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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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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:
- GEOMETRY
- NUMBER
- MEASUREMENT
- STATISTICS

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

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Curriculum Links

The activities in this book can be linked to the following achievement objectives in the New Zealand Mathematics curriculum.

NUMBER (Levels 1 and 2)

Exploring number

Students will:

- make up, tell and record number stories, up to 9, about given objects and sequence pictures;

- form a set of up to 20 objects;

- read and write any 2-digit whole number;

- rote count to 50;

- read any 3-digit number;

- understand the meaning of the digits in a 2- or 3-digit whole number;

- order any set of three or more whole numbers (up to 99);

- write and solve comparison problems;

- write and solve story problems.

Exploring computation and estimation

Students will:

- make sensible estimates and check the reasonableness of answers;

- model and explain addition calculations with a sum of up to 20;

- model and explain subtraction calculations;

- find one half and one quarter of a shape, and a half of a set of objects;

- recall basic addition and subtraction facts;

- mentally perform calculations involving addition and subtraction;

- write and solve problems which involve a choice of any combination of the four arithmetic operations.

MEASUREMENT (Levels 1 and 2)

Estimating and measuring

Students will:

- order and compare lengths, masses, and volumes, and describe the comparisons, using measuring language;

- measure by counting non-standard units;

- compare the values of coins and notes;

- read prices and give change for sums of money;

- represent a sum of money by two or more different combinations of notes and coins.

Developing concepts of time, rate, and change

Students will:

- read aspects of time, including days of the week and clocks (to hours and half hours);

- know the units of time, e.g. minute, hour, day, week, month and year.

ALGEBRA (Levels 1 and 2)

Exploring patterns and relationships

Students will:

- make and describe repeating and sequential patterns;

- continue a repeating and sequential pattern and write a rule for this;

- illustrate and talk about relationships;

- use graphs to illustrate relationships.

Exploring equations and expressions

Students will:

- write number sentences using =, from story contexts.

Teachers' Notes

PRESENTING THE PROBLEM CARDS

Prior to presenting the cards, display a list of the strategies needed for solving a problem to your class. Provide an example of each strategy by solving a related problem. The problem cards may be used in a variety of formats, including:
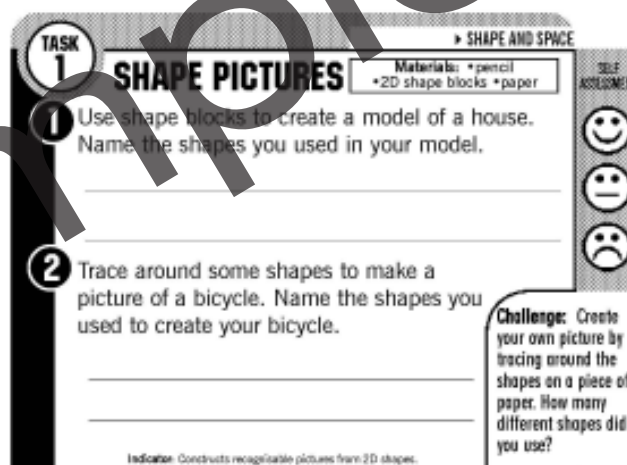
- *As a whole class*
- *In small groups*
- *In pairs*
- *Individually*
- *As an extension task*
- *As a homework task*

USING THE PROBLEM CARDS

Photocopy the relevant cards suited to the key learning areas your class is covering and distribute according to one of the above formats. Each problem card will contain the following:

1. Task number, key learning area and title;
2. Material required to complete the problem tasks;
3. 1 to 4 problem tasks;
4. A challenge task for early finishers or those needing further extension;
5. A student self assessment area;
6. Relevant indicator/s or learning focus.

Note: All Challenge **questions can be answered using another sheet of paper.**

TASK 1 ▶ SHAPE AND SPACE

SHAPE PICTURES   Materials: •pencil •2D shape blocks •paper   SELF ASSESSMENT

① Use shape blocks to create a model of a house. Name the shapes you used in your model.

② Trace around some shapes to make a picture of a bicycle. Name the shapes you used to create your bicycle.

Challenge: Create your own picture by tracing around the shapes on a piece of paper. How many different shapes did you use?

Indicator: Constructs recognisable pictures from 2D shapes.

ASSESSMENT AND ANSWERS

Two assessment task cards are located at the end of each strand for teachers to collect and assess. An assessment checklist is located at the end of the introductory section of this book for teachers to keep a record of the strategies and skills students are using as they work through each problem card. There is also provision on each problem task card for students to note their own self-assessment. They are simply required to shade in an icon to represent how they felt they performed on a task. Answers or possible solutions are also provided at the back of this book with the exception of open-ended problems where answers would vary or require a teacher to check the end results.

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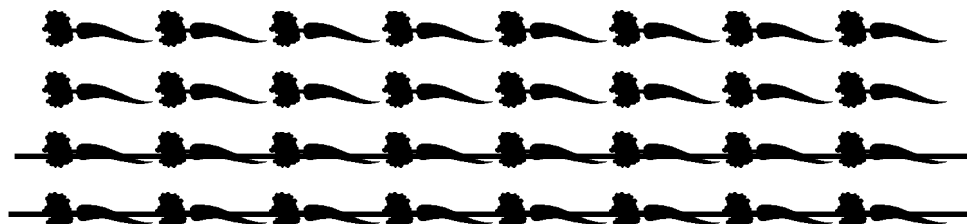
Step 3: *Count up the number of carrots left and record the answer.* (Answer = 16 carrots)

TASK 1

SHAPE PICTURES

Materials: • pencil
• 2D shape blocks • paper

SELF ASSESSMENT

① Use shape blocks to create a model of a house. Name the shapes you used in your model.

_____

_____

② Trace around some shapes to make a picture of a bicycle. Name the shapes you used to create your bicycle.

_____

_____

Indicator: Constructs recognisable pictures from 2D shapes.

Challenge: Create your own picture by tracing around the shapes on a piece of paper. How many different shapes did you use?

TASK 2

COINS

Materials: • pencil • coins

SELF ASSESSMENT

① What shape are most New Zealand coins?

_____

② Trace around these coins in the space below. Place them in order of size from the smallest to largest.

Indicator: Orders a shape according to size and makes a 3D shape from a 2D shape.

Challenge: Trace and order our coins in order of amount (from least to most). Is this order the same as the size order?
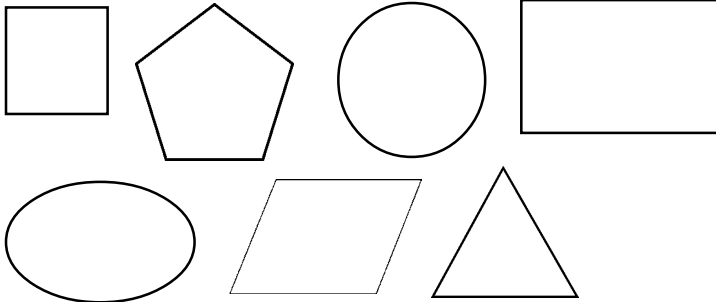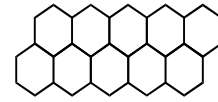
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TASK 11

PAVING

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

SELF ASSESSMENT

1 Colour the shapes that can be joined together without leaving gaps or spaces.

E.g. **Hexagons** *can be joined together.*

2 Use one or more of the shapes above to create a pattern paved outdoor area on a piece of paper.

Indicator: Identifies and uses shapes that can make a tessellating pattern.

Challenge: Using the computer or a piece of paper, design a garden path that has no gaps and has at least three different shapes included.
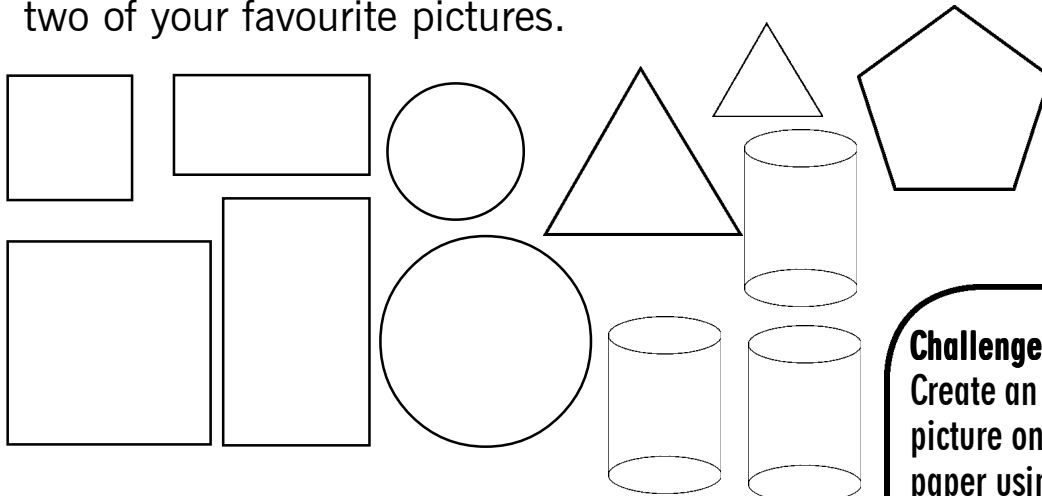
TASK 12

SHAPE PICTURES

Materials: •shape blocks •pencil •ruler •computer (optional/Challenge)

SELF ASSESSMENT

1 How many different pictures can you create using the shapes below? Use shape blocks to help you then draw two of your favourite pictures.

2 Would your pictures change if you turned them upside down? If so, how?

Indicator: Uses given shapes to create simple pictures.

Challenge: Create an interesting picture on a sheet of paper using different sized circles only. You could also try this using a computer.

Sample

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TASK 25

LUNCH ORDERS

Materials: • pencil • coins

1 Erin's lunch order totals $1.60. How many different ways can she make up this amount with coins?

_____

2 Ben's lunch order totals $2.40. How many different ways can he make up this amount with coins?

_____

3 Joel's order totals $3.20. How many different ways can he make up this amount with coins?

_____

Challenge: If a lunch order cost $3.80, how much change would a student receive from $5.00?

Indicator: Uses different coin combinations to represent amounts of money.

TASK 26

LOLLY SHOP

Materials: • pencil • coins

1 •large snakes 50c •chocolate frogs 40c •lollipops 20c •musk sticks 10c •jelly babies 5 for 10c

Find the cost of the following lollies:
a) 2 large snakes = _____
b) 1 frog and 1 lollipop = _____
c) 4 musk sticks = _____
d) 10 jelly babies = _____
e) 1 snake and 1 frog = _____
f) 1 lollipop and 3 musk sticks = _____

2 If Harry spent 40c on jelly babies, how many did he buy? _____

3 If Sarah spent 30c on musk sticks, how many did she buy? _____

Challenge: a) How much would 1 of each item cost? b) How much change would there be from $2.00?

Indicator: Adds and multiplies amounts of money in shopping situations.

TASK 5

HOW MANY JELLY BEANS?

Materials:
• pencils

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

BEANBAG TOSS

Materials: • pencils

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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