

Badger Maths
Problem Solving Book I
For Years 4 - 5

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INTRODUCTION

The aim of *Solve that Problem* is to provide a valuable resource for teachers to enhance the ability of Y4 and Y5 pupils in maths problem solving. The materials in the book support the National Numeracy Strategy objectives and, in particular, address the widely recognised need for a greater emphasis on using and applying mathematics.

HOW THE BOOK IS ORGANISED

- The *Problem Solving Process* on page 4 outlines the essential broad strategies required for pupils at Key Stage 2 to solve problems in maths. It outlines a comprehensive 4-step approach which includes spending time on explaining methods and reflecting.
- The book is divided into six main sections, each dealing with problems which can be solved using a particular strategy. In each of these sections there is a page of teaching notes about how the strategy works, and three teaching examples which can be worked through with the whole class. These examples put into practice the 4-step approach to problem solving outlined in the first chapter, and include answers and extension activities.
- Each main section of the book includes five or six copiable problem solving task cards. Each of these pages consists of three illustrated problems to solve in the form of questions or activities. The problems, numbered 1 to 102, are presented at three broad levels to provide differentiation:
 - **Level A** for pupils working below the national expectations.
 - **Level B** for pupils working at the level of national expectations.
 - **Level C** for pupils working above national expectations.
- There is also a Copymaster for each section with prompt questions to help children work through the book's 4-step approach to problem solving. This may be appropriate where children need extra help or reinforcement of the appropriate strategy.

HOW THE BOOK RELATES TO THE NATIONAL NUMERACY STRATEGY (NNS) AND NATIONAL CURRICULUM

- The chart opposite gives details of where each of the book's individual numbered problems fits into the NNS framework. Most of the problems obviously come under the framework's Problem Solving strand, although some references are included twice because they also fit into other categories such as Number Sequences or Measures.
- A small number of problems do not fit easily into an NNS topic and have been included under Puzzles or Real Life Problems.
- There are no references to the Calculations strand of the NNS since the book is primarily concerned with using and applying maths rather than the mechanics of calculation, although it must be stressed that pupils should be encouraged to talk about the methods they use to solve problems at every opportunity.
- The material in the book also addresses the Using and Applying/Problem Solving strands of each attainment target in the National Curriculum for maths at KS2.

USING THIS BOOK

The book is flexibly structured and designed to be used in several different ways:

- To help teachers teach effective strategies and approaches for solving problems.
- To resource individual NNS topics, such as Length or Ratio and Proportion, particularly where extra practice at using and applying maths is required.
- To provide differentiated practice at various problem solving strategies, e.g. drawing tables and using diagrams.
- For homework exercises or extra preparation for SATs and other maths assessments.

Copymaster Drawing a Diagram



★ Understanding the problem

List what you know from reading the problem.....

.....

What do you need to find out?

What questions do you have?

What are you uncertain about?

Is there any unfamiliar
or unclear language?

★ Planning and communicating a solution



Which solution will you try?

Will you draw a line to represent
the objects? Draw a time line to show
passing time or distance covered?

Draw a picture to stand for objects?

Trace a journey on a map? Use
directions on a compass? Use a scale
drawing? Show the relationship between
things using a diagram or symbols?

★ Reflecting and generalising

What did you find?

How accurate is your answer? How can the strategy you used be applied
to other situations? Could another more effective method have been
used? Is there a shorter or different method?

.....

.....

★ Extension

How can this problem
be extended? What factors
can be added as part of a
'what if' question?

.....

.....

.....

PROBLEM SOLVING TASK CARDS - Drawing a Diagram

Problem 1

Shape & Space

Level
A

Jane built a square tree house on one side of the river. She used eight vertical tree branches for each side. How many branches did she use altogether?



Problem 2

Shape & Space

Level
A

Brett built a tower using four different coloured milk cartons. The red carton was below the green carton. The blue carton was above the yellow carton which was above the green carton. Which carton is on top?

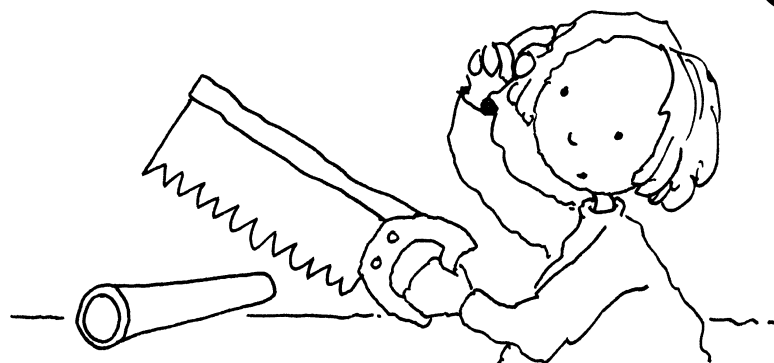


Problem 3

Measures

Level
A

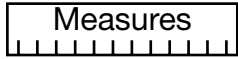
Max has to saw a pipe into seven pieces. If it takes him four minutes to make one cut, how long will it take to cut into seven pieces?



PROBLEM SOLVING TASK CARDS - Drawing a Diagram

Problem 4

Measures



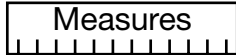
Level
A

A spider is climbing up a 30 metre building. Each day it climbs five metres and slides back one metre. How many days will it take to reach the top?



Problem 5

Measures



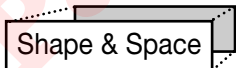
Level
A

Jacob is building a Lego figure. It takes him one and a half seconds to join two pieces. How long will it take him to join nine pieces into one long strip?



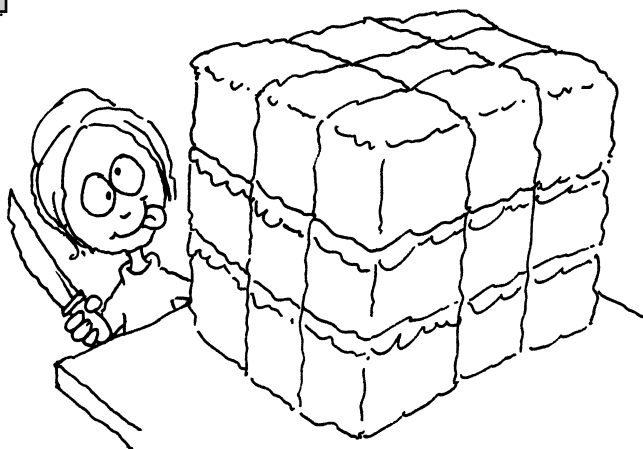
Problem 6

Shape & Space



Level
B

Jeremy's birthday cake was baked in the shape of a cube and was covered on every side with delicious pink icing. If it was cut into 27 cubes, how many pieces would have icing on no, one, two or three sides?



PROBLEM SOLVING TASK CARDS - Drawing a Diagram

Problem 7

Shape & Space

Level B

In the Year Four classroom the desks are organised in equal rows. Jane sits in the desk that is fourth from the front and third from the back. There are four desks on the right but only one to the left of Jane's desk. How many desks are in the room?



Problem 8

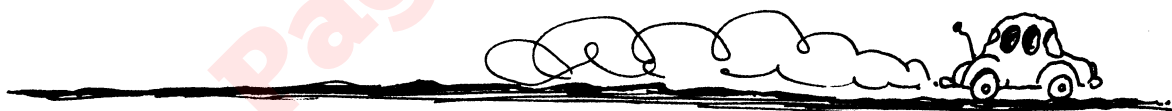
Shape & Space

Measures

Level B

Mrs Williams became terribly lost on the way to an important meeting. She stopped and asked a farmer the way. He told her that some of the roads were flooded and she would have to travel a long way round to get to her meeting. The farmer told Mrs Williams to drive for four kilometres north, then to continue on for five kilometres in a westerly direction. She was then to travel south for two kilometres and then turn to the east for one kilometre and finally to travel north for one kilometre. She would then arrive safely at her meeting.

So she could remember the way, Mrs Williams drew a map on one centimetre grid paper. Help her draw the map on the grid paper.

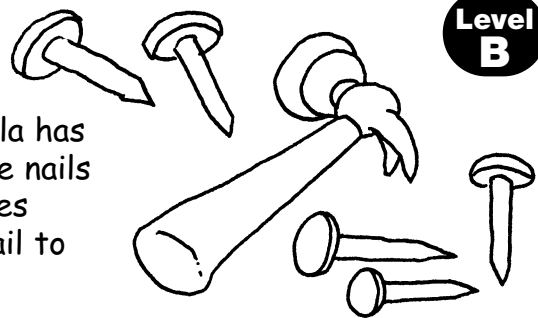


Problem 9

Measures

Level B

For her Design and Technology project, Angela has to hammer five nails into a piece of wood. The nails must be in a straight line and 0.75 centimetres apart. What is the distance from the first nail to the last?



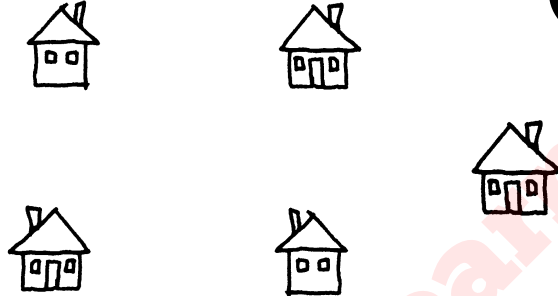
PROBLEM SOLVING TASK CARDS - Drawing a Diagram

Problem 13

Shape & Space

Level C

Five families are building homes in an isolated area. Roads will have to be built to connect each house with all the other houses. How many roads have to be built?



Problem 14

Shape & Space

Level C

A gardener is asked to plant ten trees in five rows, with each row containing four trees. How did he do this?

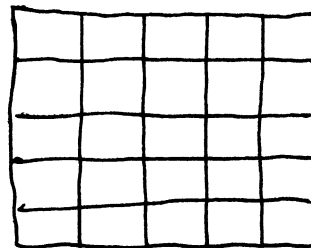


Problem 15

Shape & Space

Level C

Ten objects must be buried in the garden for a treasure hunt. To make this easier the garden has been divided into an imaginary grid, five squares across by five squares down.



To make the treasure hard to find it is important to hide the objects in different areas. You must make sure that no more than two objects lie in a line in any direction.