LEARNING and TEACHING POINTS

for

Chapter 7
Addition and Subtraction Structures

The key language to be developed in the aggregation structure of addition includes: *how many altogether? How much altogether? The total*.

The key language to be developed in the augmentation structure of addition includes: *start at and count on, increase by, go up by*.

Ensure that children experience the two addition structures in a range of relevant contexts, including money (shopping, bills, wages and salaries) and various aspects of measurement. Then they also have to recognize addition in situations of aggregation in the contexts of measurements, such as length and distance, mass, capacity and liquid volume, and time. For example, addition would be the operation required to find the total distance for a journey if I have already travelled 63 miles and then do a further 45 miles; or to find the total time for the journey if the first stage has taken me 85 minutes and the second stage takes 65 minutes.

Make explicit to children the principle of the commutative law of addition. Show them how to use it in addition calculations, particularly by starting with the bigger number when counting on. Explain that subtraction does not have this property.

Familiarity with the range of subtraction structures will enable children to interpret a subtraction calculation in a number of ways and hence increase their ability to handle these calculations by a range of methods.

The key language to be developed in the partitioning structure of subtraction includes: *take away … how many left? How many are not? How many do not?*

The key language to be developed in the reduction structure of subtraction includes: *start at and reduce by, count back by, go down by*.

The key language to be developed in the comparison structure of subtraction includes: *what is the difference? How many more? How many less (or fewer)? How much greater? How much smaller?*

The key language to be developed in the inverse-of-addition structure of subtraction includes: *what must be added? How many (much) more needed?*

Haylock, *Mathematics Explained for Primary Teachers, 4th edition*. SAGE Publications Ltd, London.

Asking the question 'what is the calculation to be entered on a calculator to solve this problem?' helps to focus the children's thinking on the underlying mathematical structure of the situation.

Children should experience problems with all the different subtraction structures in a range of practical and relevant contexts, including money (shopping, bills, wages and salaries) and various aspects of measurement.

Take every opportunity to promote the language of comparison and ordering throughout the primary age range, not just in mathematics lessons.

When comparing two quantities, *A* and *B*, as well as asking about the difference, always use at least two other forms of the question, one making the greater quantity the subject, the other the lesser. For example: how many more in *A*? How many fewer in *B*? How much greater is *A*? How much less is *B*? How much longer is *A*? How much shorter is *B*? How much heavier is *A*? How much lighter is *B*? How much earlier is *A*? How much later is *B*?

The language used in problems with the inverse-of-addition structure often signals addition rather than subtraction, so that many children will automatically add the two numbers in the question. Such children will need targeted help to recognize the need for a subtraction.

Ask children to write stories to go with, say, 84 + 28 and 84 – 28. See what structures of addition and subtraction and which contexts they use in their stories. Give them phrases or words to incorporate that will encourage them to use a wider range of structures and contexts.

Haylock, *Mathematics Explained for Primary Teachers, 4th edition*. SAGE Publications Ltd, London.