Introduction

Why teach problem solving?

'Mathematics is at heart a problem solving activity.'

Developing a Problem Solving Classroom (SCCC, 1996)

There are many reasons for including problem solving as an integral part of the primary mathematics curriculum, as supported by A Curriculum for Excellence. Well-planned problem-solving activities provide opportunities for children to:

- apply their mathematical knowledge and skills creatively and flexibly in a wide range of situations;
- develop their reasoning and communication skills;
- work co-operatively;
- think independently;
- develop confidence in their own mathematical ability;
- take risks and ask questions without fear of being wrong.

Classification of problems

There are several types of mathematical problem. The activities in this book are classified under four headings:

1. Finding all the possibilities
2. Logic problems
3. Finding rules and describing patterns
4. Diagram problems and visual puzzles.

Each of the chapters in this book focuses on a particular problem and the relevant problem-solving strategies. Further information about each of the different types of problem is given at the beginning of each chapter.

A creative approach to problem solving

When solving open-ended mathematical problems, children should be encouraged to explore different strategies and make decisions about how to record outcomes. In order to do this, they are required to think flexibly and creatively. Many problems have more than one possible answer and can be solved using different approaches. It is important that children are confident to take risks, to question their ideas and to adapt their approaches as they work. Some strategies, taken from *Mathematics 5–14* (SOED, 1991), that might be used are:

- try a more simple case;
- act out the solution;
- draw a picture or a diagram, or make a model;
- look for a pattern;
- guess, check and improve a solution;
- make a conjecture and test it with particular examples;
- work backwards;
- reason logically.

Each mathematical problem in this book is presented creatively in an imaginative or