Calculation Strategies

This booklet is intended to provide you with information about the approach to calculation taught in school.

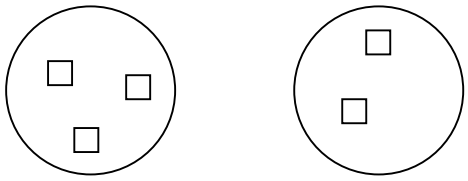
The methods will probably look different to the way you were taught to calculate.

The basis of all the methods is that they should be based upon mental calculation strategies rather than a child's ability to carry out a procedure – this will be explained more fully throughout the booklet.

All four operations – addition, subtraction, multiplication and division – are taught in each year group. They are introduced in practical ways and the correct vocabulary is prioritized.

ADDITION

This starts with combining two sets e.g.



The children are asked 'How many altogether?

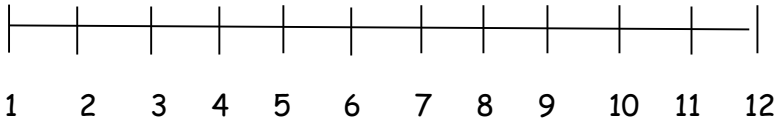
These are the stages your child may progress through. Not all children go from one stage to the next and not necessarily in this order. Also when presented with a more challenging calculation children may start to use a more simplified method again.

- children count all the cubes in set one then all the cubes in set two, then recount all the cubes from 1 to 5
- children know there a 3 cubes in set one and hold up 3 fingers, they know there are 2 cubes in set two and hold up 2 fingers, then they count all five fingers
- children count the cubes in their head and give the answer five
- children can 'see' there are five cubes and do not need to count them
- children know there are 3 cubes in set one and count on 2 more to add on the cubes in set two.

'Counting on' is an important mental method and is used throughout Key stage 1 and into key stage 2.

Counting on is taught using number tracks and lines

1	2	3	4	5	6	7	8	9	10



6 + 3 =

Children are taught to start at 6 and count on 3.

A very common error is that children count 6 as the first of the 3 'count ons' and end at number 8. To overcome this we ask them to put one finger on the starting number and use the other hand to count on, or place a counter on the start number.

Playing games like snakes and ladders will help your child overcome this simple mistake.

Children are also taught to know that addition can be done in any order and because they are using mental methods they know that an addition can be manipulated to make it easier. For example:

- 3 + 6 = would be calculated starting with the 6 and counting on 3.
- 3 + 5 + 7 = would be calculated as 7 + 3 + 5 = 15, using the children's knowledge that 7 + 3 = 10

A method of adding is to partition the number into parts (tens and ones) add the parts, and then recombine to find the total.

$$24 + 32 =$$

Partition the number into tens and ones

$$20 + 30 \qquad 4 + 2$$

Add the tens

$$20 + 30 = 50$$

Add the ones

$$4 + 2 = 6$$

Recombine to find the total

$$50 + 6 = 56$$

Once the children understand this calculation method it may be recorded like this:

$$24 + 32 =$$

$$50 + 6 = 56$$

All calculations are presented to the children horizontally at first so that the children can decide which method to use not vertically.

24 + 32 = NOT

24

+32

When children are first introduced to vertical addition at Key Stage 2 they still use their knowledge of partitioning e.g.

24

+**3**2

50 add the tens first " twenty add thirty is fifty"

2**4**

+3**2**

50

6 add the ones " four add two is six"

2**4**

+3**2**

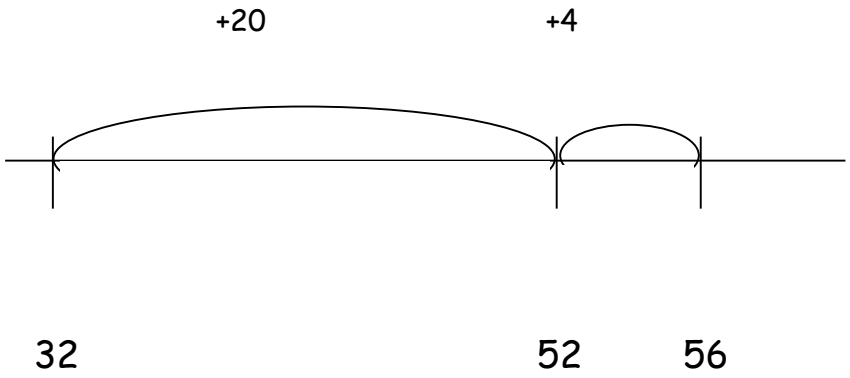
50

6

56 total the numbers " fifty add six equals fifty-six"

Children also use number lines to support their mental calculation methods.

24 + 32 =



Again here you can see the importance of place value to partition the number i.e. knowing that 24 is made up of twenty and four.

The number line is important because it provides a model to help the children remember the mental calculation.

SUBTRACTION

Again this starts practically using concrete (real) objects. Taking away a given number then finding how many remain.

An important distinction between addition and subtraction is that we cannot subtract in any order.

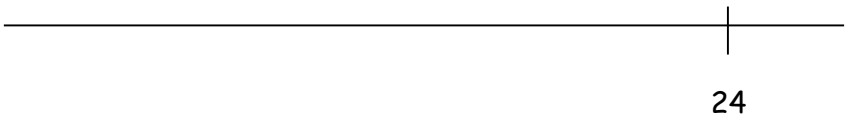
7 – 3 = is not the same as 3 - 7 =

We do teach children that subtraction is the inverse of addition and this can be used to check answers.

i.e. 7 – 3 = 4 4 + 3 = 7

Children also use number tracks / lines, number squares to help them.

24 – 7 =

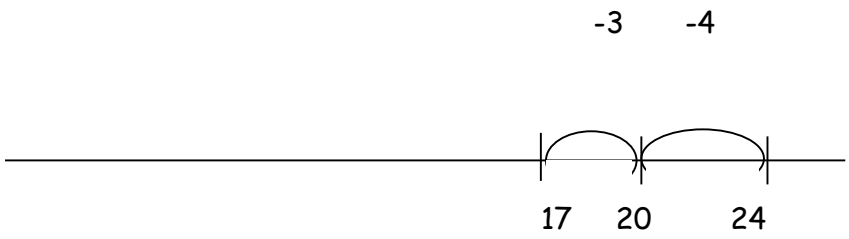


Mark the position of 24 on the number line

It is easier for children to work with multiples of 10 or 100 when calculating. We encourage the children to first count back to the nearest multiple of 10

The children are asked "How many have you subtracted / counted back?"

" How many more do you need to subtract / count back?

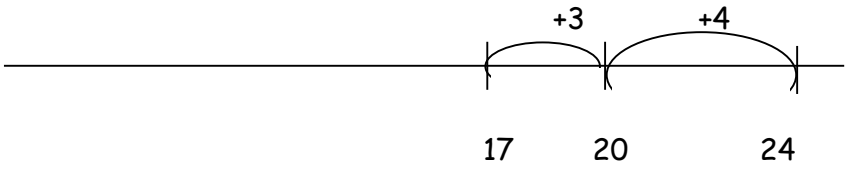


The children are asked to check how many they have subtracted / counted back.

" So 24 subtract 7 equals 17 "

When a subtraction involves two numbers that are quite close the children may use counting on rather than counting back to calculate the answer.

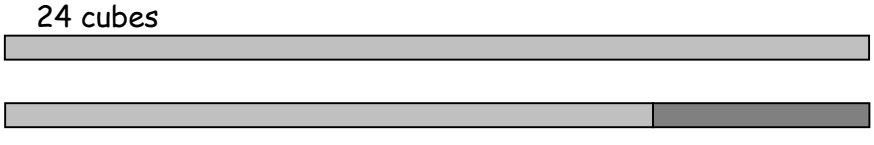
24 – 17 =



This method is often used when finding the difference between two numbers.

"The difference between 17 and 24 is 7"

We reinforce this tricky concept with models and images for the children.



17 cubes

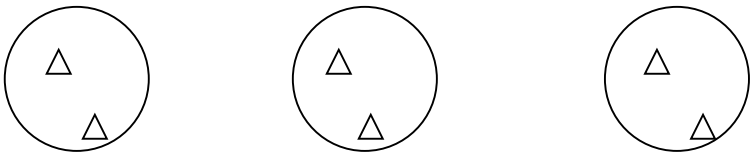
the difference is 7 cubes

MULTIPLICATION

Multiplication begins in Foundation Stage and continues throughout Key Stage 1 with the children counting in repeated multiples or steps

E.g. 10 20 30 40 50 and so on

The children make repeating sets and are taught the link between addition and multiplication (that multiplication is repeated addition)



2 + 2 + 2 = 6

" So three lots of two make six"

" Three times two makes six"

The adults model the language and recording for the children whilst they work practically.

It is important that children know that 2 x 3 will give them the same answer as 3 x 2.

It is important that children learn multiplication facts to help with their calculations. For example if they know 2 x 3 = 6 they can use this to help them work out 2 x 30 = 60

Children use doubling as a method of multiplying by two. Once again portioning is used to break the calculation down into smaller steps

35 x 2 =

30 x 2 5 x 2

multiply the tens first 30 x 2 = 60

multiply the ones 5 x 2 = 10

Add the totals together 60 + 10 = 70

DIVISION

Division starts practically by dividing a given number of objects between sets and how many sets can be made from a number of objects.

Children have to understand that 15 ÷ 3 =

Can mean 15 shared equally between 3

OR

How many lots of 3 are there in 15?

15 shared equally between 3 is usually done

practically – 15 objects, 3 sets. The children place one object in each set until they have 5 in each.

This approach is limiting when the children work with larger numbers e.g. 150 ÷ 50 would take a long time!

So we teach the children that repeated subtraction can be used to work out division calculations.