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 Building Number Sense, the Mathematics Strategy featured in this *FOCUS* book?

Number sense is an understanding of numbers and the relationships between them. As students build number sense, they become familiar with a variety of representations for whole numbers and parts of whole numbers.

Students learn to express numbers in a variety of forms. Three common ways to express numbers are in standard form, in word form and in expanded form. Students in the upper years learn to use exponents, in addition to the other common forms, to express numbers.

Students in years one to three develop counting skills and become familiar with ordinal numbers. They practise counting to identify numbers that come before or after another number. They also learn to use ordinal numbers to identify an item's position in a row or a list.

Students in years four to eight learn several ways to represent the parts of a whole. Students in year four are introduced to fractions. They learn to understand the parts of a fraction and to recognise the quantity represented by a fraction. Students in the upper years examine the relationship between fractions, decimals and percentages. They also learn to perform mathematical operations with fractions and decimals.

Students in year eight are introduced to prime and composite numbers, and they learn to determine a number's prime factorisation. They also practise following the order of operations when solving problems with parentheses, exponents or square roots.

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.)

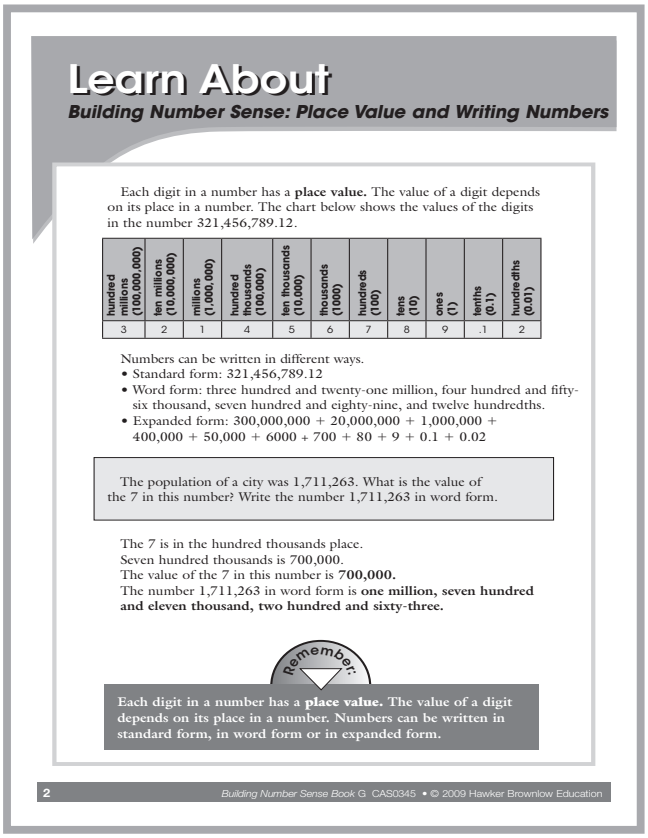
Self-Assessment: When students have finished each group of five lessons, have them complete the appropriate Self-Assessment. When students have finished all twenty lessons, have them complete Self-Assessment 5. Each Self-Assessment requires approximately 20 minutes.

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

Each digit in a number has a place value. The value of a digit depends on its location in the number. In the example at the top of the Learn About page, the digit 3 is in the hundred millions place. The value of this digit is 3 × 100,000,000 or **300,000,000.**

Remind students that place values to the left of a decimal point represent values greater than or equal to one. Place values to the right of a decimal point represent values that are less than one. Extend the introduction by asking students to identify the value of each 2 in the number. (2 × 10,000,000 = **20,000,000**) (2 × 0.01 = **0.02**)



Learn About

Building Number Sense: Place Value and Writing Numbers

Each digit in a number has a **place value.** The value of a digit depends on its place in a number. The chart below shows the values of the digits in the number 321,456,789.12.

hundred millions (100,000,000)	ten millions (10,000,000)	millions (1,000,000)	hundred thousands (100,000)	ten thousands (10,000)	thousands (1000)	hundreds (100)	tens (10)	ones (1)	tenths (0.1)	hundredths (0.01)
3	2	1	4	5	6	7	8	9	.1	2

Numbers can be written in different ways.
- Standard form: 321,456,789.12
- Word form: three hundred and twenty-one million, four hundred and fifty-six thousand, seven hundred and eighty-nine, and twelve hundredths.
- Expanded form: 300,000,000 + 20,000,000 + 1,000,000 + 400,000 + 50,000 + 6000 + 700 + 80 + 9 + 0.1 + 0.02

The population of a city was 1,711,263. What is the value of the 7 in this number? Write the number 1,711,263 in word form.

The 7 is in the hundred thousands place.
Seven hundred thousands is 700,000.
The value of the 7 in this number is **700,000.**
The number 1,711,263 in word form is **one million, seven hundred and eleven thousand, two hundred and sixty-three.**

Remember:

Each digit in a number has a place value. The value of a digit depends on its place in a number. Numbers can be written in standard form, in word form or in expanded form.

2 *Building Number Sense Book G* CAS0345 • © 2009 Hawker Brownlow Education

Numbers can be expressed in different ways. In standard form, digits are used to express a number. In word form, words are used to express a number. In expanded form, a number is shown as a sum of the value of each digit.

Explain to students that both the standard form and the word form of a number are used when writing a cheque. Discuss with students why both forms are used (to reduce the likelihood of misrepresenting an amount). You may extend the discussion by organising the class in groups of three. The first student in each group writes the standard form of a number on a sheet of paper. The next student then writes the number in word form, and the third student writes the number in expanded form. After checking each student's work, have them swap roles and play again.

Direct students' attention to the example in the shaded box on the Learn About page. Ask them to name the value of the 7 in the number. (7 × 100,000 = **700,000**)

Extend the lesson by asking students to express 43,875,619 in expanded form and in word form.

(40,000,000) + (3,000,000) + (800,000) + (70,000) + (5000) + (600) + (10) + (9)

forty-three million, eight hundred and seventy-five thousand, six hundred and nineteen

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 Building Number Sense, Book G

Lesson 1 *(page 6)*

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

5. Solution: The expression 1.35×10^9 equals 1.35 billion.

Sample Explanation: *First, I converted each of the expressions to standard notation.*

$$135 \times 1000^2 = 135 \times 1{,}000{,}000 = 135{,}000{,}000$$

$$1.35 \times 10^6 = 1{,}350{,}000$$

$$135 \times 1{,}000{,}000{,}000 = 135{,}000{,}000{,}000$$

$$1.35 \times 10^9 = 1{,}350{,}000{,}000$$

Then I found that 1.35×10^9 is the only expression that equals 1.35 billion.

Lesson 2 *(page 8)*

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

5. Solution: The fraction $\frac{3}{8}$ as a decimal is 0.375 and as a percentage is 37.5%.

Sample Explanation: *First, I divided 3 by 8 to convert the fraction to a decimal.*

$$3 \div 8 = 0.375$$

Then I moved the decimal two places to the right and added the percentage sign.

$$0.375 = 37.5\%$$

Lesson 3 *(page 10)*

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

5. Solution: The number written in standard form is 98,765,432.0123.

Sample Explanation: *I used a place-value chart in order to find the value of each digit. I then wrote the number in standard form.*

ten millions (10,000,000)	millions (1,000,000)	hundred thousands (100,000)	ten thousands (10,000)	thousands (1000)	hundreds (100)	tens (10)	ones (1)	tenths (0.1)	hundredths (0.01)	thousandths (0.001)	ten-thousandths (0.0001)
9	8	7	6	5	4	3	2	.0	1	2	3

Lesson 4 *(page 12)*

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

5. Solution: The percentage of donated cans and packages that was *not* pasta is 93.75%.

Sample Explanation: *First, I converted $\frac{1}{16}$ to a decimal by dividing 1 by 16.*

$$1 \div 16 = 0.0625$$

Then I converted 0.0625 to a percentage by moving the decimal two places to the right and adding the percentage sign.

$$0.0625 = 6.25\%$$

Finally, I subtracted 6.25% from 100% to find the percentage of donated food that was not pasta.

$$100\% - 6.25\% = 93.75\%$$