



Kimbolton Preparatory School

Reception Mathematics - Number

Children in Reception will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Children practise and improve their number skills by counting and calculating simple addition and subtraction problems. They learn to solve problems, including doubling halving and sharing. They will develop an understanding of how numbers work, so that they are confident when working with numbers to 20.

Numbers.

Numbers seem simple but actually are exceedingly complex. There are three different aspects, each of which is highly relevant to how we teach young children.

1. Numbers as names

Chanting the numbers in order, first to 20 and then on to 100, is an essential pre-requisite for all arithmetic. Emphasis is laid on the ability to count to 100 in company with the rest of the class. Children are taught to recognise the numbers up to 20. They use the numicon resources to visualise numbers.

2. Numbers as the 'how-many-ness' of a set (Cardinality)

Children come to understand that we can count to establish how many are in a set. We find out how many objects, images, sounds or actions by counting.

- One-to-one correspondence – children practice counting as they touch or move each object. This ensures that they match a spoken number to an object each time. The correct number in the set is established by the final number in the count.
- Conservation of number – children are taught to understand that number does not depend on arrangement. So if we count the number of cups on a tray and establish that there are six, then when we move the cups around the tray children should see that there is no need to re-count them; there are still six cups.
- Children are taught to understand zero (0) as the empty set, and also begin to understand that it can mean 'no 1s' in numbers such as 20 and 30.

3. Numbers as places in a line or sequence (Ordinality)

Children are taught to appreciate the ordinal aspect of numbers. Understanding that numbers form a sequence and knowing that '4' comes between '3' and '5' on the number line, are as important as being able to count four things.

The number line is arguably the most important model that we give primary children. The image of the number line will be developed through the use of the beaded and pegged lines, the numicon shapes and the use of empty number lines. Children are taught to identify and place numbers on a line, compare numbers saying which is larger or smaller and order a set of numbers to 20.

Addition.

Addition has two aspects and both need to be developed in parallel.

1. Adding as counting on

Children are taught to understand that adding involves increase. Children combine two sets by counting all of the objects and then progress to adding two sets by starting with the larger and counting on by the smaller.

The essential pre-requisite for addition is being able to say the 'next number' *without counting from one*. So, if we say 'six', it is crucial that the child can respond 'seven' without having to begin at one and count up. Children are taught to say the number one more than any number up to first 10, and then 20.

Children begin to record additions using a number sentence with + and =. Children read these sentences aloud, and then begin to write them.

Once children can say the next number, they can count on small amounts. Additions such as $5 + 2$ and $8 + 3$ become possible, using fingers as markers in the count.

2. Adding as splitting sets: number bonds

Knowing that 5 can be split into 4 and 1, into 3 and 2 and even into 5 and 0, is the basis for this aspect of addition. Children are taught to subitise, i.e. recognise that there are five without counting. We do not want children to have to count on to add 3 and 2 more, any more than we want them to count five things. Subitising is the basis for number bonds.

Children are taught that 5 can be split into $5 + 0$, $4 + 1$ and $3 + 2$ etc. Children use numicon and cubes to kinaesthetically absorb the relevant number bonds.

Children begin to record these additions using number sentences, preferably arranged so as to make the patterns clear: $0 + 5 = 5$, $1 + 4 = 5$, $2 + 3 = 5$

Number bonds to 10 are started in Reception. They are chanted, modelled on fingers, with pegs on hangers and using numicon.

Subtraction.

Subtraction has three aspects. Two of these are developed in parallel, and one is touched on in Reception, but not really developed until Y1.

1. Subtraction as counting back or taking away

This is perhaps the most intuitive aspect of subtraction. Children are taught to establish how many in a set and then count back as one, two or three objects are removed. This is recorded using the '-' sign. There are six apricots on a plate, we eat two, how many are left? The adult records this as $6 - 2 = 4$ and reads this with the children as six take away two leaves four or six subtract two equals four. Children read the - sign as 'take away', and also as 'count back' and as 'subtract'.

Children are introduced to the notion that we can model this 'taking away' on the number line. We point at six and count back two to reach four. $6 - 2 = 4$. Tiger Ted is on 9 on our number track. If we count on two, we reach 11. This models adding two more. If we count back two, we reach 7. This models taking away two.

2. Subtraction as number bonds

Just as addition must be related to splitting a number into two sets, 5 is 2 and 3 or 4 and 1, so subtraction needs to be seen as the inverse of this. $5 = 3 + 2$, $5 - 2 = 3$.

Children are taught to show this on fingers and using the numicon shapes.

3. Subtraction as difference

This aspect of subtraction will prove to be the most important for achieving numerical fluency by Year 3, when children will perform many subtractions by counting up. However, in Reception, we do not expect children to use counting up to subtract. However, the notion of difference is introduced since this is a very familiar concept for small children and one which resonates with their own experience. If Tyler has five strawberries and Cindy has three, it will be clear to both children that Tyler has more. They are encouraged to say how many more. So we draw upon children's experience of difference and use the language of 'how many more?' and 'what is the difference?'. The vocabulary of difference is developed here, and this is especially helpful in the context of measures.

Multiplication and division

Multiplication is introduced as 'doubling' and **Division** relates to halving and sharing into two or four sets.

1. Counting in 2s, 5s and 10s

Once children are confident at counting from 1 to 20 individually, and from 1 to 100 as part of a larger group, they are taught to count in 2s, 5s and 10s.

Counting in 2s helps children to develop the concept of even and odd numbers, and is also an essential pre-requisite for doubling and halving. *Counting in 5s* is easy to chant and learn.

Counting in 10s is not only useful as a precursor for the 10× table, but really helps children to distinguish the 'ty' numbers from the 'teen' numbers, e.g. **thirty** from **thirteen**.

2. Doubling

Children are taught to double the numbers 1 to 5 using the fingers of both hands. The 'one and one is two, two and two is four', etc. chant, where thumbs on both hands are held up, then finger and thumb, then three digits, etc. is an excellent way of helping children really learn these doubles. Creating doubles using cubes and numicon equipment helps to reinforce the fact that a double is a number multiplied by 2; there are two 5s in double 5.

3. Division as sharing

Once children understand their doubles they can then create the matching halves. *Double two is four and half of four is two*. They learn that some numbers can be halved (even numbers) and some can't (odd numbers). It is important to emphasise that if we are talking about cakes or biscuits, odd numbers can be halved, i.e. we can share three cakes fairly – we get 1½ each! Children need to understand that we can find half of small odd numbers, as well as knowing the halves of the even numbers up to 10.

When children are very familiar with the concept of halving, we can model sharing small multiples of four into quarters.

Reception children are only taught one aspect of division – that aspect of 'sharing' which is related to fractions. We are not demonstrating the arguably more important aspect of division as the inverse of multiplication – namely grouping. Four groups of five make twenty ($4 \times 5 = 20$). Children will be introduced to pre-1 multiplication in Year 1 and division as grouping is taught mainly in Year 2.

Calculation

Count a group of up to 20 objects
Recite numbers to 20 and beyond forwards and backwards
Number bonds to 5
Count on in 1s from a given number between 1 and 20
Count back in 1s from a given number between 1 and 20
Use more / less to compare two numbers / quantities
Find 1 or 2 more than any number to 20
Know that addition is combining two groups and subtraction is taking away
Add two 1-digit numbers
Subtract one 1-digit number from another
Begin to count in 2s, 5s and 10s
Use the words half and double.
Double numbers to 5

Default for ALL children

Count in 1s
Recite numbers to 20
Pairs with a total of 10
Count on in 1s from any given number
Count back in 1s from any given number

Begin to count in 2s, 5s, and 10s
Find half of even numbers by sharing
Double numbers to 5 using numicon