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

Charts and graphs are used to represent and compare information.

There are many types of charts and graphs. You can use bar graphs and charts to compare the number of items in groups. You can use line graphs to compare changes in data over time.

Bar graphs provide a clear visual comparison of data. The lines of a bar graph are sometimes labelled by ones, twos, fives, tens, or other increments. The bar that is the tallest or longest shows the greatest number. On horizontal or vertical bar graphs, a bar that begins at *0* and ends at the line labelled *15* represents a quantity or value of 15.

It is important to carefully read all of the labels on a bar graph in order to correctly interpret the information that is represented. A common error in reading bar graphs is to conclude that the values always increase by increments of one. Bar graphs use different increments depending upon the range of the data. Sometimes bar graphs also include dashed lines or tic marks to help identify values between the labelled lines. Students should determine the value of the dotted lines when they begin working with a bar graph.

Line graphs show changes over time, such as a child's growth in centimetres over a number of years. Since a child gets taller or remains the same height from one period of time to the next, this type of line graph would show a line that slants upward or remains flat between points. The peaks and valleys on other line graphs provide a visual representation of data that increases and decreases. For example, movie ticket sales over a week are likely to show lines that move upward for weekend sales and downward for weekday sales because more people tend to go to movies during the weekend.

Learn About
Interpreting Graphs and Charts: Line Graphs and Bar Graphs

Some graphs and charts are used to show how many items are in a group. A **line graph** uses points and lines to show how many. Line graphs show changes over time. A **bar graph** uses numbers and bars to show how many. **Charts** use numbers to show how many. The bar graph and the chart below each show the number of snow cones sold on Monday, Tuesday, Wednesday and Thursday.
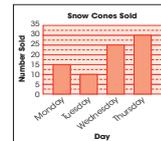
Snow Cones Sold	
Day	**Number Sold**
Monday	15
Tuesday	10
Wednesday	25
Thursday	30

Dalia recorded the number of minutes that she spent reading at home during the last four weeks. She made a line graph to show the information. How many more minutes did Dalia spend reading during week 3 than during week 1?

Dalia read for 30 minutes during week 1 and for 55 minutes during week 3.

$$55 - 30 = 25$$

Dalia read **25 minutes** more during week 3 than during week 1.

Remember:

Line graphs use points and lines to show changes in amounts over time. **Bar graphs** use numbers and bars to show how many. **Charts** use numbers to show how many.

2   *Interpreting Graphs and Charts Book* C CAS9903 • © 2009 Hawker Brownlow Education

Charts use words and numbers to display information. The information in a chart is organised in rows and columns. Schedules and timetables often appear in the form of a chart. Charts can be used both to compare amounts and to show change over time. Use the charts and graphs displayed on the Learn About page or have students create their own charts and graphs to compare the same data represented in different ways. Have students discuss when it is more appropriate to use a bar graph and when it is more appropriate to use a line graph to display data.

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 C

Lesson 1 *(page 6)*

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

  5. Solution: Sam buys 5 postcards in Tasmania.
Sample Explanation: *I subtracted the number of Tasmanian postcards in Sam's collection from the number of Western Australian postcards in his collection to find the difference.*

$$14 - 9 = 5$$

Lesson 2 *(page 8)*

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

  5. Solution: Ming used scallops and whelks.
Sample Explanation: *I combined pairs of shells until I found a pair with a sum of 12.*

clam and scallop: 2 + 4 = 6

clam and whelk: 2 + 8 = 10

clam and sand dollar: 2 + 6 = 8

scallop and whelk: 4 + 8 = 12

Lesson 3 *(page 10)*

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

  5. Solution: The sunflower grew 75 centimetres between month 3 and month 4.
Sample Explanation: *First, I identified the sunflower's height during both months.*

month 3: 175 centimetres

month 4: 250 centimetres

Then I subtracted the height for month 3 from the height for month 4 to find the difference.

250 − 175 = 75 centimetres

Lesson 4 *(page 12)*

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

  5. Solution: The friends can go over 2 and down 3 to get to the pirate ship.
Sample Explanation: *First, I identified the location of the roller coaster and the pirate ship on the grid. Then I found that the pirate ship was over 2 and down 3 from the roller coaster.*

Lesson 5 *(page 14)*

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

  5. Solution: They write the stories on 18 April.
Sample Explanation: *First, I identified 4 April on the calendar. It occurs on a Friday, so two weeks from 4 April will be two Fridays later. I looked two rows down the Friday column and found 18 April.*

Lesson 6 *(page 16)*

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

  5. Solution: The talent show got the greatest number of votes and the walk-a-thon got the fewest votes. The difference between the numbers of votes is 67.
Sample Explanation: *First, I identified the event with the greatest number of votes and the event with the least number of votes.*

talent show: 121

walk-a-thon: 54

Then I subtracted the number of votes for the walk-a-thon from the number of votes for the talent show to find the difference.

121 − 54 = 67

Lesson 7 *(page 18)*

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

  5. Solution: The number of students who chose spring is equal to the number of students who chose summer and autumn combined.
Sample Explanation: *First, I found the number of students who chose spring.*

spring: 40

Then I added the numbers of votes for the other seasons to find a pair with a sum of 40.

winter and summer: 25 + 10 = 35

autumn and winter: 30 + 25 = 55

summer and autumn: 10 + 30 = 40