

LEARNING and TEACHING POINTS
for
Chapter 5
Modelling and Problem Solving

In your teaching recognize the validity of the three ways of doing calculations: algorithms, 'ad hoc algorithms' and calculators; do not inadvertently give children the impression that using a formal, written method is somehow the superior or proper way of doing a calculation – or that doing calculations is the most important part of mathematics.

Discuss with children real-life problems, particularly in the context of money, that produce calculator answers that require different kinds of interpretation, including those with: (a) an exact, appropriate answer; (b) an exact but inappropriate answer; and (c) an answer that has been truncated.

Provide children with plenty of opportunities to work through and experience the process of mathematical modelling, making the four steps in the process explicit: (1) deciding what calculation has to be done to answer a question in a practical context; (2) doing the calculation by an appropriate method; (3) interpreting the answer back in the original context; and (4) checking the solution against the reality of the original question.

Explain truncation to primary children using informal language: 'When the calculator answer has a decimal point and fills up all the available spaces, then there are probably lots more figures to come after the ones we can see. Because the calculator does not have room for these it throws them away. This does not usually matter because they represent very small quantities.'

Recognize that all the steps in the modelling process are important and that step 2 (doing the calculation) is no more important than the others. Allow children to use a calculator when the calculations associated with a real-life problem are too difficult, so that they can still engage in the process and learn to choose the right operation, to interpret the result and to check it against the constraints of the real situation.

Deliberately choose real-life problems for children to solve with a calculator that will produce potential difficulties in interpreting the calculator answer, which you can then discuss with them, such as interpreting 4.5 as £4.50 (not 4 pounds and 5 pence).

Problems in mathematics, as defined in this section, should be used: (a) to give children opportunities to apply and therefore to reinforce the knowledge and skills they have already learnt; (b) to develop general problem solving strategies; and (c) sometimes to introduce a mathematical topic by providing the motivation for the learning of some new skills.

To help children to develop problem solving strategies in mathematics, such as clarifying the givens and the goal, ask them questions like: What do you know? What are you trying to find out? Have you seen anything like this before? Does this remind you of any other problem? What mathematics do you know that you might be able to use here? What do you want to be able to say when you have finished this? What could you find out that might help you to solve this? Can you work backwards from what you want to find out towards what you are given?