HELPING YOUR CHILD WITH NUMERACY:

ADDITION AND SUBTRACTION

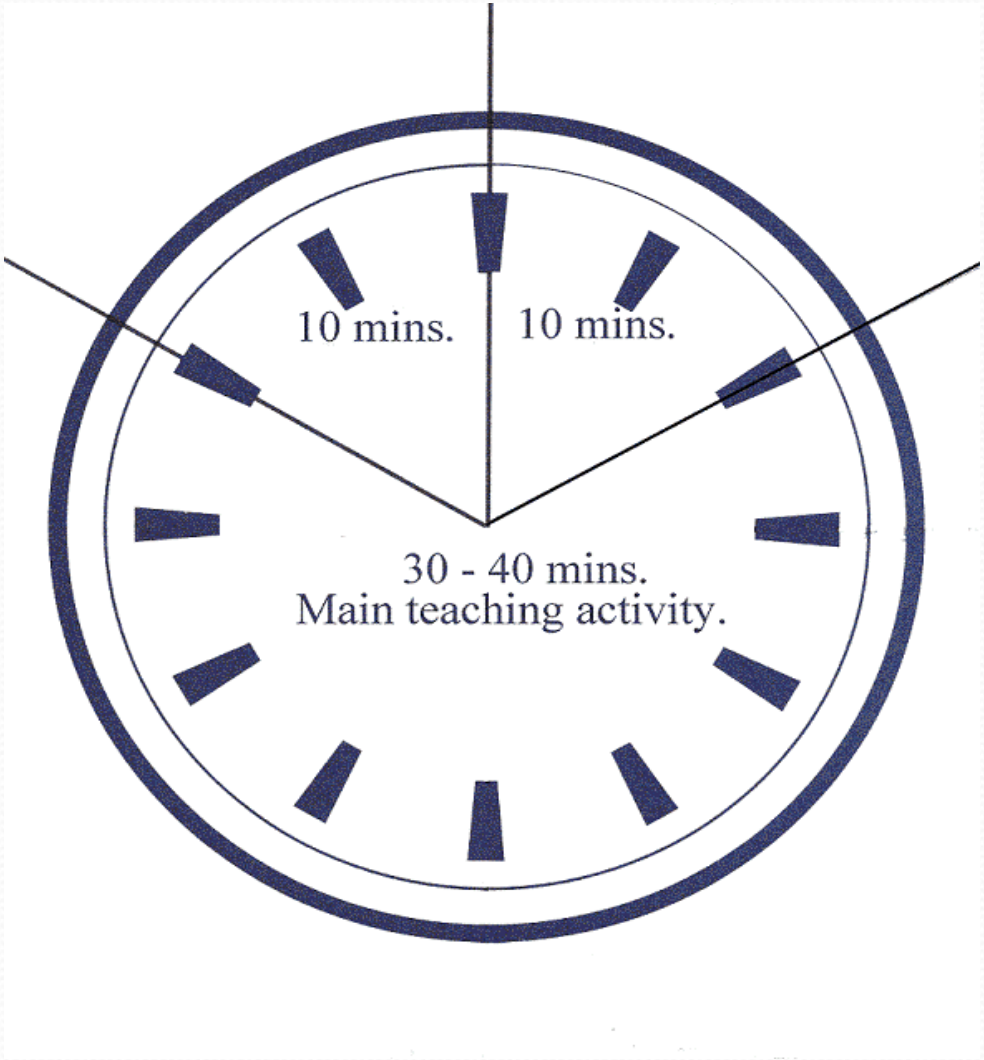
THE NATURE OF LEARNING.

Children's learning can be divided into four areas of learning:

Knowledge:	The facts that children need to retain. Requires constant repetition and consolidation in a variety of different ways. E.g. number bonds to 10.
Concepts:	Understanding general ideas that can be applied in specific instances e.g. applying number bonds to sums involving the use of 10s: 60 + ? = 100.
Skills:	The mechanics of finding an answer. Practical methods of working out the answer. E.g. counting on using a number line.
Attitudes:	The way in which children approach their work. The way in which we as adults approach mathematics work.

NUMERACY HOUR STRUCTURE.

Plenary session : used to consolidate, review and extend the work done in the main teaching activity.



Oral/ mental work: Used to rehearse and sharpen skills

WHY DO WE NEED MENTAL STRATEGIES?

Mental	Written
We may break a calculation into manageable parts, e.g. 148 – 100 + 1 instead of 148 -99	We can not change a calculation to an equivalent one, e.g. 148 – 99 is done as it is.
We say the calculation to ourselves, and therefore are aware of what numbers are involved, e.g. 2000 – 10 is not much less than 2000.	We don't say the number to ourselves, but start a procedure such as : 148 - 99 — By saying, '8 take away 9' before changing it to 18 – 9.
We choose a strategy to fit the numbers, e.g. 148 – 99 may be done differently from 84 – 77, although they are both subtractions.	We always use the same method.
We draw upon specific mathematical knowledge, an understanding of the number system, learned number facts, and so on.	We always draw upon memory of a procedure, and possibly, though not necessarily, an understanding of how it works.

THE NATURE OF LEARNING.

Understanding children's difficulties with addition and subtraction:

Change the number names 1, 2, 3 etc. for letters A, B, C this puts you at the same level as a child. To answer the questions you must not translate these letters into numbers.

Answer the following questions in order- you may use your fingers.

- How many fingers on your left hand?

- How many fingers on both hands?

C + D =

K - B =

G - D =

D x C =

B + E =

E + E =

E + F =

Q - E =

How could you use a number line to help you?

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

SKILLS IN EARLY ADDITION.

- Knowing 1 more or 1 less

- One to one counting, games and rhymes

- Counting all- a child doing 2 + 3 counts out two bricks and then three bricks and then finds the total by counting all the bricks.

- Counting on from the first number – a child finding 3 + 5 counts on from the first number. ‘four, five, six, seven, eight’.

-Counting on from the larger number- a child chooses the larger number, even when it is not the first number, and counts on from there.

- Using a known addition fact – where a child gives an immediate response to facts known by heart, such as 6 + 4 or 3 + 3 or 10 + 8.

- Using a known fact to derive a new fact – where a child uses a number bond that they know by heart to calculate one that she or he does not know, e.g. using knowledge that 5 + 5 = 10 to work out 5 + 6 = 11 and 5 + 7 = 12.

- Using knowledge of place value – where a child uses knowledge that 4 + 3 = 7 to work out 40 + 30 = 70, or knowledge that 46 + 10 is 56 to work out 46 + 11 = 57.

SKILLS IN EARLY SUBTRACTION.

- Counting out – a child finding 9 – 3 holds up nine fingers and folds down three.

- Counting back from – a child finding 9 – 3 counts back three numbers from 9: ‘eight, seven, six’.

- Counting back to - a child doing 11 – 7 counts back from the first number to the second, keeping a tally using fingers of the number of numbers that have been said.

- Counting up – a child doing 11 – 7 counts up from the first 7 to 11, ‘eight, nine, ten, eleven’ (not a ‘natural’ strategy for many children because of the widely held perception of subtraction as ‘taking away’

- Using a know fact – a child gives a rapid response based on facts known by heart, such as 10 – 3 or 20 – 9.

- Using a derived fact – a child uses a known fact to work out a new one, e.g. 20 – 5 is 15, so 20 – 6 must be 14 (more unusual in subtraction than addition).

- Using knowledge of place value – a child finding 25 – 9 knows that 25 – 10 is 15, and uses this to give an answer of 16.

LEARNING FROM MISCONCEPTIONS.

6 + 5 = 10 43 + 8 = 50 138 + 9 = 146

Here the answers are *less* than the correct answer.

14 – 5 = 10 23 – 6 = 18

Here the answers are *more* than the correct answer.

What number goes with 6 to make 10?

Child's answer: 5

A question phrased differently displaying the same counting error - the child has counted the first number on their fingers (or a number line) as part of their 'counting on' strategy rather than counting from this number.

LEARNING FROM MISCONCEPTIONS.

If I had 12 sweets and I needed 16 how many more would I need?

Some possible answers:

27- The child has counted on rather than counting back and has made the same error as we have just described. Here we have a combination of two different misconceptions.

5- Counting back inappropriately as previously described.

28- Inappropriate use of a number operation (adding instead of subtracting).

208- Inappropriate use of a number operation (adding instead of subtracting) and an incorrect form of recording. 20 and 8.

LEARNING FROM MISCONCEPTIONS.

8 + 6 =

18 - The child has continued to count all of his or her fingers when adding and has therefore mistakenly added 10.

15 – This could be accounted for with inaccurate counting or by the application of a known fact such as double 8 is 16 one less is 15 where the child should have subtracted 2 instead.

17 – This error could be accounted for by the inaccurate use of a number square e.g. counting on from 10 to 20 then 19, 18 etc.

LEARNING FROM MISCONCEPTIONS.

45 + 23

95 - The child has added two tens then three more tens rather than units.

7 + 8 + 4=

20 - A near double has been used for the calculation without the required adjustment.

20 + ? = 25

For this a child needs to know that addition is the inverse of subtraction. Therefore 25 – 20 will give the answer. This is quite a high level skill a common misconception would be to add the numbers together to give 45.

LEARNING FROM MISCONCEPTIONS.

Other points to bear in mind.

Be careful when questions are presented in a different manner or placed into a different context.

These misconceptions can be combined such as counting on for a subtraction sum as well as counting from the wrong number.

Answers can just be made up / estimated.

The best source of information regarding misconceptions is your child. The best question you can ask is ‘can you show me how you worked it out?’

Don’t expect a child who cannot count backwards to be able to do simple division.

SOME DIFFICULTIES.

Flexibility using a range of strategies can be hindered if:

- Children do almost any addition or subtraction by counting on or back in ones.

- Children rely upon a singular method or piece of apparatus.

- Subtract numbers that are close together such as 42-38, by trying to ‘take away’ or ‘count back’ 38 from 42, rather than counting up from 38.

- Don’t recognise that to add 10 or 100 is no more difficult than to add 1.

- Don’t recognise numbers which are 10 apart, or a multiple of 10.

- Never spot a double or number bond.

- Never change a calculation to make it easier, e.g. in 242 – 99 they subtract 99 rather than subtracting 100?

- To calculate mentally, turn to a standard written method and try to visualise it.

- Don’t see facts which would make the calculation easier.