Bradfield C of E Primary School

Calculation Policy

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This policy sets out the progression in calculation at Bradfield Primary school. It has been written to ensure consistency throughout the school.

Its aim is to show how jottings, pictorial representations and work related to counting and number lines link to mental and written forms of calculation. The ability to calculate mentally forms the basis of all methods of calculations and has to be maintained and refined. However, work in written forms always has to be tested, justified and proved with the use of other methods and children need to be encouraged to explain what they are doing.

Written and mental calculations are complimentary to each other and need to be taught alongside each other. Children should always start with the concrete before moving on to the abstract.

Our policy is set out in stages allowing flexibility for teachers to make the most appropriate provision for all pupils. It is important to remember that children will move through these stages at different rates.

The long term aim is for children to be able to select an efficient method of their choice that is appropriate for a given task. They should do this by always asking themselves:

Can I do this mentally?

(I may have to do some jottings)

What equipment will I need to help me?

Do I need to use a written method?

(Perhaps the numbers are too big / Perhaps there are too many steps to the problem.)

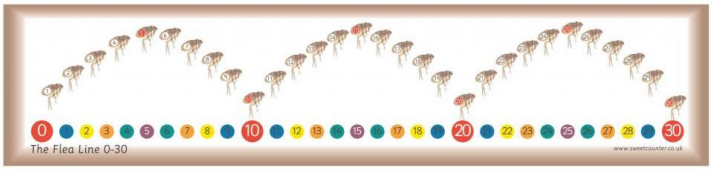
How can I test my method in another way? (Proving it!)

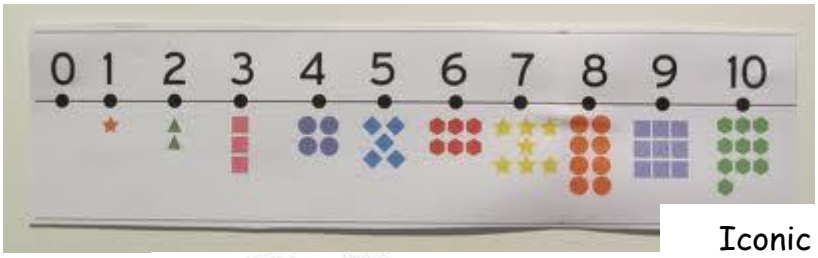
Can I explain what I am doing and why in a way that is logical?

Mental Calculation

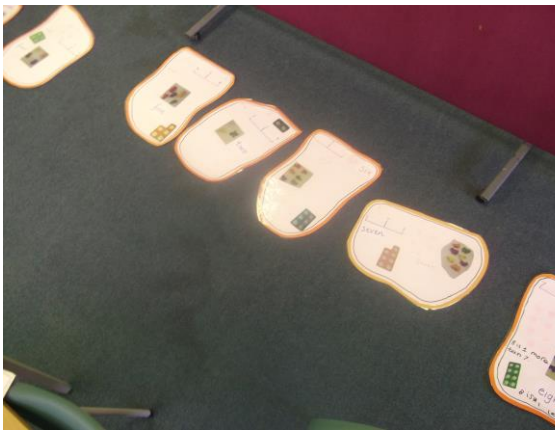
In recognition of the importance of mental calculation the key mental skills underpinning each written method are set out at the start of every operation. Early work on mental calculation will ensure that children have a sound understanding of the number system and place value. For example the use of number lines alongside the actual representation of the number, the 'iconic' (dot patterns and arrays) and the purely symbolic, will develop mental imagery of the number system. Teachers will continue to build upon this knowledge alongside the teaching of written methods.

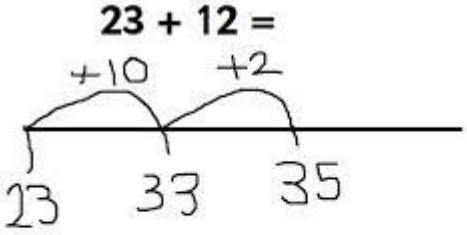
Pictorial



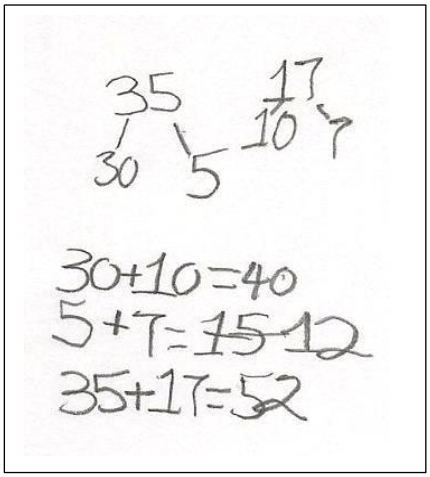


Iconic





Symbolic



Informal recording or 'jottings' help children to represent their thinking as they work mentally. It is important that teachers model and value the use of jottings.

Preparing the foundations for place-value: Understanding the relationship between digits and numbers.

As soon as children are old enough to begin writing numbers on paper they need to be introduced to the difference between digits and numbers, as this knowledge, embedded at an early age, is the foundation of place value on which our number system is built.

The Motto: **Digits make numbers**

Letters make words.

A good way of introducing this, in key stage one, is an investigation into what letters are there to make words? What are the letters that are also words?

Then, what digits are needed to make numbers?

What digits are also numbers?

If all the digits are also numbers what gives digits their value?

The digit song: (To the tune of Twinkle, Twinkle Little Star)

0,1,2,3,4,5

6 and 7, 8 and 9,

These are the digits you will need

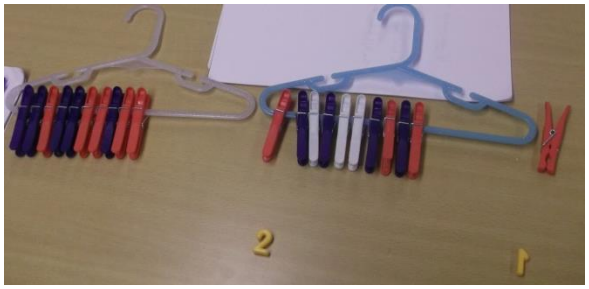
To make all the numbers in the world.

0,1,2,3,4,5

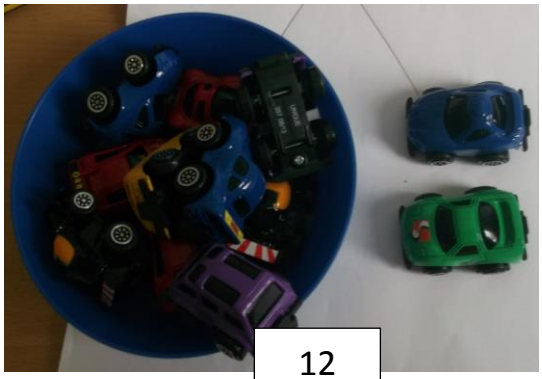
6 and 7, 8 and 9.

When writing down numbers the children need to be able to understand what digits make that number; for example 13 is a 2 digit number. Right from the beginning the adult needs to make it clear that 13 is made of one ten and 3, whilst 31 is made up of 3 tens and 1. Children only actually need to be able to handwrite the digits. It is the place of the digits that will determine how a number is written and its value.

In order to see how digits work, children need plenty of opportunities in building up sets of numbers and grouping them into tens and ones. By investigation and talk for maths children need to be encouraged to work out what the rules are for digit value.



Different ways of investigating 21.



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Challenge: To investigate digits in different orders to tackle the question, what gives digits their value? Why is 21 different than 12?… the digits are the same?

The Count and go song: (An American Marine call and response song)

Call: If you want to count and go

Response: If you want to count and go

Call: This is what you need to know

Response: This is what you need to know

Call: To know how big a number is

Response: To know how big a number is

Call: The left hand digit is the biz.

Response: The left hand digit is the biz.

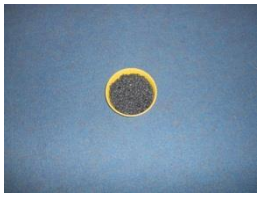
Children should be guided to the conclusion that it is the place of the digit that gives the digit its value. The further to the left the digit is the greater its value.

Children should be encouraged to make really large numbers by lining up the digits. Which is the digit with the greatest value? : The digit on the left .Which digit is worth the least? : The one on the right. 274659

As the children in grow in confidence they need to be encouraged to investigate by how much the value of the digit changes as it moves further to the left.

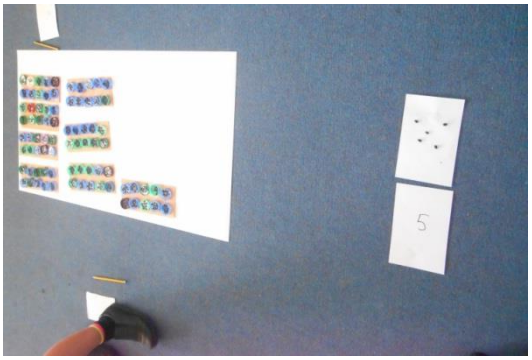
<u>An example of a digit investigation in year 4.</u>

1. Estimate:

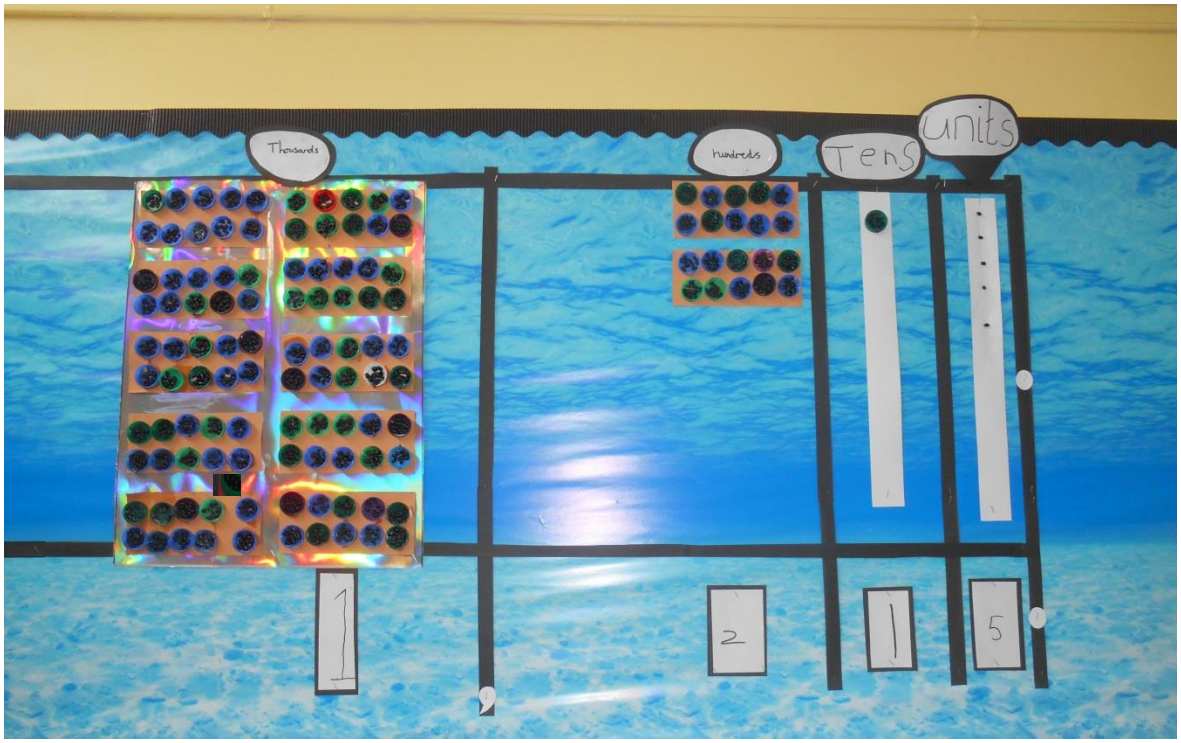


2. Sort into groups of 10- and possibly change the estimate.

3.Sort into 10 x 10 and evaluate the estimate.



Group into 10 x 100 if necessary…



This activity involved getting a class of children to sort a bag of beans into sets of ten. The difference between the digits soon became very obvious and the children worked out that as the digits moved one place to the left their value increased by ten times and as they moved to the right their value decreased by ten.

Children also need to explore the value of the place holder as distinct from 0.

First invented in India, it was created to make clear the separation of the digits if one of the place value columns was actually empty. Just like a hollow in the sand the place holder acts to prevent the digit from slipping into the wrong column. In this sense it is very different to 0 in the number line as adding 0 makes no sense at all, whilst multiply by ten and put in the place holder does.