Studley Community Infants' School

Calculation Policy

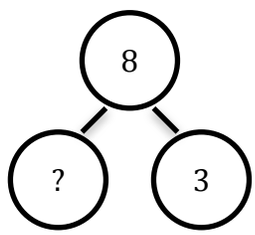
Develop children's fluency with basic facts

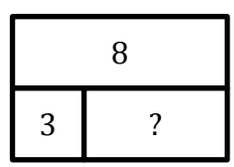
Fluency skills are dependent on accurate and rapid recall of basic number bonds to 20 and times-table facts. Spending a short time everyday on these basic facts quickly leads to improved fluency.

Develop children's understanding of the = symbol

The symbol = is an assertion of equivalence i.e. 3 + 4 = 6 + 1. Then we are saying that what is on the left of the = symbol is necessarily equivalent to what is on the right of the symbol. But many children interpret = as being simply an instruction to evaluate a calculation. If children only think of = as meaning "work out the answer to this calculation" then they are likely to get confused by empty box questions such as: 3 + ☐= 8. Later they are likely to struggle with even simple algebraic questions such as 3y = 18.

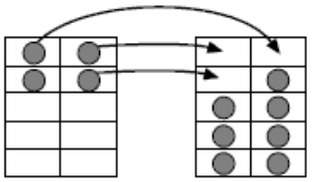
One way to model equivalence such as: 2 + 3 = 5 is to use balance scales. Teachers should vary the position of the = symbol and include empty box problems from Year 1 to deepen children's understanding of the = symbol.



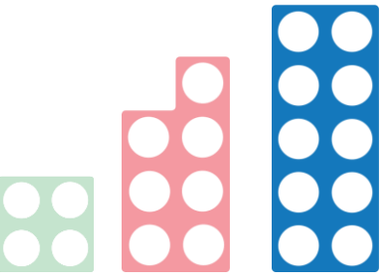


Don't count, calculate

Young children benefit from being helped at an early stage to start calculating, rather than relying on 'counting on' as a way of calculating. For example with a sum such as 4 + 7 = Rather than starting at 4 and counting on 7, children should use their knowledge and bridge to 10 to deduce that because 4 + 6 = 10, so 4 + 7 must equal 11.

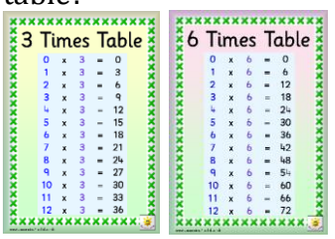


4 + 7 = 10 + 1 = 11



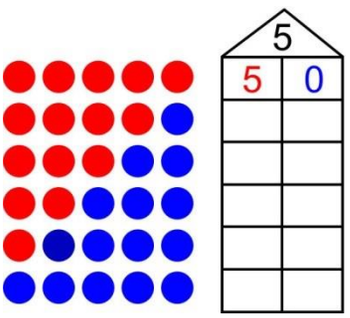
Look for pattern and make connections

Teachers should use concrete resources (apparatus and models) and visual representations (images) of mathematics. Children need to reason and look for patterns and connections. The question **"What's the same, what's different?"** should be used frequently to make comparisons. For example "what's the same, what's different between the three and six times table?"



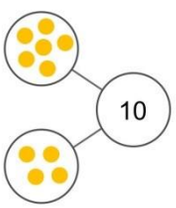
Expose mathematical structure and work systematically

Developing instant recall alongside conceptual understanding of number bonds to 10 is vital. This begins by learning number bonds to five. And is supported through the use of models/images such as the examples illustrated below:



Using other structured models such as tens frames, part whole models or bar models can help children to reason about mathematical relationships.

Part whole model



6 + 4 = 10
4 + 6 = 10
10 – 4 = 6
10 – 6 = 4

Move between the concrete and abstract (CPA approach)

Children's conceptual understanding and fluency is strengthened they experience concrete, visual (pictures) and abstract representations of a concept during a lesson (see progression in calculations). Moving between the concrete and the abstract helps children to connect abstract with familiar contexts, thus providing the opportunity to make sense of, and develop fluency in the use of, abstract symbols (written sum).

Use questioning to develop mathematical reasoning

Teachers' questions in mathematics lessons are often asked in order to find out whether children can give the right answer to a calculation or a problem. But in order to develop children's conceptual understanding and fluency there needs to be a strong and consistent focus on questioning that encourages and develops their mathematical reasoning.

This can be done simply by asking children to explain how they worked out a calculation or solved a problem, and to compare and contrast different methods that are described.

Rich questioning strategies include:

"What's the same, what's different?" In this sequence of expressions, what stays the same each time and what's different?

23 + 10 23+ 20 23+ 30 23 + 40

Discussion of the variation in these examples can help children to identify the relationship between the calculations and hence to use the pattern to calculate the answers.

"Odd one out" Which is the odd one out in this list of numbers: 24, 15, 16 and 22?

This encourages children to apply their existing conceptual understanding. Possible answers could be:

"15 is the odd one out because it's the only odd number in the list."

True or False

Children are given a series of equations are asked whether they are true or false:

If I start on 4 and count to 26 I will say the number 13.