

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 display information about a subject. Bar graphs and pictographs are two common types of graphs. Bar graphs use bars and numbers to represent data. Pictographs use symbols to represent data.

Bar graphs provide a quick visual comparison of data. The lines of a bar graph are sometimes labelled by ones, twos, fives, tens, or other increments. The tallest or longest bar shows the greatest number. On horizontal or vertical bar graphs, a bar that begins at 0 and ends at the line labelled 20 indicates a quantity or value of 20.

It is important to carefully read all the labels on a bar graph in order to interpret the information that is given. A common error in reading bar graphs is to conclude that the values always increase by ones. Have students examine the bar graph at the top of the Learn About page and determine the value by which the intervals on the bar graph increase (2).

Sometimes bar graphs include dashed lines or tick marks to help identify values between the labelled lines. Explain the purpose of these dashed lines or tick marks to students.

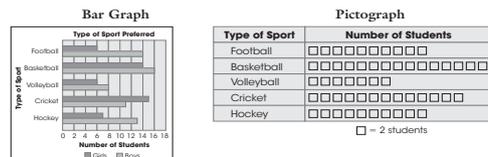
Pictographs use pictures or symbols to compare data. A common error in reading pictographs is to assume that each symbol represents a value of 1. It is important for students to read the key of a pictograph to recognise the number represented by each symbol. Ask students to identify the number of students represented by each square in the pictograph at the top of the Learn About page.

Begin a study of pictographs with symbols that represent quantities of 1 to 5. Then show examples of pictographs that contain half-symbols. For example, if each triangle symbol in a pictograph represents two students, a row of four and one-half triangles represents nine students.

Learn About

Interpreting Graphs and Charts: Bar Graphs, Pictographs and Charts

Graphs and charts are used to show information about a subject. A **bar graph** uses numbers and bars to show how many. **Pictographs** use pictures or symbols to show how many. A **chart** uses numbers to show how many.



Look at the graphs shown above. How many students chose each sport? Copy and complete the chart shown here.

Type of Sport Preferred	
Sport	Number of Students
Football	
Basketball	
Volleyball	
Cricket	
Hockey	

The graphs display the following student totals for each sport:
Football: 20; Basketball: 30; Volleyball: 14; Cricket: 26; Hockey: 20.



Bar graphs use numbers and bars to show how many.
Pictographs use pictures or symbols to show how many.
Charts use numbers to show how many.

Explain to students that the bar graph and the pictograph on the Learn About page represent the same data. Have students read all of the labels and keys. Then ask students to identify information that is provided in the bar graph but not in the pictograph.

A chart uses words and numbers to represent information on a topic. Have students read the column headings on the chart in the shaded box on the Learn About page. Point out that these headings are the same as the labels on the bar graph and pictograph. Discuss how to use the data from both the pictograph and bar graph to complete the chart. Then have students complete the 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 E

Lesson 1 (page 6)

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

5. Solution: Miss Bent had a total of 2 more students in the even-numbered years than in the odd-numbered years.

Sample Explanation: *First, I added to find the total number of students in the odd-numbered years.*

$$20 + 23 + 21 = 64$$

Then I added to find the total number of students in the even-numbered years.

$$19 + 22 + 25 = 66$$

Finally, I subtracted to find how many more students there were in the even-numbered years.

$$66 - 64 = 2$$

Lesson 2 (page 8)

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

5. Solution: Of the total group of people, 90 should be girls so that the percentage remains the same.

Sample Explanation: *First, I found the percentage of girls.*

$$\frac{60}{200} = \frac{30}{100} = 30\%$$

Then I found the new total number of people.

$$200 + 100 = 300$$

Finally, I found the total number of girls out of 300.

$$\frac{30}{100} = \frac{90}{300}$$

Lesson 3 (page 10)

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

5. Solution: 20-cent coins made up $\frac{1}{4}$ of the coins in Andrew's piggy bank.

Sample Explanation: *First, I added to find the total number of coins.*

$$35 + 50 + 45 + 70 = 200$$

Then I wrote the fraction of coins that were 20-cent coins and expressed it in simplest form.

$$\frac{50}{200} = \frac{1}{4}$$

Lesson 4 (page 12)

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

5. Solution: The difference between the maximum temperature on Wednesday and the maximum temperature on Friday was 14°C .

Sample Explanation: *I looked at the graph to find the maximum temperatures for Wednesday and Friday. Then I subtracted 4 from 18 to find the difference.*

$$18 - 4 = 14$$

Lesson 5 (page 14)

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

5. Solution: Twenty students chose swimming as their favourite sport.

Sample Explanation: *Since the number of students is 100, the number who chose each sport is equal to the percentage in the graph. So, I subtracted the number who chose skateboarding or tennis from the total number of students who chose "Other" (35) to find the number of students who chose swimming.*

$$35 - 15 = 20$$

Lesson 6 (page 16)

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

5. Solution: Mr Mackenzie earned a total of \$51,800 during the six months.

Sample Explanation: *First, I multiplied to find his total salary for the six months.*

$$6 \times \$4000 = \$24,000$$

Then I added to find his total commissions.

$$\begin{aligned} \$2400 + \$3600 + \$3800 + \$6000 \\ + \$6400 + \$5600 = \$27,800 \end{aligned}$$

Finally, I added to find his total earnings.

$$\$24,000 + \$27,800 = \$51,800$$

Lesson 7 (page 18)

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

5. Solution: There were 85 students that got a C or higher.

Sample Explanation: *Since 100 students took the test, the percentages in the graph are equal to the number of students who got each mark. A mark of C or higher means A, B or C. I added to find the total number of students who got an A, B or C.*

$$20 + 25 + 40 = 85$$