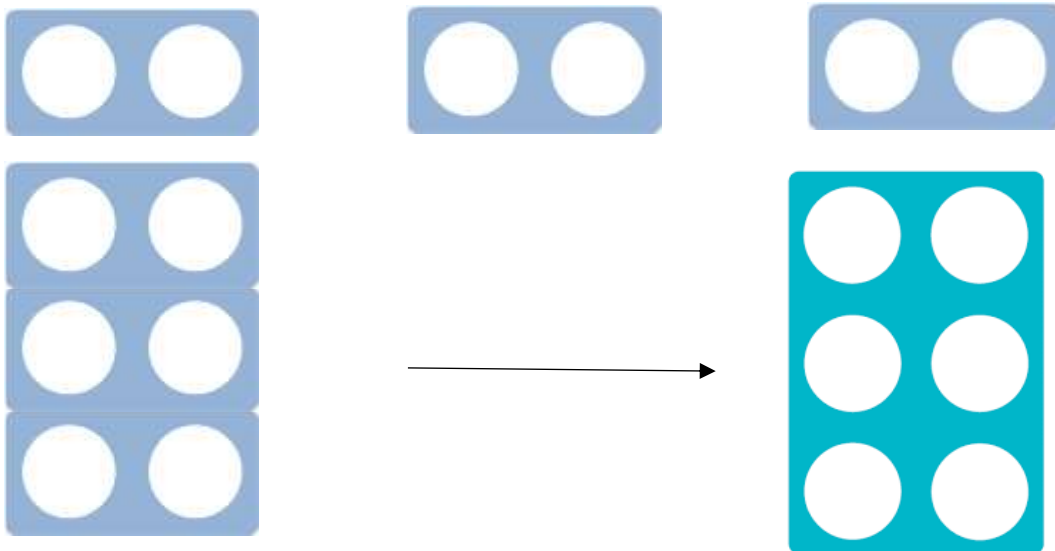


Repeated addition follows on from doubling but adds more terms.

$$2 + 2 + 2 = ?$$



Children can also use numicon to help...



Children should then be encouraged to use the language of multiplication to enable them to correctly write multiplication number sentences

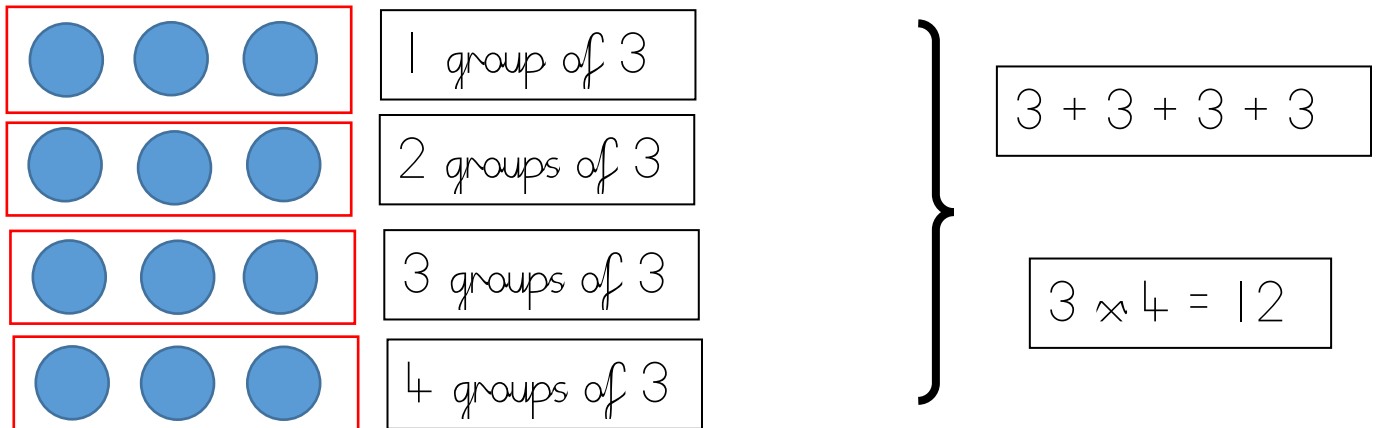
e.g.  $3 \text{ lots of } 2 = 6$

## Stage 3 - Arrays (Y1/2)



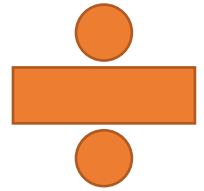
Arrays enable children to visualise the multiplication.

E.g.  $3 \times 4$



This array would be  $3 \times 4$  NOT  $4 \times 3$ .

$3 \times 4$  should be spoken as 3, 4 times not 3 lots of 4 as that would be wrote  $4 + 4 + 4$ .



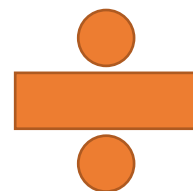
# Division

Children need to understand the concept of division as:

- Repeated subtraction

They also need to understand and work with certain principles:

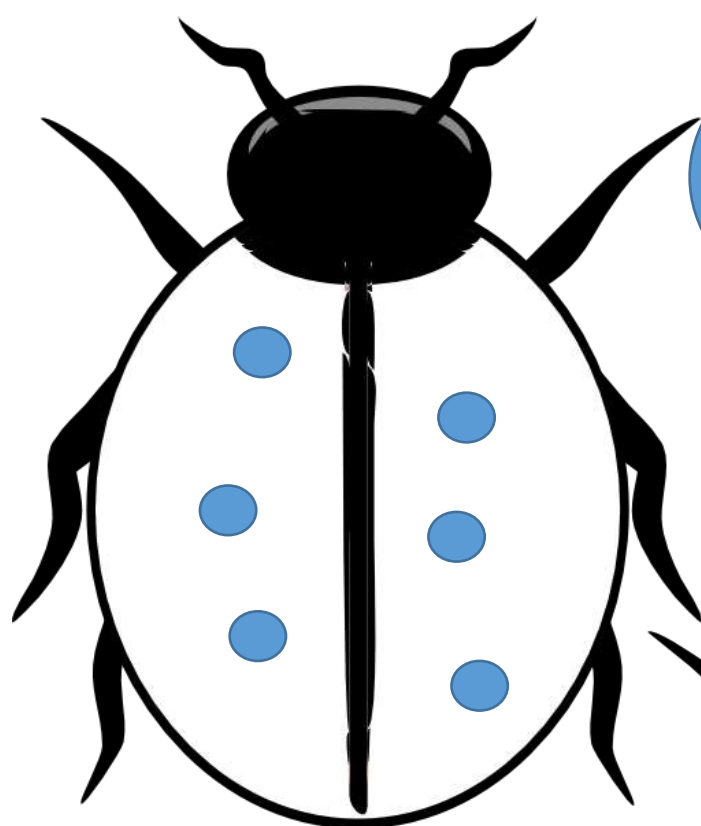
- It is the inverse of multiplication
- It is NOT commutative
- It is NOT associative



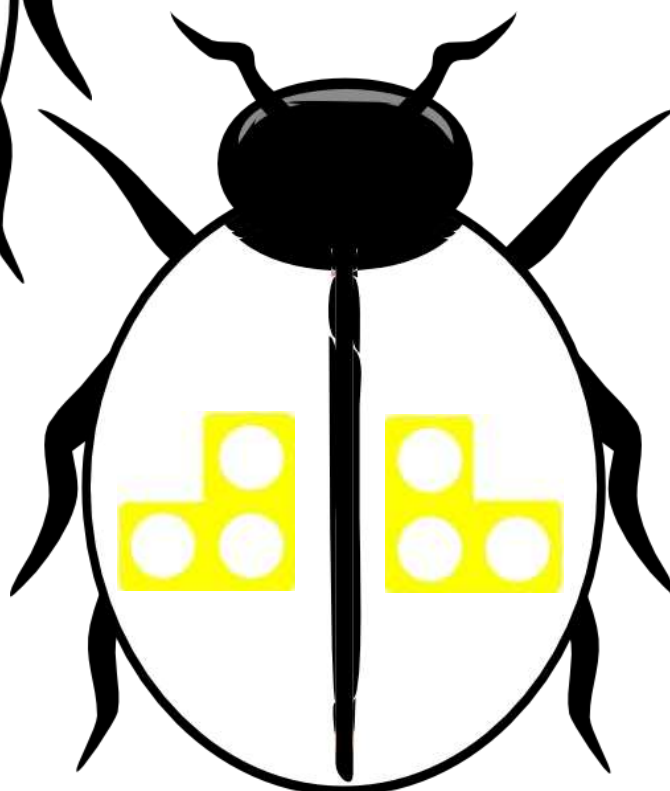
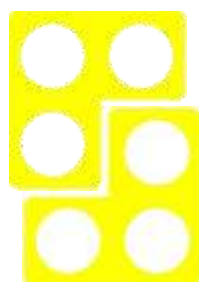
## Stage 1 – Halving (EYFS)

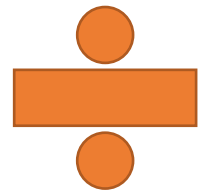
Children should experience practical calculation opportunities involving *equal* groups and *equal* sharing.

E.g. A lady bird has 6 spots on its back. Can you share them equally between both sides?



Numicon can be used in this situation to demonstrate half.

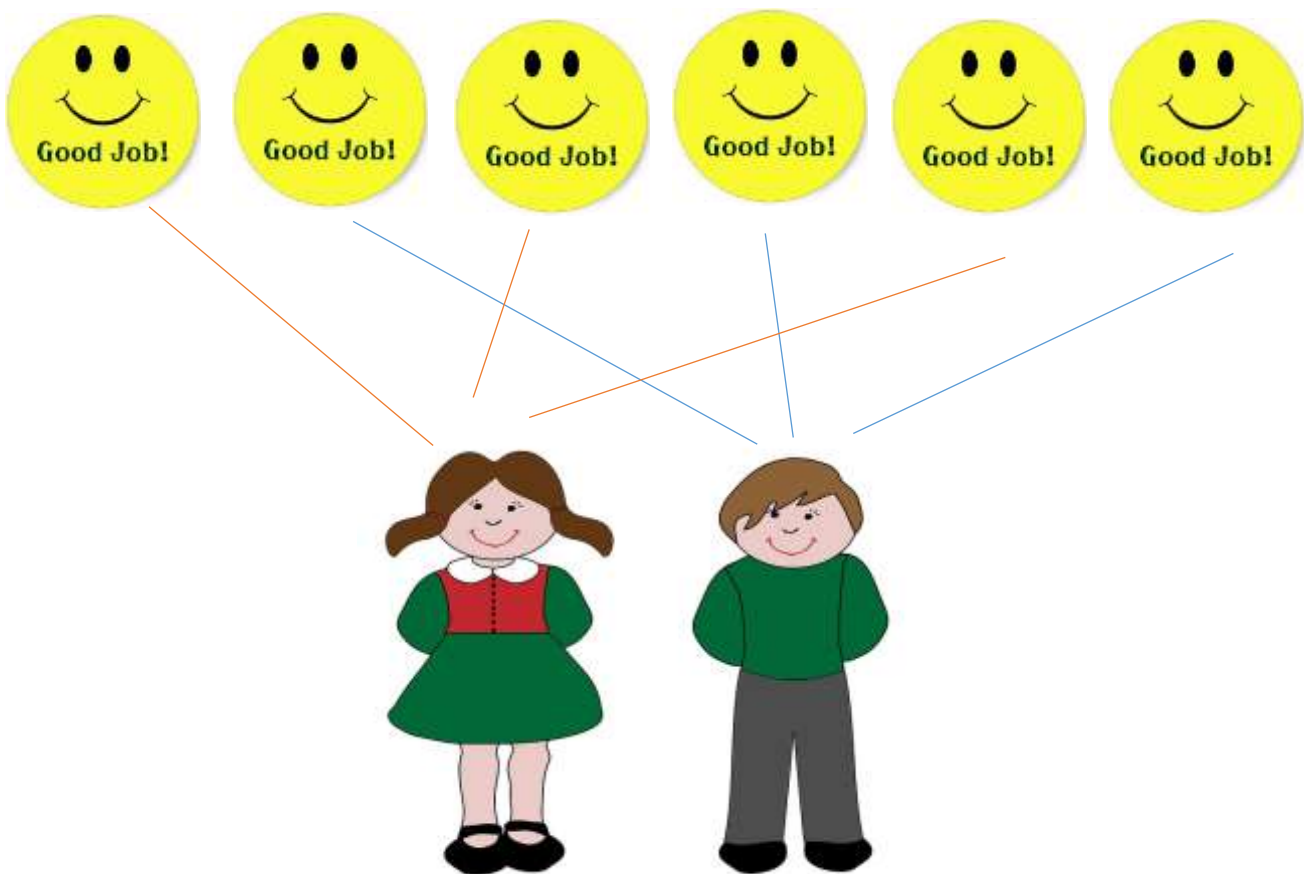




## Stage 2 – Division as Sharing (Y1/2)

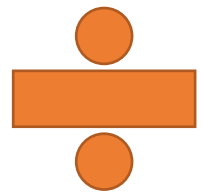
Children naturally start their learning of division as division by sharing. E.g. 6 divided by 2.

6 stickers are shared equally between 2 people. How many stickers do they each get?



6 stickers shared  
by 2 people = 3  
stickers each

Children may initially solve this as a 'one for you, one for me' strategy until all items have been given out as this strategy ensures sharing equally.



## Stage 3 – Division as Grouping (Y1/2)

To become more efficient children need to develop the understanding of division as grouping.

E.g. 6 divided by 2 = ?

How many children can get 2 stickers each?



1



2



3

6 stickers in groups of 2 stickers = 3 children

When grouping the answer is a different unit to the start e.g.

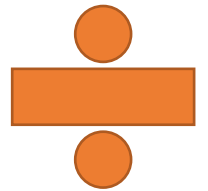
6 stickers in groups of 2 stickers = 3 children

Children should use lots of equipment to support their practical learning. Examples of this can be:

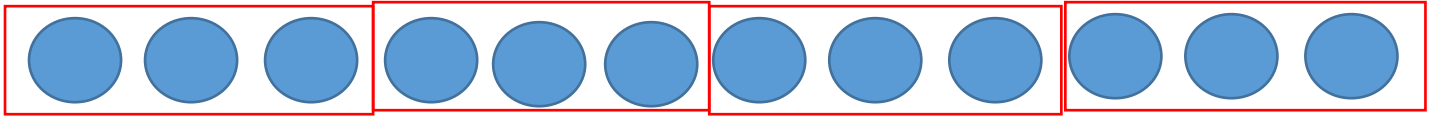
Numicon, beans, unifix, bead strings etc



Stage 4 - Division with grouping using jottings (Y2)

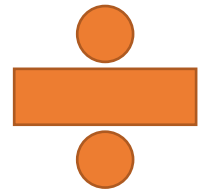


$$12 \text{ divided by } 3 = ?$$



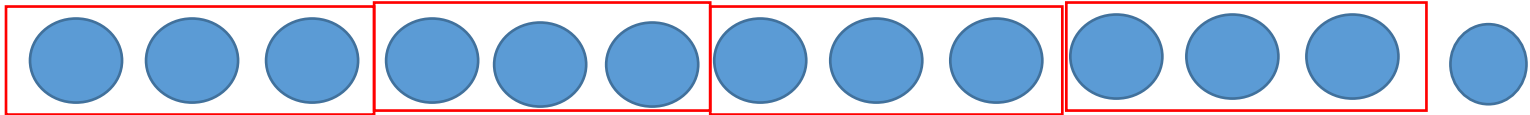
Children will begin to read this calculation as how many groups of 3 are in 12?

## Stage 5 – Division as grouping with remainders (Y3)



To continue children's learning they need to understand that division calculations sometimes have remainders.

E.g. 13 divided by 3 = ?



There are four groups of 3 with one left over.

$$13 \text{ divided by } 3 = 4 \text{ r}1$$

At this stage children then need to decide whether the remainder should be rounded up or down. This will depend on the context of the question being asked

- I have 13p. Sweets are 3 p each. How many can I buy? –

$$\text{Answer} = 4$$

(the remaining 1 p is not enough to buy another sweet)

- Apples are packed in boxes of 3. There are 13 apples how many boxes do I need? – **Answer = 5**

(the remaining 1 apple still needs to be in a box)