

Strategies for Reading Mathematics

For use with Chapter 1

Strategy: Reading the Textbook

Your textbook has many features that make your study of algebra easier. Within each lesson you may find:

- Material displayed in boxes. See the Concept Summary on page 5 for an example. Boxes such as these highlight and summarize important material. They provide a ready reference for solving exercises and reviewing the chapter.
- Student Help features in the margin such as the ones on pages 20, 34, and 42. These tell you where to find extra help within the textbook or on the Internet. They also offer tips for problem solving and avoiding common errors.


At the beginning of each chapter is a one-page Study Guide. It contains a brief overview of the chapter material, a list of key vocabulary, a review of the skills you will need for the chapter, and a study strategy.

Each chapter concludes with a review of the lessons that includes a complete list of the new vocabulary, and with two chapter tests.

STUDY TIP**Using the Skill Review**

Use the skill review portion of the Study Guide to practice skills needed for the chapter. If you find some of the questions difficult, turn to the pages listed next to the direction line. These refer to pages in previous chapters or in the Skills Review Handbook at the back of your textbook.

Questions

- Tell where in each chapter you would find each of the following features: a brief overview of the chapter, a review of prerequisite skills, and a tip for avoiding common errors.
- The Skill Review on page 2 has two sections. Where would you turn for extra help with the first section, *Operations with Signed Numbers*? Where would you turn for extra help with the second? In which section would you expect to find each of the following exercises?
 - a triangle with base 3 in. and height 4 in.
 - $(-2)(3)(-7)$
 - $-\frac{24}{3}$
 - 
- Solve each exercise from Question 2.
- Read the Student Help Study Tip given on page 34. In your own words, explain the main point the author is making.

Strategies for Reading Mathematics

For use with Chapter 1

Visual Glossary

The Study Guide on page 2 lists the key vocabulary for Chapter 1. Use the visual glossary below to help you understand some of the key vocabulary in Chapter 1. You may want to copy these diagrams into your notebook and refer to them as you complete the chapter.

GLOSSARY

graph of a real number
(p. 3) The point on a number line that corresponds to a real number.

graph of an inequality
(p. 41) All points on a real number line that correspond to solutions of the inequality.

absolute value of a number x
(p. 50) The distance the number is from 0 on a number line. The absolute value of a number x is written $|x|$.

variable (p. 12) Letter that is used to represent one or more numbers.

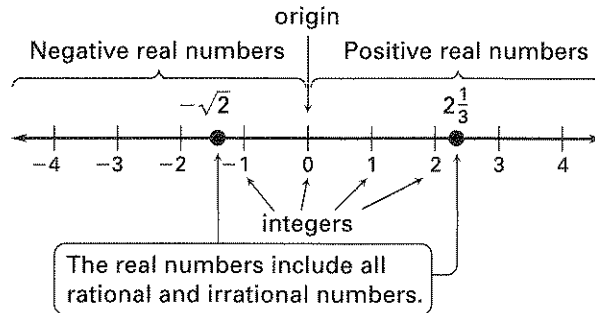
algebraic expression (p. 12) An expression involving variables.

terms of an expression
(p. 13) The parts of an algebraic expression that are added together.

like terms (p. 13) Terms that have the same variable part, such as $3x^2$ and $-5x^2$.

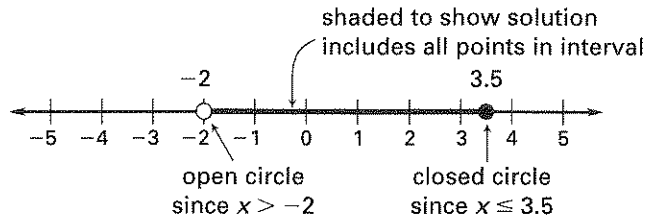
Graphing on a Number Line

The real number line can be used to graph real numbers as well as solutions to inequalities in one variable. Each point on the line corresponds to a unique real number. Values increase from left to right.



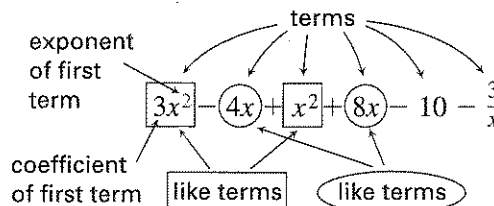
The solution of an inequality is shown by shading the appropriate interval or intervals on a number line.

Graph of interval $-2 < x \leq 3.5$



Simplifying Algebraic Expressions

An algebraic expression consists of one or more terms, at least one of which contains a variable. To simplify an algebraic expression, carry out steps to eliminate any grouping symbols and combine any like terms.



LESSON
1.1

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

1-day lesson (See *Pacing the Chapter*, TE pages 1C–1D)

For use with pages 3–10

GOALS

1. Use a number line to graph and order real numbers.
2. Identify properties of and use operations with real numbers.

State/Local Objectives _____

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

- ___ Prerequisite Skills Review: CRB pages 5–6
- ___ Strategies for Reading Mathematics: CRB pages 7–8
- ___ Warm-Up: TE page 3, CRB page 11, or Transparencies

TEACHING OPTIONS

- ___ Motivating the Lesson: TE page 4
- ___ Lesson Opener (Visual Approach): CRB page 12 or Transparencies
- ___ Examples 1–7: SE pages 3–6
- ___ Extra Examples: TE pages 4–6 or Transparencies
- ___ Closure Question: TE page 6
- ___ Guided Practice Exercises: SE page 7

APPLY/HOMEWORK

Homework Assignment

- ___ Basic 15–31 odd, 34–50 even, 51–56, 66, 68–82 even
- ___ Average 15–31 odd, 34–50 even, 51–56, 57–63 odd, 66, 68–82 even
- ___ Advanced 15–31 odd, 34–50 even, 51–56, 57–65 odd, 66, 67, 68–82 even

Reteaching the Lesson

- ___ Practice Masters: CRB pages 13–15 (Level A, Level B, Level C)
- ___ Reteaching with Practice: CRB pages 16–17 or Practice Workbook with Examples
- ___ Personal Student Tutor

Extending the Lesson

- ___ Cooperative Learning Activity: CRB page 19
- ___ Applications (Real-Life): CRB page 20
- ___ Challenge: SE page 10; CRB page 21 or Internet

ASSESSMENT OPTIONS

- ___ Checkpoint Exercises: TE pages 4–6 or Transparencies
- ___ Daily Homework Quiz (1.1): TE page 10, CRB page 24, or Transparencies
- ___ Standardized Test Practice: SE page 10; TE page 10; STP Workbook; Transparencies

Notes _____

Lesson 1.1

Lesson Plan for Block SchedulingHalf-day lesson (See *Pacing the Chapter*, TE pages 1C–1D)

For use with pages 3–10

GOALS

1. Use a number line to graph and order real numbers.
2. Identify properties of and use operations with real numbers.

State/Local Objectives _____

| CHAPTER PACING GUIDE | |
|----------------------|------------------------|
| Day | Lesson |
| 1 | 1.1 (all); 1.2 (all) |
| 2 | 1.3 (all); 1.4 (begin) |
| 3 | 1.4 (end); 1.5 (all) |
| 4 | 1.6 (all); 1.7 (all) |
| 5 | Review/Assess Ch. 1 |

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

- Prerequisite Skills Review: CRB pages 5–6
 Strategies for Reading Mathematics: CRB pages 7–8
 Warm-Up: TE page 3, CRB page 11, or Transparencies

TEACHING OPTIONS

- Motivating the Lesson: TE page 4
 Lesson Opener (Visual Approach): CRB page 12 or Transparencies
 Examples 1–7: SE pages 3–6
 Extra Examples: TE pages 4–6 or Transparencies
 Closure Question: TE page 6
 Guided Practice Exercises: SE page 7

APPLY/HOMEWORK**Homework Assignment (See also the assignment for Lesson 1.2.)**

- Block Schedule: 15–31 odd, 34–50 even, 51–56, 57–63 odd, 66, 68–82 even

Reteaching the Lesson

- Practice Masters: CRB pages 13–15 (Level A, Level B, Level C)
 Reteaching with Practice: CRB pages 16–17 or Practice Workbook with Examples
 Personal Student Tutor

Extending the Lesson

- Cooperative Learning Activity: CRB page 19
 Applications (Real Life): CRB page 20
 Challenge: SE page 10; CRB page 21 or Internet

ASSESSMENT OPTIONS

- Checkpoint Exercises: TE pages 4–6 or Transparencies
 Daily Homework Quiz (1.1): TE page 10, CRB page 24, or Transparencies
 Standardized Test Practice: SE page 10; TE page 10; STP Workbook; Transparencies

Notes _____

WARM-UP EXERCISES

For use before Lesson 1.1, pages 3–10

Simplify.

1. $12 \times (-28)$

2. $-23 + (-15)$

3. $28 \div (-12)$

Order the numbers from least to greatest.

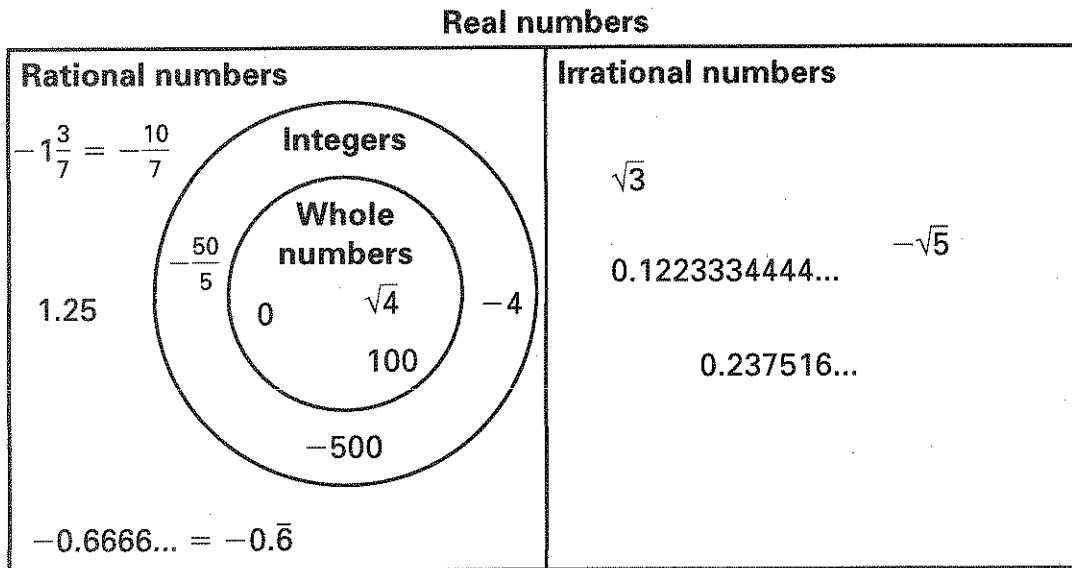
4. $0.314, 0.0978, 0.309, 0.\overline{31}$

5. $\frac{1}{2}, \frac{1}{3}, \frac{2}{5}, \frac{3}{16}$

Visual Approach Lesson Opener

For use with pages 3–10

The Venn diagram below shows subsets of the real numbers, the numbers used most often in algebra.



- Simplify $\frac{6}{3}$. Is $\frac{6}{3}$ an integer? Is it a whole number?
- All terminating decimals (such as 1.25) and all repeating decimals (such as $0.\overline{6}$) can be written as the ratio of two integers. How can you write 1.25 and $0.\overline{6}$ as ratios?
- Place each number in the correct region of the diagram.

| | | | | | |
|------------|--------------------|---------------|----------------|---------------|----------------|
| 293 | -47 | $\frac{5}{9}$ | 0.184 | $\frac{6}{3}$ | |
| $\sqrt{7}$ | $-0.4\overline{2}$ | π | $-\frac{7}{1}$ | $-\sqrt{9}$ | $4\frac{2}{3}$ |

Practice C

For use with pages 3–10

Graph the numbers on a number line. Then decide which number is greater and use the symbol $<$ or $>$ to show the relationship.

1. 5, 1

2. 1.3, -2.1

3. $-\frac{4}{5}$, $-\frac{2}{3}$

4. $\sqrt{3}$, $\sqrt{7}$

5. $-\frac{4}{3}$, $-\sqrt{2}$

6. $\sqrt{7}$, 2.8

Write the numbers in increasing order.

7. $\frac{4}{3}$, $\sqrt{2}$, $-\frac{1}{8}$, $-\frac{2}{9}$

8. 0, -1.5 , $-\frac{3}{4}$, $\frac{1}{5}$

9. $\sqrt{3}$, $-\sqrt{8}$, -2.9 , 2

Identify the property shown.

10. $a + (b + c) = a + (c + b)$

11. $a \cdot (b \cdot c) = (b \cdot c) \cdot a$

12. $a + (b + 3) = (a + b) + 3$

13. $b(c + a) = b \cdot c + b \cdot a$

14. $c(a + b) = (a + b)c$

15. $a \cdot b + 0 = a \cdot b$

Perform the given operation. Give the answer with the appropriate unit of measure.

16. $56\frac{3}{4}$ pounds + $12\frac{1}{8}$ pounds

17. $6\frac{1}{3}$ inches $- 2\frac{1}{4}$ inches

18. (15 ounce) $\left(\frac{\$3}{1 \text{ ounce}}\right)$

19. $\left(\frac{2 \text{ revolutions}}{\text{second}}\right) \left(\frac{60 \text{ seconds}}{\text{minute}}\right)$

20. **Cheetah's Speed** A cheetah can run $17\frac{1}{2}$ miles in $\frac{1}{4}$ hour. What is the speed of a cheetah in miles per hour?

21. **Basketball** During the 1995–96 season, Michael Jordan scored 2491 points in 82 games. Find his average number of points scored per game. Give your answer to 3 significant digits.

22. **Snail's Speed** A snail can travel about 0.03 miles per hour. Convert this speed into feet per hour. Note that there are 5280 feet in 1 mile. Give your answer to 4 significant digits.

23. **First Down** A football team must move 10 yards from its original position to gain a first down. In three plays a team ran for 6 yards, lost 8 yards due to a quarterback sack, and passed for 12 yards. Did the team make a first down?

Reteaching with Practice

For use with pages 3–10

GOAL

Use a number line to graph and order real numbers and identify properties of and use operations with real numbers

VOCABULARY

The **graph** of a real number is the point on a real number line that corresponds to the number. On a number line, the numbers increase from left to right, and the point labeled 0 is the origin.

The number that corresponds to a point on a number line is the **coordinate** of the point.

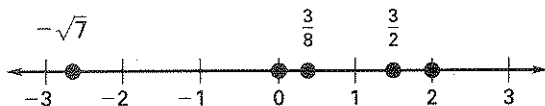
The **opposite**, or *additive inverse*, of any number a is $-a$.

The **reciprocal**, or *multiplicative inverse*, of any nonzero number a is $\frac{1}{a}$.

EXAMPLE 1**Graphing and Ordering Real Numbers**Graph and write the numbers in increasing order: $-\sqrt{7}$, 0 , $\frac{3}{2}$, 2 , $\frac{3}{8}$.**SOLUTION**

$$-\sqrt{7} \approx -2.6, \frac{3}{2} = 1.5, \frac{3}{8} \approx 0.4$$

Rewrite each number in decimal form.



Plot the points on the real number line.

$$-\sqrt{7}, 0, \frac{3}{8}, \frac{3}{2}, 2$$

Write the numbers from least to greatest.

Exercises for Example 1

Write the numbers in increasing order.

1. $1, \frac{1}{3}, \sqrt{2}$

2. $\frac{3}{5}, -1, 1$

3. $\sqrt{5}, \frac{2}{3}, 3.25$

4. $-4, 1, -1$

5. $0, -2, \frac{1}{3}$

6. $-\sqrt{2}, -15, 5.7$

7. $\frac{5}{2}, -5, -10$

8. $3, -5, 0$

EXAMPLE 2**Identifying Properties of Real Numbers**

Identify the property shown.

a. $5(10 + 2) = 5 \cdot 10 + 5 \cdot 2$

b. $(6 \cdot 4)5 = 6(4 \cdot 5)$

SOLUTION

a. Distributive property

b. Associative property of multiplication

Reteaching with Practice

For use with pages 3–10

Exercises for Example 2

Identify the property shown.

9. $5 + 3 = 3 + 5$

10. $7 + (-7) = 0$

11. $-2 + 0 = -2$

12. $2(4 + 1) = 2 \cdot 4 + 2 \cdot 1$

13. $8 \cdot \frac{1}{8} = 1$

14. $(5 + 7) + 3 = 5 + (7 + 3)$

EXAMPLE 3**Operations with Real Numbers**

At rest, the average person's heart beats 65 times per minute. During aerobic exercise, this rate increases by 40%.

- How many times does the average person's heart beat per hour?
- How many times will the average person's heart beat per minute during aerobic exercise?

SOLUTION

$$a. \left(\frac{65 \text{ beats}}{1 \text{ minute}} \right) \left(\frac{60 \text{ minutes}}{1 \text{ hour}} \right) = 3900 \text{ beats per hour}$$

- To find 40% of 65, multiply.

$$\begin{aligned} 40\% \times 65 &= 0.4 \times 65 && \text{Rewrite 40\% as 0.4.} \\ &= 26 && \text{Simplify.} \end{aligned}$$

During aerobic exercise, the average person's heart would beat
 $65 + 26 = 91$ times per minute.

Exercises for Example 3

In Exercises 15 and 16, use the following information.

At Indianapolis Motor Speedway, one lap is 2.5 miles in length. The average speed of an Indy racing car is 190 miles per hour.

- Find the length of one lap in yards.
- How many seconds would it take to complete one lap?

Quick Catch-Up for Absent Students

For use with pages 3–10

The items checked below were covered in class on (date missed) _____

Lesson 1.1: Real Numbers and Number Operations___ **Goal 1:** Use a number line to graph and order real numbers. (pp. 3–4)**Material Covered:**

___ Example 1: Graphing Numbers on a Number Line

___ Example 2: Ordering Real Numbers

___ Example 3: Ordering Elevations

Vocabulary:

whole numbers, p. 3

integers, p. 3

rational numbers, p. 3

irrational numbers, p. 3

origin, p. 3

graph of a real number, p. 3

coordinate of a point, p. 3

___ **Goal 2:** Identify properties of and use operations with real numbers. (pp. 5–6)**Material Covered:**

___ Example 4: Identifying Properties of Real Numbers

___ Student Help: Study Tip

___ Example 5: Operations with Real Numbers

___ Example 6: Using Unit Analysis

___ Example 7: Operations with Real Numbers in Real Life

Vocabulary:

opposite of a number, p. 5

reciprocal of a number, p. 5

___ Other (specify) _____

Homework and Additional Learning Support

___ Textbook (specify) pp. 7–10 _____

___ Internet: Extra Examples at www.mcdougallittel.com___ *Reteaching with Practice* worksheet (specify exercises) ________ *Personal Student Tutor* for Lesson 1.1

Cooperative Learning Activity

For use with pages 3–10

GOAL

To follow specific stocks for an extended period of time and put the stocks in order according to price

Materials: Daily newspaper that lists stock quotes or access to stock quotes from the Internet. Also, stock prices from the previous week.

Exploring Stocks

Stocks in many companies are traded each day. When an individual purchases stock in a company, he or she becomes a part of that company.

Instructions

- 1 Find the closing price for ten companies.
- 2 List the stocks in inscreasing order according to price.
- 3 Using the stock prices from the previuos week, list the gain or loss for each stock.
- 4 List the stocks in increasing order that had the largest gains (or losses).

Analyzing the Results

1. Using the ten companies that were selected, discuss the value of each stock.
2. Having compared the change over a period of one week, discuss the actual change for each stock. How many increased? How many decreased? Did any stay the same?
3. Is it a good idea to invest in the stock market? Explain.

Real-Life Application: When Will I Ever Use This?

For use with pages 3–10

World's Highest Waterfall

The world's highest waterfall is located in the Canaima National Park, on a branch of the Carrao River in southeast Venezuela. This waterfall, called the Angel Falls, plunges from the top of a mesa, or what the natives call a *tepuí*. The Angel Falls mesa is one of over a hundred of its kind, which are scattered about the Guiana Highlands of southeast Venezuela. The main characteristic of the mesas is their massive heights, each with a flat top and vertical sides. Also called *table mountains*, these mesas were formed out of sandstone over a billion years ago. The great elevation of the isolated mesas has made them into biological islands. The waters from the heavy rainfall of the Rainforest are continually eroding the vertical sides of the mesas.

In 1935 Jimmy Angel, a United States bush pilot, was flying over this area in Venezuela, when he landed on the top of a mountain in search of gold. His plane was stuck in the boggy jungle on top of the mountain. It was here that he noticed an impressive waterfall plunging down thousands of feet. His plane remained stuck upon the mountain as a monument to his discovery. This waterfall became known as Angel Falls, after the American pilot who discovered it.

1. The Angel Falls has a total drop of 3212 feet with the longest single drop of 2648 feet. Find the height of both drops in miles, yards, and inches. Give your answer to two significant digits.
2. The Angel Falls has a total drop of 3212 feet. The Eiffel Tower is 1045.59 feet high. The length of the Golden Gate Bridge is 6450 feet. The Empire State Building is 1453.71 feet high. Order these heights from greatest to least. Use the symbol $<$ or $>$ to show the relationship.

In Exercises 3 and 4, use the following information.

The exchange rate is 630.25 Venezuelan bolivars per U.S. dollar. There is no fee to make an exchange.

3. A local tour guide has offered to lead your expedition to the Angel Falls for 900,000 Venezuelan bolivars. How much money in U.S. dollars is the tour guide charging your group?
4. You decide to give your guide and additional \$250 in U.S. dollars. How much are you giving him in Venezuelan bolivars?
5. An expedition climbs to the top of Angel Falls at an average rate of 0.25 mile per hour. How long does it take the expedition to climb to the top of Angel Falls?
6. After one hour of climbing, at an average rate of 0.25 mile per hour, the expedition takes a break. How far has the expedition climbed? Show your answer in feet.
7. After 2 hours of climbing, at an average rate of 0.25 mile per hour, the expedition takes a break. How much further does the group have to climb to reach the top of the waterfall? Show your answer in feet.

Challenge: Skills and Applications

For use with pages 3–10

1. A subset of the real numbers is *closed under addition* if, for any two numbers, a and b , that are members of the subset, the number $a + b$ is also a member of the subset. Tell whether each of the following subsets of the real numbers is closed under addition. If it is not, give an example that shows it is not.

- a. The set of whole numbers b. The set of negative integers
c. The set of irrational numbers d. The set of rational numbers

2. For each of the sets in Problem 1, tell whether the set is *closed under multiplication*. If it is not, give an example that shows it is not.

3. a. For each of the following pairs of rational numbers, $\frac{a}{b}$ and $\frac{c}{d}$, find the rational number $\frac{a + c}{b + d}$, and write the 3 rational numbers in increasing order.

(i) $\frac{2}{3}, \frac{1}{2}$

(ii) $\frac{1}{3}, \frac{3}{4}$

(iii) $\frac{2}{5}, \frac{1}{4}$

(iv) $\frac{1}{6}, \frac{5}{9}$

- b. What do you notice about the order relationship of the 3 numbers in each case?
4. In a clothing store, Jane Rodriguez found a sign that read, “20% off the sale price.”
- a. A dress that originally sold for \$80 had a sale price that was 15% less than the original price. What was the final price of the dress, according to the sign?
- b. Would the final price of the dress be the same as 35% off the original price? If not, which price would be lower?
- c. At the register, another woman was buying a dress that had been subject to the same two discounts. The final price of this dress was \$81.60. What was the original price?
5. Suppose a is a whole number other than 0 and b is an *irrational* number. Is it possible for the product ab to be a rational number? Explain why or why not.

Lesson Plan1-day lesson (See *Pacing the Chapter*, TE pages 1C–1D)

For use with pages 11–18

GOALS

1. Evaluate algebraic expressions.
2. Simplify algebraic expressions by combining like terms.

State/Local Objectives _____

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

- ____ Homework Check: TE page 7; Answer Transparencies
 ____ Warm-Up or Daily Homework Quiz: TE pages 11 and 10, CRB page 24, or Transparencies

TEACHING OPTIONS

- ____ Motivating the Lesson: TE page 12
 ____ Lesson Opener (Application): CRB page 25 or Transparencies
 ____ Graphing Calculator Activity with Keystrokes: CRB page 26
 ____ Examples 1–6: SE pages 11–13
 ____ Extra Examples: TE pages 12–13 or Transparencies
 ____ Technology Activity: SE page 18
 ____ Closure Question: TE page 13
 ____ Guided Practice Exercises: SE page 14

APPLY/HOMEWORK**Homework Assignment**

- ____ Basic 15–36, 37–55 odd, 62–67, 69–89 odd; Quiz 1: 1–14
 ____ Average 15–36, 37–55 odd, 57–61 odd, 62–67, 69–89 odd; Quiz 1: 1–14
 ____ Advanced 15–36, 37–55 odd, 56, 57–61 odd, 62–68, 69–89 odd; Quiz 1: 1–14

Reteaching the Lesson

- ____ Practice Masters: CRB pages 27–29 (Level A, Level B, Level C)
 ____ Reteaching with Practice: CRB pages 30–31 or Practice Workbook with Examples
 ____ Personal Student Tutor

Extending the Lesson

- ____ Applications (Interdisciplinary): CRB page 33
 ____ Challenge: SE page 16; CRB page 34 or Internet

ASSESSMENT OPTIONS

- ____ Checkpoint Exercises: TE pages 12–13 or Transparencies
 ____ Daily Homework Quiz (1.2): TE page 17, CRB page 38, or Transparencies
 ____ Standardized Test Practice: SE page 16; TE page 17; STP Workbook; Transparencies
 ____ Quiz (1.1–1.2): SE page 17; CRB page 35

Notes _____

Lesson Plan for Block SchedulingHalf-day lesson (See *Pacing the Chapter*, TE pages 1C–1D)

For use with pages 11–18

GOALS

1. Evaluate algebraic expressions.
2. Simplify algebraic expressions by combining like terms.

State/Local Objectives _____

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

- _____ Homework Check: TE page 7; Answer Transparencies
 _____ Warm-Up or Daily Homework Quiz: TE pages 11 and 10,
 CRB page 24, or Transparencies

TEACHING OPTIONS

- _____ Motivating the Lesson: TE page 12
 _____ Lesson Opener (Application): CRB page 25 or Transparencies
 _____ Graphing Calculator Activity with Keystrokes: CRB page 26
 _____ Examples 1–6: SE pages 11–13
 _____ Extra Examples: TE pages 12–13 or Transparencies
 _____ Technology Activity: SE page 18
 _____ Closure Question: TE page 13
 _____ Guided Practice Exercises: SE page 14

APPLY/HOMEWORK**Homework Assignment (See also the assignment for Lesson 1.1.)**

- _____ Block Schedule: 15–36, 37–55 odd, 57–61 odd, 62–67, 69–89 odd; Quiz 1: 1–14

Reteaching the Lesson

- _____ Practice Masters: CRB pages 27–29 (Level A, Level B, Level C)
 _____ Reteaching with Practice: CRB pages 30–31 or Practice Workbook with Examples
 _____ Personal Student Tutor

Extending the Lesson

- _____ Applications (Interdisciplinary): CRB page 33
 _____ Challenge: SE page 16; CRB page 34 or Internet

ASSESSMENT OPTIONS

- _____ Checkpoint Exercises: TE pages 12–13 or Transparencies
 _____ Daily Homework Quiz (1.2): TE page 17, CRB page 38, or Transparencies
 _____ Standardized Test Practice: SE page 16; TE page 17; STP Workbook; Transparencies
 _____ Quiz (1.1–1.2): SE page 17; CRB page 35

Notes _____

| CHAPTER PACING GUIDE | |
|----------------------|------------------------|
| Day | Lesson |
| 1 | 1.1 (all); 1.2 (all) |
| 2 | 1.3 (all); 1.4 (begin) |
| 3 | 1.4 (end); 1.5 (all) |
| 4 | 1.6 (all); 1.7 (all) |
| 5 | Review/Assess Ch. 1 |

WARM-UP EXERCISES

For use before Lesson 1.2, pages 11–18

Simplify.

1. $-(7 \cdot 7 \cdot 7)$

2. $(-3)(-3)(-3)$

3. $-(3 - 4)$

4. $(6 + 3 - 19)x$

5. $(-11 - (-4))y$

DAILY HOMEWORK QUIZ

For use after Lesson 1.1, pages 3–10

1. Graph the numbers on a number line. Then write the numbers in increasing order.

$$-\sqrt{8}, -0.8, -\frac{19}{5}, 1.9, -3$$

2. What property is illustrated by the statement $\frac{2}{3} \cdot \frac{3}{2} = 1$?

3. What is the quotient of $\frac{3}{2}$ and -6 ?

4. Give the product with the appropriate unit of measure.

$$\left(\frac{\$9}{1 \text{ hour}}\right)\left(\frac{8 \text{ hours}}{1 \text{ day}}\right)\left(\frac{5 \text{ days}}{1 \text{ week}}\right)$$

Application Lesson Opener

For use with pages 11–17

Choose the two expressions that represent each situation.
All expressions should be used.

$x^2 + 10x$

$3x - 1.45x$

$4x + 9(1 - x)$

$1.55x$

$9 - 5x$

$x(x + 10)$

1. A videotape club sells videotapes for 3 times the wholesale price at which they buy them. Their profit is the selling price minus the wholesale price minus 45% of the wholesale price. Which expressions represent the club's profit?
2. You exercise for 1 hour per session. You jog part of the time, x hours, at 4 miles per hour and walk the rest of the time at 9 miles per hour. Which expressions represent how far you travel when you exercise?
3. A room is 10 feet longer than it is wide. Which expressions represent the area of the room?

Graphing Calculator Activity Keystrokes

For use with page 18

TI-82

- a. $(-)$ 3 x^2 + 4 ENTER
- b. ($(-)$ 3) x^2 + 4 ENTER
- c. (24 \div 2) $^{\wedge}$ 3 ENTER
- d. 5 \div (4 + 3 \times 2) ENTER

TI-83

- a. $(-)$ 3 x^2 + 4 ENTER
- b. ($(-)$ 3) x^2 + 4 ENTER
- c. (24 \div 2) $^{\wedge}$ 3 ENTER
- d. 5 \div (4 + 3 \times 2) ENTER

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- a. $(-)$ 3 x^2 + 4 ENTER
- b. ($(-)$ 3) x^2 + 4 ENTER
- c. (24 \div 2) $^{\wedge}$ 3 ENTER
- d. 5 \div (4 + 3 \times 2) ENTER

CASIO CFX-9850GA PLUS

From the main menu, choose RUN.

- a. $(-)$ 3 x^2 + 4 EXE
- b. ($(-)$ 3) x^2 + 4 EXE
- c. (24 \div 2) $^{\wedge}$ 3 EXE
- d. 5 \div (4 + 3 \times 2) EXE

Practice C

For use with pages 11–17

Write the expression using exponents.

1. $(x \cdot x \cdot x)(y \cdot y)$
2. $(-4)(-4)(-4)(-4)(-4)$
3. $-3 \cdot 3 \cdot 3 \cdot 3$
4. $(-3x)(-3x)(-3x) + (x \cdot x)$
5. -6 to the 8th power
6. the sum of x and y to the third power

Evaluate the expression.

7. $(4 + 3)(-1 + 5)^2$
8. $(-8 + 6) \div (3 - 1)^2$
9. $4(1 + 3)^2 \div (5 - 1)$
10. $((3 - 1) \cdot 2 + (-3))^5$
11. $-2^5 + (3 - 5)^5$
12. $(4 + 20 \div 4)^2$

Evaluate the expression for the given values of x and y .

13. $7x + 3y^3$ when $x = 6$ and $y = 2$
14. $\frac{5(x - y)}{2xy + 1}$ when $x = -2$ and $y = -5$
15. $4\left(\frac{x}{y}\right) + 3x - 2y$ when $x = 4$ and $y = \frac{1}{2}$
16. $\frac{(x + y)^2 - 3}{x + y}$ when $x = \frac{1}{2}$ and $y = -\frac{3}{2}$

Simplify the expression.

17. $10(x - 3) + 2(5 - 3x)$
18. $6(x^2 - x) - 3(2x - x^2)$
19. $4(x + y) - 3x + y$
20. $4(x - y) + 3(y - x)$
21. $x^3 + 2(x^2 - 1) + x^2(x + 1)$
22. $0.5(2x + 8) - 3(2 - 3x)$

23. Phone Bill A phone company charges a basic rate of \$13.99 per month.

In addition the user is charged \$0.10 per minute for all long distance calls made during the week and \$0.08 per minute for all long distance calls made during the weekend. Write an expression that gives the total monthly bill. Evaluate the expression if you talk long distance for 30 minutes during the week and 50 minutes during the weekend.

24. Engraving A gift shop advertises that they will engrave any gift purchased in their store at a rate of \$0.06 per letter and the first three letters are free. A desk plate sells for \$22. Write an expression for the total cost of buying the desk plate and having it engraved. Evaluate the expression if you wish to engrave a name that has 15 letters.

Reteaching with Practice

For use with pages 11–17

GOAL**Evaluate algebraic expressions and simplify algebraic expressions by combining like terms****VOCABULARY**

A **variable** is a letter that is used to represent one or more numbers.

An **algebraic expression** is an expression involving variables.

Like terms are expressions that have the same variable part. **Constant terms** such as -4 and 2 are also like terms.

The **base** of an exponent is the number or variable that is used as a factor in repeated multiplication. For example, in the expression 4^b , 4 is the base.

An **exponent** is the number or variable that represents the number of times the base is used as a factor. For example, in the expression 4^b , b is the exponent.

A **power** is the result of repeated multiplication. For example, in the expression $4^2 = 16$, 16 is the second power of 4 .

Any number used to replace a variable is a **value of the variable**.

When the variables in an algebraic expression are replaced by numbers, the result is called the **value of the expression**.

Terms are the parts that are added in an expression, such as 5 and $-x$ in the expression $5 - x$.

A **coefficient** is the number multiplied by a variable in a term.

Two algebraic expressions are **equivalent** if they have the same value for all values of their variable(s).

EXAMPLE 1**Using Order of Operations**

$$\begin{aligned}
 2(3 + 18 \div 3^2 - 7) &= 2(3 + 18 \div 9 - 7) && \text{Evaluate the power.} \\
 &= 2(3 + 2 - 7) && \text{Divide.} \\
 &= 2(-2) && \text{Add within parentheses.} \\
 &= -4 && \text{Multiply.}
 \end{aligned}$$

Exercises for Example 1

Evaluate the expression.

- | | | |
|---------------------|-------------------------|-------------|
| 1. $(-1 + 3) - 4^2$ | 2. $14 - 12 \div 3$ | 3. $(-5)^3$ |
| 4. $5 - (-2 + 4)^2$ | 5. $36 \div (-3)^2 - 1$ | 6. -5^2 |

Reteaching with Practice

For use with pages 11–17

EXAMPLE 2 *Evaluating an Algebraic Expression*Evaluate $2t^2 - 3$ when $t = 4$.**SOLUTION**

$$\begin{aligned}
 2t^2 - 3 &= 2(4)^2 - 3 && \text{Substitute 4 for } t. \\
 &= 2(16) - 3 && \text{Evaluate the power.} \\
 &= 32 - 3 && \text{Multiply.} \\
 &= 29 && \text{Subtract.}
 \end{aligned}$$

Exercises for Example 2

Evaluate the expression.

7. $x^2(4 - x)$ when $x = 2$ 8. $x - (x + 5)$ when $x = 20$
 9. $x^2 + 5$ when $x = -3$ 10. $3x^3 + 4$ when $x = -2$
 11. $4x - 3y + 2$ when $x = 4$ and $y = -3$ 12. $9(m - n)^2$ when $m = 4$ and $n = 1$

EXAMPLE 3 *Simplifying by Combining Like Terms*Simplify $6(x - y) - 4(x - y)$.**SOLUTION**

$$\begin{aligned}
 6(x - y) - 4(x - y) &= 6x - 6y - 4x + 4y && \text{Distributive property} \\
 &= (6x - 4x) + (-6y + 4y) && \text{Group like terms.} \\
 &= 2x - 2y && \text{Combine like terms.}
 \end{aligned}$$

Exercises for Example 3

Simplify the expression.

13. $7x - (9x + 5)$ 14. $2(n^2 + n) - 5(n^2 - 4n)$
 15. $-6x^2 + 4x - x^2 + 15x$ 16. $7x - 2y + 3 - 9y + 4 + 5x$

Quick Catch-Up for Absent Students

For use with pages 11–18

The items checked below were covered in class on (date missed) _____

Lesson 1.2: Algebraic Expressions and Models___ **Goal 1:** Evaluate algebraic expressions. (pp. 11–12)**Material Covered:**

- ___ Example 1: Evaluating Powers
 ___ Example 2: Using Order of Operations
 ___ Student Help: Skills Review
 ___ Example 3: Evaluating an Algebraic Expression
 ___ Example 4: Writing and Evaluating a Real-Life Model

Vocabulary:

| | | |
|-----------------------------|-----------------|--------------------------------|
| numerical expression, p. 11 | base, p. 11 | value of the expression, p. 12 |
| exponent, p. 11 | power, p. 11 | algebraic expression, p. 12 |
| order of operations, p. 11 | variable, p. 12 | mathematical model, p. 12 |
| value of a variable, p. 12 | | |

___ **Goal 2:** Simplify algebraic expressions by combining like terms. (p. 13)**Material Covered:**

- ___ Student Help: Study Tip
 ___ Student Help: Skills Review
 ___ Example 5: Simplifying by Combining Like Terms
 ___ Example 6: Using a Real-Life Model

Vocabulary:

| | | |
|-------------------------------|--------------------|-----------------------|
| terms of an expression, p. 13 | like terms, p. 13 | constant terms, p. 13 |
| equivalent expressions, p. 13 | coefficient, p. 13 | identity, p. 13 |

Activity 1.2: Evaluating Expressions (p. 18)___ **Goal:** Evaluate expressions using a scientific calculator or a graphing calculator.

___ Student Help: Keystroke Help

___ Other (specify) _____
 _____**Homework and Additional Learning Support**___ Textbook (specify) pp. 14–17 _____
 ________ *Reteaching with Practice* worksheet (specify exercises) ________ *Personal Student Tutor* for Lesson 1.2

Interdisciplinary Application

For use with pages 11–17

United States Congress

SOCIAL STUDIES The United States Congress is composed of the House of Representatives and the United States Senate. This legislative branch of the government was established in 1789 by the U.S. Constitution. The two houses of Congress have about the same amount of power. The Senate is commonly referred to as the *upper house*, and the House of Representatives (or the House) is referred to as the *lower house*. The House and the Senate must approve identical versions of any legislation before it can become law.

The Constitution gives Congress the power to determine the size of the House and to distribute the number of representatives among the states. In 1929, Congress passed a law that limited the number of Representatives in the House to 435 members. In addition, each state must have at least one representative. The Constitution also requires a census of the nation every ten years to determine how many representatives each state should have. In 1990, each state had one representative in the House for approximately every 572,000 people.

1. You can find the number of representatives for each state if you know the population of each state. Write the verbal model to find the number of Representatives for a state.
2. Using the population from 1990, assign labels to your verbal model.
3. Write the algebraic expression to find the number of Representatives.
4. Using the population from 1990, find the number of Representatives for each state below. Remember to round to the nearest whole number since you cannot have a fraction of a Representative.

| <u>State</u> | <u>1990 Population</u> | <u>State</u> | <u>1990 Population</u> |
|--------------|------------------------|--------------|------------------------|
| California | 29,786,000 | Florida | 12,938,000 |
| Indiana | 5,544,000 | Pennsylvania | 11,883,000 |
| Texas | 16,986,000 | Wyoming | 454,000 |

5. After the 2000 census, it is estimated that the House of Representatives will have one member for approximately every 631,000 people. Rewrite your algebraic expression to find the number of Representatives for each state.
6. Use the following 2000 projected populations to find the new number of Representatives for each state below.

| <u>State</u> | <u>2000 Est. Population</u> | <u>State</u> | <u>2000 Est. Population</u> |
|--------------|-----------------------------|--------------|-----------------------------|
| California | 32,521,000 | Florida | 15,233,000 |
| Indiana | 6,045,000 | Pennsylvania | 12,202,000 |
| Texas | 20,119,000 | Wyoming | 525,000 |

7. Compare your answers to Exercises 4 and 6. Determine which states added, lost, or stayed the same regarding the number of Representatives.

Challenge: Skills and Applications

For use with pages 11–17

1. Job A offers a starting salary of \$10,000 per year, with a raise of \$4,000 per year, at the end of the year. Job B offers the same starting salary with a raise of \$1000 per half-year, at the end of the year. In other words, we have the following data.

| Year number (n) | Job A salary for year n | Job B salary for the 1st half of year n | Job B salary for the 2nd half of year n | Job B salary for year n |
|---------------------|---------------------------|---|---|---------------------------|
| 1 | 10,000 | 5000 | 6000 | 11,000 |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

- a. Fill in the rest of the table.
- b. Find a formula for the Job A salary for year n in terms of n .
- c. Find, in terms of n , formulas for the Job B salary for the 1st half of year n and the 2nd half of year n . Add these two to get a formula for the Job B salary for year n , in terms of n .
- d. Use the formulas you found to calculate the difference in yearly salary between the two jobs. Which job pays more?
2. a. Let p be the perimeter of a rectangle, and let one side of the rectangle be x . Write a formula for the area of the rectangle in terms of p and x .
- b. Use the formula you found in part (a) to calculate the area of a rectangle with a perimeter of 18.5 and with one side of length 4.8.

Factor each of the following polynomials by factoring the terms in pairs.

Example: $x^3 - 4x^2 + 3x - 12$

Solution: $x^3 - 4x^2 + 3x - 12 = x^2(x - 4) + 3(x - 4) = (x^2 + 3)(x - 4)$

3. $x^3 + 2x^2 - 6x - 12$ 4. $4x^3 - 14x^2 - 6x + 21$

5. a. Find the values of the polynomials $ax^2 + bx + c$ for $x = 1, 2, 3, 4, 5$, and 6, in terms of a, b , and c .
- b. Find the difference between each pair of successive values that you found in part (a).
- c. Find the differences between each pair of successive values that you found in part (b). What do you notice?