

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 Using Estimation, the Mathematics Strategy featured in this *FOCUS* book?

Estimation is the process used to determine approximate values. Estimation is useful in many real-world situations and in determining if a calculated answer is reasonable. Students begin working with estimation by learning to round numbers to given place values. They also learn to perform calculations with rounded numbers.

Students in the early years learn to round whole numbers to the nearest ten and the nearest hundred. They also practise determining which number is closest to a given number. Students round increasingly greater numbers as they progress through the year levels. Students in the later years learn to round time measurements to the nearest hour and the nearest minute.

Beginning in year three, students learn to round decimal numbers. In some situations they round decimals to the nearest whole number. Eventually, students learn to round decimals to the nearest tenth, hundredth and thousandth.

In years one and two, students begin to calculate approximate answers by estimating sums with mainly two-digit numbers. Through the levels, students progress to estimating differences, products and quotients. Students at upper year levels also estimate with mixed numbers, percentages and money amounts.

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

Estimation can be used to round numbers to the nearest ten or to the nearest hundred. Estimation can also be used to round numbers before performing calculations.

Review counting by tens with students. Ask volunteers to count by tens to 100. Then ask students to count the numbers between certain tens, such as 10 and 20. After several students have had a turn counting between tens, write the number 48 on the board. Ask students to identify the ten that is closest to the number 48 (**50**).

Use kinesthetic and visual models to help students identify the nearest ten to a number. Write the numbers from 30 to 40 on separate sheets of white paper. Place the numbers on the floor to make a floor number line. Ask volunteers to stand at 30 and 40 on the floor number line. Ask another student to stand at any other number on the line, such as 33. Have students identify whether this classmate is closer to the student standing at 30 or 40. Continue with other examples, using the numbers from 30 to 40 or other groups of numbers between tens. Tell students that numbers halfway between the tens, such as 35, are rounded to the next greater ten.

Draw a number line that extends from 0 to 30 on the board, and label the numbers 0, 10, 20 and 30. Place ticks on the number line to represent all of the whole numbers between the tens. Mark the spot for 24 with an X or with a sticky note. Then ask students whether 24 is closer to 20 or 30 (**20**). Continue with several other examples until students can easily identify the nearest ten for all of the numbers on the number line.

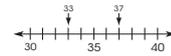
Learn About

Using Estimation: Nearest Ten to a Number

Estimation can be used to find the nearest ten to a number. To find a number's nearest ten, count up or count back. Numbers that are halfway between two tens are rounded up.

Look at the chart and number line, and then read the reason why each rounded number is correct.

Number	Nearest Ten
33	30
35	40
37	40



- The nearest ten to 33 is 30 because 33 is closer to 30 than to 40.
- The nearest ten to 35 is 40 because 35 is halfway between 30 and 40. Numbers halfway between two tens are rounded up.
- The nearest ten to 37 is 40 because 37 is closer to 40 than 30.

Jordan has 12 pairs of shorts and 18 shirts.

What is the nearest ten to 12? What is the nearest ten to 18? About how many shorts and shirts does Jordan have?



The nearest ten to 12 is **10**.
The nearest ten to 18 is **20**.

$$10 + 20 = 30$$

Jordan has **about 30** shorts and shirts.



Estimation can be used to find the nearest ten to a number. To find a number's nearest ten, count up or count back. Numbers that are halfway between two tens are rounded up.

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Using Estimation Book B, CA59822 • © 2009 Hawker Brownlow Education

Discuss common items that come in sets, and ask students to round the number of items in each set to the nearest ten. Possible ideas for this activity include a dozen eggs, boxes of crayons, a pack of six pens and a pack of 8 pencils. Then have students estimate the number of items in more than one set. For example, about how many eggs are in three dozens ($10 + 10 + 10 = \mathbf{30}$)?

How Is *FOCUS on Mathematics* Supported by Research?

FOCUS on Mathematics is supported by research from mathematical researchers and organisations, including the National Math Advisory Panel and National Council of Teachers of Mathematics, both from the US. Much of the research on effective instruction for mathematical students parallels the recommendations of the NMAP (2008). Many of these recommendations are integrated into the *FOCUS on Mathematics* series, including: word-problem focus, explicit instruction with modelling and focused practice.

Word-Problem Focus

Word problems are the proving ground for students to demonstrate their mastery of mathematical fluency and conceptual understanding. Having the ability to transfer what they have learned to new problem-solving situations is one of the major goals for mathematical education (NCTM, 2006; NMAP, 2008). “The issue of transfer, that is, the ability to use skills learned to solve one class of problems, such as similar triangles, to solve another class of problems, such as linear algebra, is a vital part of mathematics learning” (NMAP, 2008, p. 30). And yet, students, on average, have the most difficulty solving word problems.

The *FOCUS on Mathematics* series provides repeated and focused practice of key maths strategies in the context of word problems. With more than 800 word problems in the series, students gain multiple opportunities to practise core maths concepts and strategies.

Explicit Instruction with Modelling

Explicit instruction is a hallmark of effective instruction for struggling and on-level students. Explicit instruction is one of the instructional methods that research has proved to be effective. “By the term *explicit instruction*, it is meant that teachers provide clear models for solving a problem type using an array of examples, that students receive extensive practice in use of newly learned strategies and skills, that students are provided with opportunities to think aloud (i.e. talk through the decisions they make and the steps they take), and that students are provided with extensive feedback” (NMAP, 2008, p. 23). Each of these features, can be found in the *FOCUS on Mathematics* series. With explicit instruction and teacher modelling, skill efficiency is nearly guaranteed by students (Hiebert & Grouws, 2008).

FOCUS on Mathematics uses explicit instruction in the teaching of the mathematical strategies. The explicit instruction occurs in the Learn About section and the Lesson Preview section. Through the Learn About section, students receive explicit instruction consisting of a definition, semi-concrete and visual representations of the maths concepts, and a usage rule for the maths strategy. Additionally, *FOCUS on Mathematics* is a perfect vehicle for struggling students because it does not overwhelm students with the presentation of information. In the Learn About lesson, students initially experience the maths concepts in short presentations, usually three to seven sentences long. A Remember box text feature is a point of reference for students to use while attending to lessons. The Remember box is consistently placed in each book of the series. Struggling or novice maths students usually skip or gloss over text features, which are valuable tools. With repeated exposure and external prompting by the teacher, students learn to pay attention to the text feature.

Focused Practice

One of the major callings from from expert panels and organisations is for deeper learning and practice of mathematical skills and strategies. Focusing on specific key mathematical topics allows “teachers to commit more time each year to topics receiving special emphasis. At the same time, students would have opportunities to explore these topics in depth, in the context of related content and connected applications, thus developing more robust mathematical understandings” (NCTM, 2006, p. 4).

ANSWER KEY

FOCUS on Using Estimation, Book B

Lesson 1 (page 6)

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

5. Solution: They picked up toys for about 50 minutes.

Sample Explanation: *I rounded each number of minutes to the nearest ten and then added.*

16 rounds to 20

12 rounds to 10

21 rounds to 20

$$20 + 10 + 20 = 50 \text{ minutes}$$

Lesson 2 (page 8)

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

5. Solution: They took about 150 photos.

Sample Explanation: *I rounded each number to the nearest ten and then added.*

84 rounds to 80

68 rounds to 70

$$80 + 70 = 150$$

Lesson 3 (page 10)

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

5. Solution: They have about 40 carrot sticks and pieces of cheese.

Sample Explanation: *I rounded each number to the nearest ten and then added.*

22 rounds to 20

16 rounds to 20

$$20 + 20 = 40$$

Lesson 4 (page 12)

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

5. Solution: Kim worked on odd numbers for about 30 minutes.

Sample Explanation: *I rounded each number to the nearest ten and added.*

8 rounds to 10

18 rounds to 20

$$10 + 20 = 30 \text{ minutes}$$

Lesson 5 (page 14)

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

5. Solution: They shovelled snow for about 90 minutes in all.

Sample Explanation: *I rounded each number to the nearest ten and then added.*

13 rounds to 10

26 rounds to 30

48 rounds to 50

$$10 + 30 + 50 = 90 \text{ minutes}$$

Lesson 6 (page 16)

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

5. Solution: Cara measured about 400 millilitres of water and oil.

Sample Explanation: *I rounded each number to the nearest hundred and added.*

140 rounds to 100

260 rounds to 300

$$100 + 300 = 400 \text{ millilitres}$$

Lesson 7 (page 18)

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

5. Solution: Frank's drink and apple cost about 90 cents.

Sample Explanation: *I rounded each number to the nearest ten and then added.*

59 rounds to 60

29 rounds to 30

$$60 + 30 = 90 \text{ cents}$$