CONCEPT CARTOONS ON MATERIALS
and their properties

Concept cartoons are drawings that illustrate possible areas of uncertainty in everyday situations. The six cartoons reproduced in this book are reproduced with permission from 'Starting Points for Science' by Brenda Keogh and Stuart Naylor, Millgate House Publishers, 1997.
Each cartoon presents children with alternative viewpoints on some scientific concept. They are thus a useful starting point for both discussion and investigation in order to explore which of the alternatives are likely to be correct.
Concept cartoons are not necessarily designed to have a single right answer. In many cases the only possible answer is 'It depends on…' This is a realistic perspective on science for children to develop and can dispel the myth that there is always a 'right' answer. A variety of investigative approaches can be developed from the cartoons depending on the ideas produced by the children.

Teaching strategies can include group and class discussion or as starting points for individual projects or as an extra challenge to able pupils. However the cartoons are also useful in providing starting points for those with poor literacy skills, those who lack confidence in science, and those who are reluctant learners.

The particular cartoons included are described below.

Snowman
(page 32)

The issue in this concept cartoon is whether the coat is an insulator or whether it actually generates heat. Some children may believe that warm clothes make you warmer by making more heat, and they will expect the coat to generate heat and melt the snowman faster. However others will realise that the coat is simply an insulator which will tend to keep heat away from the snowman and prevent it from melting quickly. The situation shown in the concept cartoon can be investigated using real snow. Alternatively it can be modelled with ice inside a coat, glove or sock; the top half of a plastic mineral water bottle, filled with water and frozen, will make a good model snowman. The thickness, colour and nature of the material that the coat is made from can also be investigated.

Ice pops
(page 31)

All of the predictions in this concept cartoon can be directly investigated by the children. Some of them are likely to think that aluminium foil is an insulator; that cotton wool makes things warmer; that water will keep the ice pop cold; and that things will stay frozen inside a refrigerator. In each case they will be surprised by their observations! This can lead on to a whole series of follow up investigations on conductors, insulators and heat transfer.

Ice cream
(page 112)

Although the children will have experience of condensation they are unlikely to have well-formed ideas about where the condensed water comes from. The concept cartoon invites them to consider and investigate a number of possibilities, and they may well think of other possibilities themselves. The fact that the condensation comes from the air may appear to be the least likely possibility to many of the children. Wrapping the ice cream tub in polythene or aluminium foil and observing where the condensation forms should help to clarify their ideas. Investigations such as this help to lay the foundation for later work on the structure of matter and conservation of mass.

Is it a solid? (page 61)

The children will have intuitive ideas about what they mean by a solid. However they will not find it easy to apply their ideas in a consistent way. They will find it difficult to separate the object from the material it is made from, and they will tend to associate properties such as heaviness and rigidity with solids. The concept cartoon provides an opportunity for them to rethink their definitions and to make more systematic judgements. Introducing more challenging materials such as sand or dough is probably best left until after their ideas about solids are reasonably well developed.

Sandcastles (page 50)

The distinction between melting and dissolving is a common area of confusion for children. They can clarify the meaning they attach to both of these terms by investigating the situation shown in the concept cartoon. A tray full of sand can be used to model the effect of the tide on sandcastles. Observation of other changes in materials, such as melting chocolate or dissolving sugar, will be a useful complement to their investigation.

Sugar in tea (page 123)

This concept cartoon invites the children to reverse the familiar process of dissolving. It also challenges the children's ideas about what happens to the sugar in the tea – does it disappear completely as it dissolves or can it be recovered from the tea? The children can investigate the possibilities shown in the concept carton as well as other possibilities that they might suggest. Salt is a useful alternative, since it can be separated more easily from water than the sugar. Other means of separating materials would be useful ways to follow up this investigation.

The ConCISE project can provide further details and more examples of concept cartoons. In England and Wales local authority advisers will be aware of the project and many will have offered INSET to teachers. Advisers in Scotland and Northern Ireland are being contacted in the autumn of 2000.

A further selection of Concept Cartoons are to be found in ***Concept Cartoons in Science Education*** by Stuart Naylor and Brenda Keogh, Millgate House Publishers, 2000.