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PHOTOCOPY MASTERS

More Timed Maths Problems

5, 10 and 15 minute problems for 8 to 10 year olds

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More Timed Maths Problems

Introduction

This book follows on from the very popular '*Timed Maths Problems*' of a few years ago.

It presents a range of problem solving techniques in a gradually more complex way as each section of the book is encountered. This enables problems to be grouped according to the time intended for an activity to be completed: 5 minutes, 10 minutes or 15 minutes. Naturally, these times are arbitrary and will range widely depending upon the abilities of the students, but the opportunity exists to extend students by presenting problems as a challenge to be completed within the specified time. The Teachers' Notes section gives an outline of the various strategies that the students will use as they attempt the problems.

The problems in this book are ideally suited to a maths learning centre set up in the classroom. The problems can be copied, cut up, laminated and placed in boxes with students selecting a problem from the appropriate box, depending on how much time they have.

Student Outcome Statements

The problems in this book relate to the following outcome statements:

Working Mathematically: Uses Problem Solving Strategies 3.3.

Uses problem solving strategies that include those based on selecting key information and representing it in models, diagrams and lists.

Number:	***Evident when the student ...***
Number Patterns 3.12:	*Uses patterns and follows rules to solve word and number problems.*
Equations 3.13:	*Uses patterns to solve number problems.*
Applying Numbers 3.14:	*Chooses appropriate calculations to solve word problems.*
Written Computation 3.16:	*Calculates word and number problems using multiplication, addition, subtraction and division.*
Chance and Data:	***Evident when the student ...***
Interpreting Data 3.27:	*Interprets straightforward one and two-way tables.*
	Arranges data in a meaningful way in order to solve a word problem.

Referenced from *Mathematics - a curriculum profile for Australian Schools (1994).*
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Carlton Victoria 3053

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Teachers' Notes

The problems in this book require the use of the range of strategies detailed in these notes. Teachers may choose to introduce the activities by explaining the strategies before assigning the problems. With this in mind, each section in this book incorporates an explanation and examples for students to consider before attempting the problems themselves.

Making a List: This strategy involves examining all the possibilities for a solution by listing the various elements in the problem. The technique can be used when information has to be gathered and checked in order to cover a variety of possibilities.

Example: Sam has an orange, a sandwich and yoghurt in his lunch box. List all of the different orders he could eat them in.

orange, sandwich, yoghurt
sandwich, orange, yoghurt
yoghurt, orange, sandwich
yoghurt, sandwich, orange
sandwich, yoghurt, orange
orange, yoghurt, sandwich

There are six different orders.

Guess and Check: This is a good strategy to use when introducing children to problem solving. As its name suggests, the children guess possible combinations in the problem, use the guess to reach an approximate answer and then attempt the problem. When an answer is obtained the guess is modified so that an answer which is closer to the correct one can be gained.

Example: A farmer has 55 cows and sheep in total. If he has nine more cows than sheep, how many of each does he have?

The first guess might be 25 cows. If this is true then there would be 16 sheep, making a total of 41 animals altogether. This guess is too low so a higher guess can be made until the student works out that there must be 32 cows and 23 sheep.

A table can be used to check guesses.

Number of cows	**25**	**34**	**32**
Number of sheep	**16**	**25**	**23**
Total	**41 (too low)**	**59 (too high)**	**55 (correct)**

Find a Pattern: This requires the problem solver to find a pattern in the information given. This must then be continued on to find the answer. Patterns might be based on number qualities, repetition of shapes, repetition of words or spelling, for example.

Example: □, △, ○, □, ... , ...

The answer is: □, △, ○, □, △, ○.

Solve an Easier Version of the Problem: This strategy is similar to *Find a Pattern*. The student finds the solution to a complex problem by working out an easier version and then applying the same rules to the harder version.

Example: There are 30 people at a meeting. Everyone shakes hands with each person once. How many handshakes take place?

Students could first work out how many handshakes would occur with a group of five and then look for a pattern to apply to the more difficult problem.

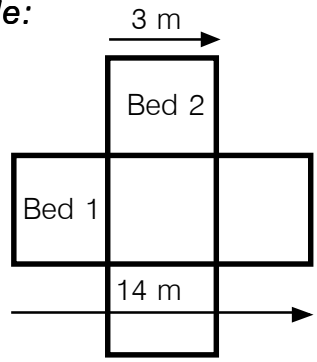
Logical Reasoning: This strategy helps students to develop skills in deductive reasoning by allowing them to use what they already know to solve the problem. Students develop a hypothesis and then check their answer as opposed to guessing the answer. Clues should be written down in the grid as shown.

Example: Jennifer, Neil and Amanda went to a costume party. They had a red mask, a green mask and a black mask to choose from. Jennifer's favourite colour is green. Amanda hates black and Neil took the leftover mask. Who wore each colour?

	Green	Red	Black
Jennifer	**yes**	**no**	**no**
Neil	**no**	**no**	**yes**
Amanda	**no**	**yes**	**no**

Create a Diagram: This strategy requires the students to draw a diagram of the problem which can then be used to provide a solution. It is particularly useful with problems relating to area.

Example:



Julie has two identical garden beds that form a cross. Bed 1 is 14 metres long and Bed 2 is 3 metres wide. What is the distance around the edge of the garden?

Working Backwards: This strategy works best when a problem is stated so that the final outcome is clear. It is necessary to determine the range of events that occurred that produced the result.

Example: Sebastian has saved $30 in his account this week. Each week he saves $5 more than the week before. How much did Sebastian save three weeks ago?

If Sebastian saved $30 this week he must have saved $25 last week and $20 the week before. This can be written into a table.

Money saved:	$30	$25	$20	$15	$10
Weeks ago:	This week	one	two	three	four

From the table we can see that Sebastian must have saved $15 three weeks ago.

Student Information Card

5 Minute Problems

Making a List

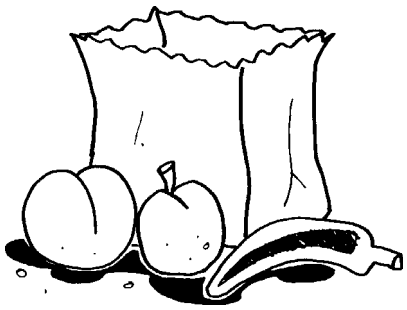
This strategy can be used to list all possible answers. You can use this technique when you need to gather and check all the information contained in the problem.

Example: There is an apple, a banana and a peach in a bag. In how many different orders can they be drawn out of the bag?

Answer:

apple, banana, peach
apple, peach, banana
peach, apple, banana
peach, banana, apple
banana, apple, peach
banana, peach, apple

= 6 different orders.



Strategy: Making a List 5

1. Mark works in a car yard. He has to wash the cars once a week and then park them back in the display room. Currently, there are four cars in the display room - an Audi, a Honda, a Mercedes and a Renault. The cars are parked in a row. In how many different orders can he arrange them?

.....

.....

.....

.....

Strategy: Making a List 5

2. Louise has won a holiday in a raffle. She will be visiting these destinations: Singapore, Bali and Thailand. She can choose any order in which to visit the countries. How many choices does she have?

.....

.....

.....

.....

.....

Student Information Card

5 Minute Problems

Guess and Check

You can use this strategy for many different types of problems. As the name suggests, you need to look at the problem and make a guess at the answer. Use this guess to attempt the problem, then modify it so that a closer answer can be gained. The Guess and Check problems from Number 1 to 5 use two variables. The level of difficulty increases when more variables are used such as in problems 6, 7 and 8.

Example: Jack went to the zoo and found that the cats had been thrown in with the orangutans! He counted 17 animals and then he counted 44 legs.

How many cats were there?

	1st Guess	*Legs*	*2nd Guess*	*Legs*	*3rd Guess*	*Legs*
Cats	10 x 4	40	8 x 4	32	5 x 4	20
Orangutans	7 x 2	14	9 x 2	18	12 x 2	24
Total	**17**	**54**	**17**	**50**	**25**	**44**

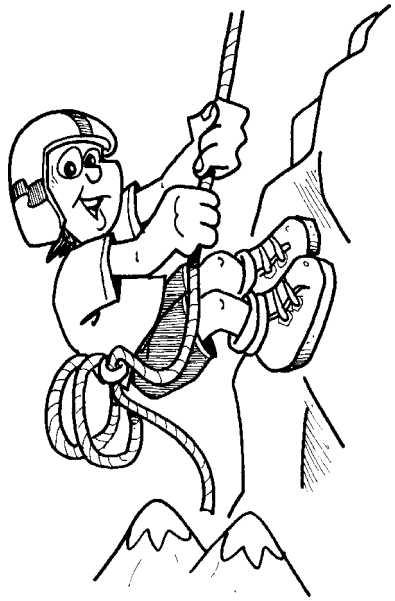
Strategy: Guess and Check 5

1. Irene won 24 ribbons at the school sports carnival. She had twice as many "First" ribbons as "Second" ribbons.

   How many of each ribbon did she have?

1sts						
2nds						

Strategy: Guess and Check 5



2. Denis went mountain climbing and climbed a total of 264 metres in two days. On the first day he climbed 66 metres more than the second day. How many metres did Denis climb on the second day?

   .....

Student Information Card

5 Minute Problems

Find a Pattern

This strategy is very useful in saving time to work out a problem. Often a problem can be solved by identifying a pattern that occurs, making it easy to predict what will happen next. Tables can be used in this strategy to help you find possible patterns.

Example: Jessie has started delivering pamphlets after school each day. On Monday she delivered pamphlets to 30 houses and it took 30 minutes. On Tuesday she delivered 40 pamphlets in 35 minutes. On Wednesday she delivered 50 pamphlets in 40 minutes. If she continues at this rate, how many pamphlets will she deliver on Friday and how long will it take?

A table can be used to identify a pattern:

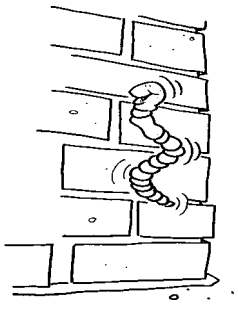
Day	No. of Pamphlets	Time taken
Mon	30	30
Tue	40	35
Wed	50	40
Thu	60	45
Fri	**70**	**50**

Strategy: Find a Pattern 5

1. Abby and Maddy are playing cards.
   Out of every three games that they play, Abby wins two.
   They have played a total of 33 games. Use the table below to work out how many games each girl has won.

Number of games played	3	6	9	12							
Abby											
Maddy											

Strategy: Find a Pattern 5



2. Willy Worm is trying to crawl up the wall. Every time he crawls 10 cm he immediately slides backwards by 5 cm. The wall is 50 cm high. It takes him exactly one minute to crawl 10 cm.
   How long will it take him to reach the top?

   Use the table below to help you work out the answer.

Time (minutes)	1	2	3	4	5	6	7				
Distance travelled (cm)	10 cm - 5 cm										
Actual distance	5 cm										

Student Information Card

Logical Reasoning

5 Minute Problems

You can use logic to help you solve problems. The simple example below shows you how you can use a grid to match up clues. This helps you to provide an explanation that can be checked rather than just guessing and checking.

Example: Rod, Rebecca and Brett each had a pet. Rod doesn't like dogs, Brett's pet can fly. Which pets belong to which person?

	Rod	Rebecca	Brett
canary	✘	✘	✓
cat	✓	✘	✘
poodle	✘	✓	✘

Strategy: Logical Reasoning

5

1. Tim, John and Andrew each like a particular flavour of milkshake. The flavours are caramel, spearmint and chocolate.
   - ☆ Tim will only have chocolate.
   - ☆ Andrew doesn't like spearmint.

   Use the table below to work out which flavour each boy prefers.

	caramel	chocolate	spearmint
Tim			
John			
Andrew			

Strategy: Logical Reasoning

5

2. Natalie, Scott and Kathryn have each taken a book out of the library. The books they chose were "Black Beauty", "Harry Potter" and "Great Cricketers".

   - ☆ Natalie loves reading about wizards.
   - ☆ The boy is a keen sportsman.

   Work out who chose each book.

	Black Beauty	Harry Potter	Great Cricketers
Natalie			
Scott			
Kathryn			

Student Information Card

10 Minute Problems

Making a List

- Remember, when using this strategy you need to list all the possibilities so that they can be counted. Refer back to the Student Information Card for '5 Minute Problems' if you need more help.

Strategy: Making a List

10

1. Michael has opened a new bank account. The bank teller has told him he can choose his own personal identification number (PIN). He can choose any order of the following digits for his PIN: 3, 7, 8, 2.

   How many different orders can he pick from?

   .....

   What is the largest number he could pick?

   .....

   What is the smallest number he could pick?

   .....

Strategy: Making a List

10

2. Abby, Bill, Caroline, Damian and Emily were attending a rock concert. They were sitting in the front row, seats 1-5.

   How many different orders could they sit in?

   .....

   .....

   .....