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### **HAWKER BROWNLOW** **E D U C A T I O N**

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## ★ TO THE TEACHER ★

One of the most important aspects of teaching is communication. Writing, speaking, explaining or drawing can help your students internalise what they have learned and clarify their own thinking. Communication can also act as a powerful tool for you to assess the thinking of your students.

Your students should be encouraged to use strategies that foster communication. We have incorporated the following strategies for your students in ***Maths the Write Way***.

- ★ Write your own problems
- ★ Communicate orally
- ★ Identify key words and explain their importance
- ★ Create your own game, puzzle, picture, poem or rap
- ★ Summarise your work
- ★ Investigate to find other ways to solve a problem
- ★ Make predictions and draw conclusions
- ★ Work cooperatively to create and assess your work

***Maths the Write Way*** contains seven lessons. Each lesson includes four Investigations and two Extensions to the Investigations. Hints are included to provide clues to the solutions. Each lesson also has four Assessments, two with open-ended responses and two with a multiple-choice format. Vocabulary activities, following Lessons 3 and 7, emphasise the importance of mathematical language. Finally, two mini reviews and a Final Review will help you assess the work of your students.

In ***Maths the Write Way***, we have provided a forum for you to instruct as well as assess. We encourage students to look for a variety of ways to solve problems. The process—not just the solution—must be emphasised. Working and sharing ideas with cooperative groups will enhance understanding and communication.

The Teacher Guide includes:

- ★ Listing of lesson objectives and necessary materials
- ★ Key vocabulary and concepts for the lesson
- ★ Suggestions for discussing key mathematical concepts
- ★ Sample solutions to all Investigations Extensions, and Assessments
- ★ Suggested strategies for solving problems
- ★ Reproducible pages for use with selected activities

We are sure you will find ***Maths the Write Way*** a valuable resource that will supplement and enhance your mathematics instructional program.

Brian E. Enright

Robert Gyles

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## Pages 2–5

**Objectives**

- ★ To round numbers to the nearest hundred thousand
- ★ To explore expanded notation and develop a rationale for its use
- ★ To compare decimals in the context of data interpretation
- ★ To discover exponents as an efficient way of expressing powers of 10

**Vocabulary**

Before beginning the lesson, you may wish to review the following maths terms: *expanded notation, exponent, powers of 10, prediction, round.*

As students round numbers, they are developing number sense and learning an essential life skill. By developing rules and rationales, students strengthen their understanding of maths concepts. Using real data will help students realise the importance of the concepts they are studying as well as make connections to real life.

In Investigation 1, students round figures to the nearest hundred thousand. Since all other data includes values in the hundred thousands, you may wish to point out that the value for Hobart is in millions but the figure is still rounded to the nearest hundred thousand. Before assigning Investigation 3, you may wish to review place-value concepts with decimals.

Answers to Investigations, Extensions and Assessments will vary. Sample solutions are provided.

**Part A**

## Pages 2–3

**Investigation 1**

When rounding to the nearest hundred thousand, look at the digit to the right of the hundred thousands place. If this digit is 4 or less, the hundred thousands-place digit remains the same and the digits that follow become zeroes. (The number is rounded down to the lower hundred thousand.)

If the digit is 5 or more, add 1 to the digit in the hundred thousands place, and all digits that follow become zeroes. (The number is rounded up to the next hundred thousand.)

**Investigation 2**

Expanded notation is a way of expressing a number in terms of its digits and place values. It allows you to get a better sense of the number by examining the actual value of each digit.

**Extension**

The railway operating expenses in Hobart are about how much more than the total of all other cities in the chart? (*about \$1,100,000*)

**Assessment 1**

D

**Assessment 2**

First find the lowest number that rounds to 400,000 when rounding to the nearest hundred thousand (350,000). Then find the greatest number that rounds to 400,000 when rounding to the nearest hundred thousand (449,999). The actual population of Kingsville could range from 350,000 to 449,999.

**Part B**

## Pages 4–5

**Investigation 3**

1. Which skater had the fastest time of all the skaters listed in this chart? (*Christa Rothenburger*)
2. In which year did Bonnie Blair skate fastest? (*1994*)
3. Which two skaters have a time difference of 2.87 seconds? (*Karin Enke and Bonnie Blair in 1994*)

### Investigation 4

10,000 or  $10^4$

100,000 or  $10^5$

1,000,000 or  $10^6$

The exponents match the number of zeros in the products.

### Extension

If I had to make a prediction for the next Olympic Games, I would guess that the winning time in the women's 1,000-metre speed skating event will be under 1:17.00. If you study the history of the Olympics, you will see that performances have continued to improve over the years. Some reasons for better times include improved skating tracks/conditions, high-tech equipment and clothing and the athletes' continual desire to be the best.

### Assessment 1

C

### Assessment 2

The value of  $10^7$  is 10,000,000, or 10 million. To find this value, multiply  $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$ . To check the answer, count the number of zeros to be sure that there are 7.

## LESSON 2

## Data Analysis

Pages 6–9

### Objectives

- ★ To find the mean of a set of data
- ★ To construct a circle graph to compare parts of a whole
- ★ To explore the probability concepts of independent events and combinations

### Materials

- ★ Reproducible 1: *Circle Graph*
- ★ Reproducible 2: *Spinners*

### Vocabulary

Before beginning the lesson, you may wish to review the following maths terms: *circle graph*, *combinations*, *independent events*, *mean*, *median*, *mode*, *probability*, *sample space*.

When students read and interpret data from charts and graphs, they can strengthen higher-order thinking skills. Also, interpreting data and finding mean are important life skills. To validate this point, you need only to look through newspapers, magazines and various books and references. Students should be aware of the differences between mean, median and mode and understand why it is sometimes helpful to examine more than one kind of 'average' for a set of data.

Probability concepts may appear abstract to many students. Through experimentation, students will begin to understand and see the validity of theoretical probability concepts.

Before assigning the Investigations in this lesson, you may wish to review the following:

- ★ making a circle graph, using per cents and degrees
- ★ converting fractions and decimals to per cents
- ★ rounding to the nearest whole per cent
- ★ the two-letter postal abbreviations for states

For Investigation 2, distribute copies of Reproducible 1. You may wish to explain that the circles are divided into sections of  $18^\circ$  or 5%, which allows students to approximate the size of each section of their graphs without measuring to the exact degree. For Investigation 3, distribute copies of Reproducible 2.

Answers to Investigations, Extensions and Assessments will vary. Sample solutions are provided.

### Part A

Pages 6–7

### Investigation 1

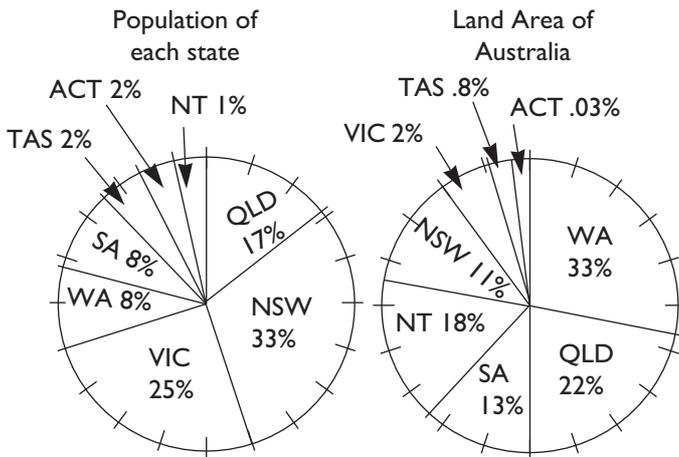
Find the mean land area (in square kilometres) of the eight states listed in the chart.

*Solution:* Find the sum of the land areas of each state:  $227,600 + 801,600 + 1,727,200 + 67,800 + 989,000 + 2,525,500 + 1,346,200 + 2,359 = 7,687,259$ .

Divide this sum by 8 to find the mean:  $7,687,259 \div 8 = 960,907$ .

### Investigation 2

The circle graphs below show how the population of each state compares to the total area of Australia.



Sample questions:

- Which state has half the land area of Queensland?
- Which state has the largest population?

### Extension

Divide the population figure by the land area for each state. This will give an idea of about how many people there are for each square kilometre of land in the state. Using this procedure, you can determine that NT and WA are the least crowded states.

### Assessment 1

D

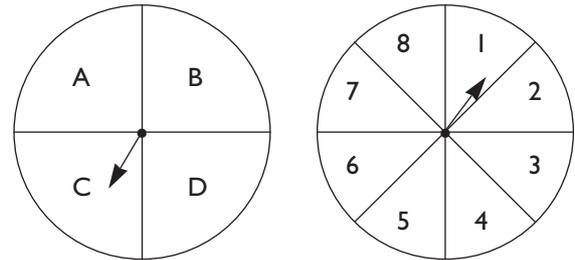
### Assessment 2

Jerry needs to get 100 on his next test in order to have a 90 average. To have a 90 average for all three tests, the sum of the scores must be 270 ( $90 + 90 + 90$ , or  $3 \times 90$ ). Since the first two scores have a sum of 170, subtract this figure from 270 to find that the third test score must be 100.

## Part B

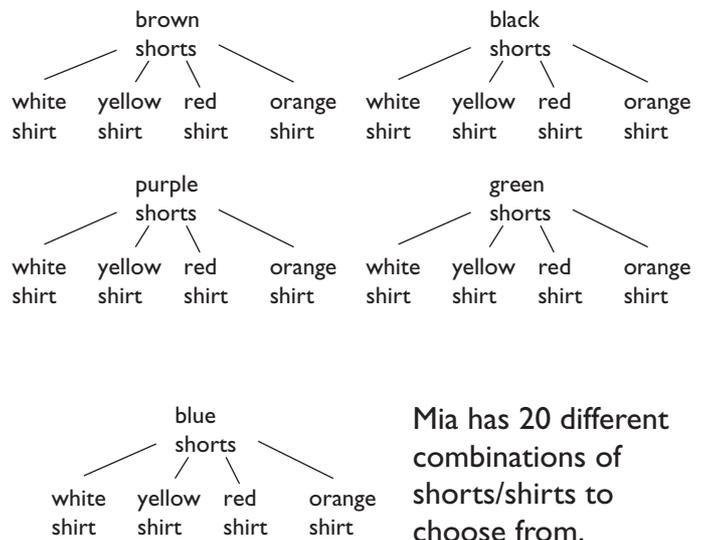
### Pages 8–9

### Investigation 3



What is the probability of spinning a B on the first spinner and an even number on the second spinner? ( $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$ )

### Investigation 4



### Extension

If Mia could no longer wear her brown shorts, eliminate all combinations with these shorts. This would mean that Mia would now have 16 different combinations to choose from.

### Assessment 1

A

### Assessment 2

Mia can make 12 outfits. Since there are 4 different blouses and there are 3 skirts to go with each blouse, multiply  $4 \times 3 = 12$ . Students might also make a list or tree diagram of the possible combinations.

**Pages 10–13**

**Objectives**

- ★ To develop mental maths strategies for division
- ★ To use multiplication and division in real-life problems involving total price and unit price
- ★ To explore the set model using fractional parts of a whole
- ★ To understand the meaning and importance of the order of operations

**Materials**

- ★ Reproducible 3: *Grocery List*
- ★ calculators
- ★ supermarket flyers

**Vocabulary**

Before beginning the lesson, you may wish to review the following maths terms: *estimate, expression, mental maths, order of operations, symbol.*

Developing mental maths strategies helps students improve operational skills and build confidence. These strategies are used in real life; for example, in finding unit price and determining the better buy.

Finding fractional parts of a set can be difficult, particularly when the value of the set (the whole) continues to vary. Students may need many experiences using the set model and drawing pictures to reinforce this model.

Order of operations can become more meaningful when used in an investigative process. As students try different operations in varying order with the same numbers, they will understand the importance of using a standard order of operations in simplifying expressions.

You may wish to discuss unit prices with students before assigning Investigation 2. Distribute copies of Reproducible 3 for the Part A Extension activity.

Answers to Investigations, Extensions, and Assessments will vary. Sample solutions are provided.

**Part A**

**Pages 10–11**

**Investigation 1**

Chen’s work is an example of the division algorithm. Brett’s work shows how the problem  $246 \div 3$  can be distributed as  $240 \div 3$  and  $6 \div 3$ . Both strategies are correct. Brett’s method is likely faster as it can be used as a mental maths strategy.

**Investigation 2**

Which cereal is the better buy in terms of price per ounce, Brand A or Brand B?

*Solution:* For Brand A, divide \$3.60 by 20gm to find that it costs \$0.18 per gram. For Brand B, divide \$3.42 by 18 gram to find that it costs \$0.19 per gram. Brand A is a better buy since it has a lower price per gram.

**Extension**

Students’ answers will vary, depending upon the flyers they have and the strategies they use. Some students may round up prices to determine an approximate cost, knowing that actual cost will be less. Doing this will ensure that the total will be less than \$100. Other students may use calculators to calculate exact amounts. Accept reasonable solutions that are close to, but not over, \$100.

**Assessment 1**

B

**Assessment 2**

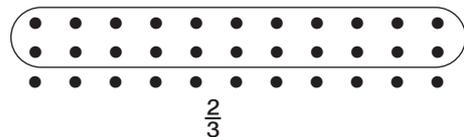
Divide \$45 by 0.09 to find 500.

**Part B**

**Pages 12–13**

**Investigation 3**

Mr Carlson’s Class



Mrs Resendez’s Class

