

# 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 Algebra, the Mathematics Strategy featured in this *FOCUS* book?

Algebra is the strand of mathematics that focuses on relationships among quantities and on the different ways to represent these relationships. One such representation uses numbers, symbols and variables. These elements can be combined to describe a mathematical situation. In the earlier years, students learn to use number sentences, which consist of numbers, symbols such as  $+$ ,  $-$ ,  $\times$ ,  $\div$ ,  $=$  and variables that identify missing information. Variables are typically shown as blanks or boxes in years one and two. Beginning in year three, letter variables are introduced.

As they progress through the years, students learn about different kinds of representations of relationships. They write and solve equations, expressions and inequalities. Students learn to translate among different representations, such as equations, tables of values and graphs. These concepts lead to more comprehensive understanding of functions.

Patterns appear frequently in algebra problems. Some patterns appear as a list of sequentially ordered numbers. Other patterns appear as IN and OUT boxes or in tables. Students find missing elements and extend both number and geometric patterns. Patterns are one more way of representing relationships.

## What is in each student book?

There are 48 student books in the *FOCUS* series. There is one student book for each of the six Mathematics Strategies, at each of the eight mathematics levels. Each student book contains:

- *To the Student*  
This introduces the program and should be read and discussed with students to make sure they understand what they are to do in the book.
- *Table of Contents*
- *Learn About (Modelled Practice)*  
These two pages provide basic instruction and modelling in the understanding and application of the Mathematics Strategy. The Learn About should be read and discussed with students to make sure they understand the Mathematics Strategy. Additional tips for helping students understand and use the Mathematics Strategy are included in the Mathematics Strategy Tips for the Teacher on pages 12–13 of this teacher guide.
- *Lesson Preview (Guided Practice)*  
These two pages include a sample problem and two selected-response questions with explanations of why each of the eight answer choices is correct or not correct. The Lesson Preview should be read, worked through and discussed with students to make sure they understand how to answer strategy-based questions.
- *20 Lessons (Independent Practice)*  
Each two-page lesson contains one passage, four strategy-based selected-response questions and one strategy-based constructed-response writing question.

**Selected-response questions:** In each lesson, students apply the Mathematics Strategy and then choose the correct answers for four selected-response (multiple-choice) strategy-based questions. You should model how to answer these kinds of questions using information on the Lesson Preview pages.

**Constructed-response writing questions:** In each lesson, students apply the Mathematics Strategy to solve a strategy-based question. You should model how to answer these kinds of questions by using one of the sample answers provided in the Answer Key.

- *Tracking Chart*  
Students use this chart for noting their completion of and performance in each lesson.
- *Self-Assessments*  
These five forms allow students the opportunity for self-assessment of their performance.
- *Answer Form*  
Students may use this form to record their answers to the eighty selected-response questions and to indicate that they have answered each of the twenty constructed-response writing questions.

## 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.

# MATHEMATICS STRATEGY TIPS FOR THE TEACHER

Using algebra can help you complete patterns.

Patterns appear in several forms. Some patterns appear as a list of sequentially ordered numbers. Other patterns take the form of an IN and OUT box. The box represents an operation or rule. A number goes into the box, a rule is applied to the number, and a new number comes out of the box.

Patterns follow rules. Increasing patterns follow addition and multiplication rules. Decreasing patterns often follow subtraction and division rules.

You can find a pattern rule by comparing the numbers in a pattern. First, determine whether the numbers are increasing or decreasing. Then find the operation used to increase or decrease the numbers. Make sure that this operation works with each given element of the pattern. For example: 3, 6, 9, 12, 15. The numbers in this pattern are increasing. Three is added to each number. The pattern rule is **add 3**.

## Learn About

### Using Algebra: Patterns

**Number patterns** follow *rules*. An IN and OUT box uses a number pattern. A number goes IN the box. A rule is followed. Then a new number comes OUT. The *rule* is the pattern that changes an IN number to an OUT number.

Find the rule. Look at each pair of IN and OUT numbers. Ask these questions:

- Is the OUT number less than or greater than the IN number?
- What pattern has been done to the IN number?

Look at the IN and OUT box. Try to find the rule.

1 →	IN	OUT	→	7
2 →	IN	OUT	→	8
3 →	IN	OUT	→	9
4 →	IN	OUT	→	10

Find the rule. The OUT numbers are greater than the IN numbers. A number has been added. Check each pair to find the number that is added.

$$1 + 6 = 7 \quad 2 + 6 = 8 \quad 3 + 6 = 9 \quad 4 + 6 = 10$$

The pattern is **add 6**.



**Number patterns** follow rules. An IN and OUT box uses a number pattern. The *rule* is the pattern that changes the IN number to an OUT number.

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You can use a pattern rule to find a missing number in a pattern. Simply apply the rule to find the missing number. For example: 1, 3, 5, \_\_\_\_, 9. The rule for this pattern is **add 2**. Five plus 2 is 7. The missing number is 7.

# Learn About

## Using Algebra: Number Sentences

A **number sentence** has numbers and symbols. It has a +, −, × or ÷ sign. It has an =, < or >. Example:  $2 + 3 = 5$

Some number sentences have a missing number. The box stands for the missing number. Example:  $2 + \square = 5$

Use addition or subtraction to find the missing number.

$$2 + 3 = 5 \quad \text{OR} \quad 5 - 3 = 2$$

You can write a number sentence to solve a problem. Read the problem. Then read how to solve the problem.

Lin has 6 balls. All of the balls are purple or green. Lin has 4 purple balls. How many green balls does Lin have?

Question:	Answer:
What do you know?	There are 6 balls. There are 4 purple balls.
What do you need to find?	The number of green balls.
What should you do?	Add or subtract.
Use the numbers to write a number sentence. Use a box for the number you need to find.	$4 + \square = 6$ OR $6 - \square = 4$
Find the number.	$4 + 2 = 6$ and $6 - 2 = 4$ So, $\square = 2$ .



A **number sentence** has numbers and symbols. It has a +, −, × or ÷ sign. It has an =, < or >. Some number sentences have a missing number. A box stands for the missing number.

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When solving number sentences that have missing numbers, you can check your answer by plugging it into the number sentence. For example: A student solves the number sentence  $8 - \square = 3$ , and finds  $\square = 4$ . The student can check his or her work by plugging 4 into the number sentence.  $8 - 4 \neq 3$ . Four is not the correct answer, because it does not fit into the number sentence.

Number sentences can represent situations. For example: Nancy has 2 pencils. Nancy's friend gave her 3 more pencils. How many pencils does Nancy have now?

This situation can be represented by the number sentence  $2 + 3 = \square$ . When writing a number sentence to represent a situation, it is important to use the correct operation. Addition is the correct operation for this situation, because Nancy is receiving more pencils.

Sometimes number sentences have missing numbers. The missing numbers are usually represented by small squares. For example:  $6 + \square = 9$ . You can use addition or subtraction to find the missing number. For example:  $6 + 3 = 9$  or  $9 - 6 = 3$ .

Students should check the accuracy of a number sentence they have written to represent a situation. One suggestion is to read the number sentence, while pointing to and adding in appropriate details from the problem. Students should make sure that all details match the scenario.

For example:  $\$9 - \square = \$5$ . Say: *Nine dollars at start minus some dollars spent equals \$5 left.*

It is also important to use the correct numbers when representing a situation with a number sentence. For example: Sam had \$9. He bought 3 comic books. Sam had \$5 left. How much money did Sam spend on comic books?

The question asks how much money Sam spent, so the number of comic books is irrelevant. The money amounts are the important numbers. The correct number sentence for this situation is  $\$9 - \square = \$5$ ,  $\square = \$4$ .