

# 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.

## What is in each teacher guide?

There are 48 teacher guides in the *FOCUS* series, one for each student book. Each teacher guide contains:

- suggested instructions for using the *FOCUS* series effectively in the classroom
- Mathematics Strategy Tips for the Teacher, a facsimile of the Learn About on pages 2–3 of the student book, with tips for additional discussion related to understanding and using the Mathematics Strategy
- four reproducibles: three Teacher Assessments to be used for individual student assessment in the Mathematics Strategy and one Class or Group Performance Graph to be used for class or group assessment in the Mathematics Strategy
- summary of research that supports the *FOCUS* series
- a completed Answer Form for the eighty selected-response questions in the student book
- an Answer Key for the eighty selected-response questions, plus sample answers for the twenty constructed-response writing questions in the student book

## How should I use the Mathematics Strategy Tips for the Teacher?

These pages contain a facsimile of the Learn About on pages 2–3 of the student book, along with extended information about the Mathematics Strategy, which you can use as a basis for in-depth discussion to make sure students understand the strategy and how to use it.

## Where do students record their answers?

Students should fill in their answers to the selected-response questions on the Answer Form on page 53 of the student book. If students use the Answer Form, they may detach it from the book. Alternatively, students may fill in the correct answers directly on the student book page.

Students should write their answers to the constructed-response questions directly on the lines provided in the student book. Students who use the Answer Form for the selected-response questions should fill in the circle on the Answer Form to show that they have answered the constructed-response question, which is the fifth question in each lesson.

## 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 find an approximate answer when an exact answer is not needed. Estimated answers are often used to check if a calculated answer is reasonable. To estimate, use rounded numbers.

Review counting by tens and hundreds with students. Ask students to count by tens to 100. Then ask students to count by hundreds to 1000. After several students have counted by tens and hundreds, write the number 84 on the board. Ask students to identify the ten that is closest to the number 84 (**80**). Continue the activity by writing a three-digit number on the board and having students identify the closest hundred.

Use a number line to help students review identifying the nearest ten to a number. Draw a number line from 20 to 50 on the board. Draw a tick for each whole number, but label only the ticks at the tens. Ask a volunteer to point to the tick that represents 38 and to describe how he or she located the number. Mark the spot for 38 with an X or with a sticky note. Then ask students to tell whether 38 is closer to 30 or 40 (**40**). Continue with several other examples until students can easily identify the nearest ten to each of the numbers on the number line. Tell students that numbers halfway between the tens, such as 35, are rounded to the next greater ten.

## Learn About

### Using Estimation: Rounding to Nearest Ten or Hundred

An **estimate** is a number that is close to the actual number you are looking for. To estimate, you can round numbers to the nearest ten or the nearest hundred. If a number is halfway between two tens or two hundreds, it is rounded to the greater ten or the greater hundred.

Look at the chart, and then read the reason why each number is rounded to the nearest ten or hundred shown.

Number	Nearest Ten	Nearest Hundred
136	140	100
155	160	200
273	270	300

- The nearest ten to 136 is 140, because 136 is closer to 140 than to 130. The nearest hundred to 136 is 100, because 136 is closer to 100 than to 200.
- The nearest ten to 155 is 160, because 155 is halfway between 150 and 160. The nearest hundred to 155 is 200, because 155 is closer to 200 than to 100.
- The nearest ten to 273 is 270, because 273 is closer to 270 than to 280. The nearest hundred to 273 is 300, because 273 is closer to 300 than to 200.

Christian's hockey team is ordering new uniforms. The pants will cost \$183 and the shirts will cost \$105. Rounding each cost to the nearest hundred, about how much will the shirts and pants cost?

\$183 rounds to \$200 and \$105 rounds to \$100  
 $\$200 + \$100 = \$300$   
 The cost of the shirts and pants is **about \$300**.



To **estimate**, you can round numbers to the nearest ten or the nearest hundred. If a number is halfway between two tens or two hundreds, it is rounded to the greater ten or the greater hundred.

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Draw a number line on the board with labelled ticks for 100, 150 and 200. Draw unlabelled ticks for all of the tens between the labelled numbers. Have volunteers point to and read the labelled numbers. Show students how to read the number line by starting at 100 and counting by tens to name each tick to 200. Then name a number that is between 100 and 200. Ask a volunteer to identify the number's approximate location on the number line. For example, if the number is 109, students should point just to the left of the tick for 110. Make sure that students understand how to identify the approximate location of each given number. Then have students identify the nearest hundred to each given number.

## 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).