

Maths Guide

EYFS

The first few years of a child's life are especially important for mathematics development. Research shows that early mathematical knowledge predicts later reading ability and general education and social progress. Conversely, children who start behind in mathematics tend to stay behind throughout their whole educational journey.

The objective for those working in Early Years, is to ensure that all children develop firm mathematical foundations in a way that is engaging, and appropriate for their age.

There are six key areas of early mathematics learning, which collectively provide a platform for everything children will encounter as they progress through their maths learning at primary school, and beyond.

Mental recall of maths facts and an understanding of number is crucial before children begin to understand calculation.

It is vitally important that the children become confident in these early skills before they move onto calculation & writing down number sentences.

In the beginning we do a lot of...

Noticing

Spotting underlying patterns is important for identifying many different kinds of mathematical relationships. It underpins memorisation of the counting sequence and understanding number operations, for instance recognising that if you add numbers in a different order their total stays the same. Pattern awareness has been described as early algebraic thinking, which involves:

- noticing mathematical features
- identifying the relationship between elements
- observing regularities

We introduce two key questions for learning...

'What do you see?' and 'How do you see it?'

What do you see? How do you see it?

‘Notice’ maths everywhere!

Maths includes noticing numbers, shapes, patterns, size, time and measurement.

Maths is everywhere – in the playground, at the shops and at home.

It is important for the children to see and notice maths.

For the second question, we use our Blue hat thinking (this is also known as meta cognition).

Metacognition is, put simply, thinking about one's thinking. Looking at why we think what we think and how we know what we know.

This is an important maths skills, explaining how you know.





NCETM

NATIONAL CENTRE FOR EXCELLENCE
IN THE TEACHING OF MATHEMATICS

You can find lots of information on the skills we teach in EYFS on the NCETM website (click the logo above)

In this guide we will explain the 6 areas and examples of how you can develop these skills in your child at home.

In this presentation we will talk through each of the six areas.



Cardinality and Counting

Understanding that the cardinal value of a number refers to the quantity, or 'howmanyness' of things it represents



Comparison

Understanding that comparing numbers involves knowing which numbers are worth more or less than each other



Composition

Understanding that one number can be made up from (composed from) two or more smaller numbers



Pattern

Looking for and finding patterns helps children notice and understand mathematical relationships



Shape and Space

Understanding what happens when shapes move, or combine with other shapes, helps develop wider mathematical thinking



Measures

Comparing different aspects such as length, weight and volume, as a preliminary to using units to compare later

Subitising

Young children have a remarkable skill: they can recognise numbers of things without counting. This is called subitising, and it develops from a very early age. Very young babies can not only tell the difference between one and two but also between large numbers of dots when there are twice as many in one group, as with 16 and 8.

Young children also have powerful visual memories and some may find it easier to remember images than words: three-year-olds can recognise three things, although they may not say the word. Subitising can help children to build images for numbers, to visualise and to learn number facts. For instance, most four-year-olds readily learn to recognise five dots on a dice, which helps them to understand the cardinal value or 'howmanyness' of five, which they can link to the word and symbol for 5. Structured images like this also help children to begin to see numbers inside numbers, for instance seeing four and one within five.

However subitising does not just happen in structured images. They should be able to see and subitise in a range of situations. Like here...



In this photo we can see
2 foot prints.
But look closely at the
footprints.....



The children may then be
able to subitise this
further.
Is there 6 or 7?
A group of 5 and a group
of 2?

When we subitise we often ask the question.. What do you see and how do you see it?

This image is taken from an amazing book...




What do you see? How do you see it?




Let's look at this picture, 'what do you notice?'.
The children may begin to discuss 'we see a person' 'The person is standing on the moon' 'we see stars' (it is important that children are 'allowed' to see what they see as maths is everywhere!)

Let's look at the stars and ask the above 2 questions.

We might see 3 of these 

2 of these 

1 of this one 

So how many are there in total?
Which are odd quantities and which are even?

We can then think about which do we see more of?

What about the small white stars? How many of those?

There are two types of Subitising

Perceptual subitising is the ability to instantly recognise the number of objects in a small group, without counting.

Conceptual subitising is the ability to see a whole quantity as groups of smaller quantities (for example, seeing six as two groups of three).

How this links to later maths skills

Whole to part Understanding

Division

Multiplication

Fractions

On the following slides you will see some examples of photos and videos explaining this in further detail.

Perceptual subitising

This is the ability to instantly recognise the number of objects in a small group, without counting.



Comparison

Understanding that comparing numbers involves knowing which numbers are worth more or less than each other

Comparing numbers involves knowing which numbers are worth more or less than each other. This depends both on understanding cardinal values of numbers and also knowing that the later counting numbers are worth more (because the next number is always one more). This understanding underpins the mental number line which children will develop later, which represents the relative value of numbers, i.e. how much bigger or smaller they are than each other.

Composition

-numbers hidden inside numbers

The child should be able to decompose numbers from 1 to 10 into two smaller numbers. This skill will help him in the future easily and quickly learn the simplest arithmetic operations – addition and subtraction. Therefore, knowledge of the composition of numbers is the foundation on which further training in mathematics will be built.

This skill will also help multiplication and division in later years.

- Knowing numbers are made up of two or more other smaller numbers involves ‘part–whole’ understanding.
- Learning to ‘see’ a whole number and its parts at the same time is a key development in children’s number understanding.
- Partitioning numbers into other numbers and putting them back together again underpins understanding of addition and subtraction as inverse operations.

What do you see? How do you see it?

Let's look at the skills we use to understand Composition

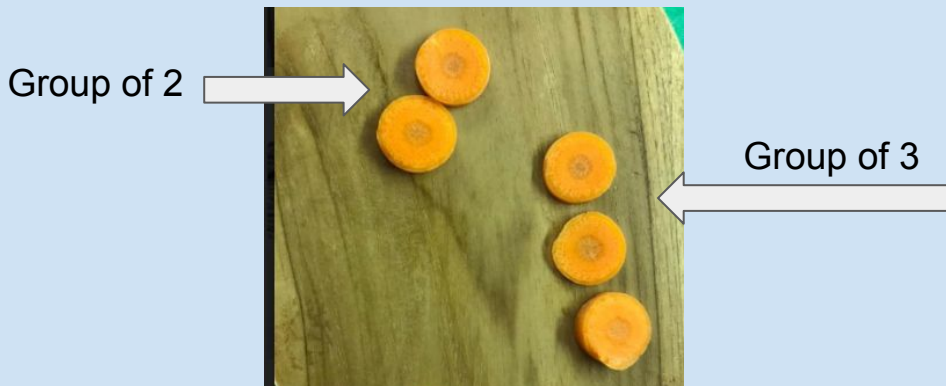
We can apply our subitising skills - when you can 'see' how many you have without actually 1-1 counting.

We then need to understand how numbers can be broken into smaller groups... we can call this 'part-whole'

We might subitise the whole amount or count the total amount.

Then we can look for smaller groups.

For example



But in total there are 5 carrots so we know that 5 can be made up of a smaller group of 2 and a smaller group of 3
 $2+3 = 5$

This is conceptual subitising - seeing the smaller numbers in the 'whole'

Conceptual subitising

This is the ability to see a whole quantity as groups of smaller quantities (for example, seeing six as two groups of three).



Children might see 2 groups of 3, 2 groups of 2 and 1 group of 1. They don't need to see the total amount at this stage, we can give them this information.



Children might see..
2 groups of 2 (top right)
A group of 3 (middle)
A group of 1 (bottom right, top middle and top left)

Sharing, equal and unequal groups

The term 'equals' is key to understanding that things are the same value. It is often mistaught as only a symbol which represents 'makes', as in a number sentence $1 + 2 =$ (makes) 3 . Equals is much more than that and so it is important for children (and adults) to understand that equals means 'equates to the same value'.

Before we introduce the equal sign, we would talk about 'sharing' and if it's 'fair'? We would then discuss that this is a number that can be shared equally.

Can we share a number into equal groups, same smaller parts? We would also discuss 'can we split into unequal groups?'

This is a key skill that lays the foundations for further learning within division, multiplication and fractions.

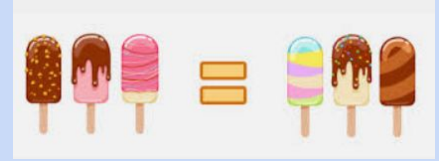
It can also link to prime numbers when children are older and their understanding that a prime number.

Prime numbers are **numbers** that have only 2 factors: 1 and themselves. For example, the first 5 **prime numbers** are 2, 3, 5, 7, and 11. Children in EYFS do not need to know this yet, however this is why we lay the foundations

Lot's of 'doing' and 'undoing' and practising using these words and ideas in their play.

Understanding the term 'Equals'

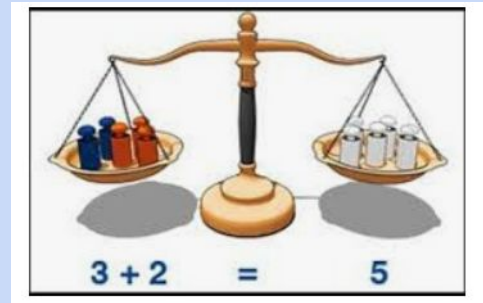
As we start to look at doubles and halves we introduce the term 'equal' to the children, which means the same quantity. As we move into showing and using the = symbol, it is still important for children to see that 'equals' as also meaning the same quantity on both sides.



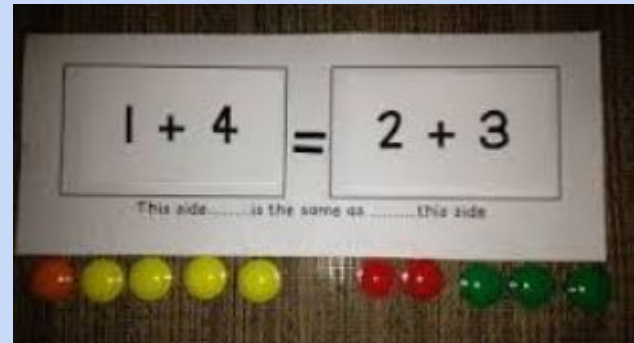
A set of balance scales can help us understand this.

The middle of the balance scales represents the = symbol.

What ever we have on the left must be equal on the right.



This is a crucial skill for children to develop before they move onto writing down number sentences or trying to solve addition problems.



Cardinality

'How manyness' the number of things represented by the number.

Cardinality is the ability to understand that the last number which was counted when counting a set of objects is a direct representation of the total in that group. A child who understands this concept will count a set once and not need to count it again.

Counting may seem easy but it requires a great deal of number sense.

This builds on to the 'subitising' skill of matching the numeral to the amount, how many there are.

These skills develop before the awareness of numerals.

Numbers or numerals

It is important that we see the value as the number or quantity. This is represented by a digit/numeral.

This is exactly the same as phonics where we hear the phoneme, which can be long or short, and it is represented by a grapheme (a letter).

Once we look at quantities above 10 we then have to use 2 digits.

We can sometimes be confident in naming numerals, recite counting and recognising patterns before we fully understanding what is behind the numeral. We need to continually ask - How do we know this?

Can they make the quantity that is behind the numeral?

Creating

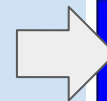
Evaluating

Analysing

Applying

Understanding

Remembering



Digits -> Numerals -> Numbers

So digits make up numerals, and numerals stand for an **idea** of a number.

1 5 3 153

digit digit digit numeral

 number

d o g dog

letter letter letter word

 idea

Just like letters make up words, and words stand for an idea of the thing.

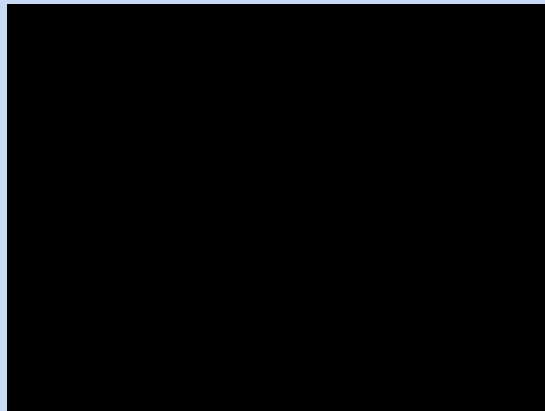
When discussing numbers past 10, it is important to refer to them carefully, for example if we say 1 and 1 is 11, is this correct?

1 and 1 makes 2 ($1+1 = 2$) so this can be misleading.

We can say- we need to use the digits 1 and 1 to create the numeral 11, which represents the number (quantity) of 11 objects.

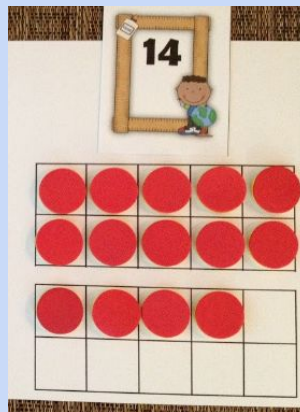
Place Value

Place value is the value of each digit in a number. It means understanding that 582 is made up of 500, 80 and 2, rather than 5, 8 and 2.



When you have a 2 digit number the first numeral represents how many tens. The second numeral represents how many ones.

So the number 12 has:
1 ten and 2 ones.

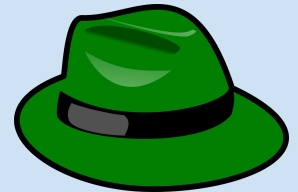
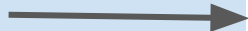


Tens Frames

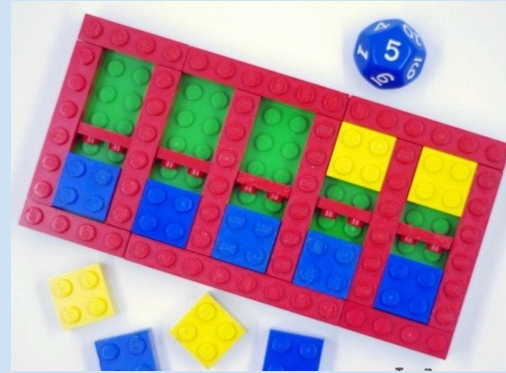
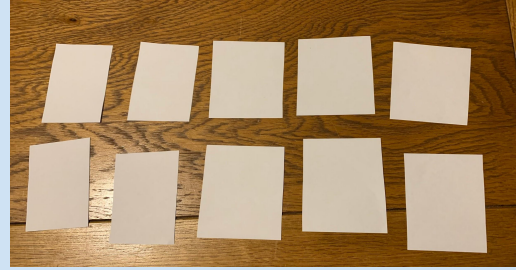
Using a tens frame to support part to whole is a tool which will be used within school to help and support the children.

Ten-Frames are two-by-five rectangular frames into which counters are placed to illustrate numbers less than or equal to ten, and are therefore very useful devices for developing number sense within the context of ten. The use of ten-frames was developed by researchers such as Van de Walle (1988) and Bobis (1988). Various arrangements of counters on the ten frames can be used to prompt different mental images of numbers and different mental strategies for manipulating these numbers, all in association with the numbers' relationship to ten.

There is a great article discussing the use of tens frames on the NRICH site. Click here.



Using what we have.



The important point is that it must have 10 equal boxes. Preferably, in 2 rows of 5.

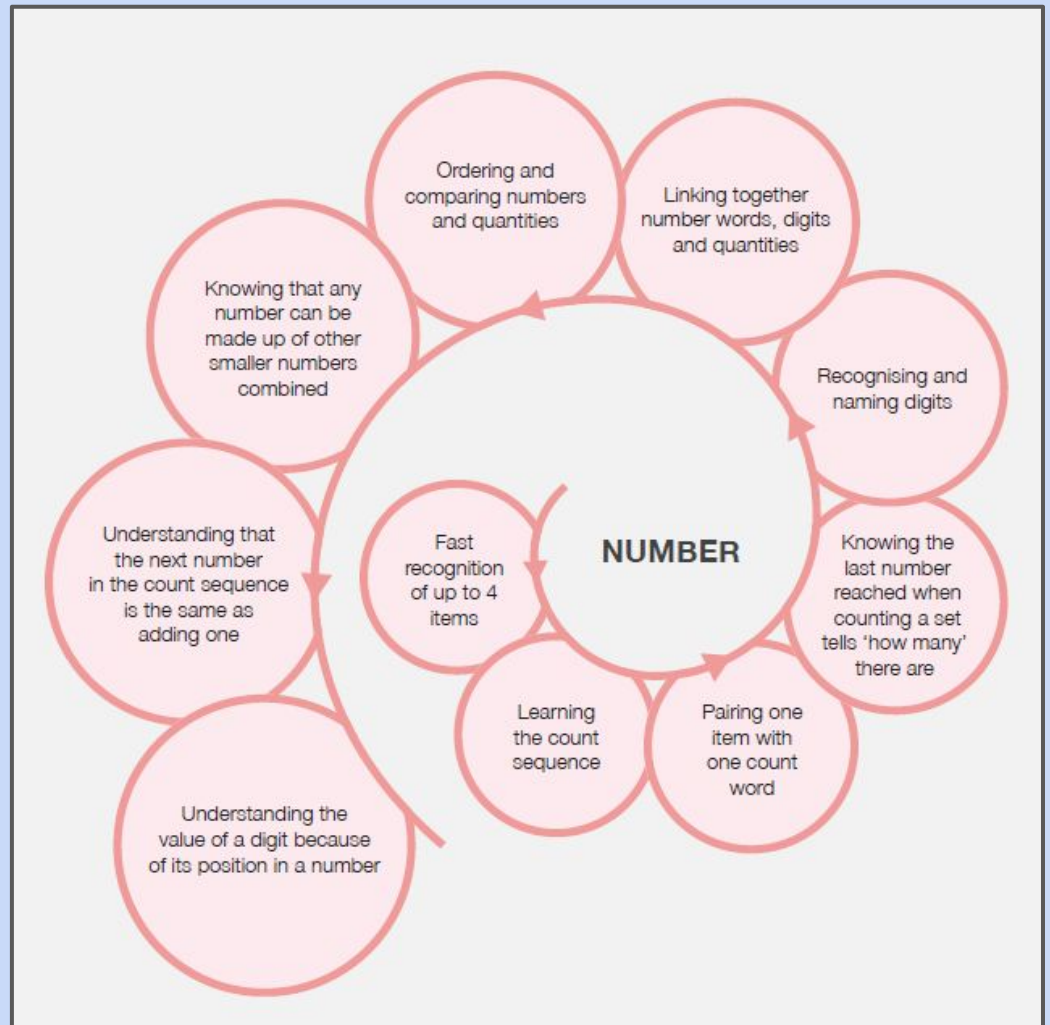
This diagram shows the journey to becoming confident in number. This includes counting, recognising numerals and understanding quantity.

The journey to being confident in Number begins in the centre of the spiral. The skills are taught across EYFS.

Being confident with number is much more than counting out loud, or rote counting. This like when reading, we want the children to understand what they are saying.

Focusing first on number quantities 1-3, then 1-5 in Nursery.

Then quantities 1-5, then 1-10 in Reception moving onto 10-20 in Year One.



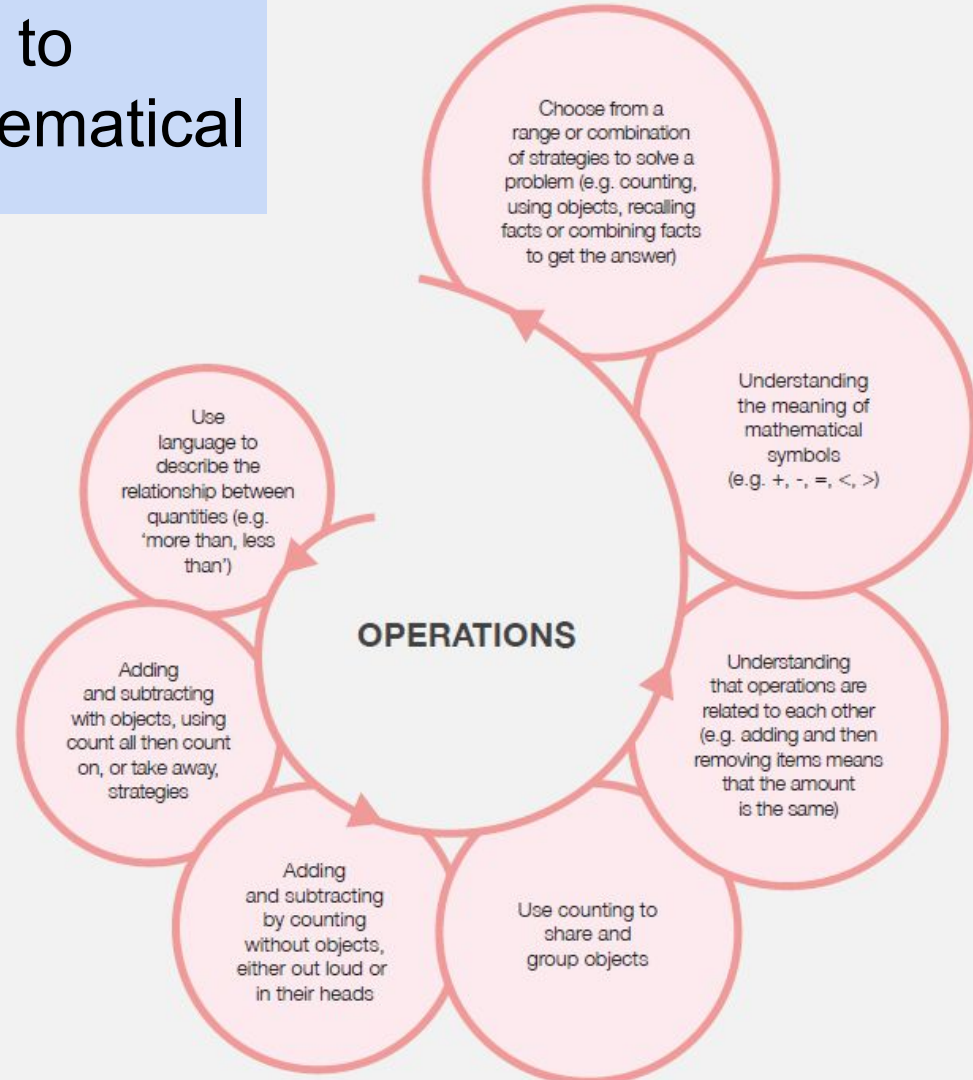
The journey to be able to confidently solve mathematical number problems.

This involves all the previously discussed skills

- Subitising
- Comparison of number
- Cardinality
- Number composition
- Noticing pattern

Also the understanding of maths language such as

- more/ less
- few/fewer
- Quantity/ total
- number/ numeral/digit



Useful Websites



Lovely website with a great range of stories all with a maths link.



A fantastic website for professionals and parents. Karen Wilding is an EYFS consultant for the NCTEM. She runs free courses for adults about how to ensure the best possible foundations for your child. Karen also has a Facebook group, which offers advice, support, resources and live sessions.

The NRICH website offers lots of articles as well as investigations and challenges that the children can complete.

