

INTRODUCTION

What is the *FOCUS* series?

FOCUS is a mathematics-strategy practice series. Each student book in the series provides brief instruction and concentrated practice for students in one targeted Mathematics Strategy. *FOCUS* also allows students the opportunity for self-assessment of their performance. It allows teachers the opportunity to identify and assess a student's level of mastery.

Six Mathematics Strategies featured in the *FOCUS* series:

- Building Number Sense
- Using Estimation
- Using Algebra
- Using Geometry
- Determining Probability and Averages
- Interpreting Graphs and Charts

The *FOCUS* series spans eight year levels, from year one to year eight. The introductory passages in each lesson are written at or below year level, allowing students to focus on the mathematics without struggling with the reading.

Book	Reading Level
Book A	at or below year one readability
Book B	at or below year two readability
Book C	at or below year three readability
Book D	at or below year four readability
Book E	at or below year five readability
Book F	at or below year six readability
Book G	at or below year seven readability
Book H	at or below year eight readability

What is Interpreting Graphs and Charts, the Mathematics Strategy featured in this *FOCUS* book?

Graphs and charts are used to organise and represent information. There are various types of graphs and charts. Each type is uniquely suited to represent a specific form of information. Students learn to read and interpret increasingly complex types of charts and graphs as they progress through the year levels.

Some graphs and charts are used to represent and compare amounts. Pictographs, which appear primarily in the early years, use pictures and symbols to represent amounts. Bar graphs use bars and numbers to represent amounts, and charts use words and numbers. Circle graphs show how the individual amounts in a group relate to the whole.

Graphs can be used to identify the location of places or items. Coordinate grids have a horizontal x -axis and a vertical y -axis. Numbers on the axes, called coordinates, are used to identify locations on coordinate grids. Maps represent locations and distances. Many maps include a scale, which shows how the distances on a map relate to actual distances.

Graphs can represent changes in amounts over time. Line graphs are commonly used for this purpose. Lines connect the points on a line graph. The lines represent change over time. In the later years, coordinate grids are used to show change over time. These are similar to line graphs, but the points are not connected with a line.

Students learn to interpret and apply the information displayed in graphs and charts. They answer questions that assess their ability to understand and analyse the information.

How should I use the **FOCUS** series in the classroom?

The **FOCUS** series can be used effectively in the classroom in several ways. Here is a suggestion for using the program in **whole class, large group, small group, paired** and **individual** formats.

To the Student

(inside front cover of the student book)

Read and discuss this with the whole class or large group to make sure students understand what they are to do in the book.

Learn About

(pages 2–3 of the student book)

Read the two pages of instruction in the Mathematics Strategy to the whole class or large group. Model using the Mathematics Strategy. Use information from the Mathematics Strategy Tips for the Teacher on pages 12–13 of this teacher guide to prompt additional in-depth discussion of the Mathematics Strategy, as appropriate. Make sure all students understand the features of the Mathematics Strategy and how to apply the Mathematics Strategy before they go on. The Learn About requires approximately 45 minutes.

Lesson Preview

(pages 4–5 of the student book)

Read the boxed directions to the whole class or large group. Emphasise what students should watch for as they read the problem. Have students read the problem individually. Guide the whole class or large group in answering the two selected-response questions. Then discuss why each answer choice is correct or not correct. Make sure all students understand how to answer the Mathematics Strategy questions before they go on. The Lesson Preview requires approximately 45 minutes.

Lessons

(pages 6–45 of the student book)

For each lesson, have students read the directions and the passage individually, in pairs or in small groups. Have students answer the selected-response questions and the constructed-response question individually, in pairs or in small groups.

Have students use the Tracking Chart on page 47 of the student book to note the date that they have finished each lesson. When the questions in all five lessons in a group have been corrected, have students note the number of correct responses for each lesson and then the number of correct responses for the whole group of lessons.

Each lesson, plus tracking, requires approximately 45 minutes. Allow students 30 minutes to read the passage and answer the questions, and allow 15 minutes to discuss the responses. Discuss the answers to the questions with the whole class or large group, or with pairs, small groups or individuals. (See **What is the correction procedure?** on page 4 of this teacher guide.)

Self-Assessment: When students have finished each group of five lessons, have them complete the appropriate Self-Assessment. When students have finished all twenty lessons, have them complete Self-Assessment 5. Each Self-Assessment requires approximately 20 minutes.

Discussion: When students have finished each group of five lessons, discuss their performance individually or in small groups. When students have finished all twenty lessons, discuss their performance individually or in small groups. Each discussion requires approximately 25 minutes.

MATHEMATICS STRATEGY TIPS FOR THE TEACHER

You can use charts and bar graphs to display information.

All graphs are alike in that they display information. They differ in the manner in which the information is shown. A bar graph uses bars and numbers to represent data. A chart uses numbers to represent data.

The title of the bar graph at the top of the page is “Items of Jewellery”. This tells the student the type of information, or data, displayed in the graph. The height of each vertical bar shows the number of each type of jewellery item. The key at the bottom of the graph shows whether a bar represents gold or silver jewellery.

Point out the heading of the vertical axis. It is labelled “Number” and has a scale that is broken into intervals of two. Mention that the dashed line between each solid line of the scale represents one item.

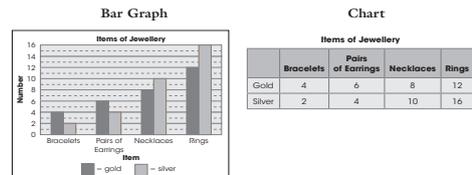
Point out that the labels along the horizontal axis name specific types of jewellery. These labels show what each bar of the graph represents. After students read the headings, ask them to determine whether the data shows a pattern or trend regarding a preference for gold or silver jewellery. (No; although there are more gold bracelets and earrings, there are a greater number of silver necklaces and rings.)

Direct students’ attention to the chart, and explain that it represents the same information as the bar graph. Read the title, row headings and column headings. Discuss with students the benefits of each type of display. For example, a chart is easier to create than a bar graph. However, the bars in a bar graph provide a visual display that allows for quick comparisons.

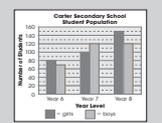
Learn About

Interpreting Graphs and Charts: Bar Graphs and Charts

A **bar graph** uses numbers and bars to compare amounts. A **chart** uses numbers to display information. The bar graph and the chart below both show that a jewellery box contained 4 gold bracelets and 2 silver bracelets.



The bar graph shows the number of boys and girls in years seven, eight and nine at Carter Secondary School. How many girls attend Carter Secondary School?



The shaded bars represent the number of girls in each grade.
Year six: 80 girls Year seven: 100 girls Year eight: 150 girls
 $80 + 100 + 150 = 330$
There are **330 girls** at Carter Secondary School.



A **bar graph** uses numbers and bars to compare amounts. A **chart** uses numbers to display information.

2

Interpreting Graphs and Charts Book F CAS0260 • © 2009 Hawker Brownlow Education

The bar graph at the bottom of the page displays information about the students who attend Carter Secondary School. Have students read the title, axis headings and key. Ask them to explain how they could use the bar graph to calculate the total number of students attending Carter Secondary School. Then have them follow the plan described to find the total. (640 students)

Extend the activity by having students represent this information in a chart.

RESEARCH SUMMARY

The following is a summary of the research upon which the *FOCUS on Mathematics* series is based.

Overview

The *FOCUS on Mathematics* series is a targeted maths-strategy practice program geared towards both on-level and off-level maths students. The research summary is based on a literature review of academic monographs, journals and reports by content-area researchers and education experts.

The summary covers the following topics in support of the series *FOCUS on Mathematics*:

- Introduction to the Series
- What Is the Need for *FOCUS on Mathematics*?
- How Is *FOCUS on Mathematics* Supported by Research?
- How Does Research Support the Assessments Found in *FOCUS on Mathematics*?
- Quick-Reference Chart: From Research to Application: Strategies and Features in *FOCUS on Mathematics*

Introduction to the Series

FOCUS on Mathematics is a series designed for on-level and struggling maths students who need repeated practice. *FOCUS on Mathematics* centres on brief instruction and concentrated practice with targeted maths concepts and strategies in the context of word problems.

The *FOCUS on Mathematics* series covers:

Building Number Sense	Using Geometry
Using Estimation	Determining Probability and Averages
Using Algebra	Interpreting Graphs and Charts

What Is the Need for *FOCUS on Mathematics*?

There is a current drive in mathematics education to meet 21st-century skills so that today's students will be competitive in tomorrow's workforce. Several expert panels and mathematical organisations have sounded the alarm bell for improving students' mathematical understanding (e.g. NCTM, 2006; NMAP, 2008), as recent tests also show that students' mathematical progress is slowing (e.g. NCES, 2007).

In answer to these concerns about students' lacklustre mathematical performance, maths experts and researchers have joined forces to combat the slowing of mathematics progress.

The release of several major reports has named algebra as a "gateway to higher mathematics", which then leads to greater successes in both the academic and working lives of students (NCTM, 2006; NMAP, 2008). In response to this joint effort, these experts have also laid a pathway for students to follow in order to develop the mathematical skills and knowledge to master algebra. The *FOCUS on Mathematics* series may be an effective tool to help students along this pathway of proficiency to algebra.

The *FOCUS on Mathematics* series provides students with explicit instruction of key mathematical concepts and strategies combined with targeted practice in the context of word problems.

ANSWER KEY

FOCUS on Interpreting Graphs and Charts, Book F

Lesson 1 (page 6)

1. B 2. D 3. B 4. B

5. Solution: The average monthly price for petrol during the first 6 months on the graph was \$1.49, or 149 cents.

Sample Explanation: *First, I found the sum of the petrol prices for the first 6 months.*

$$135 + 140 + 150 + 155 + 155 + 160 = 895 \text{ cents}$$

Then I divided by the number of months.

$$895 \div 6 \approx 149 \text{ cents or } \$1.49$$

Lesson 2 (page 8)

1. C 2. D 3. A 4. C

5. Solution: The giraffe would win; at the end of the 3-hour race, it would be 3 kilometres in front.

Sample Explanation: *First I worked out that a giraffe, if running at 51 kmh, would run 153 kilometres in 3 hours. Then I worked out that the mouse, at 50kmh, would cover 50 kilometres in 3 hours – 3 kilometres less than the giraffe.*

Lesson 3 (page 10)

1. B 2. B 3. C 4. D

5. Solution: Out of 1000 cubic metres of natural gas, 140 cubic metres would be used for commercial purposes.

Sample Explanation: *First, I converted 14% to a decimal by dividing by 100.*

$$14 \div 100 = 0.14$$

Then I multiplied this by 1000 to find the part of 1000 cubic metres that is used for commercial purposes.

$$0.14 \times 1000 = 140 \text{ m}^3$$

Lesson 4 (page 12)

1. D 2. A 3. C 4. B

5. Solution: The school made \$114 from selling raffle tickets.

Sample Explanation: *First, I found the sum of the ticket sales over the six hours.*

$$2 + 8 + 11 + 9 + 11 + 16 = 57$$

Then I multiplied 57 by \$2, the price of the tickets.

$$57 \times \$2 = \$114$$

Lesson 5 (page 14)

1. D 2. C 3. C 4. A

5. Solution: There were 5 small lemonades sold on Friday.

Sample Explanation: *First, I found in the table that large lemonades cost \$2. So, I multiplied the price by the number sold.*

$$\$2 \times 6 = \$12$$

Then I subtracted this amount from \$18.25.

$$\$18.25 - \$12.00 = \$6.25$$

Finally, I divided \$6.25 by the cost of a small lemonade to determine how many were sold.

$$\$6.25 \div \$1.25 = 5$$

Lesson 6 (page 16)

1. D 2. B 3. A 4. A

5. Solution: The average number of cyclones per year is approximately 12.

Sample Explanation: *First, I found the total number of cyclones by adding all of the numbers.*

$$21 + 27 + 29 + 32 = 109$$

Then I divided by 9, the number of years shown on the graph.

$$109 \div 9 \approx 12$$

Lesson 7 (page 18)

1. C 2. D 3. D 4. B

5. Solution: The difference between the voter turnout for 2007 and 2004 is about 0.5%.

Sample Explanation: *First, I looked at the line graph to find that about 94.8% of voters voted in 2007 and about 94.3% of voters voted in 2004.*

Then I subtracted to find the difference.

$$94.8\% - 94.3\% = 0.5\%$$

Lesson 8 (page 20)

1. B 2. A 3. D 4. B

5. Solution: The least number of students chose lemon as their favourite gumball flavour.

Sample Explanation: *I added the boys' and girls' numbers for each flavour. The flavour that had the lowest sum was lemon.*