

## To the Student: How To Use Your Book

Maybe someone has told you that your background in math is not strong enough and that you need more practice. Maybe you know that you need additional math skills and so you volunteered to take this course. Maybe you do not plan to major in mathematics or even in a math-related field but are required to take a mathematics course, regardless of your major. Whatever your reason, your goal now is to succeed!

This textbook will be a major resource in your learning. How you use it and how well you use it will be critical factors in reaching your goals. Here are a few tips:

### Reading Your Text

Many students feel that they can't read a math textbook. However, if you go about it the right way, you definitely can. Reading mathematics is not the same as reading a novel. You will need to go slowly, pay attention to detail, and make notes about questions you want to ask.

Some students prefer to read material before it has been presented. Others prefer to do their reading afterwards. Choose the style that works best for you, but make a resolution to read the text!

### Developing the Concept

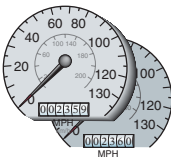
Many sections of the book include a feature called **Developing the Concept**. The purpose of this feature is to explain not only *how to* but *why*. This feature encourages visualization, pattern recognition, and informal deduction, stepping you through the logic behind definitions, rules, and procedures.

34 CHAPTER 1 ■ Introduction to Algebra: Addition and Subtraction

**DEVELOPING THE CONCEPT**

#### Addition with Carrying

The dials of your odometer display only the digits 0 through 9. If your odometer reading is 2359, then when you drive one more mile, the ones dial rotates to 0 and the tens dial rotates to 6.



Driving that one more mile can be represented by the addition

$$\begin{array}{r} 2,359 \\ + \quad 1 \\ \hline \end{array}$$

To perform this addition, we add down the ones column. However, the result is  $9 + 1 = 10$ , which is not a digit. Much as the odometer does, we write the sum by placing the 0 in the ones column and *carrying* the 1 to the tens column.

← 1 is carried to the tens column.

$$\begin{array}{r} \phantom{1} \\ 2,359 \\ + \quad 1 \\ \hline \phantom{1}0 \end{array}$$

Now we add down the remaining columns.

$$\begin{array}{r} \phantom{1} \\ 2,359 \\ + \quad 1 \\ \hline 2,360 \end{array}$$

## Examples and Your Turns

Your book has hundreds of *Examples* that give you guided practice with concepts and skills. It is not enough to simply read these examples. You should actually work the examples with paper and pencil in hand. See how far you can go on your own before you need to peek at the worked-out solution.

There is also an abundance of *Real-Data Examples and Exercises*. These examples and exercises use familiar situations so that you can see the relevance of algebra to the world around you.

Matched with the examples are exercises called *Your Turn*. This is your chance to try working a problem that is similar to the example. The answers appear upside-down at the bottom of the box. If you have difficulties, worked-out solutions to selected Your Turn problems can be found at the back of the book. The best approach is to work through the example and then immediately do the Your Turn.

136 CHAPTER 2 • Introduction to Algebra: Multiplication and Division

**C Applications**

An example of an application that might be of particular interest to you is the manner in which your course grade is determined. For simplicity, we assume that you are given five tests and that your grade is the average of those scores. The average of a list of numbers is found by adding the numbers and then dividing the sum by the number of numbers in the list.

**Example 6**

Suppose that your test scores (out of 100) were 82, 85, 91, 73, and 94. What is your test score average?

**SOLUTION**

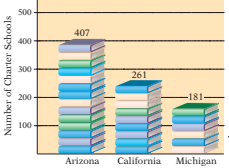
We add the test scores and divide by 5.

$$\frac{82 + 85 + 91 + 73 + 94}{5} = \frac{425}{5} = 85$$

Your test average is 85.

**Example 7**

A charter school is a school that is established and possibly funded by a state but that is not under the control of a local school system. The bar graph shows the number of charter schools that were approved in three states in 2000. (Source: Center for Education Reform.)



State	Number of Charter Schools
Arizona	407
California	261
Michigan	181

**Your Turn 6**

Suppose that a sixth test is given, and your score is 79. What is your new average?

**Your Turn 7**

Suppose that each of the three states added 15 additional charter schools. What would be the new average number of charter schools in the three states?

(a) What was the average number of charter schools in the three given states?

(b) By how much did the number of charter schools in Arizona exceed the average for the three states?

All the basic skills and concepts are illustrated with numerous examples. The steps in the solutions are annotated to explain what is being done and why.

Every example has a corresponding Your Turn, which is a similar example for you to work out. The answers to the Your Turns are given upside down at the bottom of the box, and worked-out solutions are included in the Answers to Selected Features at the back of the book.

A Real-Data Example teaches you how to organize and interpret data.

## Keys to the Calculator

Your instructor will tell you whether a calculator is permitted or encouraged in this course. There are two different kinds (scientific and graphing) and many different models. Make sure you know what calculator your instructor recommends.

Scattered throughout this book are small sections called **Keys to the Calculator**. These sections give you the typical keystrokes for performing certain operations, show the typical resulting displays, and offer some practice exercises. If calculators are to be part of your course of study, you will want to take advantage of this information.



### KEYS TO THE CALCULATOR

To add positive and negative numbers with your calculator, you will need to remember to enter negative numbers either with the  $\pm/\mp$  key or with the  $(-)$  key. Here are two possible ways to add  $-10 + (-6)$ .

Scientific calculator:  $10 \pm/\mp + 6 \pm/\mp =$

Graphing calculator:  $(-)$  10  $+$   $(-)$  6  $=$  ENTER

If your calculator has a  $(-)$  key for negative numbers, then we recommend that you use parentheses just as you would if you were writing the expression.

#### Exercises

- (a)  $-27 + 14$    (b)  $-42 + (-98)$    (c)  $576 + (-85)$    (d)  $28 + (-173)$

## Applying Yourself

In addition to the regular exercises, many exercise sets include features called **Exploring with Real-World Data: Collaborative Activities** and **Writing and Concept Extension**. These exercises challenge you to put your newly acquired knowledge into words by working with others and writing about algebraic concepts. We provide the answers to the odd-numbered exercises in the back of the book so that you can gauge your understanding of the concepts.

### Exploring with Real-World Data: Collaborative Activities

**Library Circulation** The Los Angeles (City) Public Library has 66 branches and circulates 9,663,185 books annually. The Los Angeles (County) Library has 85 branches and circulates 14,152,507 books annually. (Source: Public Library Association.)

85. Estimate the total annual circulation for the two libraries.
86. How many more books are circulated by the county library than by the city library?
87. What is the difference of the number of branches of the two libraries?
88. What is the total number of branches for the two libraries?

**Zoo Sizes** The list below gives the size of four major zoos. (Source: *World Almanac*.)

Zoo	Size (acres)
Bronx Zoo	265
Brookfield Zoo (Chicago)	216
San Diego Zoo	2,300
Miami Metrozoo	740

89. What is the difference between the sizes of the two smallest zoos?

### Writing and Concept Extension

57. Each product results in the same answer. In which arrangement are fewer steps needed to find the product? Why?
 

(i) $\begin{array}{r} 934 \\ \times 102 \\ \hline \end{array}$	(ii) $\begin{array}{r} 102 \\ \times 934 \\ \hline \end{array}$
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58. Each product results in the same answer. In which arrangement are fewer steps needed to find the product? Why?
 

(i) $\begin{array}{r} 5,000 \\ \times 3,690 \\ \hline \end{array}$	(ii) $\begin{array}{r} 3,690 \\ \times 5,000 \\ \hline \end{array}$
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59. **Take-Home Pay** A carpenter earns \$12 per hour for up to 40 hours of work per week. For each hour above 40, the hourly pay increases to \$18. Each week \$55 is deducted for insurance, and \$124 is deducted for the retirement fund. If the carpenter works 54 hours, what is the take-home pay?

## Strengthen Your Knowledge

Included at the end of nearly every section is a **Quick Reference**, which is a summary of the key concepts and rules of the section. One excellent use of this feature is in your preparation for exams. Work through the summary and check off those things that you feel confident that you know. If you are unsure about a topic, go back and review, work examples, and work related exercises.

Every chapter concludes with a set of **Review Exercises** and a **Chapter Test**. Some chapters also have a **Cumulative Test**, which includes material from preceding chapters. The answers to the Review Exercises, Chapter Tests, and Cumulative Tests all cite the pertinent subsection so that students can easily refer back to the related material.

**Chapter Review Exercises** are organized by section. These exercises allow you to practice concepts learned in the chapter.

**Chapter Tests** provide you with a self-assessment tool to check your learning progress.

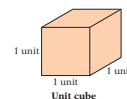
**Cumulative Tests** appear at the ends of Chapters 3, 5, 7, and 9 and help tie together concepts from several chapters.

### 2.8 Quick Reference

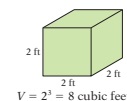
#### A. Volume

1. The **volume** of a geometric figure is a measure of the amount of space enclosed by the figure.

2. We can think of a **cube** as a box whose width, length, and height are all the same. All the dimensions of a *unit cube* are 1 unit, and the volume is 1 cubic unit.



3. The volume  $V$  of a cube whose sides are  $s$  units long is given by  $V = s^3$ .



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### CHAPTER 8 REVIEW EXERCISES

#### Section 8.1

1. The word **percent** means "per 100" or "for every 100."

In Exercises 2–4, write the percent as a simplified fraction.

2. **Reading for Pleasure** *USA Today* reported that 30% of the people in the United States said that reading was their favorite leisure activity.

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### CHAPTER 2 TEST

1. In the product  $3 \cdot 5$ , the 3 and 5 are called **factors**.

2. Identify the quotient that is not defined and explain your choice.

(i)  $8 \div 0$       (ii)  $0 \div 8$

3. For parts (a) and (b), identify the property from the following list that justifies the given statement.

(i) Associative Property of Multiplication

(ii) Commutative Property of Multiplication

(a)  $6(3y) = (6 \cdot 3)y$

(b)  $x \cdot 5 = 5x$

In Questions 4–8, perform the indicated operation.

4.  $5 \cdot 700$

5. 
$$\begin{array}{r} 3,024 \\ \times 400 \\ \hline \end{array}$$

6. 
$$\begin{array}{r} 6,307 \\ \times 926 \\ \hline \end{array}$$

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### CHAPTERS 8–9 CUMULATIVE TEST

1. Write the percent as a simplified fraction and as a decimal.

(a) 80%

(b) 0.5%

(c) 160%

2. Write the fraction as a percent.

(a)  $\frac{7}{40}$

(b)  $\frac{2}{3}$

3. Write the decimal as a percent.

(a) 0.12

(b) 3.2

(c) 0.008

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## Ongoing Help

Throughout the text, the authors offer hints about how to approach the material in the book, gained from their many years of teaching experience.

**W**ARM-UP SKILLS

The following questions review concepts and skills that you will need in Chapter 4.

1. Simplify.
  - (a)  $x + 7 + (-7)$
  - (b)  $y + 0$

In Exercises 2 and 3, simplify.

2.  $5x + 3(x - 1)$
3.  $5 - 3y + 4y$

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*Some Friendly Advice . . .*

Sometimes you can relate a mathematical concept or rule to things that you see about you in your everyday life.

In this chapter, we suggest that you think of an equation as being like a pan balance. If we add the same weight to both sides, the pans remain in balance. In the same

way, if we add the same quantity to both sides of an equation, the equation remains in "balance." We also suggest the idea of a street map to think about moving around in a coordinate system.

Let your imagination run free. The more you can relate mathematical concepts to familiar things that you can visualize, the clearer the concepts will be to you.

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**1.5** Addition and Subtraction in the Real World

**A** Bar Graph Data  
**B** Perimeter

**S**UGGESTIONS FOR SUCCESS

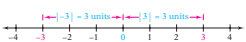
Students frequently ask math instructors "What will I ever use this for?" Have you ever asked this question? You, like many other math students, may think that the topic that you are covering in class has little use in your daily life.

Make a conscious effort to look for instances in which you can actually use the math that you are learning in class. For instance, almost every day you will see various types of graphs, tables, and charts in newspapers, magazines, and other news media. Look carefully at the data that are presented in these forms. Practice your math skills by interpreting those data. Ask yourself questions about the graphs similar to the questions about graphs in your textbook. You may find that you can use your math skills in situations that you never expected.

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**LEARNING TIP**  
You can think of finding the absolute value of a specific number as stripping away the + or - symbol from the number.

**Definition of Absolute Value**  
The **absolute value** of a number is the distance between the number and 0. The symbol for the absolute value of a number  $n$  is  $|n|$ .



**Example 7**  
Simplify the expression.  
(a)  $|4|$  (b)  $|-5|$  (c)  $|0|$

**SOLUTION**  
(a) The expression  $|4|$  means the distance between 4 and 0 on the number line. Because the distance is 4 units,  
 $|4| = 4$

**Your Turn 7**  
Simplify the expression.  
(a)  $|-13|$   
(b)  $|48|$

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Every chapter (except Chapter 1) begins with a feature called **Warm-Up Skills**—a set of 10–12 exercises that you can use to test your knowledge on the material you should have mastered before you proceed to the new chapter.

**Some Friendly Advice . . .** offers suggestions about how to approach the chapter and how to improve your study methods.

**Suggestions for Success** offers advice on study habits, ways to approach the coming material, and general observations on ways to think about mathematics.

**Learning Tips** are scattered throughout the text. Each one relates to a specific explanation or example. These tips offer cautions, alternative methods, and suggestions for a better understanding.