Ready-Ed Publications

Ebook Code: REAU0063

PHOTOCOPY MASTERS

Primary Maths PROBLEMS *for* 6-8 year olds

* **Task cards for developing a range of maths problem solving strategies.**

* **Activities cover all key learning areas of the maths curriculum.**

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Published by Ready-Ed Publications (2006)
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ISBN 1 86397 667 1

Introduction

The ***Primary Maths Problems*** series is a comprehensive teacher resource containing a variety of reproducible mathematical problem task cards – some with one solution, some with a number of solutions and some open ended. The problems are related to practical everyday mathematical situations, with each activity designed to challenge students to use their knowledge and problem solving skills.

Problem solving can develop many valuable skills in our students such as logical reasoning, creative thinking and communication skills. Students require perseverance, flexibility in ideas and methods, reflective thinking and confidence if they are going to be successful in this area. The problems will ask students to draw on a number of mathematical strategies in order to solve them. These strategies need to be introduced and taught to students if they are going to gain the skills necessary to solve a variety of problems. For students to solve a problem they first need to read the facts carefully and understand what the problem is asking them to do. They then need to work out a plan for solving the problem, carry out the processes involved and hopefully look back over their answer and assess the results successfully.

Problems can be solved using a number of different strategies. These strategies may include:

- Think, estimate and check
- Draw a diagram or picture
- Look for patterns
- Make a model
- Act out the problem
- Construct a table or a graph
- Write a statement
- Make a list
- Calculate
- Reflect and assess results

Prior to presenting the problems from this book to your students, put a list of these strategies on display. Go through each one and present students with an example to work with. Keep the strategies on display, then as your students work through the various problem cards from this book, ask them which strategies they need to solve each problem. In some cases they may need to use more than one strategy to solve a problem. A checklist included in this book allows teachers and students to keep a record of the strategies used to solve each problem. The above strategies are explained more thoroughly and with examples further on in the teaching notes, which ideally should be worked through with the students.

The problem cards in this book have been divided into the four main areas of the maths curriculum:

- SPACE
- NUMBER
- MEASUREMENT
- CHANCE and DATA

The principles of WORKING MATHEMATICALLY and REASONING and STRATEGIES have been incorporated into each of the four main areas.

Contents

PROBLEM CARDS: Space and Location

PROBLEM CARDS: Number

Curriculum Links

The activities in this book can be linked to the following areas in the Mathematics curriculum documents.

VICTORIA*

Levels 1-2

Number
Level 1: 1.1, 1.2, 1.3, 1.4, 1.5
Level 2:
Numbers, Counting and Numeration – 2.1, 2.2, 2.3, 2.4
Mental Computation and Estimation – 2.1
Computation and Applying Number – 2.1, 2.2, 2.3, 2.4
Number Patterns and Relationships – 2.1, 2.3

Space
Level 1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7
Level 2: Shape and Space – 2.1, 2.3, 2.4, 2.5, 2.6
Location – 2.1, 2.2, 2.3, 2.4

Measurement and Data
Level 1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7
Level 2:
Measuring and Estimating – 2.1, 2.3, 2.4, 2.5
Time – 2.1, 2.2
Using Relationships – 2.1
Chance – 2.1, 2.2
Data – 2.1, 2.2, 2.3, 2.4

Reasoning and Strategies
Level 1: 1.1, 1.2, 1.3
Level 2:
Mathematical Reasoning – 2.3, 2.3, 2.4
Strategies for Investigation – 2.1, 2.2

* ***Incorporates VELS: Number, Space, Measurement, Chance and Data and Working Mathematically.***

SOUTH AUSTRALIA

Levels 1-2

Exploring, Analysing and Modelling Data –
1.1, 1.2, 1.3, 2.1, 2.2, 2.3
Measurement –
1.4, 1.5, 2.4, 2.5
Number –
1.6, 1.7, 1.8, 2.6, 2.7, 2.8
Pattern and Algebraic Reasoning –
1.9, 1.10, 1.11, 2.9, 2.10, 2.11
Spatial Sense and Geometric Reasoning –
1.12, 1.13, 1.14, 2.12, 2.13, 2.14

WESTERN AUSTRALIA

Levels 1-2

Working Mathematically
Contextualise Mathematics – WM 1.1, WM 2.1
Mathematical Strategies – WM 1.2, WM 2.2
Reason Mathematically – WM 13, WM 2.3
Apply and Verify – WM 1.4, WM 2.4

Space
Represent Location – S 1.1, S 2.1
Represent Shape – S 1.2, S 2.2
Represent Transformations – S 1.3, S 2.3
Reason Geometrically – S 1.4, S 2.4

Measurement
Understand Units – M 1.1, M 2.1
Direct Measure – M 1.2, M 2.2
Estimate – M 1.3, M 2.3
Indirect Measure – M 1.4, M 2.4

Chance and Data
Understand Chance – C&D 1.1, 2.1
Collect and Organise Data – C&D 1.2, 2.2
Summarise and Represent Data – C&D 1.3, 2.3
Interpret Data – C&D 1.4, 2.4

Number
Understand Numbers – N 1.1, N 2.1
Understand Operations – N 1.2, N 2.2
Calculate – N 1.3, N 2.3
Reason About Number Patterns – N 1.4, N 2.4

NEW SOUTH WALES

Levels 1-2

Working Mathematically
Questioning – WMS 1.1, WMS 2.1
Applying Strategies – WMS 1.2, WMS 2.2
Communicating – WMS 1.3, WMS 2.3
Reasoning – WMS 1.4, WMS 2.4
Reflecting – WMS 1.5, WMS 2.5

Number
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Addition and Subtraction – NS 1.2, NS 2.2
Multiplication and Division – NS 1.3, NS 2.3
Fractions and Decimals – NS 1.4, NS 2.4
Chance – NS 1.5, NS 2.5

Teaching Points

PROBLEM SOLVING STRATEGIES

Think, estimate and check

This skill is often used subconsciously in problem solving as well as many other areas of maths. It should be the first step taken whenever a student is presented with a problem. Students read the problem at least once, think about what it is asking of them, estimate an answer and then check to see if they are correct. While solving a problem using this method, students may still need to work through a number of other strategies, such as calculating mentally or writing notes or sums, drawing up a table or chart or even checking using mathematical tools such as a calculator, scales, ruler and so on.

Example:
At the local fair there is a stall where you are given ten beanbags to throw into a bin two metres away. If you had three turns, how many beanbags do you think you are likely to get into the bin on the:
a) first turn? **b) second turn?** **c) third turn?**

Step 1: Read the problem and work out what it is asking?

Step 2: Think about and estimate how many beanbags you think you could throw into a bin. Do you think you would improve on the second and third try? You may even wish to check your answers by acting out the problem with actual beanbags and a bin if you have the equipment.

Step 3: Answers will vary from student to student depending on how confident they feel about throwing something into a target. If students do act out the problem, they would then need to check their estimates and see how close they were to how they performed. As this is a chance experiment, would the results be the same each time? *(Follow with class discussion.)*

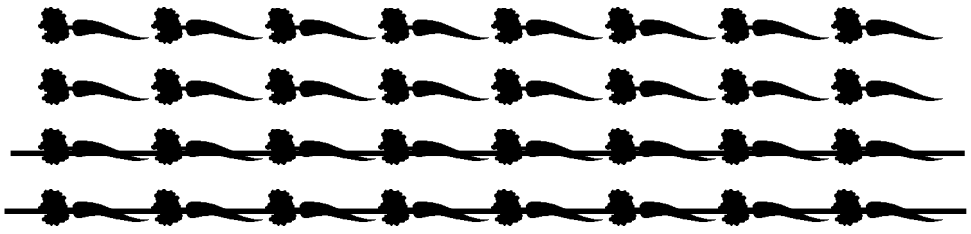
Draw a diagram/picture

This skill can be very useful in helping a student visualise the problem, making it often easier to interpret and solve. In this case students would read over the problem, think about what it is asking and draw a diagram/picture to help them solve it.

Example:
A farmer planted four rows of eight carrots. If a quarter of the carrots didn't grow and a quarter were eaten by rabbits, how many carrots did the farmer have left?

Step 1: Read the problem and work out what it is asking?

Step 2: Draw four rows of eight carrots (or use lines to represent the carrots). Cross out a quarter (1 row) to show those that didn't grow and cross out another quarter or row to show the ones eaten by rabbits.



Step 3: *Count up the number of carrots left and record the answer.* (Answer = 16 carrots)

Teaching Points

Look for patterns

As with drawing a diagram or picture, looking for a pattern can also help students to visualise the problem. A pattern may present itself particularly in the areas of space and number.

Example:
A gardener wanted to make a path from his back door to the shed using at least two different shapes that have four or more sides. Suggest two different patterns the gardener could use and draw them on a piece of paper.

Step 1: Read the problem, and think about all the shapes that have two or more sides.

Step 2: Use shape blocks to create a few different patterns that only contain two shapes that have four or more sides.

Step 3: Select two different designs and draw them. Answers will vary from student to student, however, the shapes they would need to use could include: *square, rectangle, diamond, trapezium, parallelogram, pentagon, hexagon or octagon.*

Make a model

This strategy works particularly well when dealing with problems related to shape and space. Once again in order for students to visualise the problem it is often useful to construct it or make a model first. Materials such as blocks, 2D and 3D shapes, cubes, sticks, Plasticine, paper, popsticks, and so on are all handy in representing shapes and structures in our world.

Example:
Using shape blocks create a tower that is at least as high as your ruler and can support a school shoe. Which shapes work the best?

Step 1: Read the problem and visualise what it is asking.

Step 2: Gather various 3D shape blocks and begin working on a structure that is at least the height of your ruler and can support the weight of one of your school shoes.

Step 3: Compare the height of your tower to a ruler and test out its support by placing one of your shoes on its top.

Answer*: Answers will vary, however the most effective shapes would be rectangular prisms and cubes. The tower would also need to be wide enough to support the shoe.*

TASK 9

CITY OF SHAPES

Materials: •pencil •ruler •paper •computer (optional)

SELF ASSESSMENT

1. What shapes are mainly used in houses and buildings? Make a list below.

_____

_____

2. Use the computer or a piece of paper to design a small city that is made up buildings of many different shapes.

Challenge: Why do you think buildings need shapes with edges?

Indicator: Identifies where familiar shapes are used in everyday life.

TASK 10

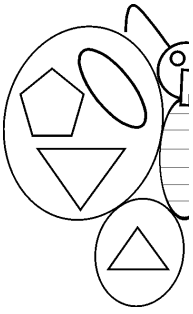
MISSING HALF

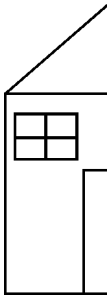
Materials: •paper •ruler •pencil

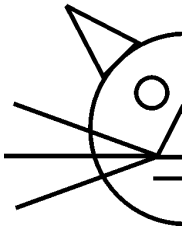
Symmetrical means that when something is cut in half it is the same on each side.

SELF ASSESSMENT

1. Draw the missing half of the pictures below.







2. On a piece of paper draw a picture of a symmetrical robot made of squares, triangles, rectangles and circles.

Challenge: Make a list of all the symmetrical things you can see in your classroom.

Indicator: Uses shape and symmetry to complete and design simple pictures.

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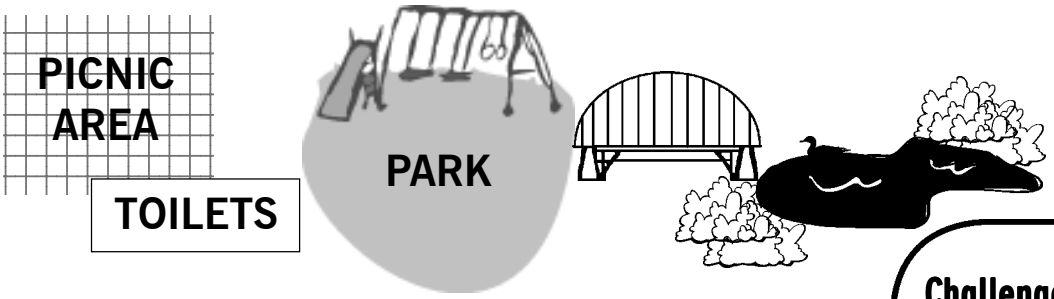
TASK 17

CREATING PATHS

Materials: •pencils (red, blue, yellow) •grey lead pencil

SELF ASSESSMENT

1 Look at the park below. Draw in three different paths travelling from the picnic area to the duck pond. *(Use a red, blue and yellow pencil.)*



2 Which path do you think is the longest?

_____

3 Which path do you think is the shortest?

_____

Indicator: Creates different paths on a simple map.

Challenge:
Write a set of directions on how to get from your house to your local park if walking.

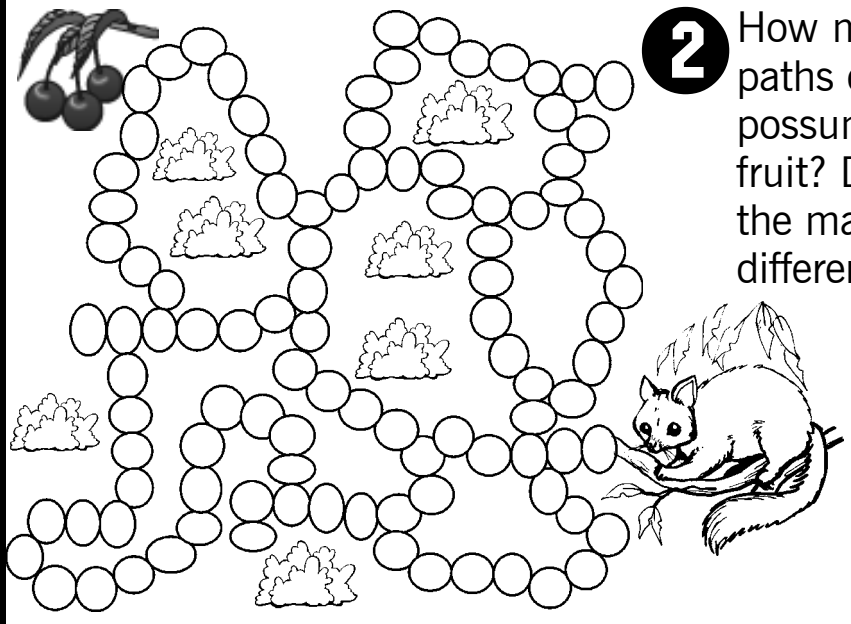
TASK 18

POSSUM MAZE

Materials:
•coloured pencils

SELF ASSESSMENT

1 Help the possum reach the fruit by drawing the shortest path through the bush maze.



2 How many possible paths could the possum take to the fruit? Draw them on the maze using different colours.

Indicator: Locates and follows different paths on a maze.

Challenge:
Design your own maze for an animal of your choice to reach its shelter. Give your maze to a friend to work out.

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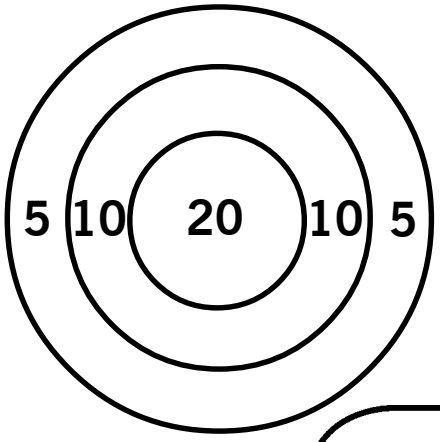
TASK 7

BALL TOSS

Materials: • pencil

SELF ASSESSMENT

1 Look at the board and list the possible scores you could make if you had two balls that hit the board.



2 What would be the lowest and highest score you could make if you had three balls that hit the target?

a) lowest = ____ **b)** highest = ____

Challenge: What possible scores could you make if you had three balls that hit the board?

Indicator: Uses addition and multiplication facts to solve a problem.

TASK 8

BOWLING

Materials: • pencil

SELF ASSESSMENT

1 In bowling you have two shots at knocking down 10 pins. List the different number combinations you could make if all pins got knocked down with each turn?

_____

2 A *strike* is when all 10 pins are knocked down in one shot and equals 10 points. If a bowler made **3** strikes in the first three rounds, a **6** in the 4th round and a **9** in the 5th round, what would be his total pin score?

_____

_____

Challenge: If a bowling card read "2 strikes, 7, 8, 9," what would the bowler's total score be?

_____

Indicator: Uses addition and multiplication facts to solve a problem.

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TASK 29

▸ NUMBER

BEN'S CHORES

Materials: •pencil •coins

SELF ASSESSMENT

1. Each time Ben completes a chore around the house his parents will give him $1.00. How many chores must he complete to receive:

   a) $3.00 ☐ **b)** $8.00 ☐ **c)** $15.00 ☐

2. If he has saved $22.00, how many chores has he completed? _____

3. If he buys a fish bowl for $9.00, a fish for $3.00 and some fish food for $2.00, how much money does he have left?

   _____

Indicator: Adds, multiples and divides money to solve a problem.

Challenge: If Ben's older sister receives $2.00 a chore, how many chores would she need to do to save $22.00?

TASK 30

▸ NUMBER (MEASUREMENT)

CAKE SHOP

Materials: •pencil

SELF ASSESSMENT

1. If a whole cake costs $12.00, how much will the following cost:

   a) ½ cake? ☐ **b)** ¼ cake? ☐ **c)** $^1/_3$ cake? ☐

2. If the cake was divided into six slices, how much would each slice cost?

   _____

3. If the cake was divided into 12 slices, how much would five slices cost?

   _____

Indicator: Uses knowledge of money and fractions to solve a problem.

Challenge: If the cake was divided into eight slices, how much would:

a) one slice cost?

b) six slices cost?

TASK 11

THREE BEARS

Materials: •pencil •tape measure

SELF ASSESSMENT

1. Make a list of the differences you think there are between the three bears (from *Goldilocks and the Three Bears*).

DADDY BEAR	MUMMY BEAR	BABY BEAR

2. You need to make three doors. If Daddy bear is 180 cm tall, Baby bear is half Daddy's height and Mummy is in the middle, how large should you make each door?

a) Daddy's door ____ **b)** Mummy's door ____

c) Baby's door ____

Indicator: Makes comparisons between the sizes of two or more objects.

Challenge:
Suppose you had to make a door that only students in your class would use. How would you work out how high to make this door? What would the height need to be?

TASK 12

LEAKING TAPS

Materials: •pencil

SELF ASSESSMENT

1. If a tap lost 10 drops of water every minute, how many drops would it lose after:

a) 3 minutes? **b)** 6 minutes? **c)** 9 minutes?

2. If a bath lost ½ cup of water in five minutes, how much would it lose after:

a) 10 minutes?

b) 20 minutes?

c) 30 minutes?

Indicator: Uses knowledge of volume, fractions and time to solve a problem.

Challenge:
How long would it take the bath to lose five cups of water?

_____

TASK 5

▸ CHANCE

HOW MANY JELLY BEANS?

Materials: • pencils

SELF ASSESSMENT

1 A jam jar was filled with jellybeans for a guessing competition. Look at the jar and the children's guesses, predict who you think would most likely and least likely win.

• Sarah – 12	• James – 30	• Ben – 6
• Lucy – 75	• Megan – 10	• John – 21
• Adam – 9	• Simone – 18	• Harry – 50

Most likely: _____ Least likely: _____

2 If it cost 20c a guess, how much money did they raise? _____

3 What prize do you think the winner would receive? _____

Challenge: Invent and describe your own chance competition.

Indicator: Predicts what might happen in simple chance experiments.

TASK 6

▸ CHANCE/NUMBER

BEANBAG TOSS

Materials: • pencils

SELF ASSESSMENT

1 At the school fete one of the stalls was the beanbag toss where $1.00 buys two beanbags which are then thrown into a bucket to win a prize. Look below at how many bean bags the children purchased and number them **1** to **6** from having the best to least chance of winning.

a) Alex (10) ___ **b)** Jake (6) ___ **c)** Megan (12) ___

d) Oliver (4) ___ **e)** Emily (8) ___ **f)** Michelle (2) ___

2 How much did each child spend at the beanbag toss?

a) Alex – $_____		**d)** Oliver – $_____	
b) Jake – $_____		**e)** Emily – $_____	
c) Megan – $_____		**f)** Michelle – $_____	

Challenge: How much money was collected altogether from these six children?

_____

Indicator: Predicts and calculates what might happen in a simple game of chance.

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