

## Introduction

Problem solving activities engage children in learning, by challenging them to think. They allow them the opportunity to express mathematical ideas and construct meaning, and to develop strategies and mathematical reasoning.

This book provides a variety of activities which cater for a range of problem solving skills, appropriate for students in years 1 and 2. It can also be used for students in years 3 and 4 who need consolidation of their skills and strategies in problem solving.

Students are encouraged to use any manipulative materials in the classroom to aid in solving problems. Students draw pictures and use mathematical notation to represent their ideas. Modelling and representing mathematical ideas is very powerful in allowing students to develop clear understandings and concepts.

## The Problem Solving Wheel

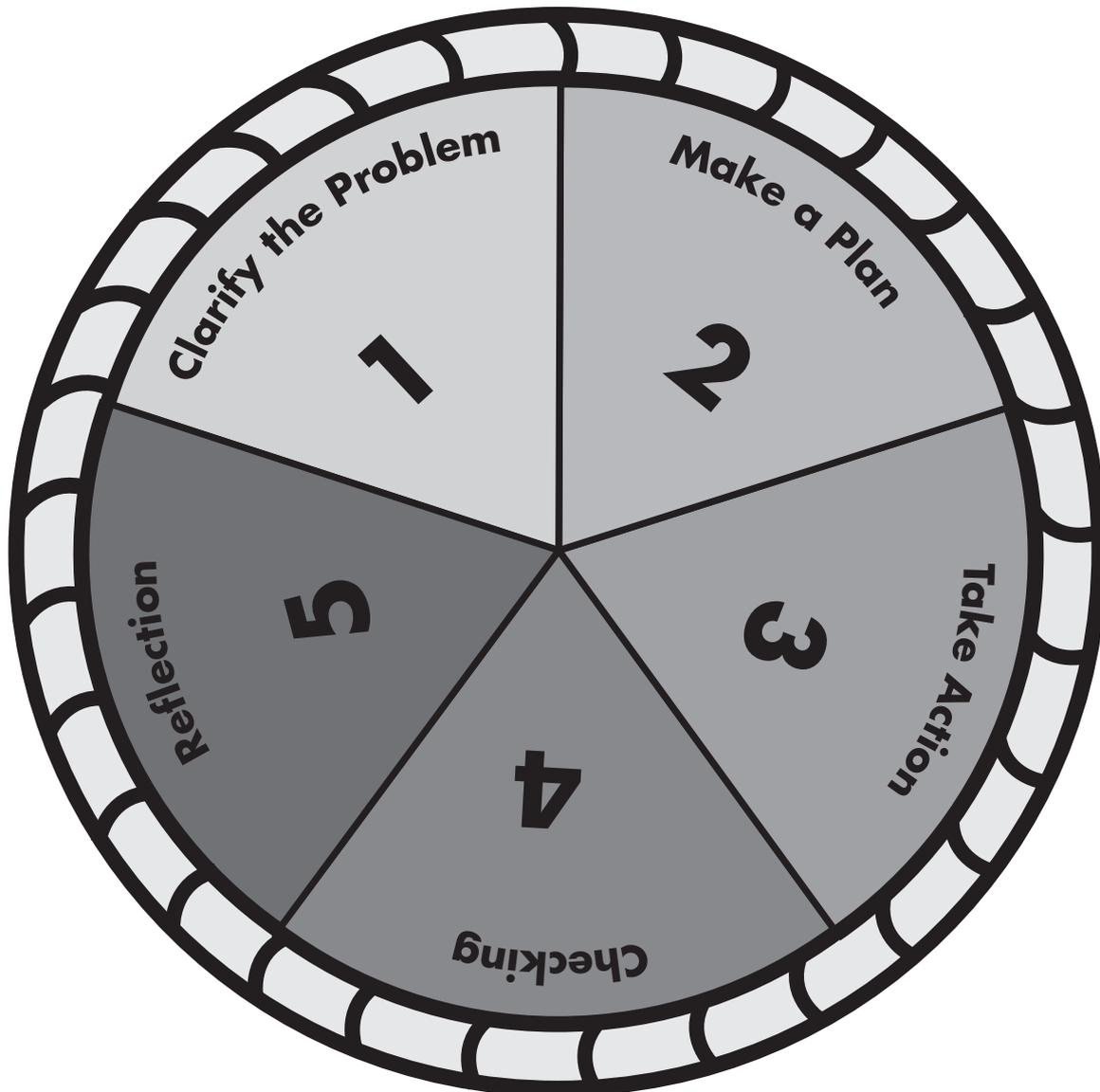
The problem solving wheel is presented as a tool for guiding students through a process. It outlines a pathway for students to develop an understanding of what thinking is required of them to undertake problem solving tasks and to develop skills and strategies.

### **The problem-solving wheel includes the following:**

1. Clarify the problem. What do I need to find out?
2. Make a plan. What do I need to do to find the answer?
3. Take action. Make a start on your idea.
4. Checking. Check to see if you are on the right track.
5. Reflection. Think about how you are learning.

Make a large wheel to display in the classroom to help focus the children as they approach problem-solving activities.

## Problem Solving Wheel



**Problem solving strategies that the children are encouraged to use are:**

- Drawing the problem
- Acting out the problem
- Estimating and checking
- Making a table or list
- Using logic and reasoning
- Breaking the problem down into small steps
- Choosing an operation
- Using concrete materials
- Looking for the pattern
- Working backwards

## Assessment:

The problem solving activities in this book may be used as assessment tasks. They inform and direct teaching and learning in the following ways.

- They monitor and record children's mathematical progress.
- Children receive feedback during the sharing sessions and are exposed to a range of strategies of others.
- Children's performances on tasks inform teachers for future planning.

## Teaching and Learning

### Selecting appropriate tasks

Effective teachers plan activities for children based on their knowledge of students' skills and understandings. Teachers set a purpose by carefully selecting tasks which best suit their students' needs and provide them with a learning experience which helps develop skills and mathematical understanding, and enables students to apply these skills and ideas to other situations. Students can then develop deeper and more complex ways of thinking and understanding.

### Constructing meaning

A rich learning environment incorporates support for students as they develop conceptual connections (scaffolding), and provides the necessary challenges to promote new levels of understanding and application. The construction of meaning through engaging in active learning is powerful in enhancing learning of mathematics in the early years.

Teachers decide whether individual students need to work independently, under adult guidance or in collaboration with other children in the class. These decisions will guide the class organisation and groupings that will be used for the sessions.

## Reflection

Reflection is an extremely important component of the classroom program in problem solving activities. At the end of sessions children share their ideas, results and strategies with others and reflect on questions related to the problem. By using 'metacognitive' thinking, students can best reflect on what has been learnt and how the learning took place: What do I know? What do I need to know? What did I learn? How did I learn? How is it related to real life? What made it easier to learn?

## Sample Problem Solving Session

### Materials required:

- Display a large version of the *Problem Solving Wheel*, in a prominent place.
- Pencils, paper or worksheet.
- Have available various counting materials, e.g. unifix cubes, counters, plastic sticks, buttons, beads. These need to be stored in small containers, such as plastic ice-cream tubs, and shelved within easy reach of the children. Encourage the children to be independent in collecting and packing away their equipment.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. There are 10 jellybeans in a bag. The colours are red, green and yellow. Draw the jellybeans. How many of each colour?

**REFLECTION:**

How did you work out how many of each colour?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

2. We counted 12 feet at the zoo. Draw who or what we saw.

**REFLECTION:**

Would your answer have been the same if we had seen tails?