

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.

LESSON 1

Patterns: Identifying Even and Odd

PART A

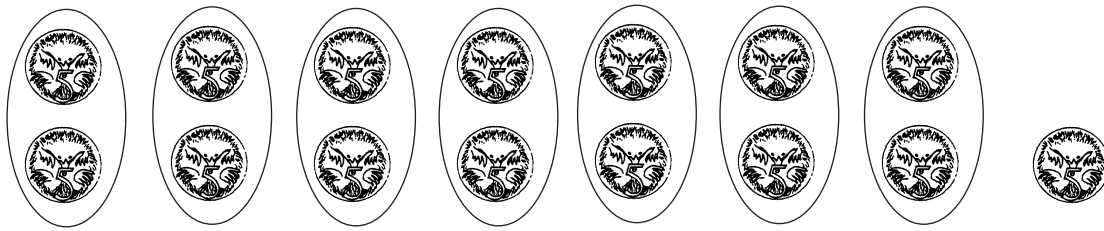
In this lesson, you will find out how you can identify even and odd numbers when dividing by 2 or when doing subtraction.

MATERIALS:

- 20 counters (coins or buttons)

Look at the number in the box. 15

Count out that number of counters. Separate the counters into groups of 2.



Separating the counters into groups of 2 shows a model for dividing by 2. Count the number of groups. This is the quotient. The counter left over represents the remainder, as shown below.

$$\boxed{15} \div 2 = 7 \text{ R}1$$

For each of the numbers in the boxes below, count out counters to show the number. Then separate them into groups of 2, as shown above.

For each number in a box, write a division problem to show what you've done with your counters. Write the division sign, the divisor, the quotient, and the remainder (if there is one).

Even Numbers

$$\boxed{14} \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\boxed{18} \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\boxed{10} \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Odd Numbers

$$\boxed{17} \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\boxed{13} \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\boxed{9} \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Use the information you learned as you worked the problems above to complete the sentences below. Write the word *even* or *odd* to complete each sentence.

1. An _____ number is a number that has no remainder when it is divided by 2.
2. An _____ number is a number that has a remainder of 1 when it is divided by 2.

Choose two numbers between 1 and 20 to create number sentences for problems 1–6. Draw *x*'s, as shown in the example, to represent the larger number. To show subtraction, circle the *x*'s that represent the smaller number. The number of *x*'s left is the difference between the larger and the smaller numbers. Show if the difference between the numbers is odd or even by circling the correct word.

Example:

x	x	x	x	x	x	x
x	x	x	x	x	x	

_____ _____ _____ odd
 13 - 5 = 8 even

<p>1. Choose two odd numbers to create a number sentence.</p> <p style="text-align: right;">_____ - _____ = _____ odd even</p>	<p>4. Choose two even numbers to create a number sentence.</p> <p style="text-align: right;">_____ - _____ = _____ odd even</p>
<p>2. Choose two odd numbers to create a number sentence.</p> <p style="text-align: right;">_____ - _____ = _____ odd even</p>	<p>5. Choose one odd and one even number to create a number sentence.</p> <p style="text-align: right;">_____ - _____ = _____ odd even</p>
<p>3. Choose two even numbers to create a number sentence.</p> <p style="text-align: right;">_____ - _____ = _____ odd even</p>	<p>6. Choose one odd and one even number to create a number sentence.</p> <p style="text-align: right;">_____ - _____ = _____ odd even</p>

7. Complete each sentence below by writing *odd* or *even*.
- a. The difference of two odd numbers is always _____.
 - b. The difference of two even numbers is always _____.
 - c. The difference of an odd and an even number is always _____.

LESSON 1 Patterns:
Identifying Even
and Odd
Pages 1–4

PART A, page 1

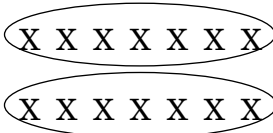
The beauty of mathematics is its orderliness and predictability. Whether you are teaching geometry, computation or any other topic, looking for patterns is the mathematical thinking involved. Students need to develop the habit of looking for patterns. Rather than memorising mathematical rules, students need to discover patterns. This skill will help them to be more successful in algebra as well as higher levels of mathematics.

There are two models for division. When the divisor is 2, the problem may mean that the number of counters could be divided into 2 groups or that there are 2 counters in each group.

Examples:

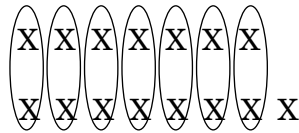
Two Groups

$$15 \div 2 = 7 \text{ R}1$$



Two in Each Group

$$15 \div 2 = 7 \text{ R}1$$



Either model is correct. The remainder would be 1 in either case. When the divisor is 2, a remainder of 1 indicates that the dividend is odd (15). No remainder indicates that the dividend is even.

Even Numbers

$$\boxed{14} \div 2 = 7$$

$$\boxed{18} \div 2 = 9$$

$$\boxed{10} \div 2 = 5$$

Odd Numbers

$$\boxed{17} \div 2 = 8 \text{ R}1$$

$$\boxed{13} \div 2 = 6 \text{ R}1$$

$$\boxed{9} \div 2 = 4 \text{ R}1$$

1. even
2. odd

EXTENSION

Here is a game that enhances the mathematical thinking of discovering patterns.

Nim Game

Two players use a total of 10 buttons. The players take turns taking 1 or 2 buttons. The player who has to take the last button loses. Decide who goes first and begin play. Players will probably need to play several games until they discover patterns to help them win. Do not tell players the secret of the game. To vary the game, use a different number of buttons or give players the option of taking 1, 2 or 3 buttons each turn.

PART B, page 2

Number sentences will vary.

1. even
2. even
3. even
4. even
5. odd
6. odd
7. a. even
b. even
c. odd

PART B, page 3

1. 7, odd
2. 8, even
3. 11, odd
4. 15, odd
5. 15, odd
6. 5, odd

PART C, page 4

1. a
2. b
3. a
4. a
5. Sample answers:
 - a. $16 - 4 = 12$
 - b. $17 \div 2 = 8 \text{ R}1$