

*Algebra Made Easy* is a maths program designed to help you develop your problem-solving skills with algebra problems. Many of the lessons will ask you to use objects or draw pictures to solve the problems. We think that this will help you better understand how to work with algebra. Each time you solve a problem in this book, try to think of another problem that you could solve the same way. As you work in *Algebra Made Easy*, you will find that problem solving can be enjoyable.

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## INTRODUCTION

'Algebra for all' is being heard across the country and yet many students enter secondary school without the necessary basic prerequisite skills to complete Algebra 1 successfully. One solution many have suggested is to develop these algebra readiness skills in years 4-9. This series is designed to accomplish that goal. The authors believe that algebra readiness should begin in the early years and then develop over a number of years. Likewise, we believe that the learning of new skills and concepts should begin at the concrete level, move to the pictorial or representational level, and finally to the verbalisation level. We have been careful to maintain the mathematical integrity of the skills and concepts covered while trying to create a series that will be interesting to and challenging for your students.

## ORGANISATION

This book is made up of ten lessons. Six of the lessons are instructional and three are mixed review. A review lesson follows Lesson 2 and provides mixed practice of the skills in Lessons 1 and 2. A review lesson follows Lesson 4 and provides mixed practice for Lessons 1-4. A review lesson follows Lesson 6 and provides mixed practice for Lessons 1-6. This method ensures that, by the end of the book, students are using all the skills introduced in each lesson. The last lesson is an extension lesson, which incorporates many of the concepts developed in the book and provides additional opportunities for students to work more challenging problems.

## INSTRUCTIONAL LESSON DESIGN

Each of the six instructional lessons focuses on a key concept in algebra. Each lesson has three major parts and can easily be covered in three or four class periods. Some students may move more quickly through the lessons, but be sure to provide enough time so that concept development can occur.

**Part A** of each lesson uses manipulatives to introduce the skill or skills. The manipulatives are items that are commonly found in classrooms. Take time beforehand to be sure that these manipulatives are available.

**Part B** of each lesson helps the student make the transition from the concrete, manipulative level to a pictorial, representational level. Students are asked for a pictorial application of the previous manipulative activity, which helps them internalise the process.

**Part C** of the lesson is the verbalisation, application level. Here students work on problems and may use manipulatives or pictorials if necessary.

## HOW SHOULD ALGEBRA MADE EASY BE USED?

There are many ways to use this book, all of which should be considered supplemental to your existing program.

1. You may choose to use the lessons in place of similar lessons in your maths program.
2. You may choose to present one lesson each month as a change of pace in your approach.
3. You may choose to select a six-week period to have students concentrate on critical prealgebra skills.

What *is* important is that you integrate this book into your mathematics program in a way in which you are comfortable and from which your students will benefit.

**PART A**

Follow your teacher's instructions to complete this activity. Remember that a variable can be any letter you choose to represent an object or groups of objects. The same variable can be used to represent different items in different situations. You may want to choose a variable that relates to the name of the object, such as the first letter of the word.

**STEP 1**

1. Choose a variable to represent the people in class who are wearing red. Write this variable. \_\_\_\_\_
2. Use a different variable to represent the people in class who are not wearing red. Write this variable. \_\_\_\_\_
3. Write a variable expression to represent all the people in the class. Use the two variables you wrote in numbers 1 and 2. \_\_\_\_\_

**STEP 2**

1. Choose a variable to represent the girls in the class. Write this variable. \_\_\_\_\_
2. Choose a different variable to represent the boys in the class. Write this variable. \_\_\_\_\_
3. Write a variable expression to represent the boys and girls in the class. Use the two variables you wrote in numbers 1 and 2. \_\_\_\_\_

**STEP 3**

1. Choose a variable to represent the boys in the class. Write this variable. \_\_\_\_\_
2. Choose a variable to represent the boys in the class who are wearing green. Write this variable. \_\_\_\_\_
3. Write a variable expression to represent the boys who are not wearing green. Use the two variables you wrote in numbers 1 and 2. \_\_\_\_\_

**STEP 4**

1. Choose a variable to represent the girls in the class. Write this variable. \_\_\_\_\_
2. Write an algebraic expression to represent the act of dividing the girls in the class into two equal groups. Use the variable you wrote in number 1. \_\_\_\_\_

**MATERIALS:**

- coloured cubes, coloured counters or beans of different colours

Work with a partner. Each partner selects a different colour and takes a handful of that colour cube or counter. Use the counters to complete the activity.

**STEP 1**

Choose two variables to represent the two colours you have.

**STEP 2**

Count the cubes of each colour and then complete the table.

colour	variable	number

**STEP 3**

Using the variables from the table, write an expression to show all of the cubes that you and your partner have. \_\_\_\_\_

**STEP 4**

Substitute the appropriate number for each variable in the expression to find the total number of cubes. \_\_\_\_\_

**STEP 5**

Take the cubes of one of the colours that you selected at the beginning of the activity. Draw a picture and then represent algebraically each situation in the table. Substitute your number of cubes to evaluate each expression. Write the result.

situation	drawing	expression	result
a. your total number of cubes			
b. 2 less than your number of cubes			
c. 3 times your number of cubes			
d. $\frac{1}{2}$ your number of cubes			
e. the sum of your cubes and 5 cubes			
f. 3 less than twice your number of cubes			

**STEP 6**

Check your partner's work and discuss any questions or disagreements you have.

# LESSON 1 Algebraic Expressions and Variables

## Pages 1–4

### PART A, page 1

In this whole-class activity, students are asked to create variables and expressions for different characteristics relating to class members. You may need to review the meaning of a variable—something that changes. Follow the instructions listed for each step in the activity. Then ask students to complete the items for each step in the student book. When students have completed the activity, be sure they realise that the same variable can be used to represent different items in different situations.

In this and other activities involving variables, the letters students choose may vary.

#### Step 1

1. Ask those students who are wearing red to stand up. Tell students to choose and write a variable to represent the people in the class who are wearing red. (Sample answer:  $r$ )
2. Sample answer:  $n$
3. Sample answer:  $r + n$

#### Step 2

1. Ask the girls in the class to stand. Tell students to choose and write a variable to represent the girls in the class. (Sample answer:  $g$ )
2. Ask the boys in the class to stand. Tell students to choose and write a variable to represent the boys in the class. (Sample answer:  $b$ )
3. Sample answer:  $g + b$ .

#### Step 3

1. Ask the boys in the class to stand up again. Tell students to choose and write a variable to represent the boys in the class. (Sample answer:  $b$ )

2. Ask the boys who are wearing green to remain standing while the other boys sit down. Tell students to choose and write a variable to represent the boys who are wearing green. (Sample answer:  $g$ )

3. Sample answer:  $b - g$

#### Step 4

1. Sample answer:  $g$
2. Sample answer:  $\frac{g}{2}$

### EXTENSION

1. Put students into small groups. Have them choose other characteristics that can be used to describe class members. (eye colour, hair colour) Tell the groups to create a variable for each characteristic.
2. Have students count the number of people that fit with the characteristics and variables they created. Groups can write expressions with the variables and then substitute the appropriate values to evaluate the expressions. (Example:  $b$  = brown,  $l$  = blue. Students who have either brown or blue eyes:  $b + l$ . If  $b = 14$  and  $l = 10$ , then  $b + l = 24$ .)

### PART B, page 2

For this activity, provide several groups of different-colour counters. You could use coloured cubes, large beans of different colours, multi-coloured pasta or small pieces of coloured paper. Each member of a pair chooses a different-colour object and takes a handful of counters for that colour.

The number of counters each partner picks up will vary.

#### Step 1

Students choose variables appropriate for their colours.

#### Step 2

Sample answer:

colour	variable	number
yellow	$y$	11
blue	$b$	5