

Glencoe McGraw-Hill

# Math Connects

Course 2

**Noteables**<sup>™</sup>  
Interactive Study Notebook  
with **FOLDABLES**

**Contributing Author**

Dinah Zike

**FOLDABLES**<sup>®</sup>

**Consultant**

Douglas Fisher, Ph.D.

Professor of Language and Literacy Education  
San Diego State University  
San Diego, CA

**Mc  
Graw  
Hill**

**Glencoe**



The McGraw-Hill Companies

Copyright © by The McGraw-Hill Companies, Inc. All rights reserved. No part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written consent of The McGraw-Hill Companies, Inc., including, but not limited to, network storage or transmission, or broadcast for distance learning.

Send all inquiries to:  
The McGraw-Hill Companies  
8787 Orion Place  
Columbus, OH 43240-4027

Printed in the United States of America.

ISBN: 978-0-07-890237-6  
MHID: 0-07-890237-1

*Math Connects: Concepts, Skills, and Problem Solving, Course 2*  
*Noteables™: Interactive Study Notebook with Foldables®*

1 2 3 4 5 6 7 8 9 10 009 17 16 15 14 13 12 11 10 09 08

# Contents

## CHAPTER 1

<b>Foldables</b> .....	1
<b>Vocabulary Builder</b> .....	2
<b>1-1</b> A Plan for Problem Solving .....	4
<b>1-2</b> Powers and Exponents.....	6
<b>1-3</b> Squares and Square Roots .....	8
<b>1-4</b> Order of Operations.....	10
<b>1-5</b> Problem-Solving Investigation: Guess and Check.....	12
<b>1-6</b> Algebra: Variables and Expressions...	13
<b>1-7</b> Algebra: Equations.....	15
<b>1-8</b> Algebra: Properties.....	18
<b>1-9</b> Algebra: Arithmetic Sequences .....	20
<b>1-10</b> Algebra: Equations and Functions...	23
<b>Study Guide</b> .....	26

## CHAPTER 2

<b>Foldables</b> .....	31
<b>Vocabulary Builder</b> .....	32
<b>2-1</b> Integers and Absolute Value .....	34
<b>2-2</b> Comparing and Ordering Integers ...	36
<b>2-3</b> The Coordinate Plane.....	38
<b>2-4</b> Adding Integers .....	41
<b>2-5</b> Subtracting Integers.....	44
<b>2-6</b> Multiplying Integers.....	46
<b>2-7</b> Problem-Solving Investigation: Look for a Pattern .....	48
<b>2-8</b> Dividing Integers .....	49
<b>Study Guide</b> .....	50

## CHAPTER 3

<b>Foldables</b> .....	54
<b>Vocabulary Builder</b> .....	55
<b>3-1</b> Writing Expressions and Equations...	57
<b>3-2</b> Solving Addition and Subtraction Equations .....	59
<b>3-3</b> Solving Multiplication Equations...	61
<b>3-4</b> Problem-Solving Investigation: Work Backward.....	63
<b>3-5</b> Solving Two-Step Equations.....	64
<b>3-6</b> Measurement: Perimeter and Area...	67
<b>3-7</b> Functions and Graphs.....	69
<b>Study Guide</b> .....	72

## CHAPTER 4

<b>Foldables</b> .....	76
<b>Vocabulary Builder</b> .....	77
<b>4-1</b> Prime Factorization .....	79
<b>4-2</b> Greatest Common Factor.....	81
<b>4-3</b> Problem-Solving Investigation: Make an Organized List.....	84
<b>4-4</b> Simplifying Fractions .....	85
<b>4-5</b> Fractions and Decimals.....	87
<b>4-6</b> Fractions and Percents .....	90
<b>4-7</b> Percents and Decimals .....	92
<b>4-8</b> Least Common Multiple.....	94
<b>4-9</b> Comparing and Ordering Rational Numbers .....	96
<b>Study Guide</b> .....	98

## CHAPTER 5

<b>Foldables</b> .....	102
<b>Vocabulary Builder</b> .....	103
<b>5-1</b> Estimating with Fractions.....	104
<b>5-2</b> Adding and Subtracting Fractions...	106
<b>5-3</b> Adding and Subtracting Mixed Numbers .....	108
<b>5-4</b> Problem-Solving Investigation: Estimate Possibilities.....	110
<b>5-5</b> Multiplying Fractions and Mixed Numbers .....	111
<b>5-6</b> Algebra: Solving Equations .....	113
<b>5-7</b> Dividing Fractions and Mixed Numbers .....	115
<b>Study Guide</b> .....	117

## CHAPTER 6

<b>Foldables</b> .....	120
<b>Vocabulary Builder</b> .....	121
<b>6-1</b> Ratios.....	123
<b>6-2</b> Rates .....	125
<b>6-3</b> Rate of Change and Slope .....	128
<b>6-4</b> Measurement: Changing Customary Units .....	130
<b>6-5</b> Measurement: Changing Metric Units .....	133
<b>6-6</b> Algebra: Solving Proportions.....	136
<b>6-7</b> Problem-Solving Investigation: Draw a Diagram .....	138
<b>6-8</b> Scale Drawings .....	139
<b>6-9</b> Fractions, Decimals, and Percents ...	142
<b>Study Guide</b> .....	144

# Contents

## CHAPTER 7

<b>Foldables</b> .....	148
<b>Vocabulary Builder</b> .....	149
<b>7-1</b> Percent of a Number .....	151
<b>7-2</b> The Percent Proportion .....	153
<b>7-3</b> Percent and Estimation .....	155
<b>7-4</b> Algebra: The Percent Equation .....	157
<b>7-5</b> Problem-Solving Investigation: Determine Reasonable Answers .....	159
<b>7-6</b> Percent of Change .....	160
<b>7-7</b> Sales Tax and Discount .....	162
<b>7-8</b> Simple Interest .....	165
<b>Study Guide</b> .....	167

## CHAPTER 8

<b>Foldables</b> .....	172
<b>Vocabulary Builder</b> .....	173
<b>8-1</b> Line Plots.....	175
<b>8-2</b> Measures of Central Tendency and Range .....	177
<b>8-3</b> Stem-and-Leaf Plots .....	180
<b>8-4</b> Bar Graphs and Histograms .....	184
<b>8-5</b> Problem-Solving Investigation: Use a Graph.....	188
<b>8-6</b> Using Graphs to Predict .....	189
<b>8-7</b> Using Data to Predict .....	191
<b>8-8</b> Using Sampling to Predict .....	193
<b>8-9</b> Misleading Statistics .....	195
<b>Study Guide</b> .....	197

## CHAPTER 9

<b>Foldables</b> .....	201
<b>Vocabulary Builder</b> .....	202
<b>9-1</b> Simple Events .....	204
<b>9-2</b> Sample Spaces.....	206
<b>9-3</b> The Fundamental Counting Principle.....	209
<b>9-4</b> Permutations.....	210
<b>9-5</b> Combinations .....	212
<b>9-6</b> Problem-Solving Investigation: Act It Out.....	214
<b>9-7</b> Theoretical and Experimental Probability.....	215
<b>9-8</b> Compound Events.....	217
<b>Study Guide</b> .....	219

## CHAPTER 10

<b>Foldables</b> .....	224
<b>Vocabulary Builder</b> .....	225
<b>10-1</b> Angle Relationships .....	227
<b>10-2</b> Complementary and Supplementary Angles .....	230
<b>10-3</b> Statistics: Display Data in a Circle Graph.....	232
<b>10-4</b> Triangles .....	236
<b>10-5</b> Problem-Solving Investigation: Use Logical Reasoning .....	238
<b>10-6</b> Quadrilaterals .....	239
<b>10-7</b> Similar Figures.....	241
<b>10-8</b> Polygons and Tessellations.....	243
<b>10-9</b> Translations.....	245
<b>10-10</b> Reflections.....	247
<b>Study Guide</b> .....	250

## CHAPTER 11

<b>Foldables</b> .....	254
<b>Vocabulary Builder</b> .....	255
<b>11-1</b> Area of Parallelograms.....	257
<b>11-2</b> Area of Triangles and Trapezoids .....	258
<b>11-3</b> Circles and Circumference .....	260
<b>11-4</b> Area of Circles.....	262
<b>11-5</b> Problem-Solving Investigation: Solve a Simpler Problem.....	263
<b>11-6</b> Area of Complex Figures .....	264
<b>11-7</b> Three-Dimensional Figures .....	266
<b>11-8</b> Drawing Three-Dimensional Figures.....	268
<b>11-9</b> Volume of Prisms .....	270
<b>11-10</b> Volume of Cylinders.....	271
<b>Study Guide</b> .....	273

## CHAPTER 12

<b>Foldables</b> .....	278
<b>Vocabulary Builder</b> .....	279
<b>12-1</b> Estimating Square Roots .....	280
<b>12-2</b> The Pythagorean Theorem .....	282
<b>12-3</b> Problem-Solving Investigation: Make a Model.....	285
<b>12-4</b> Surface Area of Rectangular Prisms .....	286
<b>12-5</b> Surface Area of Cylinders.....	289
<b>Study Guide</b> .....	291

# Organizing Your Foldables

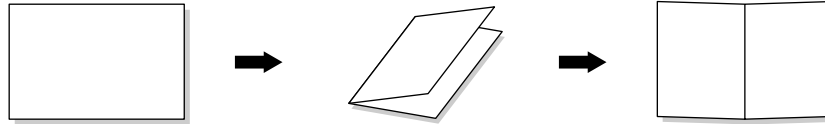


Have students make this Foldable to help them organize and store their chapter Foldables. Begin with one sheet of 11" × 17" paper.

## STEP 1

### Fold

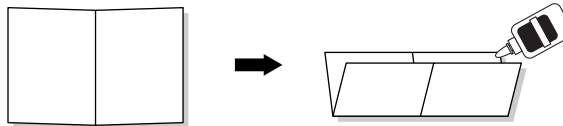
Fold the paper in half lengthwise. Then unfold.



## STEP 2

### Fold and Glue

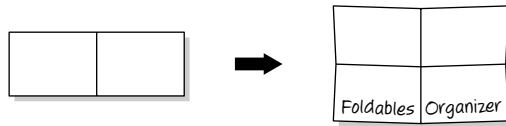
Fold the paper in half widthwise and glue all of the edges.



## STEP 3

### Glue and Label

Glue the left, right, and bottom edges of the Foldable to the inside back cover of your Noteables notebook.



**Reading and Taking Notes** As you read and study each chapter, record notes in your chapter Foldable. Then store your chapter Foldables inside this Foldable organizer.

# Using Your Noteables™ with FOLDABLES

## Interactive Study Notebook

This note-taking guide is designed to help you succeed in *Math Connects, Course 2*. Each chapter includes:

**CHAPTER 3 Algebra: Linear Equations and Functions**

**FOLDABLES** Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with a sheet of 11" x 17" paper.

**STEP 1** Fold the short sides toward the middle.

**STEP 2** Fold the top to the bottom.

**STEP 3** Open. Cut along the second fold to make four tabs.

**STEP 4** Label each of the tabs as shown.

**NOTE-TAKING TIP:** When you take notes, listen or read for main ideas. Then record those ideas in a simplified form for future reference.

The **Chapter Opener** contains instructions and illustrations on how to make a Foldable that will help you to organize your notes.

A **Note-Taking Tip** provides a helpful hint you can use when taking notes.

The **Build Your Vocabulary** table allows you to write definitions and examples of important vocabulary terms together in one convenient place.

**CHAPTER 3 BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 3. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
Addition Property of Equality			
Division Property of Equality			
formula			
linear equation			

(continued on the next page)

Math Connects, Course 2 55

**Chapter 3**

Within each chapter, **Build Your Vocabulary** boxes will remind you to fill in this table.

Copyright © Glencoe/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.

**3-2 Solving Addition and Subtraction Equations**

**MAIN IDEA**

Solve addition and subtraction equations.

**KEY CONCEPTS**

**Subtraction Property of Equality** If you subtract the same number from each side of an equation, the two sides remain equal.

**Addition Property of Equality** If you add the same number to each side of an equation, the two sides remain equal.

**FOLDABLES** Write these properties in your own words under the Equations tab.

**EXAMPLES** Solve an Addition Equation

**1** Solve  $14 + y = 20$ . Check your solution.

$14 + y = 20$  Write the equation.  
 $\square + \square = 20$   $\square$  14 from each side. Simplify.  
 $\square = \square$

**Check**  
 $14 + y = 20$  Write the original equation.  
 $14 + \square = 20$  Replace  $y$  with  $\square$ .  
 $\square = 20$  Simplify.  
 The solution is  $\square$ .

**2** Solve  $a + 7 = 6$ . Check your solution.

$a + 7 = 6$  Write the equation.  
 $\square + \square = 6$  Subtract  $\square$  from each side.  
 $\square = \square$  Simplify.

**Check**  
 $a + 7 = 6$  Write the original equation.  
 $\square + 7 = 6$  Replace  $a$  with  $\square$ .  
 $\square = 6$  Simplify. The solution is  $\square$ .

**Check Your Progress** Solve each equation.

a.  $m + 9 = 22$

Math Connects, Course 2

Lessons cover the content of the lessons in your textbook. As your teacher discusses each example, follow along and complete the fill-in boxes. Take notes as appropriate.

Examples parallel the examples in the textbook.

Foldables feature reminders you to take notes in your Foldable.

**3-5**

**EXAMPLE**

**1** **PARKS** There are 76 thousand acres of state parkland in Georgia. This is 4 thousand acres more than three times the number of acres of state parkland in Mississippi. How many acres of state parkland are there in Mississippi?

**Words** Three times the number of acres of state parkland in Mississippi plus 4,000 is 76,000.  
**Variable** Let  $m$  = the acres of state parkland in Mississippi.  
**Equation** Three times the number of acres of parkland in Mississippi plus 4,000 is 76,000.  
 $\square + 4,000 = 76,000$

Write the equation.  
 $\square + 4,000 = 76,000$   
 Subtract  $\square$  from each side.  
 $\square = \square$  Simplify.  
 Divide each side by  $\square$ .  
 $\square = \square$  Simplify.

There are  $\square$  acres of state parkland in Mississippi.

**Check Your Progress** **BASEBALL** Matthew had 64 hits during last year's baseball season. This was 8 less than twice the number of hits Gregory had. How many hits did Gregory have during last year's baseball season?

**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_  
 Exercises: \_\_\_\_\_

Check Your Progress Exercises allow you to solve similar exercises on your own.

Bringing It All Together Study Guide reviews the main ideas and key concepts from each lesson.

**CHAPTER 3 BRINGING IT ALL TOGETHER**

**STUDY GUIDE**

**FOLDABLES**

Use your Chapter 3 Foldable to help you study for your chapter test.

**VOCABULARY PUZZLEMAKER**

To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 3, go to: [glencoe.com](http://glencoe.com)

**BUILD YOUR VOCABULARY**

You can use your complete Vocabulary Builder (pages 55-56) to help you solve the puzzle.

**3-1 Writing Expressions and Equations**

Match the phrases with the algebraic expressions that represent them.

- 1. seven plus a number  a.  $7 - n$
- 2. seven less a number  b.  $7 \cdot n$
- 3. seven divided by a number  c.  $n - 7$
- 4. seven less than a number  d.  $\frac{n}{7}$
- e.  $7 + n$

Write each sentence as an algebraic equation.

- 5. The product of 4 and a number is 12.
- 6. Twenty divided by  $y$  is equal to  $-10$ .

**3-2 Solving Addition and Subtraction Equations**

7. Explain in words how to solve  $a - 10 = 3$ .

Solve each equation. Check your solution.

- 8.  $w + 23 = -11$
- 9.  $35 = z - 15$

# NOTE-TAKING TIPS

Your notes are a reminder of what you learned in class. Taking good notes can help you succeed in mathematics. The following tips will help you take better classroom notes.

- Before class, ask what your teacher will be discussing in class. Review mentally what you already know about the concept.
- Be an active listener. Focus on what your teacher is saying. Listen for important concepts. Pay attention to words, examples, and/or diagrams your teacher emphasizes.
- Write your notes as clear and concise as possible. The following symbols and abbreviations may be helpful in your note-taking.

Word or Phrase	Symbol or Abbreviation	Word or Phrase	Symbol or Abbreviation
for example	e.g.	not equal	$\neq$
such as	i.e.	approximately	$\approx$
with	w/	therefore	$\therefore$
without	w/o	versus	vs
and	+	angle	$\angle$

- Use a symbol such as a star (★) or an asterisk (\*) to emphasize important concepts. Place a question mark (?) next to anything that you do not understand.
- Ask questions and participate in class discussion.
- Draw and label pictures or diagrams to help clarify a concept.
- When working out an example, write what you are doing to solve the problem next to each step. Be sure to use your own words.
- Review your notes as soon as possible after class. During this time, organize and summarize new concepts and clarify misunderstandings.

## Note-Taking Don'ts

- **Don't** write every word. Concentrate on the main ideas and concepts.
- **Don't** use someone else's notes as they may not make sense.
- **Don't** doodle. It distracts you from listening actively.
- **Don't** lose focus or you will become lost in your note-taking.



# Introduction to Algebra and Functions



Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin this Interactive Study Notebook to help you in taking notes.

**Begin with eleven sheets of notebook paper.**

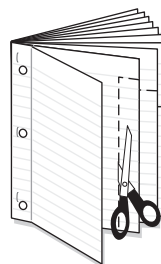
**STEP 1**

**Staple** the eleven sheets together to form a booklet.



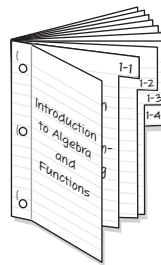
**STEP 2**

**Make** each one 2 lines longer than the one before it.



**STEP 3**

**Write** the chapter title on the cover and label each tab with the lesson number.



**NOTE-TAKING TIP:** When taking notes, it is often a good idea to write a summary of the lesson in your own words. Be sure to paraphrase key points.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 1. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
algebra			
algebraic expression [al-juh-BRAY-ihk]			
arithmetic sequence [air-ith-MEH-tik]			
base			
coefficient			
defining the variable			
domain			
equation [ih-KWAY-zhuhn]			
equivalent expression			
evaluate			
exponent			

Vocabulary Term	Found on Page	Definition	Description or Example
factors			
function			
function rule			
numerical expression			
order of operations			
perfect square			
powers			
radical sign			
range			
sequence			
solution			
square			
square root			
term			
variable			

## MAIN IDEA

- Solve problems using the four-step plan.

## EXAMPLE Use the Four-Step Plan

**1 SPENDING** A can of soda holds 12 fluid ounces. A 2-liter bottle holds about 67 fluid ounces. If a pack of six cans costs the same as a 2-liter bottle, which is the better buy?

**UNDERSTAND** *What are you trying to find?* You know the number of fluid ounces of soda in one can of soda. You need to know the number of fluid ounces of soda in a pack of six cans.

**PLAN** You can find the number of fluid ounces of soda in a pack of six cans by  the number of fluid ounces in one can by .

**SOLVE**  $12 \times \text{} = \text{}$

There are  fluid ounces of soda in a pack of six cans. The number of fluid ounces of soda in a 2-liter bottle is about . Therefore, the  is the better buy because you get more soda for the same price.

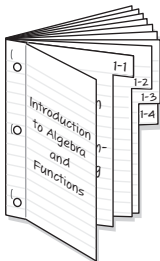
**CHECK** The answer makes sense based on the facts given in the problem.

**Check Your Progress** **FIELD TRIP** The sixth-grade class at Meadow Middle School is taking a field trip to the local zoo. There will be 142 students plus 12 adults going on the trip. If each school bus can hold 48 people, how many buses will be needed for the field trip?

## FOLDABLES

## ORGANIZE IT

Summarize the four-step problem-solving plan on the Lesson 1-1 page of your Foldable.



**EXAMPLE** Use a Strategy in the Four-Step Plan

- 2 POPULATION** For every 100,000 people in the United States, there are 5,750 radios. For every 100,000 people in Canada, there are 323 radios. Suppose Sheamus lives in Des Moines, Iowa, and Alex lives in Windsor, Ontario. Both cities have about 200,000 residents. About how many more radios are there in Sheamus's city than in Alex's city?

**KEY CONCEPTS****Problem-Solving Strategies**

- guess and check
- look for a pattern
- make an organized list
- draw a diagram
- act it out
- solve a simpler problem
- use a graph
- work backward
- eliminate possibilities
- estimate reasonable answers
- use logical reasoning
- make a model

**UNDERSTAND** You know the approximate number of radios per 100,000 people in both Sheamus's city and Alex's city.

**PLAN** You can find the approximate number of radios in each city by  the estimate per 100,000 people by two to get an estimate per 200,000 people. Then,  to find how many more radios there are in Des Moines than in Windsor.

**SOLVE**

$$\text{Des Moines: } 5,750 \times 2 = \text{  }$$

$$\text{Windsor: } 323 \times 2 = \text{  }$$

$$\text{  } - \text{  } = \text{  }$$

So, Des Moines has about  more radios than Windsor.

**CHECK**

Based on the information given in the problem, the answer seems to be reasonable.

**Check Your Progress**

**READING** Ben borrows a 500-page book from the library. On the first day, he reads 24 pages. On the second day, he reads 39 pages and on the third day he reads 54 pages. If Ben follows the same pattern of number of pages read for seven days, will he have finished the book at the end of the week?

## MAIN IDEA

- Use powers and exponents.

## BUILD YOUR VOCABULARY (pages 2–3)

Two or more numbers that are multiplied together to form a  are called **factors**.

The **exponent** tells how many times the base is used as a .

The **base** is the common .

Numbers expressed using  are called **powers**.

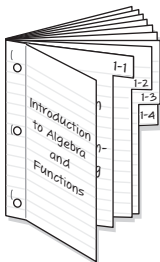
Five to the  power is five **squared**.

Four to the  power is four **cubed**.

## FOLDABLES

## ORGANIZE IT

On the Lesson 1-2 page of your Foldable, explain the difference between the terms power and exponent.



## EXAMPLES Write Powers as Products

Write each power as a product of the same factor.

1  $8^4$

Eight is used as a factor  times.  $8^4 =$

2  $4^6$

is used as a factor six times.  $4^6 =$

## Check Your Progress

Write each power as a product of the same factor.

a.  $3^6$

b.  $7^3$

**BUILD YOUR VOCABULARY** (pages 2-3)

You can **evaluate**, or find the  of,  by multiplying the factors.

Numbers written  are in **standard form**.

Numbers written  are in **exponential form**.

**WRITE IT**

Explain how you would use a calculator to evaluate a power.

---



---



---



---

**EXAMPLES** Write Powers in Standard Form

Evaluate each expression.

3  $8^3 = \text{input} = \text{input}$

4  $6^4 = \text{input} = \text{input}$

**Check Your Progress** Evaluate each expression.

a.  $4^4$

b.  $5^5$

**EXAMPLE** Write Numbers in Exponential Form

5 Write  $9 \cdot 9 \cdot 9 \cdot 9 \cdot 9$  in exponential form.

9 is the . It is used as a factor  times.

So, the exponent is .

=

**Check Your Progress** Write  $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$  in exponential form.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Find squares of numbers and square roots of perfect squares.

## BUILD YOUR VOCABULARY (pages 2–3)

The  of a number and  is the **square** of the number.

Perfect squares like 9, 16, and 225 are squares of  numbers.

The  multiplied to form perfect squares are called **square roots**.

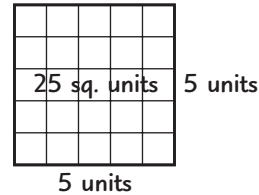
A **radical sign**,  $\sqrt{\quad}$ , is the symbol used to indicate the positive  of a number.

## EXAMPLES Find Squares of Numbers

- 1 Find the square of 5.

Multiply 5 by .

$$\square \cdot \square = 25$$



- 2 Find the square of 19.

**METHOD 1** Use paper and pencil.

$$\square \cdot \square = \square$$

**METHOD 2** Use a calculator.

$$\square \quad x^2 \quad \text{ENTER} \quad \square$$

**Check Your Progress** Find the square of each number.

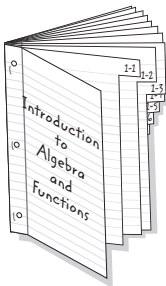
a. 7

b. 21

## FOLDABLES

## ORGANIZE IT

On the Lesson 1-3 page of your Foldable, explain in words and symbols how you find squares of numbers and square roots of perfect squares.





**KEY CONCEPT**

**Square Root** A square root of a number is one of its two equal factors.

**EXAMPLES Find Square Roots****3 Find  $\sqrt{36}$ .**

What number times itself is 36?

$$\square \cdot \square = 36, \text{ so } \sqrt{36} = \square.$$

**4 Find  $\sqrt{676}$ .**

Use a calculator.

$$\text{2nd } x^2 \square \text{ ENTER } \square$$

$$\text{So, } \sqrt{676} = \square.$$

**Check Your Progress Find each square root.**

a.  $\sqrt{64}$

b.  $\sqrt{529}$

**5 GAMES A checkerboard is a square with an area of 1,225 square centimeters. What are the dimensions of the checkerboard?**

The checkerboard is a square. By finding the square root of the area, 1,225, you find the length of one side.

$$\text{2nd } x^2 \square \text{ ENTER } \square$$

Use a calculator.

The dimensions of the checkerboard are  cm by  cm.

**Check Your Progress GARDENING Kyle is planting a new garden that is a square with an area of 42.25 square feet. What are the dimensions of Kyle's garden?**

$$\text{2nd } x^2 \square \text{ ENTER } \square$$

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Evaluate expressions using the order of operations.

## BUILD YOUR VOCABULARY (pages 2–3)

The expressions  $4 \cdot 6 - (5 + 7)$  and  $8 \cdot (9 - 3) + 4$  are

expressions.

Order of operations are  that ensure that numerical expressions have only one value.

## KEY CONCEPT

## Order of Operations

- Evaluate the expressions inside grouping symbols.
- Evaluate all powers.
- Multiply and divide in order from left to right.
- Add and subtract in order from left to right.

**FOLDABLES** Be sure to include the order of operations on the Lesson 1-4 page of your Foldable.

## EXAMPLES Evaluate Expressions

Evaluate each expression.

1  $27 - (18 + 2)$

$$27 - (18 + 2) = 27 - \boxed{\phantom{00}}$$

Add first since  $18 + 2$  is in parentheses.

$$= \boxed{\phantom{00}}$$

Subtract 20 from 27.

2  $15 + 5 \cdot 3 - 2$

$$15 + 5 \cdot 3 - 2 = 15 + \boxed{\phantom{00}} - 2$$

Multiply 5 and 3.

$$= \boxed{\phantom{00}} - 2$$

Add 15 and 15.

$$= \boxed{\phantom{00}}$$

Subtract 2 from 30.

## Check Your Progress

Evaluate each expression.

a.  $45 - (26 + 3)$

b.  $32 - 3 \cdot 7 + 4$

**EXAMPLES** Use Order of Operations

Evaluate each expression.

3  $12 \times 3 - 2^2$

$12 \times 3 - 2^2 = 12 \times 3 - \square$

Find the value of  $2^2$ .

$= \square - 4$

Multiply 12 and 3.

$= \square$

Subtract 4 from 36.

**REMEMBER IT**

If an exponent lies outside of grouping symbols, complete the operations within the grouping symbols before applying the power.

4  $28 \div (3 - 1)^2$

$28 \div (3 - 1)^2 = 28 \div \square$

Subtract 1 from 3 inside the parentheses.

$= 28 \div \square$

Find the value of  $2^2$ .

$= \square$

Divide.

**Check Your Progress**

Evaluate each expression.

a.  $9 \times 5 + 3^2$   $\square$

b.  $36 \div (14 - 11)^2$   $\square$

**EXAMPLE**

Evaluate an Expression

- 5 **MONEY** Julian is buying one box of favors, one box of balloons, and three rolls of crepe paper. What is the total cost?

Item	Quantity	Unit Cost
crepe paper	3 rolls	\$2
favors	1 box	\$7
balloons	1 box	\$5

$1 \times 7 + 1 \times 5 + 3 \times 2 = 7 + \square + 6$  or 18

The total cost is  $\square$ .**Check Your Progress**

What is the total cost of two boxes of favors, two boxes of balloons, and six rolls of crepe paper?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

# Problem-Solving Investigation: Guess and Check

## MAIN IDEA

- Solve problems using the guess and check strategy.

### EXAMPLE Use Guess and Check Strategy

**CONCESSIONS** The concession stand at the school play sold lemonade for \$0.50 and cookies for \$0.25. They sold 7 more lemonades than cookies, and they made a total of \$39.50. How many lemonades and cookies were sold?

**UNDERSTAND** You know the cost of each lemonade and cookie. You know the total amount made and that they sold  more lemonades than cookies. You need to know how many lemonades and cookies were sold.

**PLAN** Make a guess and check it. Adjust the guess until you get the correct answer.

**SOLVE** Make a guess.

$$14 \text{ cookies, } 21 \text{ lemonades} \quad 0.25(14) + 0.50(21)$$

$$\text{This guess is too } \boxed{\phantom{00}} \text{.} = \boxed{\phantom{00}}$$

$$50 \text{ cookies, } 57 \text{ lemonades} \quad 0.25(50) + 0.50(57)$$

$$\text{This guess is too } \boxed{\phantom{00}} \text{.} = \boxed{\phantom{00}}$$

$$48 \text{ cookies, } 55 \text{ lemonades} \quad 0.25(48) + 0.50(55)$$

$$= \boxed{\phantom{00}}$$

**CHECK** 48 cookies cost \$12 and 55 lemonades cost \$27.50. Since  $\$12 + \$27.50 = \$39.50$  and 55 is 7 more than 48, the guess is correct.

**Check Your Progress** **ZOO** A total of 122 adults and children went to the zoo. Adult tickets cost \$6.50 and children's tickets cost \$3.75. If the total cost of the tickets was \$597.75, how many adults and children went to the zoo?

## HOMWORK ASSIGNMENT

Page(s):

Exercises:

## MAIN IDEA

- Evaluate simple algebraic expressions.

## BUILD YOUR VOCABULARY (pages 2–3)

You can use a , or **variable**, in an expression.

The expression  $7 + n$  is called an  expression.

The branch of mathematics that involves expressions with  is called **algebra**.

The  factor of a term that contains a variable is called a **coefficient**.

## EXAMPLES Evaluate Expressions

- 1 Evaluate  $t - 4$  if  $t = 6$ .

$$t - 4 = 6 - \boxed{\phantom{00}} \quad \text{Replace } t \text{ with } \boxed{\phantom{00}}.$$

$$= \boxed{\phantom{00}} \quad \text{Subtract.}$$

- 2 Evaluate  $5x + 3y$  if  $x = 7$  and  $y = 9$ .

$$5x + 3y = 5 \cdot \boxed{\phantom{00}} + 3 \cdot \boxed{\phantom{00}} \quad \text{Replace } x \text{ with } \boxed{\phantom{00}}$$

$$\text{and } \boxed{\phantom{00}} \text{ with } 9.$$

$$= \boxed{\phantom{00}} + \boxed{\phantom{00}} \quad \text{Do all multiplications first.}$$

$$= \boxed{\phantom{00}} \quad \text{Add } \boxed{\phantom{00}} \text{ and } 27.$$

- 3 Evaluate  $5 + a^2$  if  $a = 5$ .

$$5 + a^2 = 5 + 5^2 \quad \text{Replace } a \text{ with } \boxed{\phantom{00}}.$$

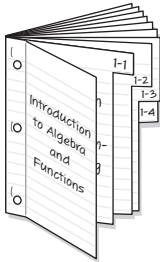
$$= 5 + \boxed{\phantom{00}} \quad \text{Evaluate the } \boxed{\phantom{00}}.$$

$$= \boxed{\phantom{00}} \quad \text{Add.}$$

## FOLDABLES

## ORGANIZE IT

Record and evaluate an example of a simple algebraic expression on the Lesson 1-6 page of your Foldable.


**Check Your Progress** Evaluate each expression.

a.  $7 + m$  if  $m = 4$ .

b.  $4a - 2b$  if  $a = 9$  and  $b = 6$ .

c.  $24 - s^2$  if  $s = 3$ .

**EXAMPLE** Evaluate an Expression

**TEMPERATURE** The formula for rewriting a Fahrenheit temperature as a Celsius temperature is  $\frac{5(F - 32)}{9}$ , where  $F$  equals the temperature in degrees Fahrenheit. Find the Celsius equivalent of  $99^\circ\text{F}$ .

$$\frac{5(F - 32)}{9} = \frac{5(99 - 32)}{9}$$

Replace  $F$  with 99.

$$= \frac{5(67)}{9} = \frac{335}{9}$$

Subtract  from 99 and multiply.

$$\approx \text{  }$$

Divide 335 by 9.

The Celsius equivalent of  $99^\circ\text{F}$  is about  $37.2^\circ\text{C}$ .

**Check Your Progress** **BOWLING** David's cost for bowling can be described by the formula  $1.75 + 2.5g$ , where  $g$  is the number of games David bowls. Find the total cost of bowling if David bowls 3 games.

**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## MAIN IDEA

- Write and solve equations using mental math.

## BUILD YOUR VOCABULARY (pages 2–3)

An **equation** is a  in mathematics that contains an equals sign.

The **solution** of an equation is a number that makes the sentence .

The process of finding a  is called **solving an equation**.

When you choose a  to represent one of the unknowns in an equation, you are **defining the variable**.

## EXAMPLE Solve an Equation Mentally

- Solve  $p - 14 = 5$  mentally.

$$p - 14 = 5 \quad \text{Write the equation.}$$

$$\square - 14 = 5 \quad \text{You know that } 19 - 14 \text{ is } \square.$$

$$\square = 5 \quad \text{Simplify.}$$

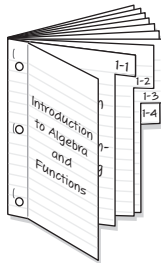
The solution is .

**Check Your Progress** Solve  $p - 6 = 11$  mentally.

## FOLDABLES

## ORGANIZE IT

On the Lesson 1-7 page of your Foldable, record and solve an example of an algebraic equations.



**EXAMPLE**

**2 TEST EXAMPLE** A store sells pumpkins for \$2 per pound. Paul has \$18. Use the equation  $2x = 18$  to find how large a pumpkin Paul can buy with \$18.

A 6 lb

B 7 lb

C 8 lb

D 9 lb

**Read the Item**

Solve  to find how many pounds the pumpkin can weigh.

**Solve the Item**

Write the equation.

$$2 \cdot \text{} = 18$$

You know that  $2 \cdot 9$  is 18.

Paul can buy a pumpkin as large as  pounds.

The answer is .

**Check Your Progress**

A store sells notebooks for \$3 each. Stephanie has \$15. Use the equation  $3x = 15$  to find how many notebooks she can buy with \$15.

F 4

G 5

H 6

J 7



**EXAMPLE** Write an Equation to Solve a Problem**REVIEW IT**

Explain how to add a decimal and a whole number. (*Prerequisite Skill*)

---



---



---



---



---

- 3 ENTERTAINMENT** An adult paid \$18.50 for herself and two students to see a movie. If the two student tickets cost \$11 together, what is the cost of the adult ticket?

**Words**

The cost of one adult ticket and two student tickets is \$18.50.

**Variable**

Let  $a$  represent the cost of an adult movie ticket.

**Equation**

$$a + 11 = 18.50$$

$$a + 11 = 18.50$$

Write the equation.

$$\boxed{\phantom{a}} + 11 = 18.50$$

Replace  $a$  with  $\boxed{\phantom{a}}$  to make the equation true.

$$\boxed{\phantom{a}} = 18.50$$

Simplify.

The number  $\boxed{\phantom{a}}$  is the solution of the equation. So, the cost of an adult movie ticket is  $\boxed{\phantom{a}}$ .

**Check Your Progress**

**ICE CREAM** Julie spends \$9.50 at the ice cream parlor. She buys a hot fudge sundae for herself and ice cream cones for each of the three friends who are with her. Find the cost of Julie's sundae if the three ice cream cones together cost \$6.30.

**HOMEWORK ASSIGNMENT**

Page(s):

---

Exercises:

---



---

## MAIN IDEA

- Use Commutative, Associative, Identity, and Distributive properties to solve problems.

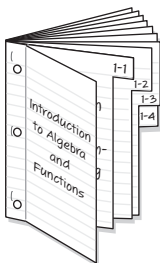
## KEY CONCEPT

**Distributive Property**  
To multiply a sum by a number, multiply each addend of the sum by the number outside the parentheses.

## FOLDABLES

## ORGANIZE IT

On the Lesson 1-8 page your Foldable, be sure to include examples showing the addition and multiplication properties.



## BUILD YOUR VOCABULARY (pages 2–3)

The expressions  $5(\$9 + \$2)$  and  $5(\$9) + 5(\$2)$  are **equivalent expressions** because they have the  value.

## EXAMPLES Use the Distributive Property

Use the Distributive Property to rewrite each expression. Then evaluate it.

1  $8(5 + 7)$

$$8(5 + 7) = 8 \cdot \boxed{\phantom{00}} + 8 \cdot \boxed{\phantom{00}}$$

$$= \boxed{\phantom{00}} + \boxed{\phantom{00}}$$

Multiply.

$$= \boxed{\phantom{00}}$$

Add.

2  $6(9) + 6(2)$

$$6(9) + 6(2) = \boxed{\phantom{00}} + \boxed{\phantom{00}}$$

Multiply.

$$= \boxed{\phantom{00}}$$

Add.

## Check Your Progress

Use the Distributive Property to evaluate each expression.

a.  $4(6 + 3)$

b.  $(5 + 3)7$

## KEY CONCEPTS

**Commutative Property**

The order in which two numbers are added or multiplied does not change their sum or product.

**Associative Property**

The way in which three numbers are grouped when they are added or multiplied does not change their sum or product.

**Identity Property**

The sum of an addend and zero is the addend. The product of a factor and one is the factor.

## EXAMPLE

- 3 **VACATIONS** Mr. Harmon has budgeted \$150 per day for his hotel and meals during his vacation. If he plans to spend six days on vacation, how much will he spend?

$$6(150) = 6(100 + \boxed{\phantom{00}}) \qquad 150 = 100 + 50.$$

$$= \boxed{\phantom{00}}(100) + \boxed{\phantom{00}}(50) \qquad \text{Distributive Property}$$

$$= 600 + \boxed{\phantom{00}} \text{ or } 900 \qquad \text{Multiply, then add.}$$

Mr. Harmon will spend about  $\boxed{\phantom{00}}$  on a six-day vacation.

**Check Your Progress**

**COOKIES** Heidi sold cookies for \$2.50 per box for a fundraiser. If she sold 60 boxes of cookies, how much money did she raise?

**BUILD YOUR VOCABULARY** (pages 2–3)

Properties are statements that are  $\boxed{\phantom{00}}$  for all numbers.

## EXAMPLE Identify Properties

- 1 Find  $5 \cdot 13 \cdot 20$  mentally. Justify each step.

$$5 \cdot 13 \cdot 20 = 5 \cdot \boxed{\phantom{00}} \cdot \boxed{\phantom{00}} \qquad \text{Commutative Property of Multiplication}$$

$$= (\boxed{\phantom{00}} \cdot 20) \cdot 13 \qquad \text{Associative Property of Multiplication}$$

$$= \boxed{\phantom{00}} \cdot 13 \text{ or } \boxed{\phantom{00}} \qquad \text{Multiply 100 and 13 Mentally.}$$

**Check Your Progress**

Name the property shown by the statement  $4 + (6 + 2) = (4 + 6) + 2$ .

## HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## MAIN IDEA

- Describe the relationships and extend terms in arithmetic sequences.

## BUILD YOUR VOCABULARY (pages 2–3)

A sequence is an  list of .

Each number in a  is called a **term**.

In an arithmetic sequence, each term is found by

the same number to the  term.

## EXAMPLES Describe Patterns in Sequences

Describe the relationship between the terms in each arithmetic sequence. Then write the next three terms in the sequence.

1 7, 11, 15, 19, ...

$$\begin{array}{ccccccc}
 7, & & 11, & & 15, & & 19, \dots \\
 \curvearrowright & & \curvearrowright & & \curvearrowright & & \\
 + \square & + & \square & + & \square & + & \square
 \end{array}$$

Each term is found by  4 to the previous term.

Continue the pattern to find the next three terms.

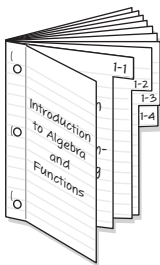
$$19 + 4 = \square \quad 23 + 4 = \square \quad 27 + 4 = \square$$

The next three terms are 23, 27, and 31.

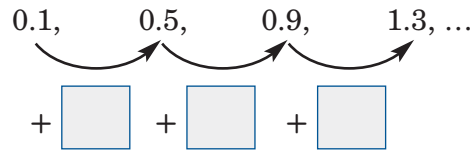
## FOLDABLES

## ORGANIZE IT

Write an example of an arithmetic and a geometric sequence on the Lesson 1-9 page of your Foldable.



**2** 0.1, 0.5, 0.9, 1.3, ...



Each term is found by adding  $\square$  to the previous term.

Continue the pattern to find the next three terms.

$1.3 + \square = 1.7$    
  $1.7 + \square = \square$    
  $2.1 + 0.4 = \square$

The next three terms are 1.7, 2.1, and 2.5.

**Check Your Progress**

**Describe the relationship between the terms in each arithmetic sequence. Then write the next three terms in the sequence.**

- a. 13, 24, 35, 46, ...

- b. 0.6, 1.5, 2.4, 3.3, ...

**WRITE IT**

In your own words, explain how to determine the pattern in a sequence.

---



---



---



---

**EXAMPLE Use a Table**

- 3 EXERCISE** Mehmet started a new exercise routine. The first day, he did 2 sit-ups. Each day after that, he did 2 more sit-ups than the previous day. If he continues this pattern, how many sit-ups will he do on the tenth day?

Position	Operation	Value of Term
1	$\square$	2
2	$2 \cdot 2$	$\square$
$\square$	$3 \cdot 2$	6
$d$	$d \cdot 2$	$2d$

(continued on the next page)

Each term is 2 times its position number. So, the expression

is .

$2n$

Write the expression.

$$2(\text{input}) = 20$$

Replace  $n$  with 10.

So, on the tenth day, Mehmet will do  sit-ups.

### Check Your Progress

**CONCERTS** The first row of a theater has 8 seats. Each additional row has eight more seats than the previous row. If this pattern continues, what algebraic expression can be used to find the number of seats in the 15<sup>th</sup> row? How many seats will be in the 15<sup>th</sup> row?

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

**MAIN IDEA**

- Make function tables and write equations.

**REMEMBER IT**

When  $x$  and  $y$  are used in an equation,  $x$  usually represents the input and  $y$  usually represents the output.

**BUILD YOUR VOCABULARY** (pages 2–3)

A relationship where one thing depends on another is called a **function**.

The  performed on the input is given by the **function rule**.

You can organize the  numbers,  numbers, and the function rule in a **function table**.

The set of  values is called the **domain**.

The set of  values is called the **range**.

**EXAMPLE** Make a Function Table

- 1 Asha earns \$6.00 an hour working at a grocery store. Make a function table that shows Asha's total earnings for working 1, 2, 3, and 4 hours.

Input	Function	Output
Number of Hours	Multiply by 6	Total Earnings (\$)
1	<input type="text"/>	6
2	$6 \times 2$	<input type="text"/>
<input type="text"/>	$6 \times 3$	18
4	<input type="text"/>	<input type="text"/>

**Check Your Progress** **MOVIE RENTAL** Dave goes to the video store to rent a movie. The cost per movie is \$3.50. Make a function table that shows the amount Dave would pay for renting 1, 2, 3, and 4 movies.

**EXAMPLES**

**3 READING** Melanie read 14 pages of a detective novel each hour. Write an equation using two variables to show how many pages  $p$  she read in  $h$  hours.

Input ▼	Function ▼	Output ▼
Number of Hours ( $h$ )	Multiply by 14	Number of Pages Read ( $p$ )
1	$1 \times 14$	<input type="text"/>
2	<input type="text"/>	28
<input type="text"/>	$3 \times 14$	42
$h$	<input type="text"/>	$14h$

Words  
▼

Variable  
▼

Equation

**number of pages read** equals  **pages** times **number of hours**

Let  $p$  represent the number of pages read.

Let  represent the number of hours.

$p =$



- 3 READING** Use your equation from Example 2 to find how many pages Melanie read in 7 hours.

Write the equation.

$$p = 14 \left( \text{ } \right)$$

Replace  $h$  with 7.

$$p = \text{ }$$

Multiply.

Melanie read 98 pages in 7 hours.

### Check Your Progress

- a. TRAVEL** Derrick drove 55 miles per hour to visit his grandmother. Write an equation using two variables to show how many miles  $m$  he drove in  $h$  hours.

- b. TRAVEL** Use your equation from above to find how many miles Derrick drove in 6 hours.

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

**BRINGING IT ALL TOGETHER****STUDY GUIDE**

<b>FOLDABLES</b>	<b>VOCABULARY PUZZLEMAKER</b>	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 1 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 1, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (pages 2–3) to help you solve the puzzle.

1-1

**A Plan for Problem Solving****Underline the correct term to complete each sentence.**

- The (*Plan*, *Solve*) step is the step of the four-step plan in which you decide which strategy you will use to solve the problem.
- According to the four-step plan, if your answer is not correct, you should (*estimate the answer*, *make a new plan and start again*).
- Once you solve a problem, make sure your solution contains any appropriate (*strategies*, *units or labels*).

1-2

**Powers and Exponents****Identify the exponent in each expression.**

4.  $5^8$

5.  $8^3$

**Evaluate each expression.**

6.  $4^3$

7.  $8^5$

**Complete the sentence.**8. Numbers written with exponents are in 

form, whereas numbers written without exponents are in

 form.

1-3

## Squares and Square Roots

Complete each sentence.

9. The square of 3 means   $\times$  .

10. Nine units squared means 9  with   
of  unit each.

Find the square of each number.

11.  $16$

12.  $28$

Find the square root of each number.

13.  $\sqrt{121}$

14.  $\sqrt{484}$

1-4

## Order of Operations

Evaluate each expression.

15.  $9 + 18 \div 6$

16.  $(7 - 4)^2 \div 3$

17.  $2 \times 4^2 \div 4 - 1$

18.  $8 + 2(9 - 5) - (2 \cdot 3)$

1-5

## Problem-Solving Investigation: Guess and Check

Solve using the *guess and check* strategy.

19. **MONEY** Gary deposited \$38 into his savings account every week for eight weeks. At the end of this time, the total amount in his account was \$729. How much money did Gary have in his account before the deposits?

1-6

Algebra: Variables and Expressions

Evaluate each expression if  $a = 5$  and  $b = 6$ .

20.  $2a + 3b$

21.  $\frac{ab}{5}$

22.  $a^2 - 3b$

1-7

Algebra: Equations

Solve each equation mentally.

23.  $5 + b = 12$

24.  $h - 6 = 3$

25.  $12 \cdot 4 = n$

26.  $2 = \frac{x}{4}$

27.  $9t = 54$

28.  $35 \div c = 7$

1-8

Algebra: Properties

Match the statement with the property it shows.

29.  $5 + (3 + 6) = (5 + 3) + 6$

a. Distributive Property

30.  $8 + 0 = 8$

b. Commutative Property of Addition

31.  $4(7 - 2) = 4(7) - 4(2)$

c. Associative Property of Addition

32.  $10 + 9 = 9 + 10$

d. Identity Property of Addition

1-9

## Algebra: Arithmetic Sequences

Complete the sentence.

33. In an arithmetic sequence, each term is found by  the same number to the previous term.

34. In a geometric sequence, each term is found by  the same number by the previous term.

What is the next term in each of the following sequences?

35. 1, 5, 25, ...

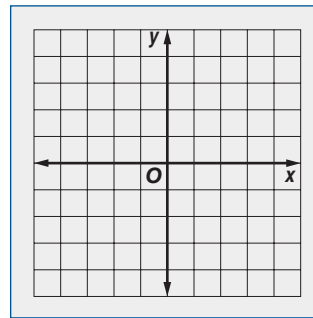
36. 7, 10, 13, ...

1-10

## Algebra: Equations and Functions

37. Complete the function table. Identify the domain and range. Then graph the function.

$x$	$2x - 1$	$y$
-1	<input type="text"/>	<input type="text"/>
0	<input type="text"/>	<input type="text"/>
1	<input type="text"/>	<input type="text"/>



Domain =

Range =

## Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 1.

## ARE YOU READY FOR THE CHAPTER TEST?

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 1 Practice Test on page 75 of your textbook as a final check.

I used my Foldables or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 1 Study Guide and Review on pages 70–74 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may want to take the Chapter 1 Practice Test on page 75 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 1 Foldables.
- Then complete the Chapter 1 Study Guide and Review on pages 70–74 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 1 Practice Test on page 75 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

## Integers

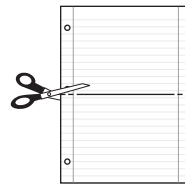


Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with two sheets of  $8\frac{1}{2} \times 11$ " paper.

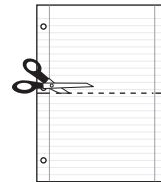
## STEP 1

**Fold** one sheet in half from top to bottom. Cut along fold from edges to margin.



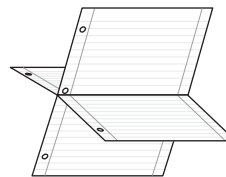
## STEP 2

**Fold** the other sheet in half from top to bottom. Cut along fold between margins.



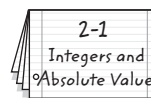
## STEP 3

**Insert** first sheet through second sheet and align folds.



## STEP 4

**Label** each page with a lesson number and title.



**NOTE-TAKING TIPS:** When you take notes, it is helpful to list ways in which the subject matter relates to daily life.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 2. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
absolute value			
additive inverse			
coordinate plane			
graph			
integer [IHN-tih-juhr]			
negative integer			
opposites			



Vocabulary Term	Found on Page	Definition	Description or Example
ordered pair			
origin			
positive integer			
quadrant			
$x$ -axis			
$x$ -coordinate			
$y$ -axis			
$y$ -coordinate			

## MAIN IDEA

- Read and write integers, and find the absolute value of a number.

## BUILD YOUR VOCABULARY (pages 32–33)

An integer is any  from the set  $\{\dots, -4, \text{}, -2, -1, 0, 1, \text{}, 3, 4, \dots\}$ .

To graph a  on the number line, draw a point on the line at its .

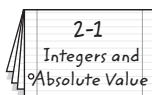
Negative integers are integers  than zero.

Positive integers are integers  than zero.

## FOLDABLES

## ORGANIZE IT

Under Lesson 2-1 in your notes, draw a number line and graph a few positive and negative integers. Then write a few real world situations that can be described by negative numbers.



## EXAMPLES Write Integers for Real-Life Situations

Write an integer for each situation.

- 1 a total rainfall of 2 inches below normal

Because it represents below normal, the integer is .

- 2 a seasonal snowfall of 3 inches above normal

Because it represents  normal, the integer is .

## Check Your Progress Write an integer for each situation.

- a. a total snowfall of 5 inches above normal

- b. an average monthly temperature of 4 degrees below normal

**BUILD YOUR VOCABULARY** (pages 32–33)

The numbers  and 5 are the same  from 0, so  $-5$  and 5 have the same **absolute value**.

**EXAMPLE** Graph Integers

- 1 Graph the set of integers  $\{-1, 3, -2\}$  on a number line.

Draw a number line. Then draw a  at the location of each integer.

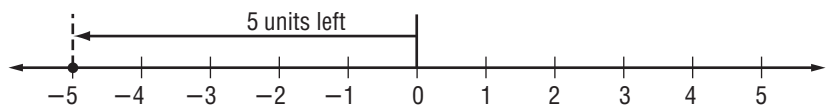
**Check Your Progress**

Graph the set of integers  $\{-2, 1, -4\}$  on a number line.

**EXAMPLES** Evaluate Expressions

- 1 Evaluate the expression  $|-5|$ .

On the number line, the graph of  $-5$  is 5 units from 0.



So,  $|-5| = \text{}$ .

- 5 Evaluate the expression  $|-4| - |-3|$ .

$$|-4| - |-3| = \text{} - \text{} \qquad |-4| = \text{, } |-3| = \text{}$$

$$= \text{} \qquad \text{Subtract.}$$

**Check Your Progress**

Evaluate each expression.

a.  $|-9|$

b.  $|8| - |-5|$

**KEY CONCEPT**

**Absolute Value** The absolute value of an integer is the distance the number is from zero on a number line.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

# Comparing and Ordering Integers

## MAIN IDEA

- Compare and order integers

### EXAMPLE Compare Integers

- 1 Replace the  $\bullet$  with  $<$  or  $>$  to make  $-9 \bullet -5$  a true sentence.

Graph each integer on a number line.



Since  is to the  of  $-5$ ,  $-9$    $-5$ .

### Check Your Progress

Replace the  $\bullet$  with  $<$  or  $>$  to make  $-3 \bullet -6$  a true sentence.

### EXAMPLE Order Integers

- 2 **TEST EXAMPLE** The lowest temperatures in Europe, Greenland, Oceania, and Antarctica are listed in the table. Which list shows the temperatures in order from coolest to warmest?

Continent	Record Low Temperature ( $^{\circ}\text{F}$ )
Europe	$-67$
Greenland	$-87$
Oceania	$14$
Antarctica	$-129$

Source: *The World Almanac*

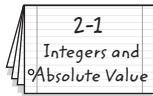
- A**  $-67, -87, 14, -129$       **C**  $-129, -87, -67, 14$   
**B**  $14, -67, -87, -129$       **D**  $-67, -87, -129, 14$

(continued on the next page)

## FOLDABLES

## ORGANIZE IT

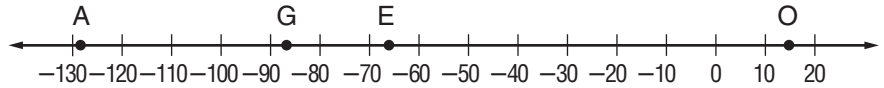
Under Lesson 2-2 in your Foldable, explain how to compare integers. Be sure to include examples.



## Read the Item

To order the integers, graph them on a number line.

## Solve the Item



Order the integers from least to greatest by reading from left

to right. The order from least to greatest is , ,

, . The answer is .

## Check Your Progress

**MULTIPLE CHOICE** The lowest temperatures on a given day in four cities in the United States are listed in the table. Which of the following lists the temperatures in order from coolest to warmest?

City	Low Temperature
Portland, OR	-12
New York City, NY	-6
Denver, CO	7
Newport, RI	-3

**F** -3, -6, 7, 12

**H** -12, 7, -6, -3

**G** -12, -6, -3, 7

**J** -3, -6, 7, -12

## HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

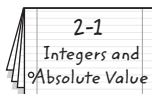
## MAIN IDEA

- Graph points on a coordinate plane.

## FOLDABLES

## ORGANIZE IT

Under Lesson 2-3 in your Foldable, record and define key terms about the coordinate system and give examples of each.



## BUILD YOUR VOCABULARY (pages 32–33)

A coordinate plane is a plane in which a

number line and a vertical number line intersect at their zero points.

The  number line of a coordinate plane is called the **x-axis**.

The  number line of a coordinate plane is called the **y-axis**.

The **origin** is the point at which the number lines intersect in a coordinate grid.

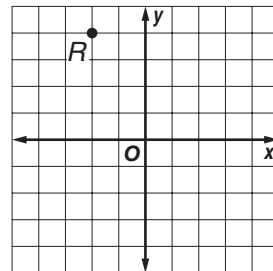
An **ordered pair** is a pair of numbers such as  $(5, -2)$  used to locate a point in the coordinate plane. The

**x-coordinate** is the  number. The **y-coordinate** is the  number.

## EXAMPLE Naming Points Using Ordered Pairs

- Write the ordered pair that corresponds to point  $R$ . Then state the quadrant in which the point is located.

- Start at the origin.
- Move  to find the **x-coordinate** of point  $R$ , which is .
- Move up to find the , which is .



So, the ordered pair for point  $R$  is . Point  $R$  is located in Quadrant .

## WRITE IT

When no numbers are shown on the  $x$ - or  $y$ -axis, how long is each interval?

---



---

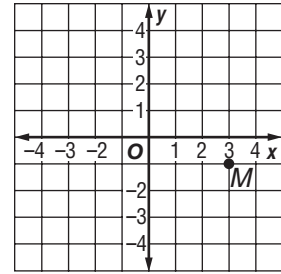


---



---

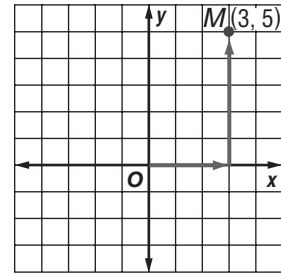
**Check Your Progress** Write the ordered pair that names point  $M$ . Then name the quadrant in which the point is located.



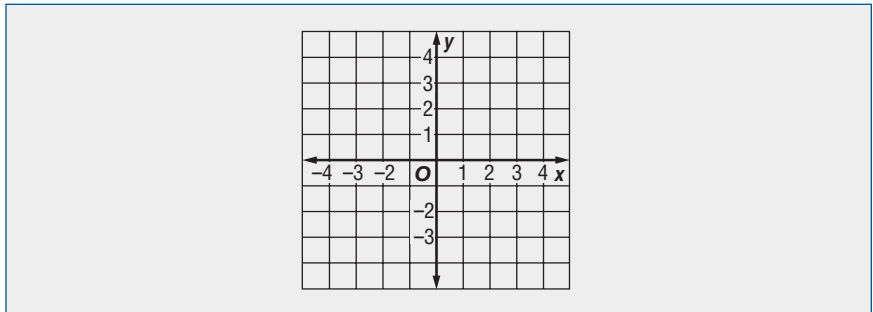
### EXAMPLES Graph an Ordered Pair

**1** Graph and label the point  $M(3, 5)$ .

- Draw a coordinate plane.
- Start at the .
- Move  units to the right.  
Then move 5 units .
- Draw a dot and label it  $M$  .

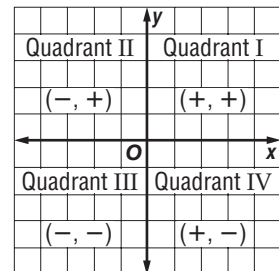


**Check Your Progress** Graph and label the point  $G(-2, -4)$ .



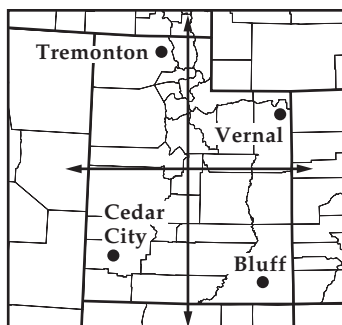
### BUILD YOUR VOCABULARY (pages 32–33)

The coordinate plane is separated into  sections called quadrants.



**EXAMPLES** Identify Quadrants

**3** **GEOGRAPHY** Use the map of Utah shown below.



**In which quadrant is Vernal located?**

Vernal is located in the  right quadrant.

Quadrant .

**1** **Which of the cities labeled on the map of Utah is located in quadrant IV?**

Quadrant  is the bottom right quadrant. So,  is in Quadrant IV.

**Check Your Progress** Refer to the map of Utah shown above.

**a.** In which quadrant is Tremonton located?

**b.** Which of the cities labeled on the map of Utah shown above is located in Quadrant III?

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:



## MAIN IDEA

- Add integers.

## KEY CONCEPTS

**Adding Integers with the Same Sign** The sum of two positive integers is positive. The sum of two negative integers is negative.

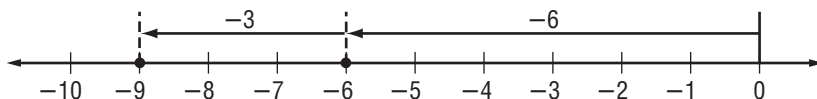
**Additive Inverse Property** The sum of any number and its additive inverse is 0.

## EXAMPLES Add Integers with the Same Sign

1 Find  $-6 + (-3)$ .

Use a number line.

- Start at .
- Move 6 units  to show  $-6$ .
- From there, move  units left to show .



So,  $-6 + (-3) = \text{}$ .

2 Find  $-34 + (-21)$ .

$-34 + (-21) = \text{}$  Both integers are negative, so the sum is .

## Check Your Progress Find each sum.

a.  $-5 + (-2)$

b.  $-27 + (-19)$

## BUILD YOUR VOCABULARY (pages 32–33)

The integers 5 and  $-5$  are called **opposites** of each other because they are the same distance from 0, but on

sides of 0.

Two  that are  are also called **additive inverses**.

## KEY CONCEPT

**Adding Integers with Different Signs** To add integers with different signs, subtract their absolute values. The sum is:

- positive if the positive integer has the greater absolute value.
- negative if the negative integer has the greater absolute value.

## EXAMPLES Add Integers with Different Signs

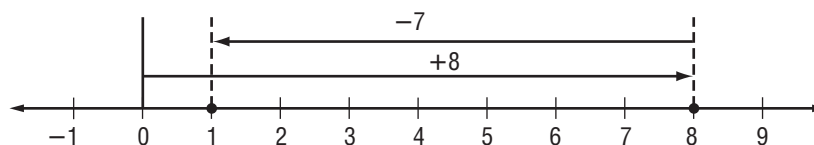
3 Find  $8 + (-7)$ .

Use a number line.

Start at .

Move  units right.

Then move  units left.



So,  $8 + (-7) =$  .

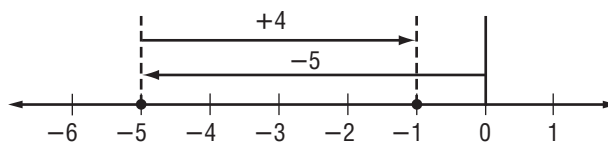
1 Find  $-5 + 4$ .

Use a number line.

Start at .

Move  units left.

Then move 4 units .

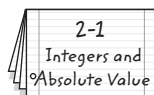


So,  $-5 +$    $= -1$

## FOLDABLES

## ORGANIZE IT

Summarize the steps for adding integers. Be sure to include examples.



## Check Your Progress Add.

a.  $6 + (-2)$

b.  $-3 + 5$

**EXAMPLES** Add Integers with Different Signs**5** Find  $2 + (-7)$ .

$2 + (-7) = \square$

Subtract absolute values;

 $7 - 2 = 5$ . Since  $\square$  has the greater absolute value, the sum is**6** Find  $-9 + 6$ .

$-9 + 6 = \square$

 $\square$  the absolute values; $9 - 6 = 3$ . Since  $-9$  has the $\square$  absolute value, the sum is negative.**REMEMBER IT**

Compare the absolute value of the addends when determining the sign of the sums.

**Check Your Progress** Add.

a.  $5 + (-9)$

b.  $7 + (-3)$

**EXAMPLE** Use the Additive Inverse Property**7** Find  $11 + (-4) + (-11)$ .

$11 + (-4) + (-11) = 11 + (-11) + (-4)$

Commutative Property (+)

$= \square + (-4)$

Additive Inverse Property

$= -4$

Identity Property (+)

**Check Your Progress** Find  $5 + (-11) + (-5)$ .**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## Subtracting Integers

## MAIN IDEA

- Subtract integers.

## EXAMPLES Subtract Positive Integers

1 Find  $2 - 15$ .

$$\begin{aligned} 2 - 15 &= 2 + (-15) \\ &= -13 \end{aligned}$$

To subtract 15, add .

Simplify.

2 Find  $-13 - 8$ .

$$\begin{aligned} -13 - 8 &= -13 + \text{} \\ &= -21 \end{aligned}$$

To subtract 8, add .

Simplify.

## Check Your Progress Subtract.

a.  $13 - 21$

b.  $-9 - 11$

## KEY CONCEPT

**Subtracting Integers** To subtract an integer, add its opposite.

**FOLDABLES** Write this concept in your Foldable. Be sure to include examples.

## EXAMPLES Subtract Negative Integers

3 Find  $12 - (-6)$ .

$$\begin{aligned} 12 - (-6) &= 12 + \text{} \\ &= \text{} \end{aligned}$$

To subtract  $-6$ , add .

Simplify.

4 Find  $-21 - (-8)$ .

$$\begin{aligned} -21 - (-8) &= -21 + 8 \\ &= -13 \end{aligned}$$

To subtract , add .

Simplify.

## Check Your Progress Subtract.

a.  $9 - (-4)$

b.  $17 - (-6)$

**EXAMPLE** Evaluate an Expression**5 ALGEBRA** Evaluate  $g - h$  if  $g = -2$  and  $h = -7$ .

$$g - h = \boxed{\phantom{00}} - \boxed{\phantom{00}}$$

Replace  $\boxed{\phantom{00}}$  with  $-2$  and $h$  with  $\boxed{\phantom{00}}$ .

$$= -2 + \boxed{\phantom{00}}$$

Subtract  $-7$ , add  $\boxed{\phantom{00}}$ .

$$= \boxed{\phantom{00}}$$

Simplify.

**Check Your Progress**Evaluate  $m - n$  if  $m = -6$  and  $n = 4$ .
**WRITE IT**

Explain how you can use a number line to check the results of subtracting integers.

---



---



---



---

**EXAMPLE****6 GEOGRAPHY** In Mongolia, the temperature can fall to  $-45^{\circ}\text{C}$  in January. The temperature in July may reach  $40^{\circ}\text{C}$ . What is the difference between these two temperatures in Mongolia?

To find the difference in temperatures, subtract the lower temperature from the higher temperature.

$$40 - (-45) = 40 \boxed{\phantom{00}} 45$$

To subtract  $-45$ ,  $\boxed{\phantom{00}}$  45.

$$= \boxed{\phantom{00}}$$

Simplify.

So, the difference between the temperatures is  $\boxed{\phantom{00}}$ .**Check Your Progress**On a particular day in Anchorage, Alaska, the high temperature was  $15^{\circ}\text{F}$  and the low temperature was  $-11^{\circ}\text{F}$ . What is the difference between these two temperatures for that day?
**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

---



---

## MAIN IDEA

- Multiply integers.

## EXAMPLES Multiply Integers with Different Signs

1 Find  $5(-4)$ .

$$5(-4) = \boxed{\phantom{00}}$$

The integers have  $\boxed{\phantom{00}}$  signs.The product is  $\boxed{\phantom{00}}$ .2 Find  $-3(9)$ .

$$-3(9) = \boxed{\phantom{00}}$$

The integers have  $\boxed{\phantom{00}}$  signs.The product is  $\boxed{\phantom{00}}$ .

## Check Your Progress Multiply.

a.  $3(-5)$ 

b.  $-5(7)$ 


## KEY CONCEPTS

**Multiplying Integers with Different Signs** The product of two integers with different signs is negative.

**Multiply Integers with the Same Sign** The product of two integers with the same sign is positive.

**FOLDABLES** Include these concepts on the Lesson 2-6 tab of your Foldable

## EXAMPLES Multiply Integers with the Same Sign

1 Find  $-6(-8)$ .

$$-6(-8) = \boxed{\phantom{00}}$$

The integers have the  $\boxed{\phantom{00}}$  sign.The product is  $\boxed{\phantom{00}}$ .4 Find  $(-8)^2$ .

$$(-8)^2 = (-8) \boxed{\phantom{00}}$$

There are  $\boxed{\phantom{00}}$  factors of  $-8$ .

$$= \boxed{\phantom{00}}$$

The product is  $\boxed{\phantom{00}}$ .5 Find  $-2(-5)(-6)$ .

$$-2(-5)(-6) = \boxed{\phantom{00}}(-6)$$

$$-2(-5) = 10$$

$$= \boxed{\phantom{00}}$$

$$10(-6) = -60$$

**Check Your Progress** Multiply.

a.  $-4(-7)$

b.  $(-5)^2$

c.  $-7(-3)(-4)$

**REMEMBER IT**

When three variables are written without an operations sign, it means multiplication.

**EXAMPLE**

- 6 MINES** A mine elevator descends at a rate of 300 feet per minute. How far below the earth's surface will the elevator be after 5 minutes?

If the elevator descends  feet per minute, then after 5 minutes, the elevator will be  $-300$  () or  $-1,500$  feet below the surface. Thus, the elevator will descend to  feet.

**Check Your Progress** **RETIREMENT** Mr. Rodriguez has \$78 deducted from his pay every month and placed in a savings account for his retirement. What integer represents a change in his savings account for these deductions after six months?

**EXAMPLE** Evaluate Expressions

- 7 ALGEBRA** Evaluate  $abc$  if  $a = -3$ ,  $b = 5$ , and  $c = -8$ .

$$abc = (-3)(5)(-8)$$

Replace  with  $-3$ ,  $b$

with , and  $c$  with .

$$= (-15)(-8)$$

Multiply  and 5.

$$= \text{$$

Multiply  $-15$  and  $-8$ .

**Check Your Progress**

Evaluate  $xyz$  if  $x = -6$ ,  $y = -2$ , and  $z = 4$ .

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## Problem-Solving Investigation: Look for a Pattern

### MAIN IDEA

- Solve problems by looking for a pattern.

### EXAMPLE Use the Look for a Pattern Strategy

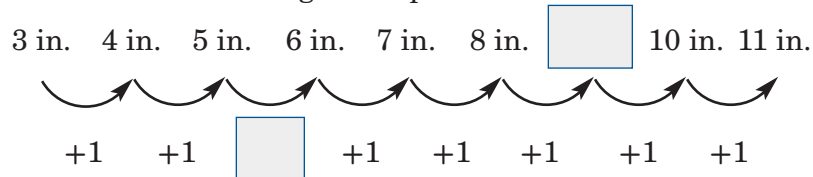
**HAIR** Lelani wants to grow an 11-inch ponytail. She has a 3-inch ponytail now, and her hair grows about one inch every two months. How long will it take for her ponytail to reach 11 inches?

**UNDERSTAND** You know the length of Lelani's ponytail now. You know how long Lelani wants her ponytail to grow and you know how fast her hair grows. You need to know how long it will take for her

ponytail to reach  inches.

**PLAN** Look for a pattern. Then extend the pattern to find the solution.

**SOLVE** After the first two months, Lelani's ponytail will be 3 inches +  inch, or 4 inches. Every  months, her hair grows according to the pattern below.



It will take eight sets of two months, or 16 months total, for Lelani's ponytail to reach  inches.

**CHECK** Lelani's ponytail grew from 3 inches to 11 inches, a difference of eight inches, in  months. Since one inch of growth requires two months and  $8 \times \text{input} = 16$ , the answer is correct.

**Check Your Progress** **RUNNING** Samuel ran 2 miles on his first day of training to run a marathon. On the third day, Samuel increased the length of his run by 1.5 miles. If this pattern continues every three days, how many miles will Samuel run on the 27<sup>th</sup> day?

### HOMWORK ASSIGNMENT

Page(s):

Exercises:



## MAIN IDEA

- Divide integers.

## KEY CONCEPTS

**Dividing Integers with Different Signs** The quotient of two integers with different signs is negative.

**Dividing Integers with the Same Sign** The quotient of two integers with the same sign is positive.

## EXAMPLES Dividing Integers with Different Signs

- 1 Find  $51 \div (-3)$ .

$$51 \div (-3) = \boxed{\phantom{00}}$$

The integers have  $\boxed{\phantom{00}}$  signs.

The  $\boxed{\phantom{00}}$  is negative.

- 2 Find  $\frac{-121}{11}$ .

$$\frac{-121}{11} = \boxed{\phantom{00}}$$

The  $\boxed{\phantom{00}}$  have different signs.

The quotient is  $\boxed{\phantom{00}}$ .

## EXAMPLE Dividing Integers with the Same Sign

- 3 Find  $-12 \div (-2)$ .

$$-12 \div (-2) = \boxed{\phantom{00}}$$

The integers have the  $\boxed{\phantom{00}}$  sign.

The quotient is  $\boxed{\phantom{00}}$ .

## Check Your Progress Find each quotient.

a.  $36 \div (-9)$

b.  $\frac{45}{-9}$

c.  $-24 \div (-8)$

## EXAMPLE

- 1 ALGEBRA Evaluate  $-18 \div x$  if  $x = -2$ .

$$-18 \div x = -18 \div (\boxed{\phantom{00}}) \text{ Replace } x \text{ with } -2.$$

$$= \boxed{\phantom{00}}$$

Divide. The quotient is negative.

**Check Your Progress** ALGEBRA Evaluate  $g \div h$  if  $g = 21$  and  $h = -3$ .


## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## BRINGING IT ALL TOGETHER

## STUDY GUIDE

	VOCABULARY PUZZLEMAKER	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 2 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 2, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (pages 32–33) to help you solve the puzzle.

## 2-1

## Integers and Absolute Value

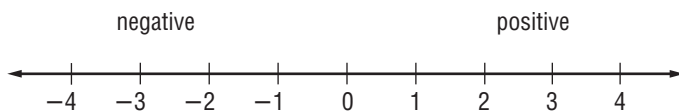
Express each of the following in words.

1.  $+7$

2.  $-7$

3.  $|7|$

4. On the following number line, draw an oval around the *negative* integers and label them negative. Draw a rectangle around the *positive* integers and label them positive.



## 2-2

## Comparing and Ordering Integers

Write each expression in words.

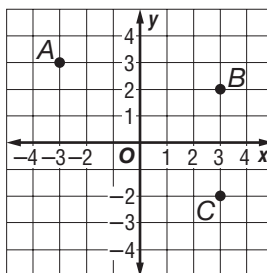
5.  $-1 < 0$

6.  $3 > -2$

2-3

## The Coordinate Plane

Look at the coordinate plane at the right. Name the ordered pair for each point graphed.

7. A 8. B 9. C 

In the coordinate plane above, identify the quadrant in which each lies.

10. A 11. B 12. C 

2-4

## Adding Integers

Tell how you would solve each of the following on a number line, then add.

13.  $-7 + (-9)$  14.  $-7 + 9$  15. How many units away from 0 is the number 17? 16. How many units away from 0 is the number  $-17$ ? 17. What are 17 and  $-17$  called?

2-5

## Subtracting Integers

Find each difference. Write an equivalent addition sentence for each.

18.  $1 - 5$

19.  $-2 - 1$

20.  $-3 - 4$

2-6

## Multiplying Integers

Choose the correct term to complete each sentence.

21. The product of two integers with different signs is (positive, negative).
22. The product of two integers with the same sign is (positive, negative).

Find each product.

23.  $(-6)(-4)$

24.  $-8(5)$

25.  $-2(3)(-4)$

2-7

## Problem-Solving Investigation: Look for a Pattern

26. **CANS** A display of soup cans at the end of a store aisle contains 1 can in the top row and 2 cans in each additional row beneath it. If there are 6 rows in the display, how many cans are in the sixth row?

2-8

## Dividing Integers

Write two division sentences for each of the following multiplication sentences.

27.  $6(-3) = 18$

28.  $-21(-2) = 42$

## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 2.

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 2 Practice Test on page 123 of your textbook as a final check.

I used my Foldables or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 2 Study Guide and Review on pages 119–122 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may want to take the Chapter 2 Practice Test on page 123 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 2 Foldables.
- Then complete the Chapter 2 Study Guide and Review on pages 119–122 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 2 Practice Test on page 123 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

# Algebra: Linear Equations and Functions



Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

**Begin with a sheet of 11" × 17" paper.**

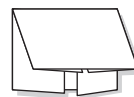
**STEP 1**

**Fold** the short sides toward the middle.



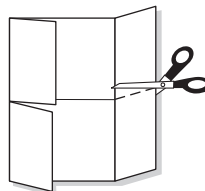
**STEP 2**

**Fold** the top to the bottom.



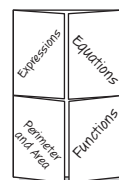
**STEP 3**

**Open.** Cut along the second fold to make four tabs.



**STEP 4**

**Label** each of the tabs as shown.



**NOTE-TAKING TIP:** When you take notes, listen or read for main ideas. Then record those ideas in a simplified form for future reference.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 3. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
Addition Property of Equality			
Division Property of Equality			
formula			
linear equation			

*(continued on the next page)*

Vocabulary Term	Found on Page	Definition	Description or Example
Subtraction Property of Equality			
two-step equation			
work backward strategy			



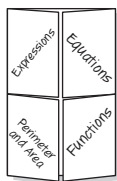
## MAIN IDEA

- Write verbal phrases and sentences as simple algebraic expressions and equations.

## FOLDABLES

## ORGANIZE IT

Write two phrases and their algebraic expressions under the Expressions tab.



## EXAMPLE Write a Phrase as an Expression

- Write the phrase *twenty dollars less the price of a movie ticket* as an algebraic expression.

Words
Variable
Equation

twenty dollars less the price of a movie ticket

Let  = the price of a movie ticket.

## Check Your Progress

Write the phrase *five more inches of snow than last year's snowfall* as an algebraic expression.

## EXAMPLES Write Sentences as Equations

Write each sentence as an algebraic equation.

- A number less 4 is 12.

Words
Variable
Equation

A number less 4 is 12.

Let  represent a number.

- Twice a number is 18.

Words
Variable
Equation

Twice a number is 18.

Let  represent a number.

**Check Your Progress** Write each sentence as an algebraic equation.

- a. Eight less than a number is 12.

- b. Four times a number equals 96.

**EXAMPLE**

- 1 FOOD** An average American adult drinks more soft drinks than any other beverage each year. Three times the number of gallons of soft drinks plus 27 is equal to the total 183 gallons of beverages consumed. Write the equation that models this situation.

Words	Three times the number of gallons of soft drinks plus 27 equals 183.
Variable	Let <input style="width: 30px; height: 20px;" type="text"/> = the number of gallons of soft drinks.
Equation	<input style="width: 150px; height: 25px;" type="text"/>

**Check Your Progress EXERCISE** It is estimated that American adults spend an average of 8 hours per month exercising. This is 26 hours less than twice the number of hours spent watching television each month. Write an equation that models this situation.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Solve addition and subtraction equations.

## KEY CONCEPTS

**Subtraction Property of Equality** If you subtract the same number from each side of an equation, the two sides remain equal.

**Addition Property of Equality** If you add the same number to each side of an equation, the two sides remain equal.

**FOLDABLES** Write these properties in your own words under the Equations tab.

## EXAMPLES Solve an Addition Equation

1 Solve  $14 + y = 20$ . Check your solution.

$$\begin{array}{r} 14 + y = 20 \\ \hline \square = \square \end{array}$$

Write the equation.

$\square$  14 from each side. Simplify.

Check

$$\begin{array}{r} 14 + y = 20 \\ 14 + \square \stackrel{?}{=} 20 \\ \square = 20 \checkmark \end{array}$$

Write the original equation.

Replace  $y$  with  $\square$ .

Simplify.

The solution is  $\square$ .

2 Solve  $a + 7 = 6$ . Check your solution.

$$\begin{array}{r} a + 7 = 6 \\ \hline \square = \square \end{array}$$

Write the equation.

Subtract  $\square$  from each side.

Simplify.

Check

$$\begin{array}{r} a + 7 = 6 \\ \square + 7 \stackrel{?}{=} 6 \\ \square = 6 \checkmark \end{array}$$

Write the original equation.

Replace  $a$  with  $\square$ .

Simplify. The solution is  $\square$ .

## Check Your Progress Solve each equation.

a.  $-6 = x + 4$

b.  $m + 9 = 22$

**EXAMPLE**

**3 FRUIT** A grapefruit weighs 11 ounces, which is 6 ounces more than an apple. How much does the apple weigh?

**Words**  
▼  
**Variable**  
▼  
**Equation**

A grapefruit's weight is  ounces more than an apple's weight.

Let  $a$  represent the apple's weight.

$$11 = 6 + a$$

Write the equation.

$$\begin{array}{r} -6 \quad -6 \\ \hline 5 = a \end{array}$$

Subtract  from each side.

Simplify.

The apple weighs  ounces.

**Check Your Progress**

**EXERCISE** Cedric ran 17 miles this week, which is 9 more miles than he ran last week. How many miles did he run last week?

**EXAMPLE** Solve a Subtraction Equation

**1** Solve  $12 = z - 8$ .

$$12 = z - 8 \quad \text{Write the equation.}$$

$$\begin{array}{r} +8 \quad +8 \\ \hline \end{array} \quad \text{Add 8 to each side.}$$

$$\text{} = z \quad \text{Simplify.}$$

The solution is .

**Check Your Progress**

Solve  $w - 5 = 27$ .

**REVIEW IT**

Explain why the sum of three negative numbers must be negative. (Lesson 2-4)

---

---

---

---

---

---

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## EXAMPLES Solving Multiplication Equations

## MAIN IDEA

- Solve multiplication equations.

## KEY CONCEPT

**Division Property of Equality** If you divide each side of an equation by the same nonzero number, the two sides remain equal.

**FOLDABLES** Record the Division Property of Equality in your own words under the Equation tab.

1 Solve  $39 = 3y$ . Check your solution.

$$39 = 3y$$

Write the equation.

$$\square = \square$$

Divide each side of the equation by  $\square$ .

$$\square = y$$

$$\square \div 3 = \square$$

## Check

$$39 = 3y$$

Write the equation.

$$39 \stackrel{?}{=} 3 \square$$

Replace  $y$  with  $\square$ . Is this sentence true?

$$39 = \square \checkmark$$

So, the solution is  $\square$ .2 Solve  $-4z = 60$ . Check your solution.

$$-4z = 60$$

Write the equation.

$$\square = \square$$

Divide each side of the equation by  $\square$ .

$$z = \square$$

$$60 \div (-4) = \square$$

## Check

$$-4z = 60$$

Write the equation.

$$-4(\square) \stackrel{?}{=} 60$$

Replace  $z$  with  $\square$ . Is this sentence true?

$$\square = 60 \checkmark$$

So, the solution is  $\square$ .

**Check Your Progress** Solve each equation. Check your solution.

a.  $6m = 42$

b.  $-64 = -16b$

**BUILD YOUR VOCABULARY** (pages 55–56)

A **formula** is an equation that shows the relationship among certain quantities.

**EXAMPLE**

**3 SWIMMING** Ms. Wang swims at a speed of 0.6 mph. At this rate, how long will it take her to swim 3 miles?

You are asked to find the time  $t$  it will take to swim a distance  $d$  of 3 miles at a rate  $r$  of 0.6 mph.

$d = rt$  Write the equation.

$3 = 0.6t$  Replace  $d$  with  and  $r$  with .

$\frac{3}{0.6} = \frac{0.6t}{0.6}$  Divide each side by 0.6.

=  $t$   $3 \div 0.6 = 5$

It would take Ms. Wang  hours to swim 3 miles.

**Check Your Progress** **COOKIES** Debbie spends \$6.85 on cookies at the bakery. The cookies are priced at \$2.74 per pound. How many pounds of cookies did Debbie buy?

**HOMEWORK  
ASSIGNMENT**

Page(s):

Exercises:

## Problem-Solving Investigation: Work Backward

### MAIN IDEA

- Solve problems using the work backward strategy.

### EXAMPLE Use the Work Backward Strategy

**SHOPPING** Lucy and Elena went to the mall. Each girl bought a CD for \$16.50, a popcorn for \$3.50, and a drink for \$2.50. Altogether, they had \$5.00 left over. How much money did they take to the mall?

**UNDERSTAND** You know that they had  left over and how much they spent on each item. You need to know how much they took to the mall.

**PLAN** Start with the end result and work backward.

**SOLVE** They had \$5.00 left.

Undo the two drinks  $\$5 + 2(\$2.50) =$    
for \$2.50 each.

Undo the two popcorns  $\$10 + 2(\$3.50) =$    
for  each.

Undo the two CDs for  $\$17 + 2(\$16.50) =$    
\$16.50 each.

So, they took  to the mall.

**CHECK** Assume they started with \$50. After buying two CDs, they had  $\$50 - 2(\$16.50)$  or .

After buying two popcorns, they had

$\$17 - 2(\text{input type="text"/})$  or \$10. After buying two

drinks, they had  $\$10 - 2(\$2.50)$  or \$5. So, the answer is correct.

### Check Your Progress

**AIRPORT** Jack needs to go home from work to pack before heading to the airport. He wants to be at the airport by 1:15 P.M. It takes him 20 minutes to drive home from work, 30 minutes to pack, and 45 minutes to get to the airport from home. What time should he leave work?

### HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## BUILD YOUR VOCABULARY (pages 55–56)

### MAIN IDEA

- Solve two-step equations.

A two-step equation has  different .

### EXAMPLES Solve Two-Step Equations

1 Solve  $4x + 3 = 19$ . Check your solution.

$$4x + 3 = 19$$

Write the equation.

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

Subtract  from each side.

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

Simplify.

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

Divide each side by .

Simplify.

### Check

$$4x + 3 = 19$$

Write the original equation.

$$4(\underline{\hspace{1cm}}) + 3 \stackrel{?}{=} 19$$

Replace  $x$  with .

$$\underline{\hspace{1cm}} + 3 \stackrel{?}{=} 19$$

Simplify.

$$\underline{\hspace{1cm}} = 19 \checkmark$$

The solution is .

2 Solve  $6 + 5y = 26$ .

$$\underline{\hspace{2cm}}$$

Write the equation.

$$\underline{-6} \quad \underline{-6}$$

Subtract  from each side.

$$5y = 20$$

Simplify.

$$\frac{5y}{5} = \frac{20}{5}$$

Divide each side by .

$$y = \underline{\hspace{1cm}}$$

Simplify.

### WRITE IT

What is the name of the property that allows you to subtract the same number from each side of an equation?

---



---



---



1 Solve  $-3c + 9 = 3$ .

$$-3c + 9 = 3$$

Write the equation.

$$\boxed{\phantom{00}} \quad \boxed{\phantom{00}}$$

Subtract  $\boxed{\phantom{00}}$  from each side.

$$\boxed{\phantom{00}} = \boxed{\phantom{00}}$$

Simplify.

$$\boxed{\phantom{00}} = \boxed{\phantom{00}}$$

Divide each side by  $\boxed{\phantom{00}}$ .

$$\boxed{\phantom{00}} = \boxed{\phantom{00}}$$

Simplify.

The solution is  $\boxed{\phantom{00}}$ .1 Solve  $0 = 6 + 3t$ .

$$0 = 6 + 3t$$

Write the equation.

$$-6 \quad -6$$

$$\boxed{\phantom{00}} = \boxed{\phantom{00}}$$

Simplify.

$$\boxed{\phantom{00}} = \boxed{\phantom{00}}$$

 $\boxed{\phantom{00}}$  each side by  $\boxed{\phantom{00}}$ .

$$\boxed{\phantom{00}} = \boxed{\phantom{00}}$$

Simplify.

The solution is  $\boxed{\phantom{00}}$ .**REMEMBER IT**

Always check your solutions by replacing the variable with your answer and simplifying.

**Check Your Progress**

Solve each equation.

a.  $3t - 7 = 14$

b.  $4 + 2w = 18$

c.  $-8k + 7 = 31$

d.  $0 = -4x + 32$

**EXAMPLE**

**5 PARKS** There are 76 thousand acres of state parkland in Georgia. This is 4 thousand acres more than three times the number of acres of state parkland in Mississippi. How many acres of state parkland are there in Mississippi?

**Words**  
▼  
**Variable**  
▼  
**Equation**

Three times the number of acres of state parkland in Mississippi plus 4,000 is 76,000.

Let  $m$  = the acres of state parkland in Mississippi.

Three times the number of acres of parkland in Mississippi

$$\underbrace{\hspace{2cm}} \text{ plus } \underbrace{4,000} \text{ is } \underbrace{76,000}.$$

$$\boxed{\hspace{2cm}} \quad \boxed{\hspace{1cm}} \quad 4,000 \quad = \quad 76,000$$

$$\boxed{\hspace{2cm}} + 4,000 = 76,000$$

Write the equation.

$$\boxed{\hspace{2cm}} \quad \boxed{\hspace{2cm}}$$


---

Subtract  $\boxed{\hspace{1cm}}$  from each side.

$$\boxed{\hspace{1cm}} = \boxed{\hspace{2cm}}$$

Simplify.

$$\boxed{\hspace{1cm}} = \boxed{\hspace{2cm}}$$

Divide each side by  $\boxed{\hspace{1cm}}$ .

$$\boxed{\hspace{1cm}} = \boxed{\hspace{2cm}}$$

Simplify.

There are  $\boxed{\hspace{2cm}}$  acres of state parkland in Mississippi.

**Check Your Progress** **BASEBALL** Matthew had 64 hits during last year's baseball season. This was 8 less than twice the number of hits Gregory had. How many hits did Gregory have during last year's baseball season?

**HOMWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## MAIN IDEA

- Find the perimeters and areas of figures.

## BUILD YOUR VOCABULARY (pages 55–56)

The  around a geometric figure is called the **perimeter**.

## EXAMPLE Find the Perimeter of a Rectangle

- 1 Find the perimeter of the rectangle. 

$$P = 2\ell + 2w$$

Perimeter of a rectangle

$$P = 2(18) + 2(2)$$

$$\ell = \text{, } w = \text{$$

$$P = \text{} + \text{$$

Multiply.

$$P = \text{$$

Add.

The perimeter is 40 .

## KEY CONCEPT

**Perimeter of a Rectangle**  
The perimeter  $P$  of a rectangle is twice the sum of the length  $\ell$  and width  $w$ .

## Check Your Progress

Find the perimeter of a rectangle with a length of 2.35 centimeters and a width of 11.9 centimeters.

## EXAMPLE

- 2 ART A painting has a perimeter of 68 inches. If the width of the painting is 13 inches, what is its length?

$$P = 2\ell + 2w$$

Perimeter of a rectangle

$$68 = 2\ell + 2(\text{)}$$

Replace  $P$  with 68 and  $w$  with 13.

$$68 = 2\ell + \text{$$

Multiply.

(continued on the next page)

$68 - 26 = 2\ell + 26 - 26$  Subtract 26 from each side.

=  $2\ell$  Simplify.

$21 = \ell$  Divide each side by 2.

**Check Your Progress** **GARDENS** A tomato garden has a perimeter of 22.2 feet. If the length of the garden is 6.3 feet, find the width.

**BUILD YOUR VOCABULARY** (pages 55–56)

The area is the measure of the  enclosed by a figure.

**EXAMPLE** Find The Area of a Rectangle

**3 FRESHWATER** Find the area of the surface of the reservoir shown below.



**KEY CONCEPT**

**Area of a Rectangle** The area  $A$  of a rectangle is the product of the length  $\ell$  and width  $w$ .

$A = \ell \cdot w$

Area of a

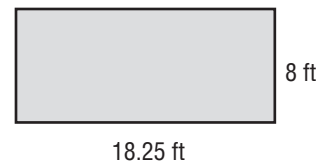
$A =$    $\cdot$   Replace  $\ell$  with 4 and  $w$  with .

$A =$   .

The area is 2.5 .

**Check Your Progress**

**PAINTING** Sue is painting a wall that measures 18.25 feet long and 8 feet high. Find the area of the surface Sue will be painting.




**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Graph linear equations.

## REMEMBER IT



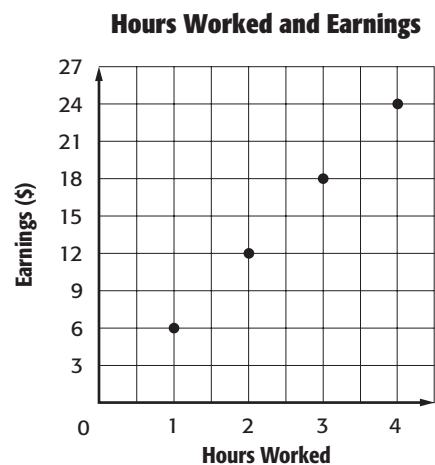
When  $x$  and  $y$  are used in an equation,  $x$  usually represents the input and  $y$  usually represents the output.

## EXAMPLE

- 1 WORK** The table shows the number of hours Abby worked and her corresponding earnings. Make a graph of the data to show the relationship between the number of hours Abby worked and her earnings.

The ordered pairs  $(1, 6)$ ,  $(\square, 12)$ ,  $(3, \square)$ , and  $(4, 24)$  represent the function. Graph the ordered pairs.

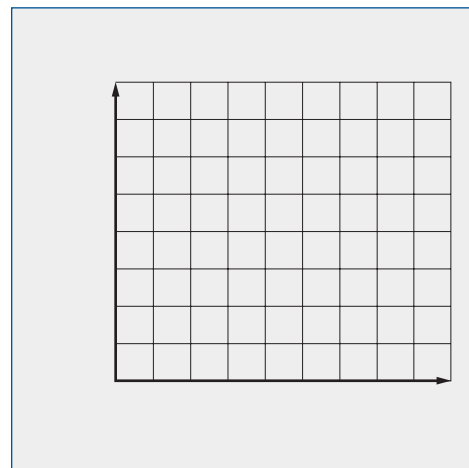
Number of Hours	Earnings (\$)
1	6
2	12
3	18
4	24



## Check Your Progress

- VIDEOS** Make a graph of the data in the table that shows the relationship between the amount David would pay and the number of movies he rents.

Number of Videos	Amount (\$)
1	\$3.50
2	\$7.00
3	\$10.50
4	\$14.00



**BUILD YOUR VOCABULARY** (pages 55–56)

An equation like  $y = 2x + 1$  is a **linear equation** because

the  is a  line.

**WRITE IT**

How many points are needed to graph a line? Why is it a good idea to graph more?

---



---



---

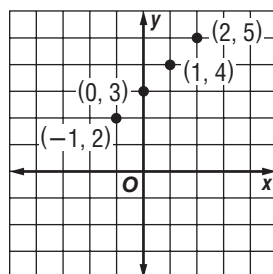


---

**EXAMPLE** Graph Solutions of Linear Equations**1** Graph  $y = x + 3$ .

Select any four values for the input  $x$ . We chose 2, 1, 0, and  $-1$ . Substitute these values for  $x$  to find the output  $y$ .

$x$	$x + 3$	$y$	$(x, y)$
2	<input type="text"/> + 3	<input type="text"/>	(2, 5)
1	<input type="text"/> + 3	4	<input type="text"/>
0	0 + 3	<input type="text"/>	<input type="text"/>
$-1$	<input type="text"/> + 3	2	<input type="text"/>

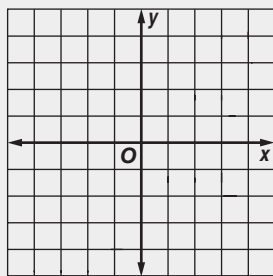


Four solutions are

(2, 5), , ,  
and .

**Check Your Progress**

Graph  $y = 3x - 2$ .



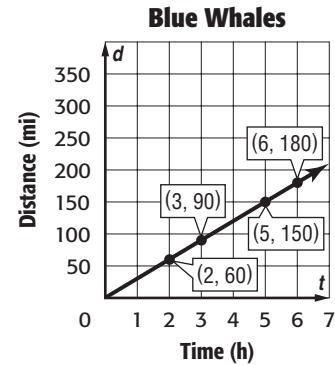
**EXAMPLE** Represent Real-World Functions

**3 ANIMALS** Blue whales can reach a speed of 30 miles per hour. The equation  $d = 30t$  describes the distance  $d$  that a whale swimming at that speed can travel in time  $t$ . Assuming that a whale can maintain that speed, represent the function with a graph.

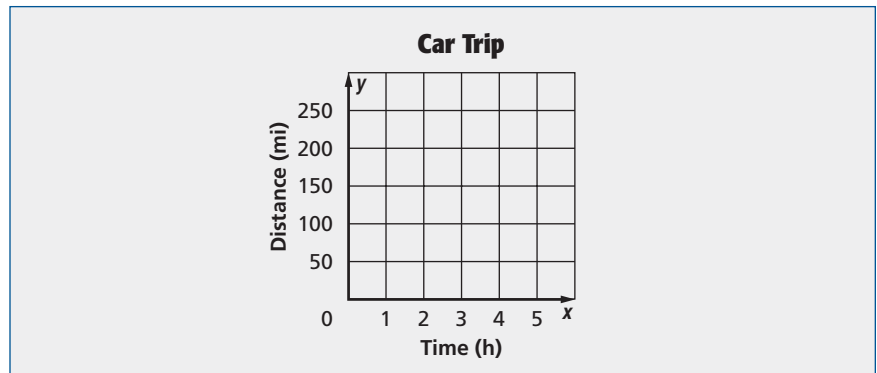
**Step 1** Select four values for  $t$ . Select only positive numbers since  $t$  represents time. Make a function table.

$t$	$30t$	$d$	$(t, d)$
2	$30(2)$	<input type="text"/>	$(2, 60)$
3	$30(3)$	90	<input type="text"/>
5	$30(5)$	<input type="text"/>	<input type="text"/>
6	$30$ <input type="text"/>	180	<input type="text"/>

**Step 2** Graph the ordered pairs and draw a line through the points.



**Check Your Progress** **TRAVEL** Susie takes a car trip traveling at an average speed of 55 miles per hour. The equation  $d = 55t$  describes the distance  $d$  that Susie travels in time  $t$ . Represent this function with a graph.



**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## STUDY GUIDE

## FOLDABLES

Use your **Chapter 3 Foldable** to help you study for your chapter test.

VOCABULARY  
PUZZLEMAKER

To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 3, go to:

[glencoe.com](http://glencoe.com)

BUILD YOUR  
VOCABULARY

You can use your completed **Vocabulary Builder** (pages 55–56) to help you solve the puzzle.

## 3-1

## Writing Expressions and Equations

Match the phrases with the algebraic expressions that represent them.

1. seven plus a number

2. seven less a number

3. seven divided by a number

4. seven less than a number

a.  $7 - n$

b.  $7 \cdot n$

c.  $n - 7$

d.  $\frac{n}{7}$

e.  $7 + n$

Write each sentence as an algebraic equation.

5. The product of 4 and a number is 12.

6. Twenty divided by  $y$  is equal to  $-10$ .

## 3-2

## Solving Addition and Subtraction Equations

7. Explain in words how to solve  $a - 10 = 3$ .

Solve each equation. Check your solution.

8.  $w + 23 = -11$

9.  $35 = z - 15$



3-3

## Solving Multiplication Equations

10. To solve  $-27 = -3d$ , divide each side by .

Solve each equation. Check your solution.

11.  $36 = 6k$

12.  $-7z = 28$

3-4

## Problem-Solving Investigation: Work Backward

13. **AGE** Bradley is four years older than his brother Philip. Philip is 7 years younger than Kailey, who is 2 years older than Taneesha. If Taneesha is 11 years old, how old is Bradley?

3-5

## Solving Two-Step Equations

14. Describe in words each step shown for solving  $12 + 7s = -9$ .

$12 + 7s = -9$

$\frac{-12}{-12} \quad \frac{-12}{-12}$

$7s = -21$

$\frac{7s}{7} = \frac{-21}{7}$

$s = -3$

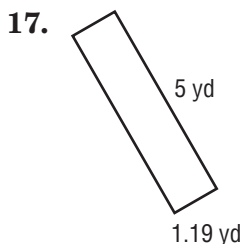
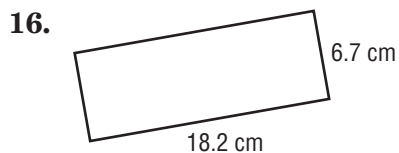
15. Number the steps in the correct order for solving the equation  $-4v + 11 = -5$ .

 Simplify Write the equation. Divide each side by  $-4$ . Simplify. Subtract 11 from each side. Check the solution.

3-6

Measurement: Perimeter and Area

Find the perimeter and area of each rectangle.



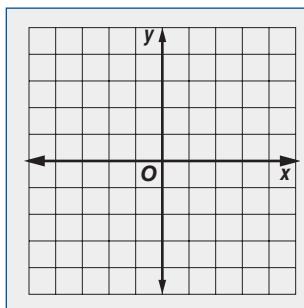
18. **FRAMING** Marcia wants to frame her favorite painting. If the frame is 3.25 feet wide and the perimeter is 15.7 feet, find the width of the frame.

3-7

Functions and Graphs

19. Complete the function table. Then graph the function.

$x$	$2x - 1$	$y$
-1	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 30px; height: 20px;" type="text"/>
0	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 30px; height: 20px;" type="text"/>
1	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 30px; height: 20px;" type="text"/>



## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 3.

Check the one that applies. Suggestions to help you study are given with each item.

- I completed the review of all or most lessons without using my notes or asking for help.
- You are probably ready for the Chapter Test.
  - You may want to take the Chapter 3 Practice Test on page 173 of your textbook as a final check.
- I used my Foldables or Study Notebook to complete the review of all or most lessons.
- You should complete the Chapter 3 Study Guide and Review on pages 169–172 of your textbook.
  - If you are unsure of any concepts or skills, refer back to the specific lesson(s).
  - You may want to take the Chapter 3 Practice Test on page 173.
- I asked for help from someone else to complete the review of all or most lessons.
- You should review the examples and concepts in your Study Notebook and Chapter 3 Foldable.
  - Then complete the Chapter 3 Study Guide and Review on pages 169–172 of your textbook.
  - If you are unsure of any concepts or skills, refer back to the specific lesson(s).
  - You may also want to take the Chapter 3 Practice Test on page 173.

Student Signature

Parent/Guardian Signature

Teacher Signature

# Fractions, Decimals, and Percents



Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin this Interactive Study Notebook to help you in taking notes.

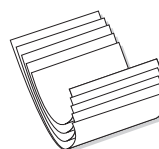
Begin with five sheets of  $8\frac{1}{2}$ "  $\times$  11" paper.

**STEP 1**

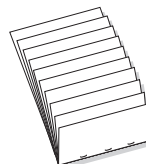
**Stack** five sheets of paper  $\frac{3}{4}$  inch apart.


**STEP 2**

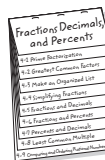
**Roll** up bottom edges so that all tabs are the same size.


**STEP 3**

**Crease** and staple along the fold.


**STEP 4**

**Write** the chapter title on the front. Label each tab with a lesson number and title.



**NOTE-TAKING TIP:** Before each lesson, skim through the lesson and write any questions that come to mind in your notes. As you work through the lesson, record the answer to your question.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 4. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
bar notation			
common denominator			
composite number [kahn-PAH-zuht]			
equivalent [ih-KWIIH-vuh-luhnt] fractions			
factor tree			
greatest common factor (GCF)			
least common denominator (LCD)			
least common multiple (LCM)			
multiple			

(continued on the next page)

Vocabulary Term	Found on Page	Definition	Description or Example
percent			
prime factorization			
prime number			
ratio			
rational number			
repeating decimal			
simplest form			
terminating decimal			

## MAIN IDEA

- Find the prime factorization of a composite number.

## BUILD YOUR VOCABULARY (pages 77–78)

A **prime number** is a whole number greater than 1 that has exactly  factors,  and .

A **composite number** is a whole number greater than  that has more than  factors.

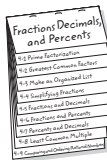
Every  number can be written as a product of prime numbers exactly one way called the **prime factorization**.

A **factor tree** can be used to find the factorization.

## FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 4-1, give examples of prime and composite numbers. Be sure to explain how to tell a prime number from a composite number.



## EXAMPLES Identify Numbers as Prime or Composite

Determine whether each number is *prime* or *composite*.

1 63

63 has six factors: 1, , 7, , 21, and .

So, it is .

2 29

29 has only two factors:  and .

So, it is .

## Check Your Progress

Determine whether each number is *prime* or *composite*.

a. 41

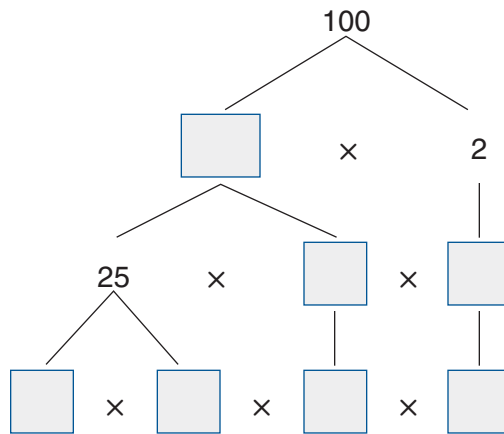
b. 24

**REMEMBER IT**

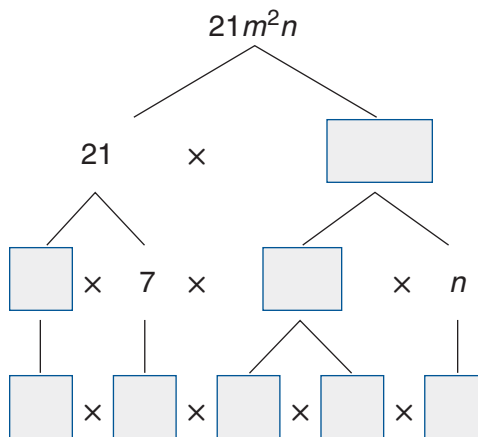
Multiplication is commutative, so the order of factors does not matter.

**EXAMPLE Find the Prime Factorization****3 Find the prime factorization of 100.**

To find the prime factorization, you can use a factor tree or divide by prime numbers. Let's use a factor tree.



$$100 = \square \times \square \times \square \times \square \text{ or } \square \times \square.$$

**EXAMPLE Find an Algebraic Expression****1 ALGEBRA Factor  $21m^2n$ .****Check Your Progress**

a. Find the prime factorization of 72.

b. Factor  $15xy^3$ .

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:



## MAIN IDEA

- Find the greatest common factor of two or more numbers.

## BUILD YOUR VOCABULARY (pages 77–78)

A Venn diagram uses  to show how elements among sets of numbers or objects are related.

The  number that is a common  to two or more numbers is called the **greatest common factor (GCF)**.

## EXAMPLE Find the Greatest Common Factor

## 1 Find the GCF of 28 and 42.

**METHOD 1** First, list the factors of 28 and 42.

factors of 28:

factors of 42:

The common factors are .

So, the GCF is .

**METHOD 2** Use prime factorization.

$$28 = 2 \times 2 \times \text{$$

$$42 = 2 \times 3 \times \text{$$

The greatest common factor or GCF is  $2 \times 7$  or .

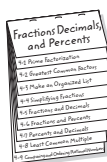
## Check Your Progress

Find the GCF of 18 and 45.

## FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 4-2, take notes on finding the greatest common factor of two or more numbers.



**WRITE IT**

Which method of finding the GCF of two or more numbers do you prefer using to find the GCF of small numbers? for large numbers?

---



---



---



---



---

**EXAMPLE Find the GCF of Three Numbers****2 Find the GCF of 21, 42, and 63.**

**METHOD 1** First, list the factors of 21, 42, and 63.

factors of 21: 1, 3, 7,

factors of 42: 1, 2, 3, 6, 7, 14, 21, 42

factors of 63: 1, 3, , 9, 21, 63

The common factors of 21, 42, and 63 are , , and .

So, the greatest common factor or GCF is .

**METHOD 2** Use prime factorization.

$$21 = 3 \times 7$$

$$42 = 2 \times 3 \times 7 \quad \text{Circle the common factors.}$$

$$63 = 3 \times 3 \times 7$$

The common prime factors are 3 and 7.

The GCF is   $\times$  , or .

**Check Your Progress Find the GCF of each set of numbers.**

24, 48, and 60

**EXAMPLE**

**3 ART** Searra wants to cut a 15-centimeter by 25-centimeter piece of tag board into squares for an art project. She does not want to waste any of the tag board and she wants the largest squares possible. What is the length of the side of the squares she should use?

The largest length of side possible is the GCF of the dimensions of the tag board.

$$15 = \square \times \square$$

$$25 = \square \times \square$$

The  $\square$  of 15 and 25 is  $\square$ . So, Searra should use squares with sides measuring  $\square$  centimeters.

### EXAMPLE

4 How many squares can she make if the sides are 5 centimeters?

$$\square \div 5 = 5 \text{ squares can fit along the length.}$$

$$\square \div 5 = 3 \text{ squares can fit along the width.}$$

So,  $5 \times 3 = \square$  squares can be made from the tag board.

### Check Your Progress

**CANDY** Alice is making candy baskets using chocolate hearts and lollipops. She is tying each piece of candy with either a red piece of string or a green piece of string. She has 64 inches of red string and 56 inches of green string. She wants to cut the pieces of string equal lengths and use all of the string she has.

- a. What is the length of the longest piece of string that can be cut?

- b. How many pieces of string can be cut if the pieces are 8 inches long?

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## Problem-Solving Investigation: Make an Organized List

### EXAMPLE Make an Organized List

#### MAIN IDEA

- Solve problems by making an organized list.

**PASSWORD** In order to log on to the computer at school, Miranda must use a password. The password is 2 characters. The first character is the letter A or B followed by a single numeric digit. How many passwords does Miranda have to choose from?

**UNDERSTAND** You know that the password has  characters and that the first character is either the letter  or B. You know that the second character is a numeric digit. You need to know how many passwords can be created.

**PLAN** Make an organized list.

#### SOLVE

A	B	A	B	A	B	<input type="text"/>	B	A	B
0	0	<input type="text"/>	1	2	2	3	3	4	4

A	B	A	B	A	<input type="text"/>	A	B	A	B
5	5	<input type="text"/>	6	7	7	8	8	9	9

There are  passwords.

**CHECK** Draw a tree diagram to check the result.

#### Check Your Progress

**DELI** At a deli, customers can choose from ham or turkey on wheat, rye, or multi-grain bread. How many sandwich possibilities are there?

### HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## MAIN IDEA

- Write fractions in simplest form.

## BUILD YOUR VOCABULARY (pages 77–78)

Fractions having the same  are called **equivalent fractions**.

A fraction is in **simplest form** when the greatest common factor of the  and the denominator is 1.

## EXAMPLES Write Fractions in Simplest Form

Write each fraction in simplest form.

1  $\frac{12}{45}$

To write a fraction in simplest form, you can divide by common factors or divide by the . Let's divide by the GCF.

First, find the GCF of the  and

.

factors of 12:

factors of 45:

The GCF of 12 and 45 is .

Then, divide the numerator and the denominator by .

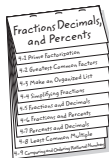
$$\frac{12}{45} = \frac{12 \div \boxed{\phantom{000}}}{45 \div \boxed{\phantom{000}}} = \boxed{\phantom{000}}$$

So,  $\frac{12}{45}$  written in simplest form is  $\frac{4}{15}$ .

## FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 4-4, take notes about simplifying fractions. Be sure to include an example.



2  $\frac{40}{64}$ factors of 40: 1, 2, , 5, 8, 10, 20, factors of 64: 1, 2, 4, 8, , 32, 64The GCF of 40 and 64 is .

$$\frac{40}{64} = \frac{40 \div \text{}}{64 \div \text{}} = \text{$$

So,  $\frac{40}{64}$  written in simplest form is .**Check Your Progress**

Write each fraction in simplest form.

a.  $\frac{32}{40}$

b.  $\frac{28}{49}$

**EXAMPLE**

3 **MUSIC** Two notes form a *perfect fifth* if the simplified fraction of the frequencies of the notes equals  $\frac{3}{4}$ . If note D = 294 Hertz and note G = 392 Hertz, do they form a *perfect fifth*?

$$\frac{\text{frequency of note D}}{\text{frequency of note G}} = \text{$$

$$= \frac{\frac{1}{2} \times 3 \times \frac{1}{7} \times \frac{1}{7}}{\frac{2}{1} \times 2 \times 2 \times \frac{7}{1} \times \frac{7}{1}} = \text{$$

The fraction of the frequency of the notes D and G is .So, the two notes do form a *perfect fifth*.**Check Your Progress**

In a bag of 96 marbles, 18 of the marbles are black. Write the fraction of black marbles in simplest form.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## EXAMPLES Use Mental Math

## MAIN IDEA

- Write fractions as terminating or repeating decimals and write decimals as fractions.

Write each fraction or mixed number as a decimal.

1  $\frac{9}{10}$

THINK

$$\frac{9}{10} = \square$$

$\times 10$  (top arrow)  
 $\times 10$  (bottom arrow)

So,  $\frac{9}{10} = \square$ .

2  $7\frac{3}{5}$

$7\frac{3}{5} = 7 + \square$

Think of it as a sum.

$= 7 + \square$

You know that  $\frac{3}{5} = 0.6$ .

$= 7.6$

Add mentally.

So,  $7\frac{3}{5} = \square$ .

## Check Your Progress

Write each fraction or mixed number as a decimal.

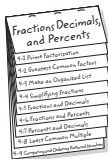
a.  $\frac{7}{25}$

b.  $9\frac{1}{5}$

## FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 4-5, take notes on writing fractions as decimals and writing decimals as fractions. Include examples.



**EXAMPLE** Use Pencil and Paper or a Calculator3 Write  $\frac{1}{8}$  as a decimal.**METHOD 1** Use paper and pencil.

$$\begin{array}{r} 0.125 \\ 8 \overline{)1.000} \\ \underline{-8} \phantom{00} \\ 20 \phantom{0} \\ \underline{-16} \phantom{0} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

Divide  by .

Division ends when the remainder is 0.

**METHOD 2** Use a calculator.

$$1 \div 8 \text{ ENTER } \boxed{\phantom{000}}$$

$$\text{So, } \frac{1}{8} = \boxed{\phantom{000}}.$$

**WRITE IT**

Write the following

decimal equivalents:

$$\frac{1}{2}, \frac{1}{3}, \frac{2}{3}, \frac{1}{4}, \frac{3}{4}, \frac{1}{5}, \frac{1}{10}, \frac{1}{8}$$

---



---



---



---



---

**Check Your Progress** Write each fraction or mixed number as a decimal.

a.  $\frac{2}{5}$

b.  $1\frac{7}{20}$

**BUILD YOUR VOCABULARY** (pages 77–78)A terminating decimal is a decimal whose digits .Repeating decimals have a pattern in the digits that repeats .Bar notation is used to indicate that a number repeats forever by writing a  over the  that repeat.



**EXAMPLES** Write Fractions as Repeating Decimals

1 Write  $\frac{1}{11}$  as a decimal.

**METHOD 1** Use paper and pencil.

$$\begin{array}{r} 0.0909\dots \\ 11 \overline{)1.0000} \\ \underline{0} \\ 10 \\ \underline{0} \\ 99 \\ \underline{99} \\ \phantom{0} \end{array}$$

**METHOD 2** Use a calculator.

$$1 \div 11 \text{ [ENTER]} 0.0909\dots$$

So,  $\frac{1}{11} = \boxed{\phantom{0.0909\dots}}$ .

**Check Your Progress** Write  $2\frac{5}{11}$  as a decimal.

**EXAMPLE** Use a Power of 10

5 **CEREAL** Jorge read that 0.72 of his favorite cereal was whole-grain wheat. Find what fraction of his cereal, in simplest form, is whole-grain wheat.

$$0.72 = \frac{72}{100} \quad \text{The final digit, } \boxed{\phantom{2}}, \text{ is in the hundredths place.}$$

$$= \frac{18}{25} \quad \text{Simplify.}$$

So,  $\boxed{\phantom{18/25}}$  of the cereal is whole-grain wheat.

**Check Your Progress** **EXERCISE** Jeanette ran 0.86 of a mile. What fraction of a mile did she run?

## HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## MAIN IDEA

- Write fractions as percents and percents as fractions.

**BUILD YOUR VOCABULARY** (pages 77–78)

A ratio is a  of two numbers by

.

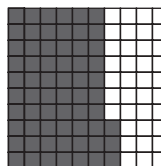
When a  compares a number to , it can be written as a percent.

**EXAMPLES** Write Ratios as Percents

Write each ratio as a percent.

- 1 Diana scored 63 goals out of 100 attempts.

You can represent 63 out of 100 with a model.



$$\frac{63}{100} = \text{$$

- 2 In a survey, 31.9 out of 100 people on average preferred crunchy peanut butter.

$$\frac{31.9}{\text{$$

**Check Your Progress** Write each ratio as a percent.

- a. Alicia sold 34 of the 100 cookies at the bake sale.

- b. On average, 73.4 out of 100 people preferred the chicken instead of the roast beef.

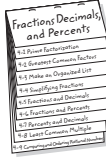
## KEY CONCEPT

**Percent** A percent is a ratio that compares a number to 100.

**FOLDABLES**

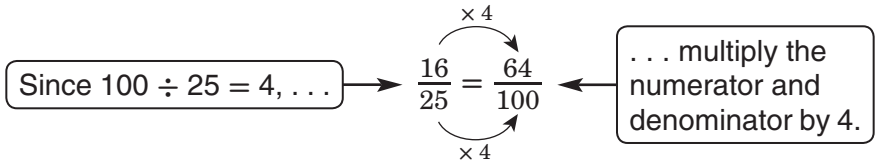
**ORGANIZE IT**

Under the tab for Lesson 4-6, take notes on writing fractions as percents and percents as fractions. Include examples.



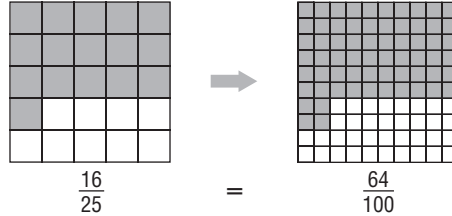
**EXAMPLE Write a Fraction as a Percent**

3 Write  $\frac{16}{25}$  as a percent.



$\frac{64}{100} = 64\%$

So,  $\frac{16}{25} = 64\%$ .



**Check Your Progress** Write  $\frac{11}{20}$  as a percent.

**EXAMPLE**

1 **FISHING** William caught and released 20 trout on his fishing trip. Twelve of them were rainbow trout. What percent of the trout he caught were rainbow trout?

William caught  rainbow trout out of 20 trout.

$\frac{12}{20} =$

Write an equivalent fraction with a denominator of 100.

$= 60\%$

$\frac{60}{100} = 60\%$

So,  of the trout William caught were rainbow trout.

**Check Your Progress** **READING** Mitchell read 18 out of 25 chapters of a book during his winter vacation. What percent of chapters did he read?

**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## MAIN IDEA

- Write percents as decimals and decimals as percents.

## KEY CONCEPT

**Writing Percents as Decimals** To write a percent as a decimal, divide the percent by 100 and remove the percent symbol.

## EXAMPLES Write Percents as Decimals

## 1 Write 47.8% as a decimal.

To write a percent as a decimal, you can either first write the percent as a  or divide mentally. Let's divide mentally.

$$\begin{aligned} 47.8\% &= \underbrace{47.8} && \text{Remove the \% symbol and divide by 100.} \\ &= 0.478 && \text{Add leading zero.} \end{aligned}$$

So,  $47.8\% =$  .

2 **POPULATION** According to the Administration on Aging, about  $28\frac{1}{5}\%$  of the population of the United States is 19 years of age or younger. Write  $28\frac{1}{5}\%$  as a decimal.

$$\begin{aligned} 28\frac{1}{5}\% &= 28.2\% && \text{Write } \frac{1}{5} \text{ as } 0.2. \\ &= \underbrace{28.2} && \text{Remove the \% symbol and divide by 100.} \\ &= \text{  } && \text{Add leading zero.} \end{aligned}$$

So,  $28\frac{1}{5}\% = 0.282$ .

## Check Your Progress

a. Write 83.2% as a decimal.

b. **AMUSEMENT PARKS** A popular amusement park reports that  $17\frac{1}{10}\%$  of its visitors will return at least three times during the year. Write  $17\frac{1}{10}\%$  as a decimal.

**EXAMPLE** Write Decimals as Percents

3 Write 0.33 as a percent.

**METHOD 1** Write the decimal as a fraction.

$$0.33 = \frac{33}{100}$$

$$= \boxed{\phantom{000}} \quad \text{Write the fraction as a percent.}$$

**METHOD 2** Multiply mentally.

$$0.33 = 33.0 \quad \text{Multiply by 100.}$$

$$= 33\% \quad \text{Add the \% symbol.}$$

$$\text{So, } 0.33 = \boxed{\phantom{000}}.$$

**Check Your Progress** Write 0.7 as a percent.

**EXAMPLE**

1 **POPULATION** In 1790, about 0.05 of the population of the United States lived in an urban setting. Write 0.05 as a percent.

$$0.05 = \boxed{\phantom{000}} \quad \text{Definition of decimal}$$

$$= \boxed{\phantom{000}} \quad \text{Definition of } \boxed{\phantom{000}}$$

**Check Your Progress** In 2000, the population of Illinois had increased by 0.086 from 1990. Write 0.086 as a percent.

## HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## MAIN IDEA

- Find the least common multiple of two or more numbers.

## BUILD YOUR VOCABULARY (pages 77–78)

A **multiple** is the  of a number and any  number.

The **least common multiple (LCM)** of two or more numbers is the  of their common multiples, excluding .

## EXAMPLES Find the LCM

## 1 Find the LCM of 4 and 6.

**METHOD 1** List the nonzero multiples.

multiples of 4:

multiples of 6:

The common multiples are , 24, 36, ...

The LCM of 4 and 6 is .

**METHOD 2** Use prime factorization.

$$4 = \square \cdot \square$$

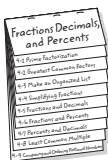
$$6 = \square \cdot \square$$

The LCM is  $2 \cdot 2 \cdot 3$  or .

## FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 4-8, take notes about least common multiples. Be sure to include examples.



### 2 Find the LCM of 4 and 15.

Use Method 2. Find the prime factorization of each number.

$$4 = \square \times 2 \text{ or } \square$$

$$15 = \square \times \square$$

The prime factors of 4 and 15 are  $\square$ .

The LCM of 4 and 15 is  $\square \times 3 \times 5$ , or  $\square$ .

**Check Your Progress** Find the LCM of each set of numbers.

a. 8, 12

b. 6, 14

### EXAMPLE

**3 WORK** On an assembly line, machine A must be oiled every 18 minutes, machine B every 24 minutes, and machine C every 48 minutes. If all three machines are turned on at the same time, in how many minutes will all three machines need to be oiled at the same time?

First find the LCM of 18, 24, and 48.

$$18 = 2 \times 3 \times 3 \text{ or } 2 \times 3^2$$

$$24 = 2 \times 2 \times 2 \times 3 \text{ or } 2^3 \times 3$$

$$48 = 2 \times 2 \times 2 \times 2 \times \square \text{ or } 2^4 \times 3$$

The LCM of 18, 24, and 48 is  $2^4 \times 3^2$  or  $\square \times 9$ , which is 144.

So, all three machines will need to be oiled at the same time in

$\square$  minutes.

**Check Your Progress** **LIGHTS** Brenda put up three different strands of decorative blinking lights. The first strand blinks every 6 seconds while the second strand blinks every 8 seconds. The third strand blinks every 4 seconds. If all strands blink at the same time, in how many seconds will they again blink at the same time?

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## MAIN IDEA

- Compare and order fractions, decimals, and percents.

## BUILD YOUR VOCABULARY (pages 77–78)

Rational numbers are numbers that can be written as fractions and include fractions, terminating and repeating decimals, and .

A common denominator is a common multiple of two or more .

The least common denominator (LCD) is the  of the denominators.

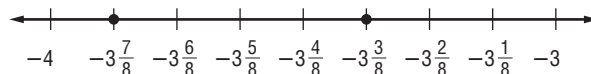
## EXAMPLES Compare Rational Numbers

Replace each  $\bullet$  with  $<$ ,  $>$ , or  $=$  to make a true sentence.

1  $-3\frac{3}{8} \bullet -3\frac{7}{8}$

Graph each rational number on a number line.

Mark off equal size increments of  between  $-4$  and .



The number line shows that  $-3\frac{3}{8}$    $-3\frac{7}{8}$ .

2  $\frac{5}{12} \bullet \frac{7}{16}$

The LCD of the denominators, 12 and 16, is 48.

$$\frac{5}{12} = \frac{5 \cdot \boxed{\phantom{00}}}{12 \cdot \boxed{\phantom{00}}} = \frac{\boxed{\phantom{00}}}{48}$$

$$\frac{7}{16} = \frac{7 \cdot \boxed{\phantom{00}}}{16 \cdot \boxed{\phantom{00}}} = \frac{\boxed{\phantom{00}}}{48}$$

Since   $<$  , then  $\frac{5}{12}$    $\frac{7}{16}$ .

## REVIEW IT

Explain how to write  $\frac{48}{60}$  as a decimal.  
(Lesson 4-5)

---



---



---



---



**Check Your Progress** Replace each  $\bullet$  with  $<$ ,  $>$ , or  $=$  to make a true sentence.

a.  $-2\frac{4}{5} \bullet -2\frac{3}{5}$

b.  $\frac{5}{8} \bullet \frac{7}{12}$

## KEY CONCEPT

**Rational Numbers**  
Rational numbers are numbers that can be written as fractions.

**FOLDABLES** Takes notes on rational numbers. Be sure to include examples.

## EXAMPLE

**3 DOGS** According to the Pet Food Manufacturer's Association, 11 out of 25 people own large dogs and 13 out of 50 people own medium dogs. Do more people own large or medium dogs?

Write  $\frac{11}{25}$  and  $\frac{13}{50}$  as decimals and compare.

$$\frac{11}{25} = \text{ } \quad \frac{13}{50} = \text{ }$$

Since  $0.44 > 0.26$ ,  $\frac{11}{25} \text{ } \frac{13}{50}$ .

So, a greater fraction of people own  dogs than own  dogs.


**Check Your Progress** A survey showed that 21 out of 50 people stated that summer is their favorite season and 13 out of 25 people prefer fall. Do more people prefer summer or fall?

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## STUDY GUIDE

	VOCABULARY PUZZLEMAKER	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 4 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 4, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (pages 77–78) to help you solve the puzzle.

4-1

## Prime Factorization

Underline the correct terms to complete each sentence.

1. A factor tree is complete when all of the factors at the bottom of the factor tree are (*prime, composite*) factors.
2. The order of the factors in prime factorization (*does, does not*) matter.

Find the prime factorization of each number.

3. 36

4. 48

5. 250

6. 60

4-2

## Greatest Common Factor

Complete each sentence.

7. A  shows how elements of sets of numbers are related.
8. A prime factor is a factor that is a  number.

9. You can find the  of two numbers by  the common prime factors.

**Find the common prime factors and GCF of each set of numbers.**

10. 20, 24

11. 28, 42

4-3

### Problem-Solving Investigation: Make an Organized List

12. **CLOTHES** Lucas has a pair of brown pants and a pair of black pants. He has a white dress shirt, a blue dress shirt, and a tan dress shirt. He has a striped tie and a polka-dotted tie. Assuming he can wear any combination, how many combinations of one pair of pants, one dress shirt, and one tie can Lucas wear?

4-4

### Simplifying Fractions

**Complete the sentence.**

13. To find the simplest form of a fraction,  the numerator and the denominator by the .

**Write each fraction in simplest form.**

14.  $\frac{18}{24}$

15.  $\frac{15}{60}$

4-5

### Fractions and Decimals

**Write each fraction or mixed number as a decimal. Use bar notation if the decimal is a repeating decimal.**

16.  $3\frac{2}{3}$

17.  $5\frac{3}{4}$

18.  $\frac{2}{5}$

19.  $7\frac{3}{8}$

20.  $6\frac{1}{2}$

21.  $\frac{7}{10}$

4-6

Fractions and Percents

22. Write the ratio that compares 4 to 25 in three different ways.

23. Write the ratio in exercise 23 as a percent.

24. Write 88% as a fraction in simplest form.

25. Write  $\frac{9}{20}$  as a percent.

4-7

Percents and Decimals

Write each percent as a decimal.

26. 69%

27. 3%

28.  $32\frac{1}{4}\%$

Write each decimal as a percent.

29. 0.47

30. 0.5775

31. 0.09

4-8

Least Common Multiple

Find the LCM of each set of numbers.

32. 15, 36

33. 21, 70

34. 16, 20

35. 6, 9, 24

36. 12, 18, 30

37. 14, 28, 35

4-9

Comparing and Ordering Rational Numbers

Replace each  $\bullet$  with  $<$ ,  $>$ , or  $=$  to make each sentence true.

38.  $\frac{14}{35} \bullet \frac{12}{20}$

39.  $\frac{21}{49} \bullet \frac{18}{63}$

## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 4.

Check the one that applies. Suggestions to help you study are given with each item.

- I completed the review of all or most lessons without using my notes or asking for help.
- You are probably ready for the Chapter Test.
  - You may want to take the Chapter 4 Practice Test on page 225 of your textbook as a final check.

- I used my Foldables or Study Notebook to complete the review of all or most lessons.
- You should complete the Chapter 4 Study Guide and Review on pages 221–224 of your textbook.
  - If you are unsure of any concepts or skills, refer back to the specific lesson(s).
  - You may want to take the Chapter 4 Practice Test on page 225 of your textbook.

- I asked for help from someone else to complete the review of all or most lessons.
- You should review the examples and concepts in your Study Notebook and Chapter 4 Foldables.
  - Then complete the Chapter 1 Study Guide and Review on pages 221–224 of your textbook.
  - If you are unsure of any concepts or skills, refer back to the specific lesson(s).
  - You may also want to take the Chapter 4 Practice Test on page 225 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

## Applying Fractions

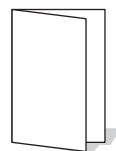


Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

**Begin with a sheet of 11" by 17" paper, four index cards, and glue.**

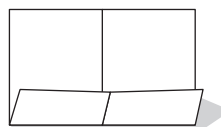
**STEP 1**

**Fold** the paper in half widthwise.



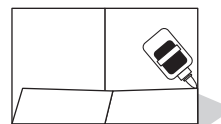
**STEP 2**

**Open** and fold along the length about  $2\frac{1}{2}$ " from the bottom.



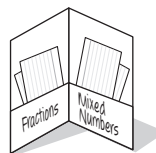
**STEP 3**

**Glue** the edges on either side to form two pockets.



**STEP 4**

**Label** the pockets *Fractions* and *Mixed Numbers*, respectively. Place two index cards in each pocket.



**NOTE-TAKING TIP:** When you take notes, place a question mark next to any concepts you do not understand. Be sure to ask your teacher to clarify these concepts before a test.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 5. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
compatible numbers			
like fractions			
multiplicative inverse [MUHL-tuh-PLIH-kuh-tihv]			
reciprocal [rih-SIH-pruh-kuhl]			
unlike fractions			

## MAIN IDEA

- Estimate sums, differences, products, and quotients of fractions and mixed numbers.

## EXAMPLES Estimate with Mixed Numbers

Estimate.

$$1 \quad 5\frac{1}{4} + 3\frac{5}{8}$$

$$5\frac{1}{4} + 3\frac{5}{8} \rightarrow 5 + \square = \square$$

The sum is *about*  $\square$ .

$$2 \quad 7\frac{3}{4} \times 1\frac{7}{8}$$

$$7\frac{3}{4} \times 1\frac{7}{8} \rightarrow \square \times \square = \square$$

The sum is *about*  $\square$ .

## Check Your Progress Estimate.

a.  $2\frac{7}{9} + 5\frac{1}{4}$

b.  $4\frac{2}{3} \times 3\frac{1}{8}$



## EXAMPLES Estimate with Fractions

Estimate.

$$3 \quad \frac{1}{3} + \frac{4}{7}$$

$$\begin{array}{|c|c|c|} \hline \hline \hline \end{array} \quad \frac{1}{3} \text{ is about } \frac{1}{2}.$$

$$\begin{array}{|c|c|c|c|c|c|} \hline \hline \hline \end{array} \quad \frac{4}{7} \text{ is about } \frac{1}{2}.$$

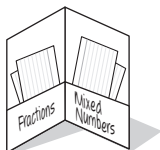
$$\frac{1}{3} + \frac{4}{7} \rightarrow \square + \square = \square$$

The sum is *about*  $\square$ .

## FOLDABLES

## ORGANIZE IT

Record main ideas, definitions and other notes about estimating with fractions on study cards. Store these cards in the "Fractions" pocket of your Foldable.



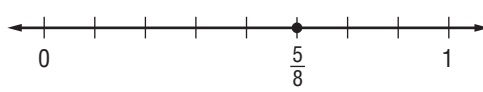


**REMEMBER IT**

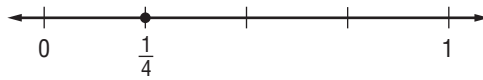


Some fractions are easy to round because they are close to 1. Examples of these kinds of fractions are ones where the numerator is one less than the denominator, such as  $\frac{4}{5}$  or  $\frac{7}{8}$ .

1  $\frac{5}{8} - \frac{1}{4}$



$\frac{5}{8}$  is about  $\frac{1}{2}$ .



$\frac{1}{4}$  is about 0.

$\frac{5}{8} - \frac{1}{4} \rightarrow$    $-$    $=$

The difference is *about* .

2  $\frac{5}{6} \div \frac{4}{5}$

$\frac{5}{6} \div \frac{3}{4} \approx$    $\div$    $= 1$

$\frac{5}{6} \approx$   and  $\frac{3}{4} \approx$  .

**Check Your Progress** Estimate.

a.  $\frac{8}{9} + \frac{1}{6}$

b.  $\frac{11}{12} - \frac{2}{9}$

c.  $\frac{3}{5} \div \frac{7}{8}$




**BUILD YOUR VOCABULARY** (page 103)

Numbers that are easy to compute  are called **compatible numbers**.

**EXAMPLE** Use Compatible Numbers

3 Estimate  $\frac{3}{4} \times 21$  using compatible numbers.

$\frac{3}{4} \times 21 \approx \frac{3}{4} \times 20$  or

Round 21 to 20, since 20 is divisible by 4.

**Check Your Progress** Estimate  $\frac{2}{3} \times 17$  using compatible numbers.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

# Adding and Subtracting Fractions

## MAIN IDEA

- Add and subtract fractions.

## KEY CONCEPT

**Adding and Subtracting Like Fractions** To add or subtract like fractions, add or subtract the numerators and write the result over the denominator. Simplify if necessary.

### EXAMPLES Add and Subtract Like Fractions

Add or subtract. Write in simplest form.

1  $\frac{7}{12} + \frac{4}{12}$

$$\frac{7}{12} + \frac{4}{12} = \frac{\boxed{\phantom{000}}}{12}$$

Add the  $\boxed{\phantom{000}}$ .

$$= \boxed{\phantom{000}}$$

Write the sum over the denominator.

2  $\frac{5}{6} - \frac{1}{6}$

$$\frac{5}{6} - \frac{1}{6} = \frac{\boxed{\phantom{000}}}{6}$$

$\boxed{\phantom{000}}$  the numerators.

$$= \boxed{\phantom{000}} \text{ or } \boxed{\phantom{000}}$$

Write the difference over the  $\boxed{\phantom{000}}$ . Simplify.

### EXAMPLES Add and Subtract Unlike Fractions

Add or subtract. Write in simplest form.

1  $\frac{1}{3} + \frac{1}{9}$

To add or subtract unlike fractions, you can use a  $\boxed{\phantom{000}}$  or the  $\boxed{\phantom{000}}$ . Let's use the LCD.

The least common denominator of 3 and 9 is  $\boxed{\phantom{000}}$ .

$$\frac{1}{3} = \frac{1 \times 3}{\boxed{\phantom{000}}} = \frac{3}{9}$$

Rename  $\frac{1}{3}$  using the  $\boxed{\phantom{000}}$ .

$$\frac{1}{3} \rightarrow \boxed{\phantom{000}}$$

$$+ \frac{1}{9} \rightarrow \frac{+ \frac{1}{9}}{\boxed{\phantom{000}}}$$

So,  $\frac{1}{3} + \frac{1}{9} = \boxed{\phantom{000}}$ .

**WRITE IT**

Explain what happens to denominators when adding like fractions.

---



---



---



---

$$\frac{3}{4} - \frac{1}{6}$$

The LCD of 4 and 6 is .

$$\frac{3}{4} \rightarrow \frac{3 \times 3}{4 \times 3} \rightarrow \frac{\text{}}{12}$$

Rename each fraction using the LCD.

$$-\frac{1}{6} \rightarrow \frac{1 \times 2}{6 \times 2} \rightarrow -\frac{\text{}}{12}$$

So,  $\frac{3}{4} - \frac{1}{6} = \text{}$ .

**Check Your Progress**

Add or subtract. Write in simplest form.

a.  $\frac{7}{15} + \frac{4}{15}$

b.  $\frac{3}{8} + \frac{1}{4}$

c.  $\frac{7}{9} - \frac{1}{6}$



**EXAMPLE**

- 5 ART** A picture mounted on art board is  $\frac{1}{8}$  inch thick. The frame for the picture is  $\frac{1}{2}$  inch thick. How much thicker than the picture is the frame?

The phrase *how much thicker* suggests , so find  $\frac{1}{2} - \frac{1}{8}$ .

$$\frac{1}{2} - \frac{1}{8} = \frac{\text{}}{\text{}} - \frac{\text{}}{\text{}}$$

Rename the fractions using the LCD.

$$= \frac{3}{8}$$

Subtract the numerators.

The frame is  inch thicker than the picture.

**Check Your Progress**

**RUNNING** Gregory ran  $\frac{3}{4}$  of a mile on Monday and  $\frac{5}{6}$  of a mile on Tuesday. How much more of a mile did he run on Tuesday?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Add and subtract mixed numbers.

## EXAMPLES Add and Subtract Mixed Numbers

Add or subtract. Write in simplest form.

$$1 \quad 3\frac{1}{12} + 14\frac{7}{12}$$

Estimate  $3 + 15 =$

$$\begin{array}{r} 3\frac{1}{12} \\ + 14\frac{7}{12} \\ \hline \end{array}$$

or

Add the whole numbers and fractions separately.

Simplify. Compare the sum to the estimate.

$$2 \quad 9\frac{7}{10} - 4\frac{3}{5}$$

Estimate  $10 - 5 =$

$$\begin{array}{r} 9\frac{7}{10} \longrightarrow 9\frac{7}{10} \\ \hline \end{array}$$

$$\begin{array}{r} -4\frac{3}{5} \longrightarrow \hline \hline \end{array}$$

$$\begin{array}{r} \hline \hline \end{array}$$

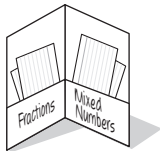
Rename the fraction using the .

Simplify. Compare the sum to the estimate.

## FOLDABLES

## ORGANIZE IT

Record main ideas, definitions, and other notes about adding and subtracting mixed numbers on study cards. Store the cards in the "Mixed Numbers" pocket of your Foldable.



## EXAMPLES Rename Mixed Numbers to Subtract

Subtract. Write in simplest form.

$$1 \quad 8\frac{1}{5} - 3\frac{3}{5}$$

$$\begin{array}{r} 8\frac{1}{5} \longrightarrow 7\frac{6}{5} \\ \hline \end{array}$$

Rename  $8\frac{1}{5}$  as .

$$\begin{array}{r} -3\frac{3}{5} \longrightarrow -3\frac{3}{5} \\ \hline \end{array}$$

First subtract the

and then the .

$$11 - 8\frac{2}{3}$$

$$11 \rightarrow \boxed{\phantom{00}}$$

$$- 8\frac{2}{3} \rightarrow - 8\frac{2}{3} \quad \text{Subtract.}$$


---


$$\boxed{\phantom{00}}$$

**REMEMBER IT** 

When you are adding mixed numbers, you can add the whole numbers first and then add the fractions. Make sure if the fractions add to more than one, that you change the sum of the whole numbers.

**Check Your Progress** Add or subtract. Write in simplest form.

a.  $5\frac{5}{14} + 4\frac{3}{14}$

b.  $6\frac{2}{9} - 3\frac{5}{9}$

c.  $9\frac{3}{8} - 5\frac{3}{4}$

**EXAMPLE**

**5 COOKING** A quiche recipe calls for  $2\frac{3}{4}$  cups of grated cheese. A recipe for quesadillas requires  $1\frac{1}{3}$  cups of grated cheese. What is the total amount of grated cheese needed for both recipes?

$$2\frac{3}{4} + 1\frac{1}{3} = 2\frac{9}{12} + 1\frac{4}{12}$$

Rename the fractions.

$$= \boxed{\phantom{00}} + \boxed{\phantom{00}}$$

Add whole numbers and add fractions.

$$= 3 + 1\frac{1}{12} \text{ or } \boxed{\phantom{00}}$$

Rename  $\frac{13}{12}$  as  $1\frac{1}{12}$  and simplify.

The total amount of grated cheese needed is  cups.

**Check Your Progress** **TIME** Jordan spent  $3\frac{1}{6}$  hours at the mall and  $2\frac{1}{4}$  hours at the movies. How many more hours did he spend at the mall than at the movies?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## Problem-Solving Investigation: Eliminate Possibilities

### EXAMPLE Eliminate Possibilities

#### MAIN IDEA

- Solve problems by eliminating possibilities.

**GAMES** On a television game show, the winning contestant must answer three questions correctly to win the grand prize. Each question is worth twice as many points as the question before it. The third question is worth 1,000 points. How much is the first question worth—250, 500, or 2,000 points?

**UNDERSTAND** You know that there are three questions and each question is worth  as many points as the question before it. You know that the third question is worth 1,000 points.

**PLAN** Eliminate answers that are not

.

**SOLVE** The first question cannot be worth 2,000 points since each question after it would have to worth more than 2,000 points, and the third question is only  points. So, eliminate that choice. If the first question is worth 500 points, then the second question would be worth 1,000 points and the third question would be worth  points. So, eliminate that choice. The reasonable answer is 250 points.

**CHECK** If the first question is worth 250 points, then the second question would be worth  points, and the third question would be worth 1,000 points. So, the answer is correct.

**Check Your Progress** **CELL PHONES** A cell phone company charges \$35 for 500 free minutes and \$0.50 for each additional minute. Using this plan, what is a reasonable price a customer would pay for using 524 minutes—\$32, \$40, or \$47?

### HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## MAIN IDEA

- Multiply fractions and mixed numbers.

## EXAMPLES Multiply Fractions

**Multiply. Write in simplest form.**

1  $\frac{1}{8} \times \frac{1}{9}$

$$\frac{1}{8} \times \frac{1}{9} = \boxed{\phantom{00}}$$

← Multiply the numerators.  
← Multiply the denominators.

$$= \boxed{\phantom{00}}$$

Simplify.

2  $6 \times \frac{1}{3}$

$$6 \times \frac{1}{3} = \boxed{\phantom{00}} \times \frac{1}{3}$$

Write 6 as  $\boxed{\phantom{00}}$ .

$$= \frac{6 \times 1}{1 \times 3}$$

Multiply the numerators and the denominators.

$$= \boxed{\phantom{00}} \text{ or } \boxed{\phantom{00}}$$

Simplify.

## KEY CONCEPT

### Multiplying Fractions

To multiply fractions, multiply the numerators and multiply the denominators.

**FOLDABLES** Take notes on multiplying fractions and mixed numbers. Place your study cards in your Foldable.

## Check Your Progress

**Multiply. Write in simplest form.**

a.  $\frac{1}{5} \times \frac{1}{7}$

b.  $12 \times \frac{1}{6}$

## EXAMPLE Simplify Before Multiplying

**Multiply. Write in simplest form.**

1  $\frac{3}{12} \times \frac{4}{5}$

$$\frac{3}{12} \times \frac{4}{5} = \frac{3}{\cancel{12}_3} \times \frac{\cancel{4}^1}{5}$$

Divide 4 and 12 by their GCF, 4.

$$= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}}$$

Multiply the numerators and the denominators.

$$= \boxed{\phantom{00}}$$

Simplify.

**REMEMBER IT**

The Distributive Property can help you do mental math. When you see a problem like  $\frac{1}{4} \cdot 4\frac{4}{9}$ , you can think, "What is  $\frac{1}{4}$  of 4 and what is  $\frac{1}{4}$  of  $\frac{4}{9}$ ?" This is equal to  $\frac{1}{4} \left(4 + \frac{4}{9}\right)$ .

**EXAMPLE Multiply Mixed Numbers**

**1** Multiply  $\frac{1}{3} \times 6\frac{6}{7}$ . Write in simplest form.

**METHOD 1** Rename the mixed number.

$$\frac{1}{3} \times 6\frac{6}{7} = \frac{1}{3} \times \frac{48}{7}$$

Rename  $6\frac{6}{7}$  as an

fraction, .

$$= \frac{\text{input}}{1 \times 7}$$

Multiply.

$$= \text{input} \text{ or } \text{input}$$

Simplify.

**METHOD 2** Use mental math.

$$\frac{1}{3} \times 6\frac{6}{7} = \frac{1}{3} \times \left( \text{input} + \text{input} \right)$$

Write  $6\frac{6}{7}$  as a sum of its parts.

$$= \left( \frac{1}{3} \times 6 \right) + \left( \frac{1}{3} \times \frac{6}{7} \right)$$

Property

$$= \text{input} + \text{input} \text{ or } \text{input}$$

Multiply.

**Check Your Progress** Multiply. Write in simplest form.

a.  $\frac{4}{9} \times \frac{6}{7}$

b.  $\frac{1}{6} \times 4\frac{6}{9}$

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:



## MAIN IDEA

- Solve equations with rational number solutions.

## BUILD YOUR VOCABULARY (page 103)

Two numbers whose  is  are called **multiplicative inverses**.

**Reciprocals** is another name given to

## EXAMPLES Find Multiplicative Inverses

## KEY CONCEPT

**Multiplicative Inverse Property** The product of a number and its multiplicative inverse is 1.

Find the multiplicative inverse of each number.

1

$$\frac{4}{7}$$

$$\frac{4}{7} \cdot \text{[ ]} = 1$$

Multiply  $\frac{4}{7}$  by  to get the product 1.

The multiplicative inverse of  $\frac{4}{7}$  is , or .

2

$$6\frac{1}{4}$$

$$6\frac{1}{4} = \text{[ ]}$$

Rename the  as an improper fraction.

$$\frac{25}{4} \cdot \text{[ ]} = 1$$

Multiply  $\frac{25}{4}$  by  to get the product 1.

The multiplicative inverse of  $6\frac{1}{4}$  is .

## Check Your Progress

Find the multiplicative inverse of each number.

a.  $\frac{5}{8}$

b.  $4\frac{1}{3}$

## KEY CONCEPT

**Multiplication Property of Equality** If you multiply each side of an equation by the same nonzero number, the two sides remain equal.

## EXAMPLE Solve a Division Equation

3 Solve  $11 = \frac{p}{6}$ . Check your solution.

$$11 = \frac{p}{6}$$

Write the equation.

$$11 \cdot \square = \frac{p}{6} \cdot \square$$

Multiply each side by  $\square$ .

$$\square = p$$

Simplify.

## Check

$$11 = \frac{p}{6}$$

Write the original equation.

$$11 = \frac{\square}{6}$$

Replace  $p$  with  $\square$ .

$$11 = \square$$

Simplify.

The solution is  $\square$ .

## EXAMPLE Use a Reciprocal to Solve an Equation

1 Solve  $\frac{2}{5}x = \frac{6}{15}$ .

$$\frac{2}{5}x = \frac{6}{15}$$

Write the equation.

$$\square \frac{2}{5}x = \square \left( \frac{6}{15} \right)$$

Multiply each side by the  $\square$  of  $\frac{2}{5}$ .

$$x = \square \text{ or } \square$$

Simplify.

## Check Your Progress Solve.

a.  $\frac{m}{9} = 4$

b.  $\frac{3}{8}x = \frac{3}{4}$

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

# Dividing Fractions and Mixed Numbers

## MAIN IDEA

- Divide fractions and mixed numbers.

## KEY CONCEPT

**Division by a Fraction**  
To divide by a fraction, multiply by its multiplicative inverse or reciprocal.

## WRITE IT

Will the quotient  $7\frac{1}{6} \div 3\frac{2}{3}$  be a fraction less than 1 or greater than 1? Explain.

---



---



---



---

### EXAMPLE Divide by a Fraction

- 1 Find  $\frac{2}{3} \div \frac{4}{9}$ . Write in simplest form.

$$\begin{aligned} \frac{2}{3} \div \frac{4}{9} &= \frac{2}{3} \cdot \boxed{\phantom{00}} && \text{Multiply by the reciprocal } \frac{4}{9}. \\ &= \frac{\cancel{2}^1}{\cancel{3}_1} \cdot \frac{\cancel{9}^3}{\cancel{4}_2} && \text{Divide out common factors.} \\ &= \boxed{\phantom{00}} \text{ or } \boxed{\phantom{00}} && \text{Multiply and simplify.} \end{aligned}$$

### EXAMPLE Divide by Mixed Numbers

- 2 Find  $\frac{5}{6} \div 2\frac{1}{2}$ . Write in simplest form.

**Estimate**  $1 \div \frac{5}{2} = 1 \times \boxed{\phantom{00}}$  or  $\frac{2}{5}$

$$\begin{aligned} \frac{5}{6} \div 2\frac{1}{2} &= \frac{5}{6} \div \boxed{\phantom{00}} && \text{Rename } 2\frac{1}{2} \text{ as an } \boxed{\phantom{00}} \text{ fraction.} \\ &= \frac{5}{6} \cdot \boxed{\phantom{00}} && \text{Multiply by the reciprocal of } \frac{5}{2}. \\ &= \boxed{\phantom{00}} && \text{Divide out common factors.} \\ &= \boxed{\phantom{00}} && \text{Multiply. The quotient is close to the estimate.} \end{aligned}$$

### Check Your Progress

Divide. Write in simplest form.

a.  $\frac{6}{7} \div \frac{2}{5}$

b.  $\frac{3}{8} \div 2\frac{1}{2}$

**EXAMPLE**

- 3 FACTORY** A bottling machine needs to be restocked with new lids every  $2\frac{3}{4}$  hours. If the machine runs  $19\frac{1}{4}$  hours, how many times will it have to be restocked with lids?

$$\begin{aligned}
 19\frac{1}{4} \div 2\frac{3}{4} &= \boxed{\phantom{00}} \div \boxed{\phantom{00}} && \text{Rename the mixed numbers as improper fractions.} \\
 &= \frac{77}{4} \cdot \frac{4}{11} && \text{Multiply by the } \boxed{\phantom{00}} \\
 &&& \text{of } \frac{11}{4}, \text{ which is } \frac{4}{11}. \\
 &= \frac{\cancel{77}^7}{\cancel{4}_1} \cdot \frac{\cancel{4}_4}{\cancel{11}_1} && \text{Divide out common factors.} \\
 &= \boxed{\phantom{00}} \text{ or } \boxed{\phantom{00}} && \text{Multiply.}
 \end{aligned}$$

So, the machine will need to be restocked  $\boxed{\phantom{00}}$  times.


**Check Your Progress** **FURNITURE** A rectangular table is  $5\frac{5}{6}$  feet long. If the area of the table is  $20\frac{5}{12}$  square feet, how wide is the table?

## HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## STUDY GUIDE

	VOCABULARY PUZZLEMAKER	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 5 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 5, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (page 103) to help you solve the puzzle.

5-1

## Estimating with Fractions

Estimate.

1.  $8\frac{2}{3} + 7\frac{1}{4}$

2.  $11\frac{7}{8} \div 3\frac{5}{6}$

5-2

## Adding and Subtracting Fractions

Add or subtract. Write in simplest form.

3.  $\frac{7}{8} + \frac{3}{8}$

4.  $\frac{5}{6} - \frac{1}{3}$

5.  $\frac{1}{5} + \frac{3}{4}$

5-3

## Adding and Subtracting Mixed Numbers

Add or subtract. Write in simplest form.

6.  $3\frac{7}{8} + 6\frac{1}{4}$

7.  $7\frac{1}{6} + 2\frac{5}{12}$

8.  $8\frac{3}{7} - 4\frac{5}{7}$

9.  $9\frac{2}{9} - 1\frac{2}{3}$

5-4

## Problem-Solving Investigation: Eliminate Possibilities

10. **READING** Joel read  $\frac{5}{8}$  of a novel. If the novel has 600 pages, is 250, 300, or 375 a reasonable number of pages that Joel has read?

5-5

## Multiplying Fractions and Mixed Numbers

Multiply. Write in simplest form.

11.  $\frac{2}{7} \times 4\frac{1}{5}$

12.  $\frac{1}{6} \times \frac{3}{4}$

13.  $5\frac{1}{6} \times \frac{2}{5}$

14.  $\frac{5}{8} \times \frac{4}{5}$

5-6

## Algebra: Solving Equations

Find the multiplicative inverse of each number.

15.  $\frac{3}{5}$

16.  $1\frac{1}{2}$

17. 3

Solve each equation.

18.  $\frac{1}{3}a = \frac{5}{6}$

19.  $-4 = \frac{k}{3}$

5-7

## Dividing Fractions and Mixed Numbers

Divide. Write in simplest form.

20.  $\frac{1}{4} \div \frac{2}{3}$

21.  $\frac{7}{8} \div \frac{2}{3}$

22.  $6 \div 1\frac{1}{3}$

23.  $5\frac{3}{4} \div 2\frac{1}{2}$

## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 5.

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 5 Practice Test on page 275 of your textbook as a final check.

I used my Foldable or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 5 Study Guide and Review on pages 271–274 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 5 Practice Test on page 275 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 5 Foldable.
- Then complete the Chapter 5 Study Guide and Review on pages 271–274 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 5 Practice Test on page 275 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

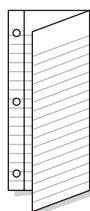
## Ratios and Proportions



Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

**Begin with a sheet of notebook paper.**

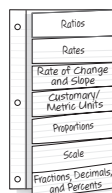
**STEP 1** **Fold** lengthwise to the holes.



**STEP 2** **Cut** along the top line and then make equal cuts to form 7 tabs.



**STEP 3** **Label** the major topics as shown.



**NOTE-TAKING TIP:** When you take notes, it may be helpful to include an example for each term or concept learned.



**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 6. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
cross products			
equivalent ratios			
gram			
kilogram			
liter			
meter			
metric system			
proportion			
proportional			
rate			

Vocabulary Term	Found on Page	Definition	Description or Example
ratio			
scale			
scale drawing			
scale factor			
scale model			
slope			
unit rate			
unit ratio			

## MAIN IDEA

- Write ratios as fractions in simplest form and determine whether two ratios are equivalent.

## BUILD YOUR VOCABULARY (pages 121–122)

A  is a comparison of two quantities by division. Ratios that express the  relationship between two quantities are **equivalent ratios**.

## EXAMPLE Write Ratios in Simplest Form

- 1 **APPLES** Mr. Gale bought a basket of apples. Using the table, write a ratio comparing the Red Delicious apples to the Granny Smith apples as a fraction in simplest form.

## Mr. Gale's Apples

12 Fuji

9 Granny Smith

30 Red Delicious

$$\begin{array}{l} \text{Red Delicious} \\ \text{Granny Smith} \end{array} \frac{30}{9} = \frac{\cancel{30}^{10}}{\cancel{9}_3} \text{ or } \boxed{\phantom{00}}$$

The ratio of Red Delicious apples to Granny Smith apples is .

## EXAMPLE Identify Equivalent Ratios

- 2 Determine whether the ratios 12 onions to 15 potatoes and 32 onions to 40 potatoes are equivalent.

$$12 \text{ onions} : 15 \text{ potatoes} = \frac{12 \div 3}{15 \div 3} \text{ or } \boxed{\phantom{00}}$$

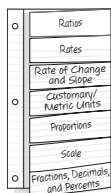
$$32 \text{ onions} : 40 \text{ potatoes} = \frac{32 \div 8}{40 \div 8} \text{ or } \boxed{\phantom{00}}$$

The ratios simplify to the same fraction. They are .

## FOLDABLES

## ORGANIZE IT

Record a term or concept from Lesson 6-1 under the Ratios tab and write a definition along with an example to the right of the definition.



**Check Your Progress**

- a. **FLOWERS** A garden has 18 roses and 24 tulips. Write a ratio comparing roses to tulips as a fraction in simplest form.

- b. Determine whether the ratios 3 cups vinegar to 8 cups water and 5 cups vinegar to 12 cups water are equivalent.

**REMEMBER IT**

Ratios such as 120:1,800 can also be written in simplest form as 1:15.

**EXAMPLE**

- 3 **POOLS** It is recommended that no more than one person be allowed into the shallow end of an outdoor public pool for every 15 square feet of surface area. If a local pool's shallow end has a surface area of 1,800 square feet, are the lifeguards correct to allow 120 people into that part of the pool?

**Recommended Ratio**

$$1:15 = \boxed{\phantom{00}} \text{ persons per square feet}$$

**Actual Ratio**

$$120:1,800 = \frac{120}{1,800} \text{ or } \boxed{\phantom{00}} \text{ persons per square feet}$$

Since the ratios simplify to the same fraction, they are

. The lifeguards are correct.

**Check Your Progress**

- SCHOOL** A district claims that they have 1 teacher for every 15 students. If they actually have 2,700 students and 135 teachers, is their claim correct?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Determine unit rates.

## BUILD YOUR VOCABULARY (pages 121–122)

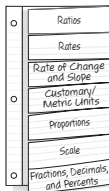
A ratio that  two quantities with different kinds of units is called a **rate**.

When a rate is simplified so that it has a  of 1 unit, it is called a **unit rate**.

## FOLDABLES

## ORGANIZE IT

Under the rate tab, take notes on rate and unit rate. Be sure to include examples.



## EXAMPLES Find Unit Rates

- 1 **READING** Julia read 52 pages in 2 hours. What is the average number of pages she read per hour?

Write the rate as a fraction. Then find an equivalent rate with a denominator of 1.

$$52 \text{ pages in 2 hours} = \frac{52 \text{ pages}}{2 \text{ hours}}$$

Write the rate as a fraction.

$$\begin{aligned} & 52 \text{ pages} \div \square \\ &= \frac{\quad}{2 \text{ hours} \div \square} \end{aligned}$$

Divide the numerator and denominator by .

$$\begin{aligned} &= \frac{\square \text{ pages}}{\square \text{ hours}} \end{aligned}$$

Simplify.

- 2 **SODA** Find the unit price per can if it costs \$3 for 6 cans of soda. Round to the nearest hundredth if necessary.

$$\$3 \text{ for 6 cans} = \frac{\$3}{6 \text{ cans}}$$

Write the rate as a fraction.

$$= \frac{\$3 \div 6}{6 \text{ cans} \div 6}$$

Divide the numerator and the denominator by 6.

$$= \frac{\square}{\square}$$

Simplify.

**REMEMBER IT**

The word *rate* is often understood to mean unit rate.

**Check Your Progress** Find each unit rate.

a. 16 laps in 4 minutes

b. \$3 for one dozen cookies

**EXAMPLE** Compare Using Unit Rates

**1 TEST EXAMPLE** The costs of 4 different sizes of orange juice are shown in the table. Which container costs the least per ounce?

Amount	Total Cost
16 oz	\$1.28
32 oz	\$1.92
64 oz	\$2.56
96 oz	\$3.36

A 96-oz container

C 32-oz container

B 64-oz container

D 16-oz container

**Read the Item**

Find the unit price, or the cost per ounce of each size of orange juice. Divide the price by the number of ounces.

**Solve the Item**

$$\$1.28 \div \boxed{\phantom{00}} \text{ ounces} = \boxed{\phantom{00}} \text{ per ounce.}$$

$$\$1.92 \div \boxed{\phantom{00}} \text{ ounces} = \boxed{\phantom{00}} \text{ per ounce.}$$

$$\$2.56 \div \boxed{\phantom{00}} \text{ ounces} = \boxed{\phantom{00}} \text{ per ounce.}$$

$$\$3.36 \div \boxed{\phantom{00}} \text{ ounces} = \boxed{\phantom{00}} \text{ per ounce.}$$

The -ounce container of orange juice costs the least per ounce. The answer is .

**Check Your Progress**

**MULTIPLE CHOICE** The costs of different sizes of bottles of laundry detergent are shown below. Which bottle costs the least per ounce?

Amount	Total Cost
16 oz	\$3.12
32 oz	\$5.04
64 oz	\$7.04
96 oz	\$11.52

- F** 96-oz container  
**G** 64-oz container  
**H** 32-oz container  
**J** 16-oz container

**EXAMPLE** Use a Unit Rate

- 1 POTATOES** An assistant cook peeled 18 potatoes in 6 minutes. At this rate, how many potatoes can he peel in 50 minutes?

Find the unit rate.

$$18 \text{ potatoes in } 6 \text{ minutes} = \frac{18 \div 6}{6 \div 6} = \frac{3}{1}$$

The unit rate is  potatoes per minute.

$$\frac{3 \text{ potatoes}}{1 \text{ min}} \cdot 50 \text{ min} = \text{  potatoes}$$

He can peel  potatoes in 50 minutes.

**Check Your Progress**

Sarah can paint 21 beads in 7 minutes. At this rate, how many beads can she paint in one hour?

**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

**MAIN IDEA**

- Identify rate of change and slope using tables and graphs.

**BUILD YOUR VOCABULARY** (pages 121–122)

A **rate of change** is a rate that describes how one quantity changes in relation to another and is usually expressed as a

**EXAMPLE** Find Rate of Change from a Table

- 1 The table shows the number of miles a car drove on a trip. Use the information to find the approximate rate of change.

		+ 65	+ 65	+ <input style="width: 30px; height: 20px;" type="text"/>
		↘	↘	↘
Distance (miles)	65	130	195	260
Time (hours)	1	2	3	4
		↙	↙	↙
		+ 1	+ 1	+ 1

$$\frac{\text{change in distance}}{\text{change in time}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

The distance increased  miles for every hour.

So, the rate was 65 miles per hour.

**Check Your Progress** The table shows the number of miles a car drove on a trip. Use the information to find the rate of change.

Distance (miles)	44	88	132	176
Fuel (gallons)	2	4	6	8

**WRITE IT**

Explain how rate of change is similar to unit rates.

---



---



---



---

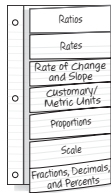


**BUILD YOUR VOCABULARY** (pages 121–122)

The constant rate of change in  $y$  with respect to the constant change in  is called the **slope** of a line.

**EXAMPLE** Find Rate of Change from a Graph**FOLDABLES****ORGANIZE IT**

Under the rate of change and slope tab, take notes on how to find the slope of a line.

**GRAPH THE DATA** Find the slope of the line. Explain what the slope represents.

Graph the points and connect them with a line.

Hours	Amount Earned
3	\$45
6	\$90
9	\$135

Pick two points on the line, such as (3, 45) and (6, 90), to find the slope.

$$\text{slope} = \frac{\text{change in } y}{\text{change in } x}$$

$$= \frac{90 - \boxed{\phantom{00}}}{6 - \boxed{\phantom{00}}}$$

$$= \frac{45}{3} \text{ or } \boxed{\phantom{00}}$$

The slope is  and represents the amount earned per hour.

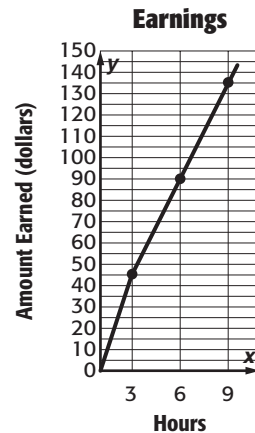
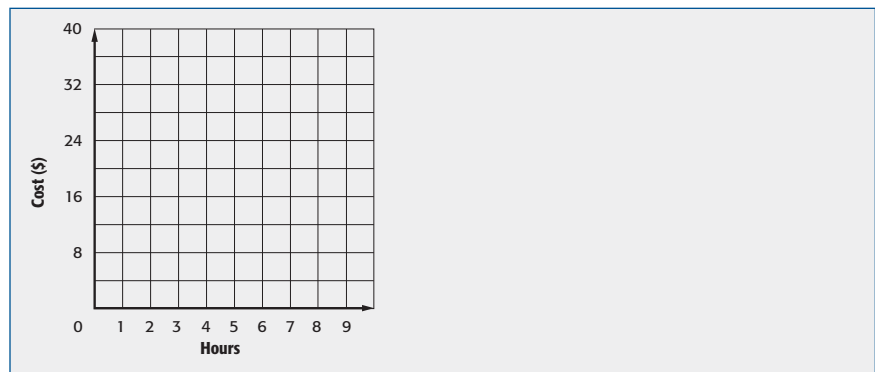
**Check Your Progress** The

table shows the cost of renting a bicycle. Graph the data. Find the slope of the line. Explain what the slope represents.

Hours	Cost
2	\$8
4	\$16
6	\$24



## MAIN IDEA

- Change units in the customary system.

## BUILD YOUR VOCABULARY (pages 121–122)

A **unit ratio** is a ratio in which the denominator is  unit.

## EXAMPLES Convert Larger Units to Smaller Units

REMEMBER IT 

You multiply to change from larger units of measure because it takes more smaller units than larger units to measure an object.

## 1 Convert 2 miles into feet.

Since 1 mile = 5,280 feet, the unit ratio is .

$$2 \text{ mi} = 2 \text{ mi} \cdot \frac{5,280 \text{ ft}}{1 \text{ mi}} \quad \text{Multiply by } \frac{5,280 \text{ ft}}{1 \text{ mi}}.$$

$$= 2 \cancel{\text{mi}} \cdot \frac{5,280 \text{ ft}}{1 \cancel{\text{mi}}} \quad \text{Divide out common units.}$$

$$= \text{  } \text{ ft or } 10,560 \text{ ft} \quad \text{Multiply.}$$

So, 2 miles =  feet.

## 2 ELEVATOR The elevator in an office building has a weight limit posted of one and a half tons. How many pounds can the elevator safely hold?

$$1\frac{1}{2} \text{ t} = 1\frac{1}{2} \text{ t} \cdot \text{  } \quad \text{Multiply by } \text{  }$$

since there are  pounds in 1 ton.

$$= 1\frac{1}{2} \cdot 2,000 \text{ lb or } 3,000 \text{ lb} \quad \text{Multiply.}$$

So, the elevator can safely hold  pounds.

## REVIEW IT

Explain how estimating can help you solve a problem. (Lesson 6-1)

---



---



---



---



---

## Check Your Progress Complete.

a.  $8 \text{ yd} = \blacksquare \text{ ft}$

b.  $4\frac{1}{2} \text{ T} = \blacksquare \text{ lb}$

**EXAMPLES** Convert Smaller Units to Larger Units**3** Convert 11 cups into pints.

Since 1 pint = 2 cups, the unit ratio is  $\frac{2 \text{ c}}{1 \text{ pt}}$ , and its

reciprocal is .

$$11 \text{ c} = 11 \text{ c} \cdot \frac{1 \text{ pt}}{2 \text{ c}}$$

Multiply by .

$$= 11 \cancel{\text{ c}} \cdot \frac{1 \text{ pt}}{2 \cancel{\text{ c}}}$$

Divide out common units.

$$= 11 \cdot \text{  }$$

$$= \frac{11}{2} \text{ pt}$$

Multiplying 11 by  $\frac{1}{2}$  is the same as dividing 11 by 2.

$$= \text{  } \text{ pt}$$

So, 11 cups =  pints.

**4** **SOCCKER** Tracy kicked a soccer ball 1,000 inches. How many feet did she kick the ball?

Since 1 foot = 12 inches, multiply by . Then divide out common units.

$$1,000 \text{ in.} = 1,000 \cancel{\text{ in.}} \cdot \frac{1 \text{ ft}}{12 \cancel{\text{ in.}}}$$

$$= 1,000 \text{ in.} \cdot \text{  } \text{ ft}$$

$$= \frac{1000}{12} \text{ ft or } \text{  } \text{ ft}$$

So, Tracy kicked the soccer ball .

**Check Your Progress** Complete.

a. 21 qt = ■ gal

b. 78 oz = ■ lb

**EXAMPLE**

- 5 LEMONADE** Paul made 6 pints of lemonade and poured it into 10 glasses equally. How many cups of lemonade did each glass contain?

Begin by converting 6 pints to cups.

$$6 \text{ pt} = 6 \text{ pt} \cdot \frac{\boxed{\phantom{000}}}{1 \text{ pt}}$$

$$= 6 \cdot 2 \text{ cups or } \boxed{\phantom{000}} \text{ cups}$$

Find the unit rate which gives the number of cups per glass.

$$\frac{12 \text{ cups}}{10 \text{ glasses}} = \frac{6}{5} \text{ or } \boxed{\phantom{000}} \text{ cups per glass}$$

- Check Your Progress** **CANDY** Tom has 3 pounds of candy he plans to divide evenly among himself and his 3 best friends. How many ounces of candy will each of them get?

**HOMEWORK  
ASSIGNMENT**

Page(s):

Exercises:

**MAIN IDEA**

- Change metric units of length, capacity, and mass.

**BUILD YOUR VOCABULARY** (pages 121–122)

The metric system is a  system of measures.

The meter is the base unit of .

The liter is the base unit of .

The gram measures .

The base unit of mass in the metric system is the

.

**EXAMPLES** Convert Units in the Metric System**1** Complete  $7.2 \text{ m} = \blacksquare \text{ mm}$ .

To convert from meters to millimeters,

by .

$$7.2 \times \text{} = \text{}$$

So,  $7.2 \text{ m} = \text{} \text{ mm}$ .

**2** Complete  $40 \text{ cm} = \blacksquare \text{ m}$ .

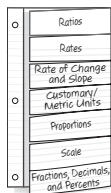
To convert from centimeters to meters,  by .

$$40 \div \text{} = \text{}$$

So,  $40 \text{ cm} = \text{} \text{ m}$ .

**FOLDABLES****ORGANIZE IT**

Under the metric units tab, take notes on how to change metric units, include examples involving length, capacity, and mass.



**Check Your Progress** Complete.

a.  $7.5 \text{ m} = \square \text{ cm}$

b.  $3,400 \text{ mm} = \square \text{ m}$

**EXAMPLE**

- 3 FARMS** A bucket holds 12.8 liters of water. Find the capacity of the bucket in milliliters.

You are converting from  to milliliters. Since the bucket holds 12.8 liters, use the relationship  $1 \text{ L} = \square \text{ mL}$ .

$1 \text{ L} = 1,000 \text{ mL}$

Write the relationship.

$$\square \times 1 \text{ L} = 12.8 \times 1,000 \text{ mL}$$

Multiply each side by 12.8 since you have 12.8 liters.

$$12.8 \text{ L} = \square \text{ mL}$$

To multiply 12.8 by 1,000, move the decimal point  places to the right.

So, the capacity of the bucket in milliliters is  mL.

**Check Your Progress** **BOOKS** A box of textbooks has a mass of 32,850 grams. What is the mass of the box in kilograms?

**WRITE IT**

Explain how you can multiply a number by a power of ten.

---



---



---



---

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

**EXAMPLES** Convert Between Measurement Systems

- 1 Convert 7.13 miles to kilometers. Round to the nearest hundredth if necessary.

Use the relationship 1   $\approx$  1.61 kilometers.

$$1 \text{ mi} \approx \text{  } \text{ km} \quad \text{Write the relationship.}$$

$$7.13 \times 1 \text{ mi} \approx 7.13 \times \text{  } \text{ km} \quad \text{Multiply each side by }$$

since you have 7.13 mi.

$$7.13 \text{ mi} \approx \text{  } \text{ km} \quad \text{Simplify.}$$

So, 7.13 miles is approximately  kilometers.

- 5 Convert 925.48 grams to pounds. Round to the nearest hundredth if necessary.

Since 1 pound  $\approx$   grams, the unit ratio is  $\frac{1 \text{ lb}}{453.6 \text{ g}}$ .

$$925.48 \text{ g} \approx \text{  } \text{ g} \cdot \frac{1 \text{ lb}}{453.6 \text{ g}} \quad \text{Multiply by }$$

$$\approx \frac{925.48 \text{ lb}}{453.6} \text{ or } \text{  } \text{ lb} \quad \text{Simplify.}$$

So, 925.48 grams is approximately  pounds.

**Check Your Progress** Complete. Round to the nearest hundredth if necessary.

a. 8.15 gal =  L

b. 5.75 m =  yd

## MAIN IDEA

- Solve proportions.

## BUILD YOUR VOCABULARY (pages 121–122)

Two quantities are **proportional** if they have a

rate or ratio.

A **proportion** is an equation stating that two ratios or rates

are .

In a proportion, a **cross product** is the  of the numerator of one ratio and the denominator of the other ratio.

## KEY CONCEPT

**Proportion** A proportion is an equation stating that two ratios are equivalent.

## EXAMPLE Identify Proportional Relationships

- 1 **MATH** Before dinner, Mohammed solved 8 math problems in 12 minutes. After dinner, he solved 2 problems in 3 minutes. Is the number of problems he solved proportional to the time?

To identify proportional relationships, you can compare unit rates or compare ratios by comparing cross products. Let's

compare ratios by comparing .

$$\begin{array}{ccc} \text{problems} \longrightarrow & \frac{8}{12} \stackrel{?}{=} \frac{2}{3} & \longleftarrow \text{problems} \\ \text{minutes} \longrightarrow & & \longleftarrow \text{minutes} \end{array}$$

$$8 \cdot 3 = \boxed{\phantom{00}} \cdot 2$$

$$24 = 24$$

Since the cross products are , the number of problems solved is proportional to the time.



**Check Your Progress**

Determine if the quantities \$30 for 12 gallons of gasoline and \$10 for 4 gallons of gasoline are proportional.

**EXAMPLES** Solve a Proportion

2 Solve  $\frac{5}{8} = \frac{18}{x}$ .

$$\frac{5}{8} = \frac{18}{x}$$

$$5 \cdot x = 8 \cdot 18$$

$$5x = \boxed{\phantom{000}}$$

$$\frac{5x}{\boxed{\phantom{00}}} = \frac{144}{\boxed{\phantom{00}}}$$

$$x = \boxed{\phantom{000}}$$

Write the proportion.

Find the cross products.

Multiply.

Divide each side by  $\boxed{\phantom{00}}$ .

Simplify.

1 Solve  $\frac{3.5}{14} = \frac{6}{n}$ .

$$\frac{3.5}{14} = \frac{6}{n}$$

$$3.5 \cdot n = 14 \cdot 6$$

$$3.5n = \boxed{\phantom{000}}$$

$$\frac{3.5n}{\boxed{\phantom{00}}} = \frac{84}{\boxed{\phantom{00}}}$$

$$n = \boxed{\phantom{000}}$$

Write the proportion.

Find the cross products.

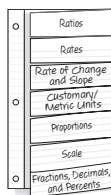
Multiply.

Divide each side by  $\boxed{\phantom{00}}$ .

Simplify.

**FOLDABLES****ORGANIZE IT**

Under the proportions tab, take notes on how to solve a proportion. Include examples.

**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

**Check Your Progress**

Solve each proportion.

a.  $\frac{9}{15} = \frac{k}{18}$

b.  $\frac{4.6}{w} = \frac{4}{5}$

## Problem-Solving Investigation: Draw a Diagram

### MAIN IDEA

- Solve problems by drawing a diagram.

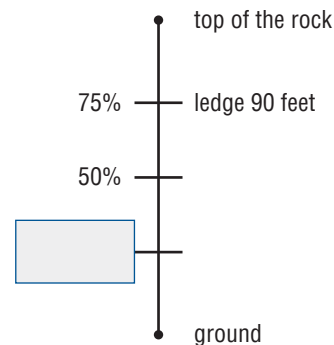
### EXAMPLE Draw a Diagram

**ROCK CLIMBING** A rock climber stops to rest at a ledge 90 feet above the ground. If this represents 75% of the total climb, how high above the ground is the top of the rock?

**UNDERSTAND** You know that  feet is 75% of the total height. You need to find the total height.

**PLAN** Draw a diagram showing the part already climbed.

**SOLVE**



You know that  $75\% \div 3 = 25\%$ . If 75% of the total height is 90 feet, then 25% of the total height would be  $90 \div 3$ , or 30, feet. You know that  $75\% + 25\% = \text{$ , so 90 feet + 30 feet = 120 feet, which is the height of the top of the rock.

**CHECK** Since 75%, or 0.75, of the total height is 90 feet, and  $90 \div 120 = \text{$ , the solution checks.

### HOMEWORK ASSIGNMENT

Page(s):

Exercises:

**Check Your Progress** **INVENTORY** A retail store has taken inventory of 400 items. If this represents 80% of the total items in the store, what is the total number of items in the store?

## MAIN IDEA

- Solve problems involving scale drawings.

## BUILD YOUR VOCABULARY (pages 121–122)

Scale drawings and scale models are used to represent objects that are too  or too  to be drawn at actual size.

The **scale** gives the ratio that compares the  of the drawing to the real object.

## EXAMPLE Use a Map Scale

- 1 **MAPS** What is the actual distance between Portland and Olympia?



**Step 1** Use a ruler to find the map distance between the two cities. The map distance is about .

**Step 2** Write and solve a proportion using the scale. Let  $d$  represent the actual distance between the cities.

$$\begin{array}{l} \text{map} \longrightarrow \frac{3}{8} \text{ inch} \\ \text{actual} \longrightarrow \frac{23 \text{ mi}}{d \text{ mi}} = \frac{1.69 \text{ inches}}{d \text{ mi}} \end{array} \quad \begin{array}{l} \longleftarrow \text{map} \\ \longleftarrow \text{actual} \end{array}$$

$$\frac{3}{8} \times d = 23 \times 1.69 \quad \text{Cross products.}$$

$$0.375d = 3.887 \quad \text{Multiply. Write } \frac{3}{8} \text{ as a decimal.}$$

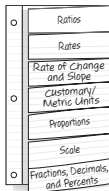
$$d = \text{  } \quad \text{Divide both sides by 0.375.}$$

The distance between the cities is about  kilometers.

## FOLDABLES

## ORGANIZE IT

Under the scale tab, explain how to solve a problem involving scale drawings. Be sure to include an example.



**Check Your Progress** **MAPS** On a map of California, the distance between San Diego and Bakersfield is about  $11\frac{2}{5}$  centimeters. What is the actual distance if the scale is 1 centimeter = 30 kilometers?

## WRITE IT

Explain why these two scales are equivalent scales:

$$\frac{1}{2} \text{ inch} = 4 \text{ miles}$$

$$1 \text{ inch} = 8 \text{ miles}$$

---



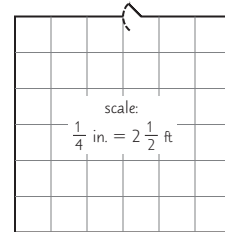
---



---

### EXAMPLE Use a Blueprint Scale

**2 ARCHITECTURE** On the blueprint of a new house, each square has a side length of  $\frac{1}{4}$  inch. If the length of a bedroom on the blueprint is  $1\frac{1}{2}$  inches, what is the actual length of the room?



Write and solve a proportion.

	Scale	=	Length of Room	
blueprint →	$\frac{1}{4}$ inch		<div style="border: 1px solid black; width: 100px; height: 30px;"></div>	← blueprint
actual →	<div style="border: 1px solid black; width: 100px; height: 30px;"></div>		$t$ feet	← actual

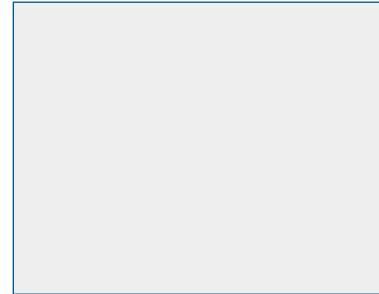
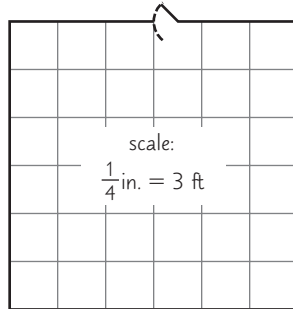
$$\frac{1}{4} \cdot t = \text{[ ]} \quad \text{Cross products}$$

$$\frac{1}{4}t = \frac{15}{4} \quad \text{Multiply.}$$

$$t = \text{[ ]} \quad \text{Simplify.}$$

The length of the room is .

**Check Your Progress** On a blueprint of a new house, each square has a side length of  $\frac{1}{4}$  inch. If the width of the kitchen on the blueprint is 2 inches, what is the actual width of the room?



**EXAMPLE Find a Scale Factor**

**3** Find the scale factor of a blueprint if the scale is  $\frac{1}{2}$  inch = 3 feet.

$$\frac{\frac{1}{2} \text{ inch}}{3 \text{ feet}} = \frac{\frac{1}{2} \text{ inch}}{\boxed{\phantom{000000}}}$$

Convert 3 feet to .

$$= \boxed{\phantom{000}} \cdot \frac{\frac{1}{2} \text{ inch}}{36 \text{ inches}}$$

Multiply by  to eliminate the fraction in the numerator.

$$= \boxed{\phantom{000}}$$

Divide out the common units.

The scale factor is . That is, each measure on the

blueprint is  the  measure.

**Check Your Progress** Find the scale factor of a blueprint if the scale is 1 inch = 4 feet.

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

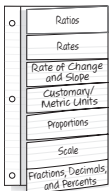
## MAIN IDEA

- Write percents as fractions and decimals and vice versa.

## FOLDABLES

## ORGANIZE IT

Under the Fractions, Decimals, and Percents tab, take notes on writing percents as fractions and fractions as percents. Include examples.



## EXAMPLES Percents as Fractions

- 1 **NUTRITION** In a recent consumer poll, 41.8% of the people surveyed said they gained nutrition knowledge from family and friends. What fraction is this? Write in simplest form.

$$41.8\% = \frac{41.8}{100}$$

$$= \frac{41.8}{100} \cdot \square$$

$$= \square \text{ or } \square$$

Write a fraction with a denominator of 100.

Multiply to eliminate the decimal in the numerator.

Simplify.

- 2 Write  $12\frac{1}{2}\%$  as a fraction in simplest form.

$$12\frac{1}{2}\% = \frac{12\frac{1}{2}}{100}$$

$$= 12\frac{1}{2} \div 100$$

$$= \square \div 100$$

$$= \square \times \square$$

$$= \square \text{ or } \square$$

Write a fraction.

Divide.

Write  $12\frac{1}{2}$  as an improper fraction.

Multiply by the reciprocal of 100.

Simplify.

## Check Your Progress

- a. **ELECTION** In a recent election, 64.8% of registered voters actually voted. What fraction is this? Write in simplest form.

- b. Write  $62\frac{1}{2}\%$  as a fraction in simplest form.

## KEY CONCEPTS

Common Fraction/  
Decimal/Percent  
Equivalents

$$\frac{1}{3} = 0.\bar{3} = 33\frac{1}{3}\%$$

$$\frac{2}{3} = 0.\bar{6} = 66\frac{2}{3}\%$$

$$\frac{1}{8} = 0.125 = 12\frac{1}{2}\%$$

$$\frac{3}{8} = 0.375 = 37\frac{1}{2}\%$$

$$\frac{5}{8} = 0.625 = 62\frac{1}{2}\%$$

$$\frac{7}{8} = 0.875 = 87\frac{1}{2}\%$$

## EXAMPLES Fractions as Percents

- 3 **PRODUCE** In one shipment of fruit to a grocery store, 5 out of 8 bananas were still green. Find this amount as a percent.

$$\frac{5}{8} = \frac{n}{100}$$

Write a proportion.

$$500 = 8n$$

Find the cross products.

$$\frac{500}{\square} = \frac{8n}{\square}$$

Divide each side by  $\square$ .

$$\square = n$$

Simplify.

$$\text{So, } \frac{5}{8} = 62\frac{1}{2}\% \text{ or } \square.$$

- 4 Write  $\frac{5}{12}$  as a percent. Round to the nearest hundredth if necessary.

$$\frac{5}{12} = \frac{n}{100}$$

Write a proportion.

$$\square = \square$$

Find the cross products.

$$500 \div 12 \text{ [ENTER]} 41.66666667$$

Use a calculator.

$$\text{So, } \frac{5}{12} \text{ is about } \square.$$

- 5 Write  $\frac{3}{7}$  as a percent. Round to the nearest hundredth.

$$\frac{3}{7} = 0.4285714\dots$$

Write  $\frac{3}{7}$  as a decimal.

$$= \square \text{ by 100 and add the } \square.$$

## Check Your Progress

Write each fraction as a percent. Round to the nearest hundredth.

a.  $\frac{13}{25}$

b.  $\frac{11}{15}$


HOMEWORK  
ASSIGNMENT

Page(s):

Exercises:

## BRINGING IT ALL TOGETHER

## STUDY GUIDE

	VOCABULARY PUZZLEMAKER	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 6 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 6, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (pages 121–122) to help you solve the puzzle.

6-1

## Ratios

State whether each sentence is true or false. If false, replace the underlined word to make it a true sentence.

1. When you simplify a ratio, write a fraction as a mixed number.

2. To write a ratio comparing measures, both quantities should have the same unit of measure.

Write each ratio as a fraction in simplest form.

3. 63:7

4. 15:54

6-2

## Rates

Complete.

5. A  is a ratio that compares two quantities with different kinds of units.

Write each ratio as a fraction in simplest form.

6. 36 inches: 48 inches

7. 15 minutes to 3 hours

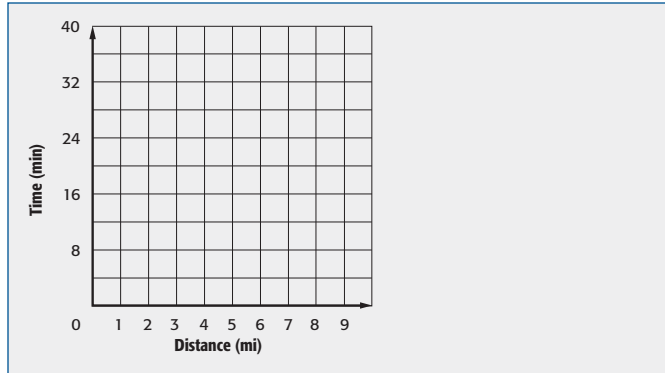


6-3

Rate of Change and Slope

8. The table shows Amanda’s running time during a 5-mile race. Graph the data. Find the slope of the line. Explain what the slope represents.

Distance (miles)	Time (minutes)
1	6
2	12
3	18
4	24
5	30



6-4

Measurement: Changing Customary Units

Complete.

9.  $3\frac{3}{4}$  pt =  c

10. 90 ft =  yd

11. 156 oz =  lb

6-5

Measurement: Changing Metric Units

Complete.

12. 4.3 cm =  mm

13. 42.7 g =  mg

6-6

Algebra: Solving Proportions

Complete each sentence.

14. The cross products of a  are equal.

15. If you know  parts of a proportion, you can solve for the fourth part by  and then  both sides by the coefficient of the unknown.

Solve each proportion.

16.  $\frac{15}{n} = \frac{3}{8}$

17.  $\frac{6}{20} = \frac{x}{80}$

18.  $\frac{b}{16} = \frac{3}{48}$

6-7

**Problem-Solving Investigation: Draw a Diagram**

19. **LADDERS** A ladder leans against a wall. The top of the ladder rests against the wall at a point 12 feet above the ground. If this distance represents 80% of the height of the wall, how tall is the wall?

6-8

**Scale Drawings**

On a map, the scale is  $\frac{1}{4}$  inch = 10 miles. For each map distance, find the actual distance.

20. 6 inches       21.  $\frac{3}{8}$  inch
22.  $2\frac{1}{2}$  inches       23. 1 inch

6-9

**Fractions, Decimals, and Percents**

Complete the table of equivalent fractions.

	Fraction	Decimal	Percent
24.	$\frac{1}{3}$	<input style="width: 80px; height: 30px;" type="text"/>	<input style="width: 80px; height: 30px;" type="text"/>
25.	$\frac{3}{8}$	<input style="width: 80px; height: 30px;" type="text"/>	$37\frac{1}{2}\%$
26.	$\frac{1}{8}$	<input style="width: 80px; height: 30px;" type="text"/>	<input style="width: 80px; height: 30px;" type="text"/>
27.	<input style="width: 50px; height: 30px;" type="text"/>	0.875	$87\frac{1}{2}\%$

## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 6.

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 6 Practice Test on page 337 of your textbook as a final check.

I used my Foldable or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 6 Study Guide and Review on pages 333–336 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 6 Practice Test on page 337 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 6 Foldable.
- Then complete the Chapter 6 Study Guide and Review on pages 333–336 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 6 Practice Test on page 337 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

## Applying Percents

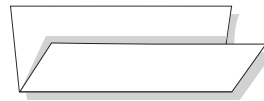


Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

**Begin with a sheet of 11" × 17" paper.**

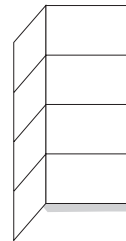
**STEP 1**

**Fold** the paper in half lengthwise.



**STEP 2**

**Open** and refold the paper into fourths along the opposite axis.



**STEP 3**

**Trace** along the fold lines and label each section with a lesson title or number.

7-1	7-2
7-3	7-4
7-5	7-6
7-7	7-8



**NOTE-TAKING TIP:** When you take notes, it is often helpful to reflect on ways the concepts apply to your daily life.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 7. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
discount			
percent equation			
percent of change			
percent of decrease			
percent of increase			

*(continued on the next page)*

Vocabulary Term	Found on Page	Definition	Description or Example
percent proportion			
principal			
sales tax			
simple interest			

**MAIN IDEA**

- Find the percent of a number.

**REMEMBER IT**

Finding the percent of a number means to multiply.

**EXAMPLE** Find the Percent of a Number**1** Find 8% of 125.

**METHOD 1** Write the percent as a fraction.

$$8\% = \frac{8}{100} \text{ or } \boxed{\phantom{00}}$$

$$\frac{2}{25} \text{ of } 125 = \frac{2}{25} \times 125 \text{ or } \boxed{\phantom{00}}$$

**METHOD 2** Write the percent as a decimal.

$$8\% = \frac{8}{100} \text{ or } \boxed{\phantom{00}}$$

$$0.08 \text{ of } 125 = 0.08 \times 125 \text{ or } \boxed{\phantom{00}}$$

So, 8% of 125 is  $\boxed{\phantom{00}}$ .

**Check Your Progress** Find 72% of 350.
**EXAMPLE** Use Percents Greater than 100%**2** Find 125% of 64.

You can either write the percent as a  $\boxed{\phantom{00}}$  or as a  $\boxed{\phantom{00}}$ . Let's write the percent as a decimal.

$$125\% = \frac{125}{100} = \boxed{\phantom{00}}$$

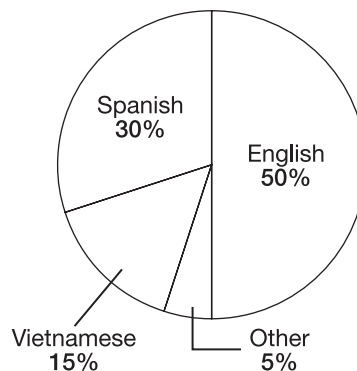
$$1.25 \text{ of } 64 = 1.25 \times 64 \text{ or } \boxed{\phantom{00}}$$

So, 125% of 64 is  $\boxed{\phantom{00}}$ .

**Check Your Progress** Find 225% of 50.

**EXAMPLE**

- LANGUAGES** The graph below shows that 30% of the people in a community speak Spanish as their first language. If a community has 800 people, how many people can be expected to speak Spanish as their first language?



To find 30% of 800, write the percent as a  .  
Then multiply.

$$\begin{aligned}
 30\% \text{ of } 800 &= 30\% \cdot 800 \\
 &= \text{} \cdot 800 \\
 &= 240
 \end{aligned}$$

So, about  people in the community speak Spanish as their first language.

**HOMEWORK  
ASSIGNMENT**

Page(s):

Exercises:

**Check Your Progress** **SLEEP** The average person sleeps 33% of their adult life. If their adult life consists of 62 years, how many years does the average person spend sleeping?



## MAIN IDEA

- Solve problems using the percent proportion.

## KEY CONCEPT

**Percent Proportion** The percent proportion is  $\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$ .

## BUILD YOUR VOCABULARY (pages 149–150)

A percent proportion compares  of a quantity to the whole quantity, called the , using a percent.

## EXAMPLE Find the Percent

## 1 What percent of 24 is 18?

18 is the part, and 24 is the whole. You need to find the percent.

$$\frac{p}{w} = \frac{n}{100}$$

Write the proportion.

$$\frac{\text{ } = n}{\text{ } = 100}$$

$$p = \text{ } , w = \text{ }$$

$$18 \cdot 100 = 24 \cdot n$$

Find the cross products.

$$1,800 = 24n$$

Simplify.

$$\frac{\text{ } = 24n}{\text{ } = 24}$$

Divide each side by .

$$\text{ } = n$$

Simplify.

So,  of 24 is .

## EXAMPLE Find the Part

## 2 What number is 30% of 150?

30 is the percent and 150 is the base. You need to find the part.

$$\frac{p}{w} = \frac{n}{100}$$

Percent proportion

$$\frac{p}{150} = \frac{\text{ } = n}{\text{ } = 100}$$

$$w = \text{ } , n = \text{ }$$

$$p \cdot 100 = 150 \cdot 30$$

Find the cross products.

$$100p = \text{ } = 4,500$$

Simplify.

$$\frac{100p}{100} = \frac{4,500}{100}$$

Divide each side by 100.

$$p = \text{ } = 45$$

Simplify.

So, 30% of  is 45.

**EXAMPLE** Find the Base**3** 12 is 80% of what number?

12 is the part and 80 is the percent. You need to find the base.

$$\frac{p}{w} = \frac{n}{100}$$

Percent proportion

$$\frac{12}{w} = \boxed{\phantom{00}}$$

$$a = \boxed{\phantom{00}}, n = 80.$$

$$\boxed{\phantom{000}} = w \cdot 80$$

Find the cross products.

$$1,200 = \boxed{\phantom{000}}$$

Simplify.

$$\frac{1,200}{8} = \frac{80w}{80}$$

Divide each side by  $\boxed{\phantom{00}}$ .

$$\boxed{\phantom{000}} = w$$

So, 12 is 80% of 15.

**WRITE IT**

Write an example of a real-world percent problem.

---



---



---



---



---

**Check Your Progress**

a. What percent of 80 is 28?

b. What number is 65% of 180?

c. 36 is 40% of what number?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Estimate percents by using fractions and decimals.

## EXAMPLE

- 1 CONCERTS** A town sold 407 tickets to a chamber music concert in the town square. Of the tickets sold, 61% were discounted for senior citizens. About how many senior citizens bought tickets for the concert?

You need to estimate 61% of 407.

61% is about 60%, and 407 is about 400.

$$61\% \text{ of } 407 \approx \boxed{\phantom{000}} \cdot 400 \quad 61\% \approx \frac{3}{5}$$

$$\approx 240 \quad \text{Multiply.}$$

So, about  $\boxed{\phantom{000}}$  senior citizens bought tickets.

## Check Your Progress

**TAXES** Michelle discovered that 27% of her paycheck was deducted for taxes. If her paycheck before taxes was \$590, about how much was deducted for taxes?

## EXAMPLE

- 2 COINS** Melinda calculated that 40% of the coins in her coin collection were minted before 1964. If there are 715 coins in her collection, about how many of them were minted before 1964?

You can use a fraction or 10% of a number to estimate. Let's use 10% of a number.

**Step 1** Find 10% of the number.

$$715 \text{ is about } \boxed{\phantom{000}}.$$

$$10\% \text{ of } 700 = 0.1 \cdot 700$$

$$= \boxed{\phantom{000}}$$

(continued on the next page)

## FOLDABLES

## ORGANIZE IT

Record the main ideas, and give examples about percent and estimation in the section for Lesson 7-3 of your Foldable.

7-1	7-2
7-3	7-4
7-5	7-6
7-7	7-8

**Step 2** Multiply.

40% of 700 is  $4 \cdot 10\%$  of 700.

$$4 \times 70 = \boxed{\phantom{00}}$$

So, about  $\boxed{\phantom{00}}$  coins were minted before 1964.

**Check Your Progress SAVINGS** Suki saves 70% of her monthly allowance. If her monthly allowance is \$58, about how much does she save?

**EXAMPLES** Percents Greater Than 100 or Less Than 1

**REMEMBER IT**



To estimate the percent of a number, round the percent, round the number, or round both.

**1** Estimate 173% of 60.

173% is about 175%.

$$\begin{aligned} 175\% \text{ of } 60 &= (100\% \text{ of } 60) + (75\% \text{ of } 60) \\ &= (1 \cdot 60) + \left(\frac{3}{4} \cdot 60\right) \\ &= 60 + 45 \text{ or } \boxed{\phantom{00}} \end{aligned}$$

So, 173% of 60 is about  $\boxed{\phantom{00}}$ .

**2** Estimate  $\frac{1}{3}\%$  of 898.

$\frac{1}{3}\%$  is one third of 1%. 898 is about 900.

$$\begin{aligned} 1\% \text{ of } 900 &= 0.01 \cdot 900 && \text{Write } 1\% \text{ as } \boxed{\phantom{00}}. \\ &= 9 && \text{Multiply.} \end{aligned}$$

One third of 9 is  $\frac{1}{3} \cdot 9$  or  $\boxed{\phantom{00}}$ .

So,  $\frac{1}{3}\%$  of 898 is about  $\boxed{\phantom{00}}$ .

**Check Your Progress** Estimate.

a. 142% of 80

b.  $\frac{1}{5}\%$  of 197

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Solve problems by using the percent equation.

## BUILD YOUR VOCABULARY (pages 149–150)

The equation  = percent  $\cdot$   is called the percent equation.

## EXAMPLE Find the Part

- 1 What number is 46% of 200?

46% or  is the percent and  is the whole.

Let  $p$  represent the .

$$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{whole}}$$

$$p = \text{input} \cdot 200 \quad \text{Write an equation.}$$

$$p = \text{input} \quad \text{Multiply.}$$

So, 46% of 200 is .

## EXAMPLE Find the Percent

- 2 26 is what percent of 32?

Let  $n$  represent the percent.

$$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{whole}}$$

$$\text{input} = n \cdot 32 \quad \text{Write an equation.}$$

$$\text{input} = \text{input} \quad \text{Divide each side by } \text{input}.$$

$$\text{input} = n \quad \text{Simplify.}$$

$$\text{input} = n \quad \text{Write as a percent.}$$

So, 26 is  of 32.

## FOLDABLES

## ORGANIZE IT

Record the main ideas, and give examples about the percent equation in the section for Lesson 7-4 of your Foldable.

7-1	7-2
7-3	7-4
7-5	7-6
7-7	7-8

**EXAMPLE** Find the Whole**3** 12 is 40% of what number?

Let  $w$  represent the whole.

$$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{whole}}$$

$$\boxed{\phantom{00}} = \boxed{\phantom{00}} \cdot w \quad \text{Write an equation.}$$

$$\frac{\boxed{\phantom{00}}}{0.40} = \frac{w}{\boxed{\phantom{00}}} \quad \text{Divide each side by } \boxed{\phantom{00}}.$$

$$\boxed{\phantom{00}} = w$$

So, 12 is 40% of  $\boxed{\phantom{00}}$ .

**WRITE IT**

Name two ways a percent can be written in the percent equation.

---



---



---



---



---

**Check Your Progress**

a. What number is 72% of 500?

b. 18 is what percent of 80?

c. 36 is 90% of what number?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## Problem-Solving Investigation: Determine Reasonable Answers

**EXAMPLE** Solve. Use the Reasonable Answer Strategy.

### MAIN IDEA

- Solve problems by determining reasonable answers.

**FUNDRAISER** A soccer team is having a candy sale to raise funds to buy new shirts. The team gets to keep 25% of the sales. Each candy bar costs \$1.50, and the team has sold 510 bars so far. If the shirts cost a total of \$175, should the team order the shirts yet? Explain.

**UNDERSTAND** You know the shirts cost a total of \$175 and that each candy bar costs \$1.50. You know that the team has sold  bars so far and that they get to keep 25% of the sales. You need to know if the team has enough money to order the shirts yet.

**PLAN** Find how much the team has earned so far. Round 510 to 500. Then find  of their sales.

**SOLVE**  $\$1.50 \cdot 500 =$

Find 25% of \$750.  
 $25\% \text{ of } 750 = 0.25 \cdot 750$   
 $=$

The team gets to keep . Since this is more than the cost of the shirts, they should order the shirts.

**CHECK** Use a calculator to check that the actual result is 191.25, so the answer is reasonable.

### Check Your Progress

**FIELD TRIP** There are 392 students in the seventh grade at Hamilton Middle School. If 35% of the seventh grade will attend the class field trip, is it reasonable to say that about 170 students will attend the field trip? Explain.

## HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## MAIN IDEA

- Find the percent of increase or decrease.

**BUILD YOUR VOCABULARY** (pages 149–150)

A **percent of change** is a ratio that compares the change in quantity to the  amount.

If the **original** quantity is , the percent of change is called the **percent of increase**.

If the **original** quantity is , the percent of change is called the **percent of decrease**.

**EXAMPLE** Find Percent of Increase

- 1 SHOPPING** Last year a sweater sold for \$56. This year the same sweater sells for \$60. Find the percent of change in the cost of the sweater. Round to the nearest whole percent if necessary.

Since the new price is  than the original price, this is a percent of . The amount of increase is  $60 - \text{$  or  $\text{$ .

$$\begin{aligned} \text{percent of increase} &= \frac{\text{amount of increase}}{\text{$$

$$= \frac{\text{$$

$$= \frac{\text{$$

$$= \text{$$

Substitution

Simplify.

Write as a .

The percent of  is about .



**Check Your Progress**

**DVDs** Last year a DVD sold for \$20. This year the same DVD sells for \$24. Find the percent of change in the cost of the DVD. Round to the nearest whole percent if necessary.

**EXAMPLE Find Percent of Decrease**

**2 ATTENDANCE** On the first day of school this year, 435 students reported to Howard Middle School. Last year on the first day, 460 students attended. Find the percent of change for the first day attendance. Round to the nearest whole percent if necessary.

Since the new enrollment figure is  than the figure for  year, this is a percent of . The amount of decrease is  - 435 or  students.

percent of decrease =  $\frac{\text{$ }{\text{original amount}}

=  $\frac{25}{\text{$ } \quad \text{Substitution}

=  $\frac{\text{$ }{\text{} \quad \text{Simplify.}

=  $\frac{\text{$ }{\text{} \quad \text{Write  as a percent.}

The percent of  in the enrollment is about .

**Check Your Progress**

**ZOO** At the beginning of the summer season, the local zoo reported having 385 animals in its care. At the beginning of last year's summer season the zoo had reported 400 animals. Find the percent of change in the number of animals at the zoo. Round to the nearest whole percent if necessary.

**FOLDABLES**

**ORGANIZE IT**

Record the main ideas, and give examples about percent of change in the section for Lesson 7-6 of your Foldable.

7-1	7-2
7-3	7-4
7-5	7-6
7-7	7-8

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Solve problems involving sales tax and discount.

## BUILD YOUR VOCABULARY (pages 149–150)

Sales tax is an  amount of money charged on items that people .

Discount is the amount by which the regular  of an item is .

## FOLDABLES

## ORGANIZE IT

Record the main ideas, and give examples about sales tax and discount in the section for Lesson 7-7 of your Foldable.

7-1	7-2
7-3	7-4
7-5	7-6
7-7	7-8

## EXAMPLE Find the Total Cost

- 1 **GOLF** A set of golf balls sells for \$20, and the sales tax is 5.75%. What is the total cost?

To find the total cost, you can add sales tax to the regular price or add the percent of tax to 100%. Let's add sales tax to the regular price.

First, find the  tax.

$$5.75\% \text{ of } \$20 = \text{} \cdot 20$$

$$= \text{} \quad \text{The sales tax is } \text{}.$$

Next, add the sales tax to the regular price.

$$\text{} + 20 = \text{}$$

The  cost of the set of golf balls is .

**Check Your Progress** **BOOKS** A set of three paperback books sells for \$35 and the sales tax is 7%. What is the total cost of the set?

**EXAMPLE** Find the Sale Price**REMEMBER IT**

The cost of an item with sales tax will always be greater than the regular price. The discounted price of an item is always less than the regular price.

- 2 OUTERWEAR** Whitney wants to buy a new coat that has a regular price of \$185. This weekend, the coat is on sale at a 33% discount. What is the sale price of the coat?

**METHOD 1**

First, find the amount of the   $d$ .

$$33\% \text{ of } \$185 = \text{} \cdot \$185 \quad \text{Write 33\% as a decimal.}$$

$$= \text{} \quad \text{The discount is \$61.05.}$$

So, the sale price is  $\$185 - \text{}$  or  $\text{}$ .

**METHOD 2**

First, subtract the  of discount from 100%.

$$100\% - \text{} = \text{}$$

So, the sale price is  of the regular price.

$$67\% \text{ of } \$185 = \text{} \cdot 185 \quad \text{Write 67\% as a decimal.}$$

$$= \text{} \quad \text{Use a calculator.}$$

So, the sale price of the coat is .

**Check Your Progress**

- ELECTRONICS** Alex wants to buy a DVD player that has a regular price of \$175. This weekend, the DVD player is on sale at a 20% discount. What is the sale price of the DVD player?

**EXAMPLE** Find the Percent of the Discount

**3 WATCHES** A sports watch is on sale for \$60.20 after a 30% discount. What is the original price?

First, find the percent paid.

$$100\% - 30\% = \boxed{\phantom{00}}$$

Next, use the  $\boxed{\phantom{00}}$  equation to find the  $\boxed{\phantom{00}}$ .

**Words**

**Variable**

**Equation**

$\boxed{\phantom{00}}$  is 70% of what amount?

Let  $n$  represent the original price.

$$60.20 = 70\% \cdot \boxed{\phantom{00}}$$

$$60.20 = \boxed{\phantom{00}} \cdot n \quad \text{Write 70\% as a decimal.}$$

$$\boxed{\phantom{00}} = n \quad \boxed{\phantom{00}} \text{ each side by 0.70.}$$

The original price of the sports watch is  $\boxed{\phantom{00}}$ .

**Check Your Progress** **FURNITURE** A rocking chair is on sale for \$318.75 after a 15% discount. What is the original price?

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## MAIN IDEA

- Solve problems involving simple interest.

## BUILD YOUR VOCABULARY (pages 149–150)

**Simple Interest** is the amount  or earned for the use of money.

**Principal** is the amount of  deposited or

.

## EXAMPLES Find Interest Earned

**SAVINGS** Brandon found a bank offering a certificate of deposit that pays 4% simple interest. He has \$1,500 to invest. How much interest will he earn in each amount of time?

## 1 3 years

$$I = prt$$

Formula for simple interest

$$I = \text{} \cdot \text{} \cdot \text{$$

Replace the variables.

$$I = \text{$$

Simplify.

Brandon will earn  in interest in  years.

## 2 30 months

$$30 \text{ months} = \text{} = \text{} \text{ years}$$

Write the time as years.

$$I = prt$$

Formula for simple interest

$$I = \text{} \cdot \text{} \cdot \text{$$

Replace the variables.

$$I = \text{$$

Simplify.

Brandon will earn  in interest in 30 months.

## FOLDABLES

## ORGANIZE IT

Record the main ideas, and give examples about simple interest in the section for Lesson 7-8 of your Foldable.

7-1	7-2
7-3	7-4
7-5	7-6
7-7	7-8

**WRITE IT**

Which is better: a higher percentage of interest on your credit card or on your savings account? Explain.

---



---



---



---

**Check Your Progress**

- a. SAVINGS** Cheryl opens a savings account that pays 5% simple interest. She deposits \$600. How much interest will she earn in 2 years?

---



---



---



---

- b. SAVINGS** Micah opens a savings account that pays 4% simple interest. He deposits \$2,000. How much interest will he earn in 42 months?

---



---



---



---

**EXAMPLE Find Interest Paid on a Loan**

- 1 LOANS** Laura borrowed \$2,000 from her credit union to buy a computer. The interest rate is 9% per year. How much interest will she pay if it takes 8 months to repay the loan?

$$I = \square$$

Formula for simple interest

$$I = 2,000 \cdot 0.09 \cdot \frac{8}{12}$$

Replace  $p$  with  $\square$ ,  $r$  with

$\square$ , and  $t$  with  $\square$ .

$$I = \square$$

Simplify.

Laura will pay  $\square$  in interest in  $\square$  months.

**Check Your Progress**

- LOANS** Juan borrowed \$7,500 from the bank to purchase a used car. The interest rate is 15% per year. How much interest will he pay if it takes 2 years to repay the loan?

---



---



---




---

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## STUDY GUIDE

	VOCABULARY PUZZLEMAKER	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 7 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 7, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (pages 149–150) to help you solve the puzzle.

7-1

## Percent of a Number

Find each number.

1. What is 3% of 530?

2. Find 15% of \$24.

3. Find 200% of 17.

4. What is 0.6% of 800?

7-2

## The Percent Proportion

5. In the formula  $\frac{p}{w} = \frac{n}{100}$ ,  $p$  is the ,  $w$  is the ,  
and  $n$  is the .

6. What number is 30% of 15?

7. 32.5 is 65% of what number?

7-3

Percent and Estimation

Write fraction equivalents in simplest form for the following percents.

8. 20%       9. 40%       10. 60%       11. 80%   
 12. 25%       13. 50%       14. 75%       15. 100%

Estimate.

16. 49% of 80       17. 78% of 25   
 18. 153% of 10       19. 0.5% of 200

7-4

Algebra: The Percent Equation

Write an equation for each problem. Then solve.

20. 40% of what number is 48?       21. 18 is what percent of 72?   
 22. Find 80% of 90.       23. 12% of what number is 60?

7-5

Problem-Solving Investigation: Determine Reasonable Answers

24. **TRAVEL** The Winston family determined that lodging accounted for 48% of their total travel costs. If they spent \$1,240 total during their trip, would about \$560, \$620, or \$750 be a reasonable amount that they spent on lodging?



7-6

**Percent of Change**

State whether each sentence is *true* or *false*. If *false*, replace the underlined word to make a true sentence.

25. If the new amount is less than the original amount, then there is a percent of increase.

26. The amount of increase is the new amount minus the original amount.

Find the percent of change. Round to the nearest whole percent. State whether the percent of change is an increase or decrease.

27. original: \$48; new: \$44.25

28. original: \$157; new: \$181

29. original: \$17.48; new: \$9.98

7-7

Sales Tax and Discount

Find the total cost or sale price to the nearest cent.

30. \$29.99 jeans; 15% discount

31. \$6.25 lunch; 8.5% sales tax

Find the percent of discount to the nearest percent.

32. Pen: regular price, \$9.95; sale price, \$6.95

33. Sweatshirt: regular price, \$20; sale price, \$15.95

7-8

Simple Interest

Find the interest earned to the nearest cent for each principal, interest rate, and time.

34. \$15,000, 9%, 2 years, 4 months

35. \$250, 3.5%, 6 years

## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 7.

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 7 Practice Test on page 389 of your textbook as a final check.

I used my Foldable or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 7 Study Guide and Review on pages 384–388 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 7 Practice Test on page 389 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 7 Foldable.
- Then complete the Chapter 7 Study Guide and Review on pages 384–388 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 7 Practice Test on page 389 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

## Statistics: Analyzing Data

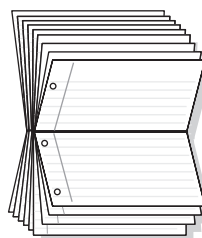


Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

### Begin with nine sheets of notebook paper.

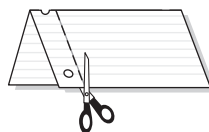
#### STEP 1

**Fold** 9 sheets of paper in half along the width.



#### STEP 2

**Cut** a 1" tab along the left edge through one thickness.



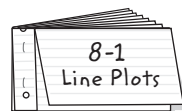
#### STEP 3

**Glue** the 1" tab down. Write the lesson number and title on the front tab.



#### STEP 4

**Repeat** Steps 2 and 3 for the remaining sheets. Staple them together on the glued tabs to form a booklet.



**NOTE-TAKING TIP:** When you take notes, it is sometimes helpful to make a graph, diagram, picture, chart, or concept map that presents the information introduced in the lesson.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 8. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
analyze			
bar graph			
biased sample			
cluster			
data			
histogram			
inferences			
leaf			
line graph			
line plot			

*(continued on the next page)*

Vocabulary Term	Found on Page	Definition	Description or Example
mean			
measures of central tendency			
median			
mode			
outlier			
population			
random sample			
range			
scatter plot			
statistics			
stem			
stem-and-leaf plot			
survey			
unbiased sample			

### MAIN IDEA

- Display and analyze data using a line plot.

### BUILD YOUR VOCABULARY (pages 173–174)

**Statistics** deals with collecting, organizing, and interpreting data.

A **line plot** is a diagram that shows the data on a number line.

Data that is grouped closely together is called a **cluster**.

**Outliers** are numbers that are quite separated from the rest of the data in a data set.

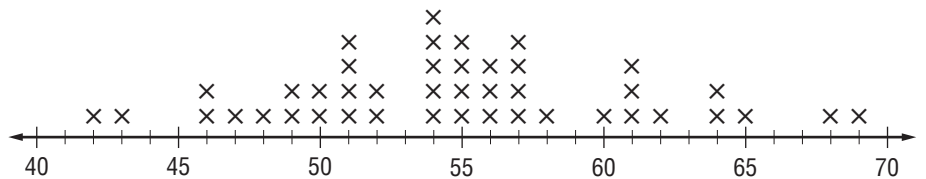
### EXAMPLE Display Data Using a Line Plot

- 1 PRESIDENTS** The table below shows the ages of the U.S. presidents at the time of their inaugurations. Make a line plot of the data.

Age at Inauguration														
57	51	54	56	61	61	49	49	55	52	57	64	50	51	69
57	50	47	54	64	58	48	55	51	46	57	65	55	60	54
61	52	54	62	68	54	56	42	43	46	51	55	56		

**Step 1** Draw a number line. Use a scale of 40 to 70 and an interval of 5.

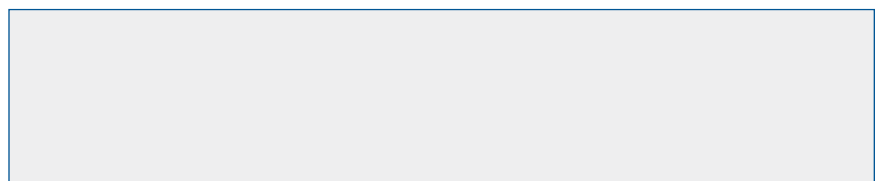
**Step 2** Place an × above the number that represents the age of each U.S. president.



### Check Your Progress

**STUDY TIME** The table at the right shows the number of minutes each student in a math class spent studying the night before the last math exam. Make a line plot of the data.

Minutes Studying			
36	42	60	35
70	48	55	32
60	58	42	55
38	45	60	50



### FOLDABLES

### ORGANIZE IT

Write a set of data that could be displayed in a line plot. Under the lab for Lesson 8-1, display the data in a line plot.



**BUILD YOUR VOCABULARY** (pages 173–174)

The **range** is the **difference** between the greatest and least numbers in the data set. When you **analyze** data, you use observations to describe and compare data.

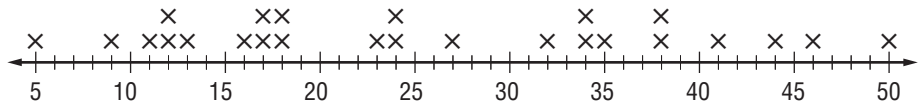
**EXAMPLE** Use a Plot to Analyze Data

**REMEMBER IT**



A line plot does not need to start at 0, but you cannot leave out numbers on the number line when there are no x's above them.

**2 CLIMATE** The line plot shows the number of inches of precipitation that fell in several cities west of the Mississippi River during a recent year. Identify any clusters, gaps, and outliers, and find the range of the data.



There are data clusters between  and 13 inches and

between 16 and  inches. There are gaps:

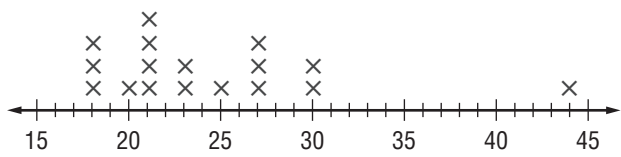
between 18 and ; between  and 32.

Since  and 50 are apart from the rest of the data, they could be outliers.

The range is  -  or  inches.

**Check Your Progress**

**AGE** The line plot below shows the ages of students in an introductory computer course at the local community college. Identify any clusters, gaps, and outliers, and find the range of the data.



**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_



**MAIN IDEA**

- Describe a set of data using mean, median, mode, and range.

**BUILD YOUR VOCABULARY** (pages 173–174)

Measures of central tendency can be used to describe the **center** of the data.

The **mean** of a set of data is the sum of the data divided by the number of items in the data set.

**EXAMPLE** Find the Mean

- 1 ANIMALS** The table below shows the number of species of animals found at 30 major zoos across the United States. Find the mean.

Number of Species in Major U.S. Zoos				
300	400	283	400	175
617	700	700	715	280
800	290	350	133	400
195	347	488	435	640
232	350	300	300	400
705	400	800	300	659

Source: *The World Almanac*

$$\text{mean} = \frac{300 + 400 + \boxed{\phantom{000}} + \dots + \boxed{\phantom{000}}}{30}$$

← sum of data  
← number of data items

The mean number of species of animals is .

**Check Your Progress**

**SLEEP** The table below shows the results of a survey of 15 middle school students concerning the number of hours of sleep they typically get each night. Find the mean.

Nightly Hours of Sleep				
7	8	6	7	8
9	5	6	7	7
8	6	7	8	8

## FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 8-2, define and differentiate between mean, median, and mode.


**BUILD YOUR VOCABULARY** (pages 173–174)

The **median** of a set of data is the middle number of the ordered data, or the mean of the middle two numbers.

The **mode** or modes of a set of data is the number or numbers that occur most often.

**EXAMPLE** Find the Mean, Median, and Mode

- 2 OLYMPICS** The table below shows the number of gold medals won by each country participating in the 2002 Winter Olympic games. Find the mean, median, and mode of the data.

2002 Winter Olympics: Gold Medals Won				
12	6	4	3	0
10	6	4	2	3
11	2	3	4	2
1	1	0	2	2
1	0	0	0	0

mean: sum of data divided by , or

median: 13th number of the  data, or

mode: number appearing  often, or

**Check Your Progress**

**PETS** The table below shows the number of pets students in an art class at Green Hills Middle School have at home. Find the mean, median, and mode of the data.

Pets			
0	2	1	0
1	3	5	2
0	1	0	2
3	1	2	0

**EXAMPLE**

- 3 TEST EXAMPLE** The average weight in pounds of several breeds of dogs is listed below.

15, 45, 26, 55, 15, 30

If the average weight of the Golden Retriever, 70 pounds, is added to this list, which of the following statements would be true?

- A The mode would increase.
- B The median would decrease.
- C The median would increase.
- D The mean would decrease.

**Read the Item**

You are asked to identify which statement would be true if the data value  was added to the data set.

**Solve the Item**

Use number sense to eliminate possibilities.

The mode, , will remain unchanged since the new data value occurs only once. So, eliminate choice .

Since the new data value is  than each value in the data set, neither the mean nor median will decrease. So, eliminate choices B and .

Since 70 is greater than each value in the data set, the median will now . So, the answer is .

**Check Your Progress**

If the average weight of the Chihuahua, 4 pounds, is added to the list above, which of the following statements would be true?

- F The mean would decrease.
- G The mode would decrease.
- H The median would stay the same.
- J The mean would increase.

## HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## MAIN IDEA

- Display and analyze data in a stem-and-leaf plot.

## BUILD YOUR VOCABULARY (pages 173–174)

In a stem-and-leaf plot, the data are organized from

to .

The digits of the  place value usually form the leaves and the next place-value digits form the stems.

## EXAMPLE Display Data in a Stem-and-Leaf Plot

- 1 BASEBALL** The table below shows the number of home runs that Babe Ruth hit during his career from 1914 to 1935. Make a stem-and-leaf plot of the data.

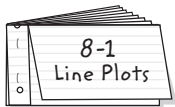
Home Runs			
0	54	25	46
4	59	47	41
3	35	60	34
2	41	54	6
11	22	46	
29	46	49	

**Step 1** The digits in the  place value will form the leaves and the remaining digits will form the . In these data,  is the least value, and  is the greatest. So, the ones digit will form the  and the  digit will form the stems.

## FOLDABLES

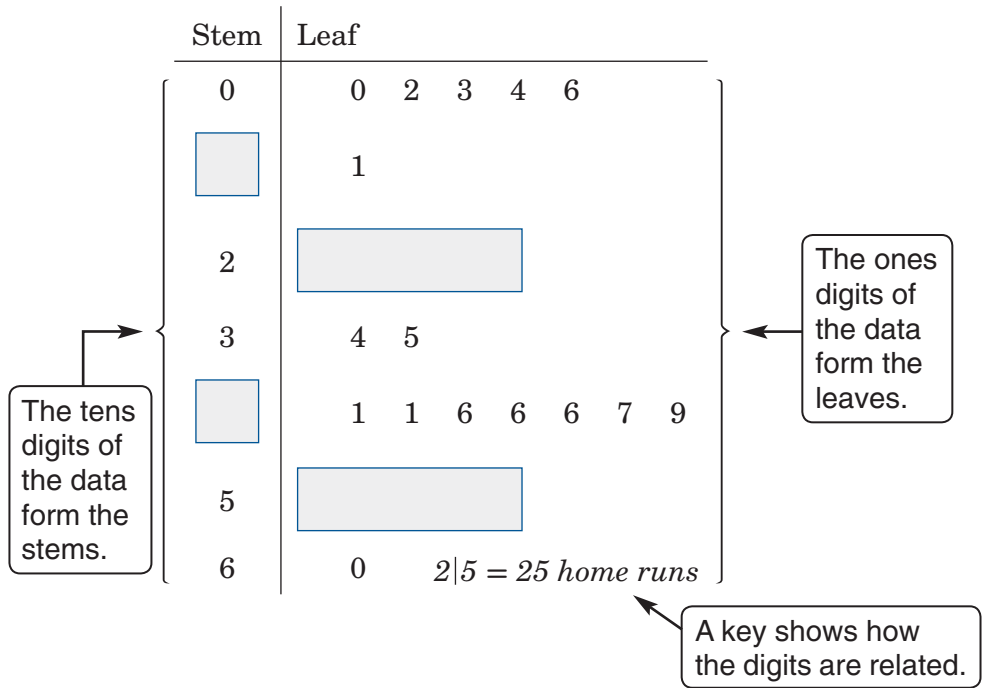
## ORGANIZE IT

Under the tab for Lesson 8-3, give an example of a set of data for which a stem-and-leaf plot would be appropriate. Draw the stem-and-leaf plot.



**Step 2** List the stems 0 to  in order from least to greatest in the *Stem* column. Write the leaves, the  digits of the home runs, to the  of the corresponding stems.

**Step 3** Order the leaves and write a *key* that explains how to read the stems and leaves



**Check Your Progress**

**BUSINESS** The table shows the number of hours several business men and women spent aboard an airplane. Make a stem-and-leaf plot of the data.

Hours Aboard an Airplane						
4	18	0	23	12	7	9
35	14	6	11	21	19	6
15	26	9	0	13	22	10

**EXAMPLE** Describe Data**WRITE IT**

Explain how to find how many items are on a stem-and-leaf plot.

---



---



---



---

- 2 FITNESS** The stem-and-leaf plot below shows the number of miles that Megan biked each day during July. Find the range, median, and mode of the data.

Stem	Leaf
0	5 5 5 6
1	0 0 0 0 1 2 2 5 8 8 9
2	1 2 5 8
3	0

$2|5 = 25 \text{ miles}$

range: greatest distance – least distance =  –

or  miles

median: middle value, or  miles

mode: most frequent value, or  miles

**Check Your Progress**

- SNOWFALL** The stem-and-leaf plot below shows the number of inches of snow that fell in Hightown during the month of January for the past 15 years. Find the range, median, and mode.

Stem	Leaf
0	1 3 5 7 9
1	0 0 0 2 4 4 7 8
2	2 6

$1|2 = 12 \text{ inches}$

**EXAMPLE** Effects of Outliers

**Animals' Life Spans**

**3 ANIMALS** The average life span of several animal species is shown in the stem-and-leaf plot. Which measure of central tendency is most affected by the inclusion of the outlier?

Stem	Leaf
0	3 4 6 8
1	0 0 2 2 2 5 5 6 8
2	0 0 0 0 2
3	
4	0            1 0 = 10 years

The mode, , is not affected by the inclusion of the outlier, .

Calculate the mean and median each without the , 40. Then calculate them including the outlier and compare.

**without the outlier**

**including the outlier**

mean:  $\frac{3 + 4 + \dots + 22}{18} \approx 12.4$

mean:  $\frac{3 + 4 + \dots + 20 + \text{[ ]}}{\text{[ ]}} \approx 13.8$

median:

The mean increased by  $13.8 - 12.4$ , or , while the median increased by  $15 - 13.5$ , or . So, the  is most affected by the inclusion of the outlier.

**Check Your Progress**

**TEST SCORES** The test scores earned by a class of middle school math students on a chapter test are shown. Which measure of central tendency is most affected by the inclusion of the outlier?

**Test Scores**

Stem	Leaf
5	8
6	
7	5 6 7 9
8	0 0 1 2 2 5 5 6 6 7
9	0 2 3 3 3 4 4 6

7|5 = 75 points

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Display and analyze data using bar graphs and histograms.

**BUILD YOUR VOCABULARY** (pages 173–174)

A bar graph is one method of  data by using solid bars to represent quantities.

**EXAMPLE** Display Data Using a Bar Graph

- 1 TOURISM** Make a bar graph to display the data in the table below.

Country	Vacation Days per Year
Italy	42
France	37
Germany	35
Brazil	34
United Kingdom	28
Canada	26
Korea	25
Japan	25
United States	13

Source: *The World Almanac*

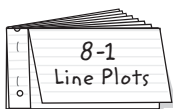
**Step 1** Draw and label the axes. Then choose a  on the vertical axis so that it includes all of the vacation days per year.

**Step 2** Draw a  to represent each category.

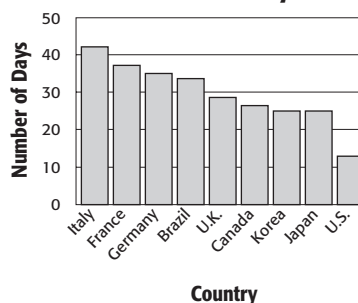
## FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 8-4, draw a sketch of a bar graph and a histogram and describe their similarities and differences.



Vacation Days





**Check Your Progress**

**SPORTS** The table shows the average number of miles run each day during training by members of the cross country track team. Make a bar graph to display the data.

Runner	Miles
Bob	9
Tamika	12
David	14
Anne	8
Jonas	5
Hana	10

**BUILD YOUR VOCABULARY** (pages 173–174)

A **histogram** is a special kind of  graph that uses bars to represent the frequency of numerical data that have been organized in .

**WRITE IT**

Explain when you would use a bar graph and when you would use a histogram.

---



---



---



---

**EXAMPLE** Display Data Using a Histogram

**2 BASKETBALL** The number of wins for 29 teams of a basketball league for a season have been organized into a frequency table. Make a histogram of the data.

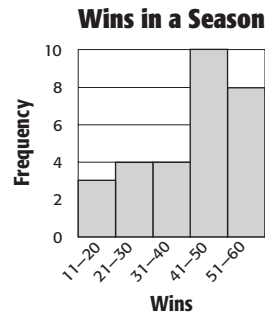
Number of Wins	Frequency
11–20	3
21–30	4
31–40	4
41–50	10
51–60	8

(continued on the next page)

**Step 1** Draw and  horizontal and  axes.

Add a .

**Step 2** Draw a bar to represent the  of each interval.



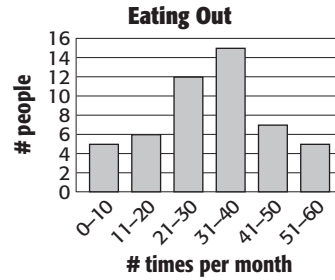
### Check Your Progress

**SPEED** The speeds of cars on a stretch of interstate are clocked by a police officer and have been organized into a frequency table. Make a histogram of the data.

Speed (mph)	Frequency
50-59	2
60-69	14
70-79	18
80-89	3

**EXAMPLES** Analyze Data to Make Inferences

**DINING OUT** The bar graph shows the number of times people dine out each month.



- 1 How many people are represented in the histogram? Justify your answer.

Find the sum of the heights of the bars in the histogram.

$$5 + \boxed{\phantom{00}} + \boxed{\phantom{00}} + 15 + 7 + \boxed{\phantom{00}} = \boxed{\phantom{00}}$$

- 2 What percent of people surveyed ate out more than 40 times per month?

$$\frac{7 + 5}{50} = \frac{\boxed{\phantom{00}}}{50}$$

← number of people who ate out more than 40 times  
 ← total number of people surveyed

$$\frac{12}{50} = \boxed{\phantom{00}}$$

Write the fraction as a decimal.

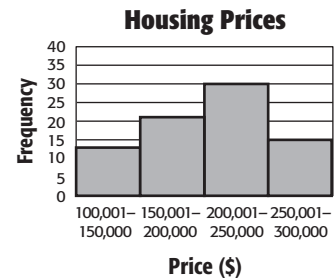
$$0.24 = \boxed{\phantom{00}}$$

Write the decimal as a percent.

So, 24% of the people surveyed ate out more than 40 times per month.

**Check Your Progress**

**HOUSING** The bar graph shows the number of houses sold in various price ranges.



- a. How many houses are represented in the histogram?

- b. What percent of houses were sold for more than \$200,000

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

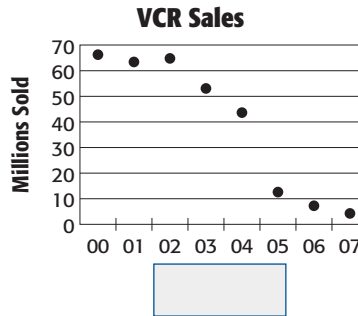
# Problem-Solving Investigation: Use a Graph

## EXAMPLE Solve Problems by Using a Graph

### MAIN IDEA

- Solve problems by using a graph.

**VCR SALES** Based on the information in the graph, how many VCRs would you expect to be sold in 2012?



**UNDERSTAND** You know that the graph shows a rapid downward trend. You need to determine how many VCRs would be expected to be sold in 2012.

**PLAN** Look at the trend of the graph. Predict the number of VCR sales in 2012.

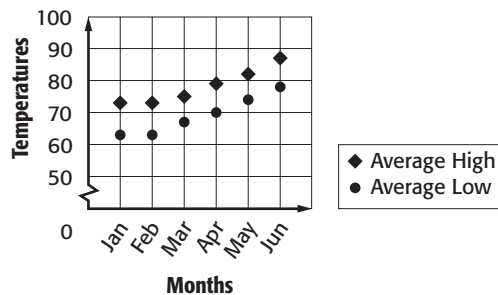
**SOLVE** If the trend continues, no VCRs will be expected to be sold in 2012.

**CHECK** The graph rapidly decreases. The answer is reasonable.

The graph shows a rapid  trend. If it continued,  VCRs would be sold in .

**Check Your Progress** **TEMPERATURE** Refer to the graph below. Suppose the trends continue. Predict the average high temperature for the month of August.

**Miami Average Temperatures**



## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## BUILD YOUR VOCABULARY (pages 173-174)

### MAIN IDEA

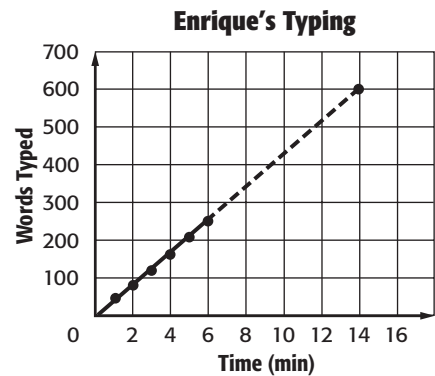
- Analyze line graphs and scatter plots to make predictions and conclusions.

Line graphs can be useful in predicting  events when they show trends over .

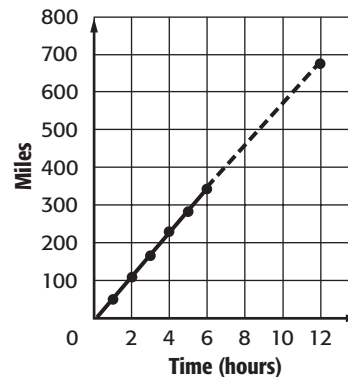
### EXAMPLE Use a Line Graph to Predict

**1 TYPING** The line graph shows the time it has taken Enrique to type a class paper so far. The paper is 600 words long. Use the graph to predict the total time it will take him to type his paper.

By looking at the pattern in the graph, you can predict that it will take Enrique about  minutes to type his 600-word paper.



**Check Your Progress TRAVEL** During a recent road trip, Helen kept track of the number of miles traveled after each hour of travel time was completed. The table shows her information. Use the line graph to predict how far Helen will travel in 12 hours of travel time.



### FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 8-6, include an example of a line graph and explain how it can be used to make predictions.



## WRITE IT

Explain how a line graph can help you to make a prediction.

---



---



---



---



---

## BUILD YOUR VOCABULARY (pages 173–174)

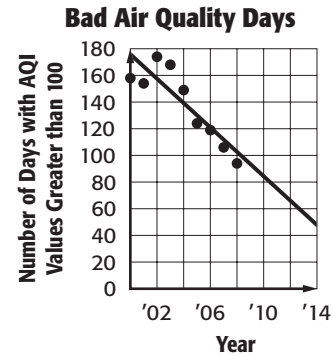
A scatter plot displays two sets of data on the same graph and are also useful in making .

### EXAMPLE Use a Scatter Plot to Predict

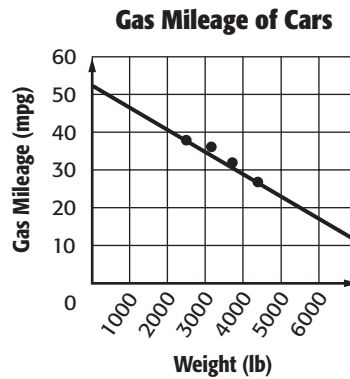
**3 POLLUTION** The scatter plot shows the number of days that a city failed to meet air quality standards from 2000 to 2008. Use it to predict the number of days of bad air quality in 2014.

By looking at the pattern, you can predict that the number of days of bad air quality in 2014

will be about  days.



**Check Your Progress** **GAS MILEAGE** Use the scatter plot below to predict the gas mileage for a car weighing 5500 pounds.



## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

### MAIN IDEA

- Predict actions of a larger group by using a sample.

### BUILD YOUR VOCABULARY (pages 173–174)

A **survey** is designed to collect  about a specific group of people, called the **population**.

### EXAMPLE

**1 PETS** The table shows the results of a survey in which people were asked whether their house pets watch television. There are 540 students at McCloskey Middle School who own pets. Predict how many of them would say their pets watch TV.

Does your pet watch television?	
Response	Percent
yes	38%
no	60%
don't know	2%

You can use the percent proportion and the survey results to predict the number of people who said their pets watch TV.

### FOLDABLES

### ORGANIZE IT

Under the tab for Lesson 8-7, give examples about using statistics to predict.

8-1	8-2	8-3
8-4	8-5	8-6
8-7	8-8	8-9

part of the population

$$\frac{p}{w} = \frac{n}{100}$$

Percent proportion

$$\frac{p}{\text{part of population}} = \frac{38}{540}$$

Survey results: 38% =

entire population

$$100a =$$

Cross products

$$a =$$

Simplify.

About  of the people surveyed said that their pets watch television.

## REVIEW IT

Solve the proportion

$$\frac{7}{9} = \frac{x}{27}$$

---



---



---



---

**Check Your Progress** **VIDEO GAMES** In a survey of middle school students, 32% responded that playing video games was their favorite after-school activity. Predict how many of the 260 students surveyed said that playing video games was their favorite after-school activity.

---



---



---



---

### EXAMPLE

**2 SUMMER JOBS** According to one survey, 25% of high school students reported they would not get summer jobs. Predict how many of the 948 students at Mohawk High School will not get summer jobs.

You need to predict how many of the  students will not get summer jobs.

Words

What number is 25% of 948?

Variable

Let  $n$  represent the .

Equation

$$n = \text{} \cdot 948$$

$$n = \text{} \cdot 948 \quad \text{Write the equation.}$$

$$n = \text{} \quad \text{Multiply.}$$

So, you could predict that about  of the students at Mohawk High School will not get summer jobs.

**Check Your Progress** **SEASONS** According to one survey, 31% of adults consider spring to be their favorite season of the year. Predict how many of the 525 employees of a large corporation would respond that spring is their favorite season of the year.

---



---



---



---

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:



**MAIN IDEA**

- Predict the actions of a larger group by using a sample.

**BUILD YOUR VOCABULARY** (pages 173–174)

A **sample** is representative of a larger population. An **unbiased sample** is representative of the entire population. A **simple random sample** is the most common type of unbiased sample.

A **biased sample** occurs when one or more parts of the population are favored over others. A **convenience sample** includes members of a population who are easily accessed.

A **voluntary response sample** involves only those who want to participate in sampling.

**EXAMPLE** Determine Validity of Conclusions

**Determine whether the conclusion is valid. Justify your answer.**

- 1 A newspaper asks its readers to answer a poll about whether or not an issue should be on the ballot in an upcoming election. 85% of the readers who responded said that they wanted the issue on the ballot, so the newspaper printed an article saying that 85% of people want the issue on the ballot.

The conclusion is . The population is restricted to readers and it is a voluntary response sample and is . The results of a voluntary response sample do not necessarily represent the entire .

**Check Your Progress** Determine whether the conclusion is valid. Justify your answer.

A coffee shop asks every tenth customer that comes in the door to identify their favorite coffee drink. 45% of the customers surveyed said the mocha coffee is their favorite drink. The manager of the store concluded that about half of the store's customers like the mocha coffee.

**EXAMPLE**

**2 VENDING MACHINES** An office building manager interviewed 60 of their employees to determine whether or not a vending machine should be placed in the break room. 45 of the employees said yes and 15 said no. If there are 255 employees in the building, predict how many employees would like a vending machine in the break room.

The sample is an unbiased  sample since employees were randomly selected. Thus, the sample is valid.

$\frac{45}{60}$  or % of the employees would like a vending machine in the break room. So, find 75% of .

$$0.75 \times 255 = \text{} \quad 75\% \text{ of } 255 = 0.75 \text{  } 255$$

So, about  employees would like a vending machine in the break room.

**Check Your Progress** **CLUBS** A Spanish teacher is trying to determine if students would be interested in joining a Spanish club. She randomly asked 30 of her students. 18 of the students said yes and 12 said no. If the teacher has 105 students in her Spanish classes, predict how many would like to join a Spanish club.

## HOMWORK ASSIGNMENT

Page(s): \_\_\_\_\_

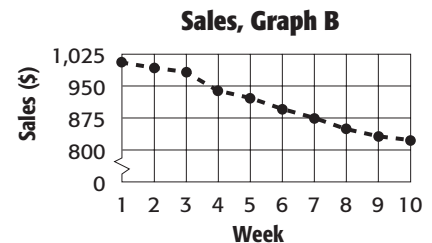
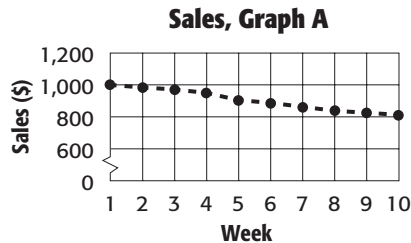
Exercises: \_\_\_\_\_

## MAIN IDEA

- Recognize when statistics and graphs are misleading.

## EXAMPLE Changing the Interval of Graphs

- 1 BUSINESS** The line graphs below show the last 10 weeks of sales for the Crumby Cookie Bakery.



- a. Do the graphs show the same data? If so, explain how the graphs differ.

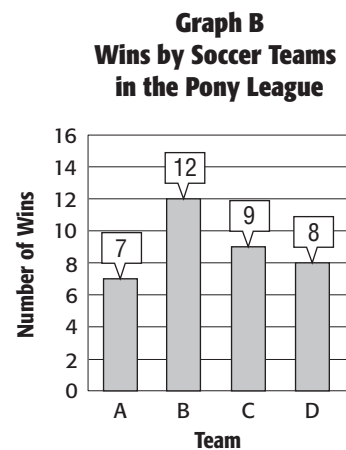
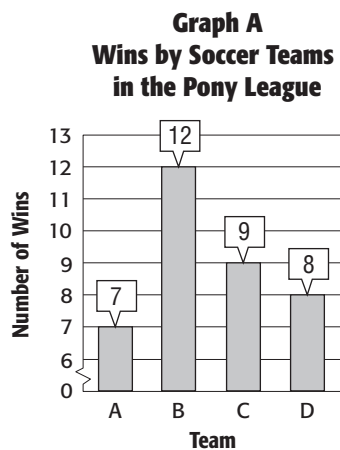
The graphs show the  data. However, the graphs differ in that Graph  has greater intervals and a greater range.

- b. Which graph makes it appear that the bakery's sales declined only slightly?

Graph  makes it appear that the sales declined only slightly even though both graphs show the same decline.

## Check Your Progress

- SOCCER** The graphs show the number of wins by four different soccer teams. Do the graphs show the same data? If so, explain how they differ.



## FOLDABLES

## ORGANIZE IT

Under the tab for Lesson 8-9, explain how to recognize misleading graphs and statistics.



## EXAMPLE Misleading Statistics

- 2 GRADES** Michael and Melissa both claim to be earning a C average, 70% to 79%, in their Latin class. One student is wrong. Which one? Explain how he or she is using a misleading statistic.

mean

Michael:

Melissa:

median

Michael:

Melissa:

Test	Grade (%)	
	Michael	Melissa
1	80	88
2	76	83
3	73	75
4	70	70
5	40	60
6	25	65
7	10	62

Michael is wrong. He is using the  to describe his grade rather than the . Only Melissa's mean, or average, is 70% or better.

**Check Your Progress** **RETAIL SALES** Two different grocery stores each claim to have the lowest average prices. Use the table to explain their reasoning and determine which store really has the lowest average prices.


Item	Store A	Store B
Milk	\$1.29	\$1.34
Bread	\$1.99	\$1.85
Eggs	\$1.19	\$1.09
Soda	\$2.29	\$2.99
Coffee	\$7.99	\$5.29
Ice Cream	\$4.39	\$4.19

## HOMWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

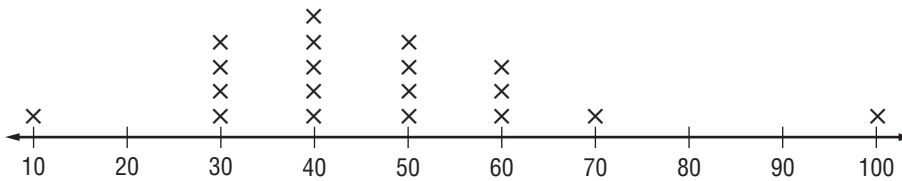
**STUDY GUIDE**

	<p><b>VOCABULARY PUZZLEMAKER</b></p>	<p><b>BUILD YOUR VOCABULARY</b></p>
<p>Use your <b>Chapter 8 Foldable</b> to help you study for your chapter test.</p>	<p>To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 8, go to: <a href="http://glencoe.com">glencoe.com</a></p>	<p>You can use your completed <b>Vocabulary Builder</b> (pages 173–174) to help you solve the puzzle.</p>

8-1

**Line Plots**

The line plot shows prices for different running shoes.



1. What is the range of the prices?

8-2

**Measures of Central Tendency and Range**

Find the mean, median, and mode of each set of data.

2. 2, 5, 5, 6, 8, 11, 12

3. 6, 5, 12, 34, 20, 17

8-3

**Stem-and-Leaf Plots**

4. The stem-and-leaf plot shows test scores for 13 students. Find the range, median, and mode of the data.

Stem	Leaf
0	7 8
1	5 5 6 9
2	0 2 2 3 3 3 4

$1|5 = 15$

8-4

Bar Graphs and Histograms

Write *true* or *false* for each statement. If the statement is *false*, replace the underlined words with words that will make the statement true.

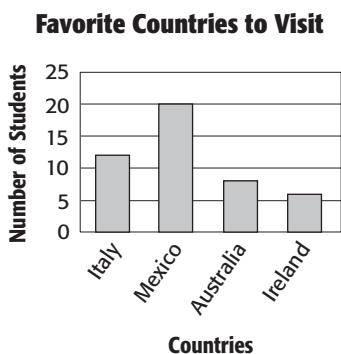
5. A bar graph is used to compare data.

6. A histogram shows categories on one of the axes.

8-5

Problem-Solving Investigation: Use a Graph

The graph shows the results of a survey about favorite countries students would like to visit.



7. Which place was favored by most students?

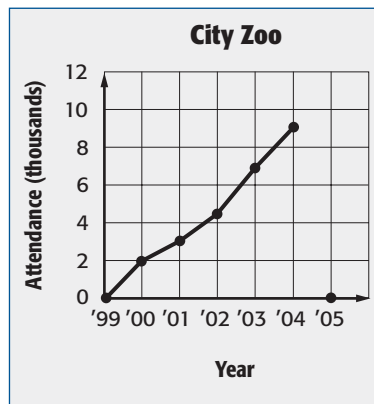
8. Compare the number of students that would like to visit Italy versus Ireland.

8-6

Using Graphs To Predict

Refer to the graph shown.

9. Mark the City Zoo graph to show how to predict the attendance in 2005.
10. If the trend continues, predict the attendance in 2005.



8-7

Using Data To Predict

11. **LUNCHES** A survey of 7th graders showed that 44% bring their lunch to school. Predict how many of the 450 7th graders bring their lunch to school.

12. **ZOO** A survey of zoo visitors showed that 28% chose the lion exhibit as their favorite. If 338 people visited today, predict how many would choose the lion exhibit as their favorite.

8-8

Using Sampling To Predict

Determine whether each conclusion is valid. Justify your answer.

13. A researcher randomly surveys ten employees from each department of a large company to determine the number of employees that buy their lunch in the cafeteria. Of these, 82% said they do buy their lunch in the cafeteria. The researcher concludes that most of the employees do buy their lunch in the cafeteria.

14. Every tenth customer who purchases books from an online store is asked to take a survey. The majority of those who replied said they would like more shipping options. As a result, the store adds more shipping options for their customers.

8-9

Misleading Statistics

The table lists the number of wrong answers a student had on her homework papers this year.

15. Which measure of central tendency might she use to emphasize her good work?

16. Which measure of central tendency best represents her work? Explain.

Wrong Answers				
1	8	2	7	2
6	8	7	2	4
7	2	5	8	6

## Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 8.

## ARE YOU READY FOR THE CHAPTER TEST?

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 8 Practice Test on page 455 of your textbook as a final check.

I used my Foldables or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 8 Study Guide and Review on pages 450–454 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may want to take the Chapter 8 Practice Test on page 455 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 8 Foldables.
- Then complete the Chapter 8 Study Guide and Review on pages 450–454 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 8 Practice Test on page 455 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature



## Probability



Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

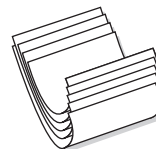
**Begin with five sheets of  $8\frac{1}{2}$ " by 11" paper.**

**STEP 1**

**Stack** 5 sheets of paper  $\frac{3}{4}$  inch apart.

**STEP 2**

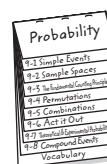
**Roll** up bottom edges so that all tabs are the same size.

**STEP 3**

**Crease** and staple along fold.

**STEP 4**

**Write** the chapter title on the front. Label each tab with a lesson number and title. Label the last tab *Vocabulary*.



**NOTE-TAKING TIP:** When taking notes, writing a paragraph that describes the concepts, the computational skills and the graphics will help you to understand the math in a lesson.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 9. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description of these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
combination			
complementary events [KAHM-pluh-MEHN-tuh-ree]			
composite events			
experimental probability [ihk-SPEHR-uh-MEHN-tuhl]			
fair game			
Fundamental Counting Principle			

Vocabulary Term	Found on Page	Definition	Description or Example
independent event			
outcome			
permutation [PUHR-myu-TAY-shuhn]			
probability [PRAH-buh-BIH-luh-tee]			
random			
sample space			
simple event			
theoretical probability [thee-uh-REHT-uh-kuhl]			
tree diagram			

## MAIN IDEA

- Find the probability of a simple event.

## KEY CONCEPT

**Probability** The probability of an event is a ratio that compares the number of favorable outcomes to the number of possible outcomes.

**FOLDABLES** On the tab for Lesson 9-1, take notes on how to find the probability of simple events. Include examples.

## BUILD YOUR VOCABULARY (pages 202–203)

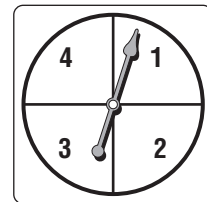
An **outcome** is any possible .

A **simple event** is one  or a collection of outcomes.

Outcomes occur at **random** if each outcome occurs by .

## EXAMPLE Find Probability

- 1 If the spinner shown is spun once, what is the probability of its landing on an odd number?



$$P(\text{odd number}) = \frac{\text{odd numbers possible}}{\text{total numbers possible}}$$

$$= \frac{2}{\quad}$$

Two numbers are odd: 1 and 3.

$$= \frac{\quad}{\quad}$$

Simplify.

The probability of spinning an odd number is  $\frac{1}{2}$  or .

**Check Your Progress** What is the probability of rolling a number less than three on a number cube marked with 1, 2, 3, 4, 5, and 6 on its faces?

## REVIEW IT

Explain how to subtract a fraction from 1.

---



---



---



---



---

### EXAMPLE

- 2 **GAMES** A game requires spinning the spinner shown in Example 1. If the number spun is greater than 3, the player wins. What is the probability of winning the game?

Let  $P(A)$  be the probability that the player will win.

$$P(A) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

$$= \frac{1}{4}$$

The probability of winning the game is .

### BUILD YOUR VOCABULARY (pages 202–203)

The sum of the probabilities of complementary events is 1 or 100%.

### EXAMPLE

- 3 **GAMES** What is the probability of *not* winning the game described in Example 2?

$$P(A) + P(\text{not } A) = 1 \quad \text{Definition of complementary events}$$

$$\frac{1}{4} + P(\text{not } A) = 1 \quad \text{Replace } P(A) \text{ with } \frac{1}{4}.$$

$$-\frac{1}{4} \qquad -\frac{1}{4} \quad \text{Subtract } \frac{1}{4} \text{ from each side.}$$

$$P(\text{not } A) = \input{type="text"}$$

The probability of *not* winning the game is  $\frac{3}{4}$ .

### Check Your Progress

A game requires spinning the spinner shown in Example 1. If the number spun is less than or equal to 2, the player wins.

- a. What is the probability of winning the game?

- b. What is the probability of *not* winning the game?

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

### MAIN IDEA

- Find sample spaces and probabilities.

### BUILD YOUR VOCABULARY (pages 202–203)

The **sample space** is the set of all  outcomes.

A **tree diagram** can be used to display the

### EXAMPLE Find the Sample Space

- 1 CHILDREN** A couple would like to have two children. Find the sample space of the children's genders if having a boy is equally likely as having a girl.

Make a table that shows all of the possible outcomes.

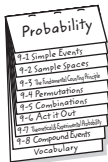
girl	<input type="text"/>
girl	boy
boy	<input type="text"/>
boy	girl

**Check Your Progress CARS** A dealer sells a car in red, black, or white. The car also can be 2-door or 4-door. Find the sample space for all possible cars available from this dealer.

### FOLDABLES

## ORGANIZE IT

On the tab for Lesson 9-2, record what you learn about sample spaces. Explain how to find probability using a tree diagram.



**EXAMPLE**

**2 TEST EXAMPLE** Amy was trying to decide what kind of sandwich to make. She had two kinds of bread, wheat and sourdough. And she had three kinds of lunchmeat, ham, turkey, and roast beef. Which list shows all the possible bread-lunchmeat combinations?

**A**

Outcomes	
wheat	ham
sourdough	turkey
wheat	turkey
sourdough	ham

**B**

Outcomes	
wheat	ham
wheat	turkey
wheat	roast beef

**C**

Outcomes	
wheat	ham
wheat	turkey
wheat	roast beef
sourdough	ham
sourdough	turkey
sourdough	roast beef

**D**

Outcomes	
wheat	turkey
sourdough	turkey
wheat	turkey
sourdough	ham
wheat	ham
sourdough	ham

**Read the Item**

There are two bread choices and three lunchmeat choices. Find all of the bread-lunchmeat combinations.

*(continued on the next page)*

## WRITE IT

In a probability game using two counters A and B, what would the outcome BA mean?

---



---



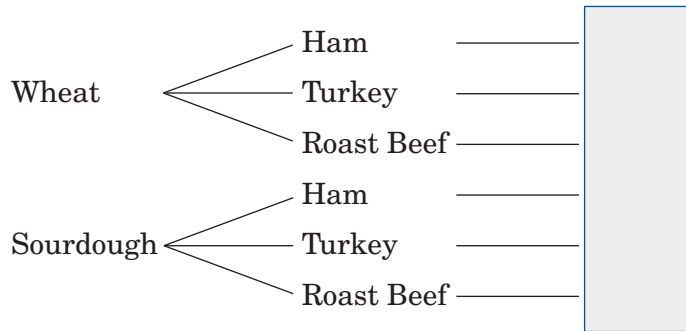
---



---

### Solve the Item

Make a tree diagram to show the sample space.



There are 6 different bread-lunchmeat combinations.

The answer is .

### Check Your Progress

**MULTIPLE CHOICE** A new car can be ordered with exterior color choices of black, red, and white, and interior color choices of tan, gray, and blue. Which list shows the different cars that are possible?

**F**

Outcomes	
black	tan
red	tan
white	tan
black	gray
red	gray
white	gray
black	blue
red	blue
white	blue

**H**

Outcomes	
black	tan
red	gray
white	blue
black	gray
red	blue
white	tan

**G**

Outcomes	
black	tan
red	gray
white	blue
black	gray

**J**

Outcomes	
black	tan
red	gray
white	blue

## HOMWORK ASSIGNMENT

Page(s):

Exercises:



# The Fundamental Counting Principle

## BUILD YOUR VOCABULARY (pages 202–203)

You can use the **Fundamental Counting Principle** to find the number of possible outcomes in a sample space.

### MAIN IDEA

- Use multiplication to count outcomes and find probabilities.

### KEY CONCEPT

**The Fundamental Counting Principle** If event  $M$  can occur in  $m$  ways and is followed by event  $N$  that can occur in  $n$  ways, then the event  $M$  followed by  $N$  can occur in  $m \times n$  ways.

**FOLDABLES** Include this concept in your notes.

### EXAMPLE

- 1 **CLOTHING** The table below shows the shirts, shorts, and shoes in Gerry's wardrobe. How many possible outfits—one shirt, one pair of shorts, and one pair of shoes—can he choose?

Shirts	Shorts	Shoes
red	beige	black
blue	green	brown
white	blue	
yellow		

$$\begin{array}{ccccccc}
 \underbrace{\text{shirts}} & \times & \underbrace{\text{shorts}} & \times & \underbrace{\text{shoes}} & = & \underbrace{\text{total}} \\
 \square & \times & \square & \times & \square & = & \square
 \end{array}$$

There are  possible outfits that Gerry can choose.

### Check Your Progress

**SANDWICHES** The table below shows the types of bread, types of cheese, and types of meat that are available to make a sandwich. How many possible sandwiches can be made by selecting one type of bread, one type of cheese, and one type of meat?

Bread	Cheese	Meat
White	American	Turkey
Wheat	Swiss	Ham
Rye	Mozzarella	Roast Beef

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## MAIN IDEA

- Find the number of permutations of a set of objects and find probabilities.

## BUILD YOUR VOCABULARY (pages 202–203)

A permutation is an , or listing of objects in which  is important.

## EXAMPLE Find a Permutation

- 1 BOWLING** A team of bowlers has five members, who bowl one at a time. In how many orders can they bowl?

There are  choices for the first bowler.

There are  choices for the second bowler.

There are  choices for the third bowler.

There are  choices for the fourth bowler.

There is  choice that remains.

$5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = \text{$

There are  possible arrangements, or permutations, of the five bowlers.

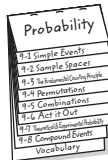
## KEY CONCEPT

**Factorial** The expression  $n$  factorial ( $n!$ ) is the product of all counting numbers beginning with  $n$  and counting backward to 1.

**Check Your Progress TRACK AND FIELD** A relay team has four members who run one at a time. In how many orders can they run?

**EXAMPLE** Find a Permutation**FOLDABLES****ORGANIZE IT**

On the tab for Lesson 9-4, record what you learn about permutations.



- 2 RAFFLE** A school fair holds a raffle with 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> prizes. Seven people enter the raffle, including Marcos, Lilly, and Heather. What is the probability that Marcos will win the 1<sup>st</sup> prize, Lilly will win the 2<sup>nd</sup> prize, and Heather will win the 3<sup>rd</sup> prize?

There are  choices for 1<sup>st</sup> prize.

There are  choices for 2<sup>nd</sup> prize.

There are  choices for 3<sup>rd</sup> prize.

$7 \cdot 6 \cdot 5 = 210$  ← The number of permutations of 3 prizes.

There are  possible arrangements, or permutations, of the 3 prizes. Since there is only one way of arranging Marcos first, Lilly second, and Heather third, the probability of this event is .

**Check Your Progress**

**CLUBS** The president and vice president of the French Club will be randomly selected from a jar of 24 names. Find the probability that Sophie will be selected as president and Peter selected as vice president.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Find the number of combinations of a set of objects and find probabilities.

**BUILD YOUR VOCABULARY** (pages 202–203)

An arrangement, or listing, of objects in which order is

is called a **combination**.

**EXAMPLE** Find the Number of Combinations

- 1 DECORATING** Ada can select from seven paint colors for her room. She wants to choose two colors to paint stripes on her walls. How many different pairs of colors can she choose?

**METHOD 1** Make a list.

Number the colors 1 through 7.

1, 2	1, 5	2, 3	2, 6	3, 5	4, 5	5, 6
1, 3	1, 6	2, 4	2, 7	3, 6	4, 6	5, 7
1, 4	1, 7	2, 5	3, 4	3, 7	4, 7	6, 7

There are  different pairs of colors.

**METHOD 2** Use a permutation.

There are  $7 \cdot 6$  permutations of two colors chosen from seven.  
There are  $2 \cdot 1$  ways to arrange the two colors.

$$\frac{7 \cdot 6}{2 \cdot 1} = \text{} = \text{}$$

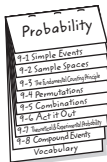
There are  different pairs of colors Ada can choose.

**Check Your Progress** **HOCKEY** The Brownsville Badgers hockey team has 14 members. Two members of the team are to be selected to be the team's co-captains. How many different pairs of players can be selected to be the co-captains?

## FOLDABLES

## ORGANIZE IT

On the tab for Lesson 9–5, record what you learn about combinations. Be sure to compare and contrast combinations and permutations.



**REMEMBER IT**

To find a combination you must divide the permutation by the number of ways you can arrange the items.

**EXAMPLES**

- 2 INTRODUCTIONS** Ten managers attend a business meeting. Each person exchanges names with each other person once. How many introductions will there be?

There are  $10 \cdot 9$  ways to choose 2 people.

There are  $2 \cdot 1$  ways to arrange the 2 people.

$$\frac{10 \cdot 9}{2 \cdot 1} = \frac{90}{2} \text{ or } \boxed{\phantom{00}}$$

There are  $\boxed{\phantom{00}}$  introductions.

- 3** If the introductions in Example 2 are made at random, what is the probability that Ms. Apple and Mr. Zimmer will be the last managers to exchange names?

Since there are  $\boxed{\phantom{00}}$  introductions and only one favorable outcome, the probability that Ms. Apple and Mr. Zimmer will be the last managers to exchange names is  $\boxed{\phantom{00}}$ .

**Check Your Progress**

- a. INTRODUCTIONS** Fifteen managers attend a business meeting. Each person exchanges names with each other person once. How many introductions will there be?

- b.** What is the probability that Ms. Apple and Mr. Zimmer will be the last managers to exchange names?

**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

# Problem-Solving Investigation: Act It Out

## MAIN IDEA

- Solve problems by acting it out.

### EXAMPLE Solve Using the Act It Out Strategy

**LUNCH** Salvador is looking for his lunch money, which he put in one of the pockets of his backpack this morning. If the backpack has six pockets, what is the probability that he will find the money in the first pocket that he checks?

**UNDERSTAND** You know that there are  pockets in Salvador's backpack and that one of the pockets contains his lunch money.

**PLAN** Toss a number cube several times. If the cube lands on 1, Salvador will find the money in the first pocket that he checks. If the cube lands on 2, 3, 4, 5, or 6, Salvador will not find the money in the first pocket that he checks.

**SOLVE** Toss the cube and make a table of the results.

<b>Trials</b>	1	2	3	4	5	6	7	8	9	10	11	12
<b>Outcome</b>	4	5	1	2	2	3	6	4	5	2	1	3

The highlighted entries show that  out of the 12 trials resulted in Salvador finding his lunch money in the first pocket that he checks.

So, the probability is  $\frac{2}{12}$  or .

**CHECK** Repeat the experiment several times to see whether the results agree.

### Check Your Progress

**PHOTOGRAPHS** A photographer is taking a picture of the four members in Margaret's family. Margaret's grandmother will stand on the right. How many different ways can the photographer arrange the family members in a row for the photo?

## HOMEWORK ASSIGNMENT

Page(s):

Exercises:

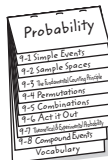
## MAIN IDEA

- Find and compare experimental and theoretical probabilities.

## FOLDABLES

## ORGANIZE IT

On the tab for Lesson 9-7, take notes about theoretical and experimental probability. Be sure to describe their differences.



## BUILD YOUR VOCABULARY (pages 202–203)

Experimental probability is based on what  occurred during an experiment. Theoretical probability is based on what  happen when conducting an experiment.

## EXAMPLE Experimental Probability

- 1 A spinner is spun 50 times, and it lands on the color blue 15 times. What is the experimental probability of spinning blue?

$$P(\text{blue}) = \frac{\text{number of times } \boxed{\phantom{000}} \text{ is spun}}{\text{number of } \boxed{\phantom{000}} \text{ outcomes}}$$

$$= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} \text{ or } \boxed{\phantom{00}}$$

The experimental probability of spinning the color blue is .

## Check Your Progress

A marble is pulled from a bag of colored marbles 30 times and 18 of the pulls result in a yellow marble. What is the experimental probability of pulling a yellow marble?

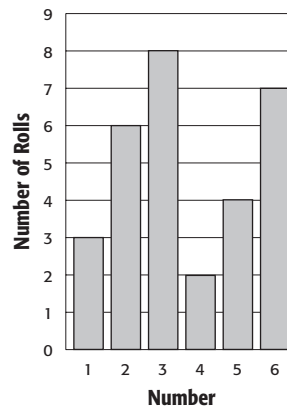
**EXAMPLES** Experimental and Theoretical Probability

The graph shows the results of an experiment in which a number cube is rolled 30 times.

2 Find the experimental probability of rolling a 5.

$$P(5) = \frac{\text{number of times } \boxed{\phantom{00}} \text{ occurs}}{\text{number of possible outcomes}}$$

$$= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} \text{ or } \boxed{\phantom{00}}$$



The experimental probability of rolling

a  $\boxed{\phantom{00}}$  is  $\boxed{\phantom{00}}$ .

3 Compare the experimental probability of rolling a 5 to its theoretical probability.

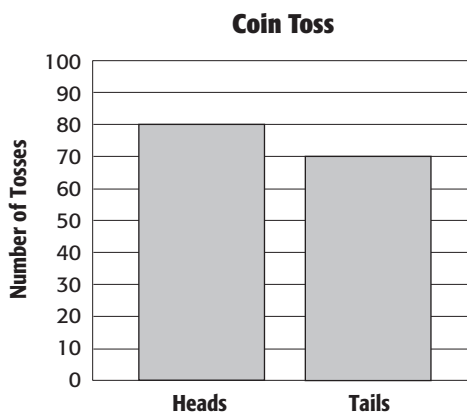
The theoretical probability of rolling a 5 on a number cube

is  $\boxed{\phantom{00}}$ . So, the theoretical probability is close to the experimental probability of  $\boxed{\phantom{00}}$ .

**Check Your Progress** The graph shows the result of an experiment in which a coin was tossed 150 times.

a. Find the experimental probability of tossing heads for this experiment.

b. Compare the experimental probability of tossing heads to its theoretical probability.



**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_



## MAIN IDEA

- Find the probability of independent and dependent events.

## KEY CONCEPT

**Probability of Two Independent Events** The probability of two independent events can be found by multiplying the probability of the first event by the probability of the second event.

**FOLDABLES** On the tab for Lesson 9-8, give an example of finding the probability of two independent events.

## BUILD YOUR VOCABULARY (pages 202–203)

A **compound event** consists of two or more  events.

When choosing one event does not  choosing a second event, both events are called **independent events**.

## EXAMPLE Independent Events

- 1 **LUNCH** For lunch, Jessica may choose from a turkey sandwich, a tuna sandwich, a salad, or a soup. For a drink, she can choose juice, milk, or water. If she chooses a lunch and a drink at random, what is the probability that she chooses a sandwich (of either kind) and juice?

$$P(\text{sandwich}) = \boxed{\phantom{000}} \quad P(\text{juice}) = \boxed{\phantom{000}}$$

$$P(\text{sandwich and juice}) = \boxed{\phantom{000}} \cdot \boxed{\phantom{000}} \text{ or } \boxed{\phantom{000}}$$

So, the probability that she chooses a sandwich and juice is .

## Check Your Progress

**SWEATS** Zachary has a blue, a red, a gray, and a white sweatshirt. He also has blue, red, and gray sweatpants. If Zachary randomly pulls a sweatshirt and a pair of sweatpants from his drawer, what is the probability that they will both be blue?

## BUILD YOUR VOCABULARY (pages 202–203)

If one event affects the outcome of a second event, the events are called **dependent events**.

If two events cannot happen at the same time, then they are **disjoint events**.

**EXAMPLES** Dependent Events

**2 SOCKS** There are 4 black, 6 white, and 2 blue socks in a drawer. José randomly selects two socks without replacing the first sock. What is the probability that he selects two white socks?

$P(\text{first sock is white}) = \frac{6}{12}$  There are  white socks and  total socks.

$P(\text{second sock is white}) = \frac{5}{11}$  After one white sock is removed, there are  white socks and  total socks.

$P(\text{two white socks}) = \frac{1}{2} \cdot \frac{5}{11}$  or

**KEY CONCEPT**

**Probability of two Dependent Events** The probability of two dependent events,  $A$  and  $B$ , can be found by multiplying the probability of  $A$  by the probability of  $B$  after  $A$  occurs.

**FOLDABLES** On the tab for Lesson 9-8, give an example of finding the probability of two independent events.

**3 Disjoint Events**

**MONTHS** A month of the year is randomly selected. What is the probability of the month ending in the letter  $Y$  or the letter  $R$ .

They are disjoint events since it is impossible to have a month ending in both the letter  $Y$  and the letter  $R$ ?

$P(\text{ending in } Y \text{ or } R) = \frac{\text{There are 8 months that end in } Y \text{ or } R.}{\text{There are 12 months.}}$

**Check Your Progress**

**a. GAMES** Janet has a card game that uses a deck of 48 cards – 16 red, 16 blue, and 16 green. If she randomly selects two cards without replacing the first, what is the probability that both are green?


**b. MARBLES** There are 12 yellow, 3 black, 5 red, and 8 blue marbles in a bag. Joseph randomly selects one marble from the bag. What is the probability that the marble selected will be black or red?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## STUDY GUIDE

	VOCABULARY PUZZLEMAKER	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 9 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 9, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (pages 202–203) to help you solve the puzzle.

9-1

## Simple Events

For Questions 1–3, a bag contains 4 green, 6 orange, and 10 purple blocks. Find each probability if you draw one block at random from the bag. Write as a fraction in simplest form.

1. P(green)

2. P(orange)

3. P(purple)

9-2

## Sample Spaces

4. **PHONES** A phone company offers three different calling features (caller ID, call waiting, and call forward) and two different calling plans (Plan A or Plan B). Find the sample space for all possibilities of a calling feature and a calling plan.

9-3

The Fundamental Counting Principle

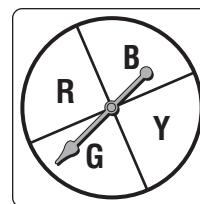
5. Underline the correct term to complete the sentence: The operation used in the Fundamental Counting Principle is (*addition, multiplication*).

Use the Fundamental Counting Principle to find the total number of outcomes in each situation.

6. Tossing a coin and rolling a 6-sided number cube.

7. Making a sandwich using whole wheat or sourdough bread, ham or turkey, and either cheddar, swiss, or provolone cheese.

8. Choosing a marble from a bag containing 10 differently colored marbles and spinning the spinner at the right.



9-4

Permutations

9. **LETTERS** How many permutations are there of the letters in the word *pizza*?

10. **BASEBALL** In how many ways can the six infielders of a baseball team stand in a row for autograph signing?

11. **NUMBERS** How many 4-digit passwords can be formed using the digits 1, 3, 4, 5, 7, and 9? Assume no number can be used more than once.

9-5

## Combinations

Complete each sentence.

12. You can find the number or combinations of objects in a set by  the number of  of the entire set by the number of ways each smaller set can be arranged.
13. A  is an arrangement or listing in which order is not .
14. The burger shop offers 3 choices of condiments from the following: lettuce, onions, pickles, ketchup, and mustard. How many different combinations of condiments can you have on your burger?

9-6

## Problem-Solving Investigation: Act It Out

15. **TRAVEL** Four friends are driving to the beach. In how many different ways can two friends sit in the front and two friends sit in the back if Raul must be the driver?

9-7

## Theoretical and Experimental Probability

Underline the correct term(s) to complete each sentence.

16. The word experimental means based on (experience, theory).
17. Theoretical probability is based on what (you actually try, is expected).
18. (Experimental, theoretical) probability can be based on past performance and can be used to make predictions about future events.

Sue has 5 different kinds of shoes: sneakers, sandals, boots, moccasins, and heels.

19. If she chooses a pair each day for two weeks, and chooses moccasins 8 times, what is the experimental probability that moccasins are chosen?

20. Find the theoretical probability of choosing the moccasins.

9-8

### Compound Events

State whether each sentence is *true* or *false*. If *false*, replace the underlined word to make the sentence true.

21. A compound event consists of more than one single event.

22. When the outcome of the first event does not have any effect on the second event it is called a simple event.

23. A yellow and a green cube are rolled. What is the probability that an even number is rolled on the yellow cube and a number less than 3 is rolled on the green cube?

24. There are 4 chocolate chip, 6 peanut butter, and 2 sugar cookies in a box. Malena randomly selects two cookies without replacing the first. Find the probability that she selects a peanut butter cookie and then a sugar cookie.

## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 9.

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 9 Practice Test on page 503 of your textbook as a final check.

I used my Foldable or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 9 Study Guide and Review on pages 498–502 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may want to take the Chapter 9 Practice Test on page 503 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 9 Foldable.
- Then complete the Chapter 9 Study Guide and Review on pages 498–502 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 9 Practice Test on page 503 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

## Geometry: Polygons



Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

**Begin with a sheet of 11" by 17" paper.**

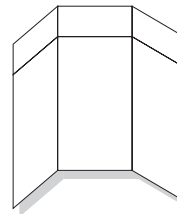
**STEP 1**

**Fold** a 2" tab along the long side of the paper.



**STEP 2**

**Unfold** the paper and fold in thirds widthwise.



**STEP 3**

**Open** and draw lines along the folds. Label the head of each column as shown. Label the front of the folded table with the chapter title.

What I Know About Polygons	What I Need to Know	What I've Learned



**NOTE-TAKING TIP:** As you study a chapter, take notes, record concepts, and write examples about important definitions and concepts.



**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 10. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
acute triangle			
adjacent angles			
complementary angles			
congruent angles			
congruent segments			
equilateral [EH-kwuh-LA-tuh-rull] triangle			
indirect measurement			
isosceles [y-SAHS-LEEZ] triangle			
line symmetry			
obtuse triangle			
parallelogram			

(continued on the next page)

Vocabulary Term	Found on Page	Definition	Description or Example
quadrilateral [KWAH-druh-LA-tuh-ruhl]			
reflection			
rhombus [RAHM-buhs]			
scalene [SKAY-LEEN] triangle			
similar figures			
straight angle			
supplementary angles			
tessellation			
translation			
trapezoid [TRA-puh-ZOYD]			
vertex			
vertical angles			

## MAIN IDEA

- Classify angles and identify vertical and adjacent angles.

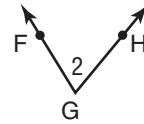
## BUILD YOUR VOCABULARY (pages 225–226)

An angle has two sides that share a  endpoint and is measured in units called **degrees**.

The  where the sides of an angle  is called the **vertex**.

## EXAMPLE Naming Angles

## 1 Name the angle at the right.



- Use the vertex as the middle letter and a point from each side.

or

- Use the vertex only.

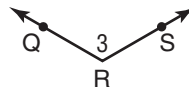
- Use a number.

The angle can be named in four ways:

, , , or .

## Check Your Progress

Name the angle below.



**REMEMBER IT**

A ray starts at a point and goes without end in one direction.

**BUILD YOUR VOCABULARY** (pages 225–226)

A **right angle** measures   $90^\circ$ .

An **acute angle** measures  than  $90^\circ$ .

An **obtuse angle** measures   $90^\circ$  and  $180^\circ$ .

A **straight angle** measures   $180^\circ$ .

**EXAMPLES** Classify Angles

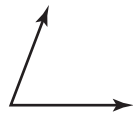
Classify each angle as *acute*, *obtuse*, *right*, or *straight*.

2



The angle is exactly , so it is a  angle.

3

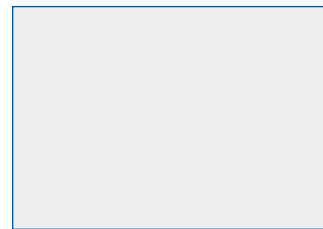
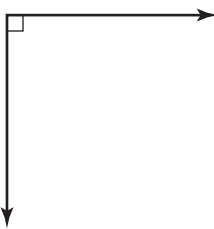


The angle is  than  $90^\circ$ , so it is an  angle.

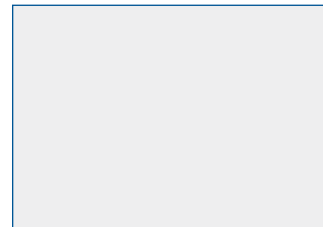
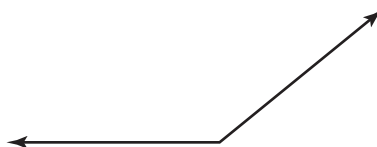
**Check Your Progress**

Classify each angle as *acute*, *obtuse*, *right*, or *straight*.

a.



b.



**BUILD YOUR VOCABULARY** (pages 225–226)

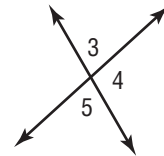
Two angles that have the same  are **congruent**.

Two angles are **vertical** if they are  angles formed by the intersection of two lines.

Two angles are **adjacent** if they share a common vertex, a common , and do not overlap.

**EXAMPLE**

- 1** Determine if each pair of angles in the figure at the right are vertical angles, adjacent angles, or neither.



- a.  $\angle 3$  and  $\angle 5$

Since  $\angle 3$  and  $\angle 5$  are opposite angles formed by the intersection of two lines, they are  angles.

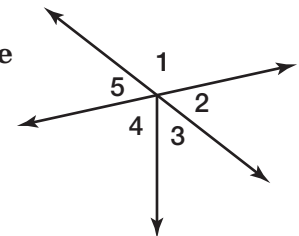
- b.  $\angle 3$  and  $\angle 4$

$\angle 3$  and  $\angle 4$  share a common vertex and side, and do not overlap. So, they are  angles.

- c.  $\angle 4$  and  $\angle 5$

$\angle 4$  and  $\angle 5$  share a common vertex and side, and do not overlap. So, they are  angles.

- Check Your Progress** Determine if each pair of angles in the figure at the right are vertical angles, adjacent angles, or neither.



- a.  $\angle 1$  and  $\angle 2$

- b.  $\angle 2$  and  $\angle 5$

- c.  $\angle 1$  and  $\angle 4$

## MAIN IDEA

- Identify complementary and supplementary angles and find missing angle measures.

## BUILD YOUR VOCABULARY (pages 225–226)

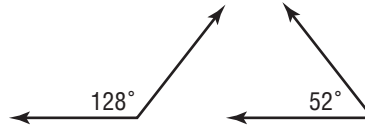
Complementary angles have a sum of .

Supplementary angles have a sum of .

## EXAMPLES Classify Angles

Classify each pair of angles as *complementary*, *supplementary*, or *neither*.

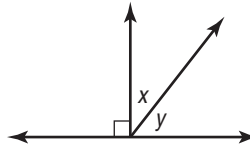
1



$$\boxed{\phantom{000}} + 52^\circ = \boxed{\phantom{000}}$$

So, the angles are .

2



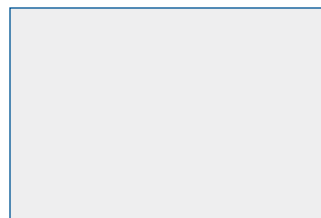
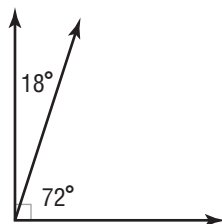
$\angle x$  and  $\angle y$  form a  angle.

So, the angles are .

## Check Your Progress

Classify each pair of angles as *complementary*, *supplementary*, or *neither*.

a.

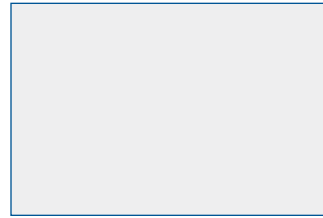
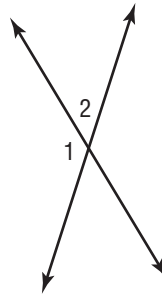


**REMEMBER IT**



When two angles are congruent, the measure of the angles are equal.

b.



**EXAMPLE** Find a Missing Angle Measure

- 1 Angles  $PQS$  and  $RQS$  are supplementary. If  $m\angle PQS = 56^\circ$ , find  $m\angle RQS$ .

Since  $\angle PQS$  and  $\angle RQS$  are supplementary,  
 $m\angle PQS + m\angle RQS = 180^\circ$ .

$m\angle PQS + m\angle RQS = 180$  Write the equation.

+  $m\angle RQS =$

Replace  $m\angle PQS$  with .

$\underline{-56 \qquad \qquad \qquad -56}$

Subtract  from each side.

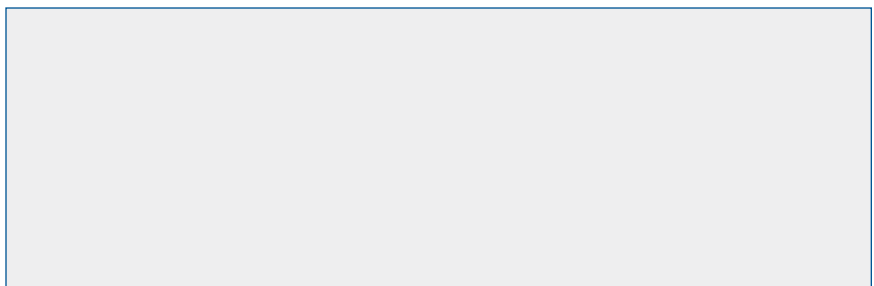
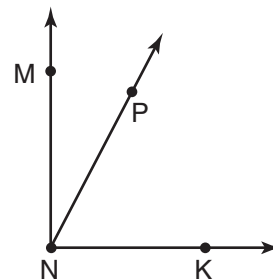
$m\angle RQS =$

$180 -$    $=$

The measure of  is  $124^\circ$ .

**Check Your Progress**

Angles  $MNP$  and  $KNP$  are complementary. If  $m\angle MNP = 23^\circ$ , find  $m\angle KNP$ .



**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Construct and interpret circle graphs.

## BUILD YOUR VOCABULARY (pages 225–226)

A graph that shows data as parts of a  is a **circle graph**.

## EXAMPLE Display Data in a Circle Graph

- 1 SPORTS** In a survey, a group of middle school students were asked to name their favorite sport. The results are shown in the table. Make a circle graph of the data.

Sport	Percent
football	30%
basketball	25%
baseball	22%
tennis	8%
other	15%

- Find the degrees for each part. Round to the nearest whole degree.

football:  of  $360^\circ = 0.30 \cdot 360^\circ$  or

basketball:  $25\%$  of  $360^\circ =$    $\cdot 360^\circ$  or

baseball:  of  $360^\circ = 0.22 \cdot 360^\circ$  or about

tennis:  $8\%$  of  $360^\circ =$    $\cdot 360^\circ$  or about

other:  of  $360^\circ = 0.15 \cdot 360^\circ$  or about

- Draw a circle with a radius marked as shown. Then use a  to draw the first angle, in this case . Repeat this step for each section.

## WRITE IT

Write a proportion to convert 65% to the number of degrees in a part of a circle graph.

---



---



---

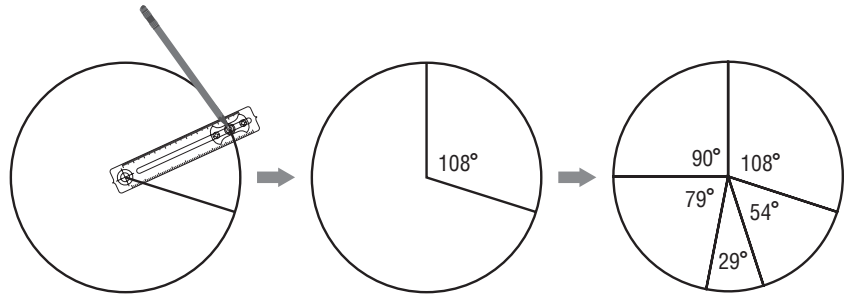


---



---



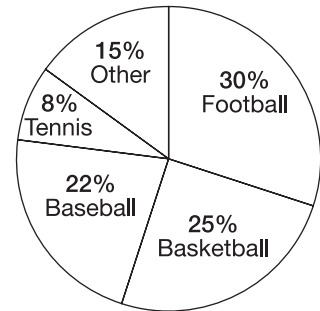


- Label each section of the graph with the category and

. Give the graph

a .

**Favorite Sport**



## REVIEW IT

Explain how to convert a fraction to a decimal. (Lesson 4-5)

---



---



---



---



---



---

### EXAMPLE Construct a Circle Graph

- MOVIES** Gina has the following types of movies in her DVD collection. Make a circle graph of the data.

Type of Movie	Numbers
action	24
comedy	15
science fiction	7

- Find the total number of DVDs:  $24 + 15 + 7$  or .

- Find the  that compares each number with the . Write the ratio as a  number rounded to the nearest hundredth.

action:   $\approx 0.52$

comedy:   $\approx 0.33$

science fiction:   $\approx 0.15$

(continued on the next page)

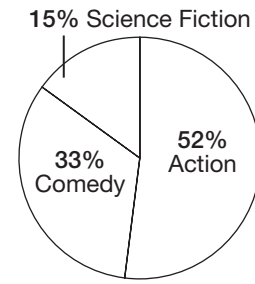
- Find the number of degrees for each section of the graph.

action:  $0.52 \cdot 360^\circ =$

comedy:  $0.33 \cdot 360^\circ =$

science fiction:  $0.15 \cdot 360^\circ =$

Gina's DVD Collection

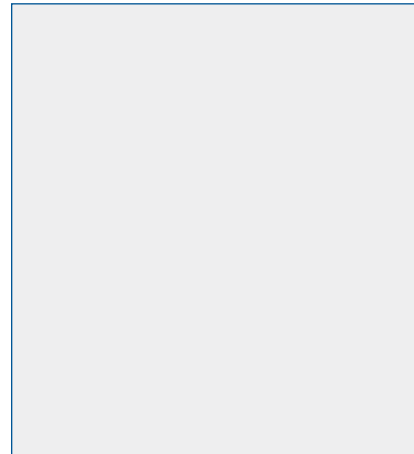


- Draw the circle graph.

**Check Your Progress**

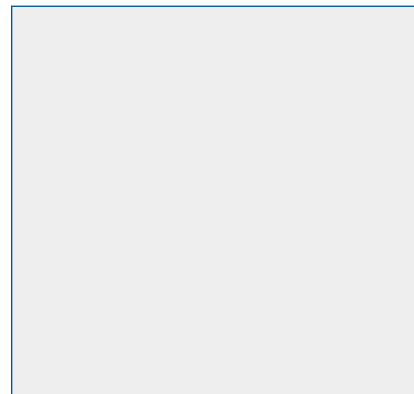
- a. ICE CREAM** In a survey, a group of students were asked to name their favorite flavor of ice cream. The results are shown in the table. Make a circle graph of the data.

Flavor	Percent
chocolate	30%
cookie dough	25%
peanut butter	15%
strawberry	10%
other	20%



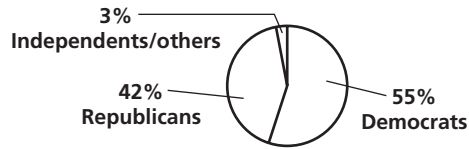
- b. MARBLES** Michael has the following colors of marbles in his marble collection. Make a circle graph of the data.

Color	Number
black	12
green	9
red	5
gold	3



**EXAMPLES** Analyze a Circle Graph

**VOTING** The circle graph below shows the percent of voters in a town who are registered with a political party.



**1** Which party has the most registered voters?

The largest section of the circle is the one representing . So, the Democratic party has the most registered voters.

**1** If the town has 3,400 registered Republicans, about how many voters are registered in all?

Republicans: 42% of registered voters =

$$0.42 \times n = 3,400$$

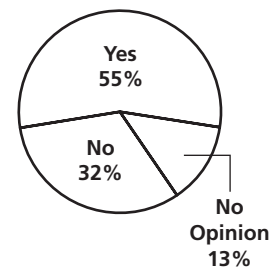
$$0.42n = 3,400$$

$$n \approx 8,095$$

So, there are about  registered voters in all.

**Check Your Progress** **SPORTS** The circle graph below shows the responses of middle school students to the question “Should teens be allowed to play professional sports?”

**a.** Which response was the greatest? **Should Teens Be Allowed to Play Professional Sports?**



**b.** If there were 1,500 middle school students, how many had no opinion?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

### MAIN IDEA

- Identify and classify triangles.

### KEY CONCEPT

**Angles of a Triangle** The sum of the measures of the angles of a triangle is  $180^\circ$ .

**FOLDABLES** Record this relationship in your Foldable. Be sure to include an example.

### BUILD YOUR VOCABULARY (pages 225–226)

A triangle is a figure with three  and three .

Sides with the same  are congruent segments.

### EXAMPLE Find a Missing Measure

**1 ALGEBRA** Find  $m\angle A$  in  $\triangle ABC$  if  $m\angle A = m\angle B$ , and  $m\angle C = 80^\circ$ .

Since the sum of the angle measures in a triangle is  $180^\circ$ ,

$$m\angle A + m\angle B + m\angle C = \text{}$$

Let  $x$  represent  $m\angle A$ . Since  $m\angle A = m\angle B$ ,  $x$  also represents

$$\text{}$$

$$x + x + 80 = 180$$

Write the equation.

$$\text{} + 80 = 180$$

$$x + x = 2x$$

$$\begin{array}{r} \text{} \\ - \text{} \\ \hline \end{array} \quad \begin{array}{r} \text{} \\ - \text{} \\ \hline \end{array}$$

Subtract  from each side.

$$\frac{2x}{\text{}} = \frac{100}{\text{}}$$

Divide each side by 2.

$$x = \text{}$$

So,  $m\angle A = \text{}$ .

**Check Your Progress** **ALGEBRA** Find  $m\angle M$  in  $\triangle MNO$  if  $m\angle N = 75^\circ$  and  $m\angle O = 67^\circ$ .

**BUILD YOUR VOCABULARY** (pages 225–226)

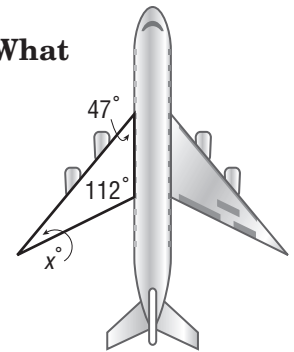
An **acute triangle** has all acute angles. A **right triangle** has one right angle. An **obtuse triangle** has one obtuse angle.

A **scalene triangle** has no congruent sides. An **isosceles triangle** has at least 2 congruent sides. An **equilateral triangle** has three congruent sides.

**EXAMPLE**

**TEST EXAMPLE** An airplane has wings that are shaped like triangles. What is the missing measure of the angle?

- A  $41^\circ$     B  $31^\circ$     C  $26^\circ$     D  $21^\circ$



**Read the Item**

To find the missing measure, write and solve an equation.

**Solve the Item**

$$x + \square + \square = 180 \quad \text{The sum of the measures is 180.}$$

$$x + \square = 180 \quad \text{Simplify.}$$

$$\begin{array}{r} x + \square = 180 \\ -159 \quad -159 \\ \hline x = \square \end{array} \quad \text{Subtract 159 from each side.}$$

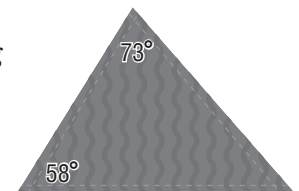
$$x = \square$$

The missing measure is  $21^\circ$ . The answer is D.

**Check Your Progress**

**MULTIPLE CHOICE** A piece of fabric is shaped like a triangle. Find the missing angle measure.

- F  $73^\circ$                       G  $49^\circ$   
H  $58^\circ$                       J  $53^\circ$



**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

# Problem-Solving Investigation: Use Logical Reasoning

## MAIN IDEA

- Solve problems by using logical reasoning.

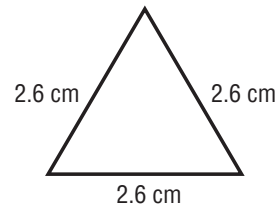
### EXAMPLE Solve Using Logical Reasoning

**GEOMETRY** Draw an equilateral triangle. How can you confirm that it is equilateral?

**UNDERSTAND** You know that equilateral triangles have  congruent sides. You need to confirm whether or not a drawn triangle is equilateral.

**PLAN** Draw an equilateral triangle. Measure the sides to confirm that all three sides are .

**SOLVE** Draw the triangle.



Measure the sides using a ruler or centimeter ruler. The side lengths are 2.6 centimeters, 2.6 centimeters, and 2.6 centimeters. Since all three sides are congruent, the triangle is equilateral.

**CHECK** Since all three sides are congruent, the triangle is equilateral. You can have someone else also measure the sides to check that the triangle is .

**Check Your Progress** **GEOMETRY** Do the angles in an equilateral triangle have a special relationship?

## HOMWORK ASSIGNMENT

Page(s):

Exercises:

### MAIN IDEA

- Identify and classify quadrilaterals.

### FOLDABLES

## ORGANIZE IT

Record what you learn about quadrilaterals. Illustrate and describe the five types of quadrilaterals discussed in this chapter.

What I Know About Polygons	What I Need To Know	What I've Learned

### BUILD YOUR VOCABULARY (pages 225–226)

A quadrilateral is a  figure with  sides and four .

A **parallelogram** is a quadrilateral with opposite sides  and opposite sides .

A **trapezoid** is a  with one pair of  sides.

A **rhombus** is a parallelogram with four congruent sides.

### EXAMPLES Classify Quadrilaterals

Classify the quadrilateral using the name that best describes it.

1



The quadrilateral has 4  angles and opposite sides are . It is a .

2



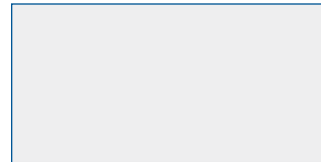
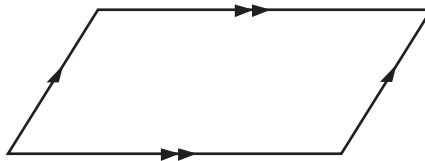
The quadrilateral has  pair of  sides. It is a .

**KEY CONCEPT**

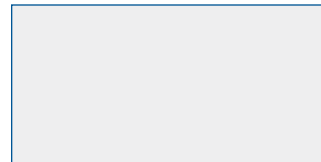
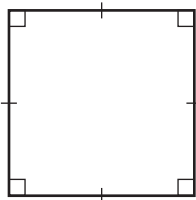
**Angles of a Quadrilateral**  
The sum of the measures of the angles of a quadrilateral is  $360^\circ$ .

**Check Your Progress** Classify the quadrilateral using the name that *best* describes it.

a.



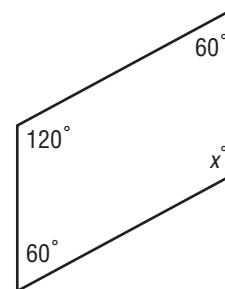
b.



**EXAMPLE** Find a Missing Measure

**1 ALGEBRA** Find the value of  $x$  in the quadrilateral shown.

Write and solve an equation. Let  $x$  represent the missing measure.



$$\square + \square + \square + x = 360$$

$$\square + x = 360$$

$$\square \quad \square$$

$$x = \square$$

The sum of the measures is  $360^\circ$ .

Simplify.

Subtract  $\square$  from both sides.

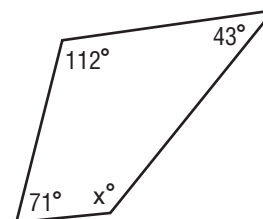
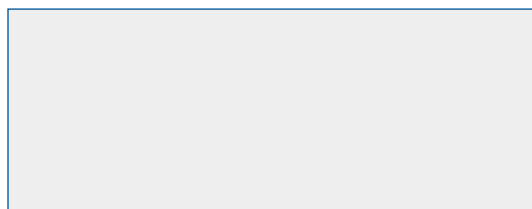
So, the missing angle measure is  $\square$ .

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

**Check Your Progress** Find the missing angle measure in the quadrilateral.





### MAIN IDEA

- Determine whether figures are similar and find a missing length in a pair of similar figures.

### KEY CONCEPT

**Similar Figures** If two figures are similar, then

- the corresponding sides are proportional, and
- the corresponding angles are congruent.

### BUILD YOUR VOCABULARY (pages 225–226)

Figures that have the same  but not necessarily

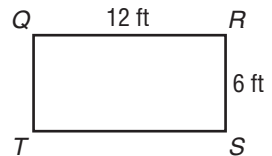
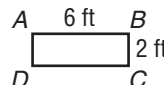
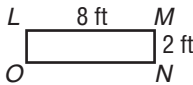
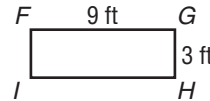
the same  are **similar figures**.

The  of similar figures that “match” are **corresponding sides**.

The  of similar figures that “match” are **corresponding angles**.

### EXAMPLE Identify Similar Figures

1 Which rectangle below is similar to rectangle *FGHI*?



Compare the ratios of the corresponding sides.

Rectangle *LMNO*

Rectangle *ABCD*

Rectangle *QRST*

$$\frac{FG}{LM} = \frac{9}{8}$$

$$\frac{FG}{AB} = \text{[ ]}$$

$$\frac{FG}{QR} = \frac{9}{12}$$

$$\frac{GH}{MN} = \text{[ ]}$$

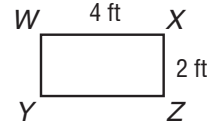
$$\frac{GH}{BC} = \frac{3}{2}$$

$$\frac{GH}{RS} = \text{[ ]}$$




So, rectangle *FGHI* is similar to rectangle .

**Check Your Progress** Which rectangle from Example 1 is similar to rectangle WXYZ shown?



**BUILD YOUR VOCABULARY** (pages 225–226)

**Indirect measurement** uses similar figures to find the length, width, or height of objects that are too difficult to measure directly.

**FOLDABLES**

**ORGANIZE IT**

Use your Foldable to record what you learn about similar figures and indirect measurement.

What I Know About Polygons	What I Need To Know	What I've Learned

**EXAMPLE**

**2 ARCHITECTURE** A rectangular picture window 12 feet long and 6 feet wide needs to be shortened to 9 feet in length to fit a redesigned wall. If the architect wants the new window to be similar to the old window, how wide will the new window be?

$$\frac{12}{9} = \frac{6}{w}$$

Write a proportion.

$$12w = \boxed{\phantom{00}}$$

Find the cross products.

$$12w = \boxed{\phantom{00}}$$

Simplify.

$$w = \boxed{\phantom{00}}$$

Divide each side by  $\boxed{\phantom{00}}$ .

So, the width of the new window will be  $\boxed{\phantom{00}}$  feet.

**Check Your Progress** Tom has a rectangular garden that has a length of 12 feet and a width of 8 feet. He wishes to start a second garden that is similar to the first and will have a width of 6 feet. Find the length of the new garden.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

**MAIN IDEA**

- Classify polygons and determine which polygons can form a tessellation.

**BUILD YOUR VOCABULARY** (pages 225–226)

A **polygon** is a simple, closed figure formed by three or more straight line segments.

A **regular polygon** has all sides congruent and all angles congruent.

A polygon is named by the number of sides it has:

**pentagon** (5 sides), **hexagon** (6 sides), **heptagon** (7 sides),

**octagon** (8 sides), **nonagon** (9 sides), and **decagon** (10 sides).

**EXAMPLES** Classify Polygons

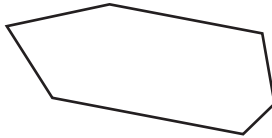
Determine whether each figure is a polygon.

1



The figure is not a polygon since it has a  side.

2

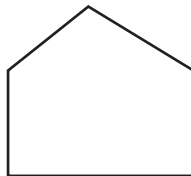


This figure has 6 sides that are not all of equal length. It is a  that is not .

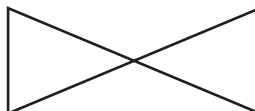
**Check Your Progress**

Determine whether each figure is a polygon. If it is, classify the polygon and state whether it is regular. If it is not a polygon, explain why.

a.




b.



## FOLDABLES

## ORGANIZE IT

Use your Foldable to record what you learn about polygons and tessellations. Explain how a tessellation can be made with several kinds of polygons.

What I Know About Polygons	What I Need To Know	What I've Learned

## BUILD YOUR VOCABULARY (pages 225–226)

A repetitive pattern of polygons that fit together with no

or  is called a **tessellation**.

## EXAMPLE Tessellations

**3 PATTERNS** Ms. Pena is creating a pattern on her wall. She wants to use regular hexagons. Can Ms. Pena make a tessellation with regular hexagons?

The measure of each angle in a regular hexagon is .

The sum of the measures of the angles where the vertices meet must be  $360^\circ$ .

So, solve  $120n = 360$ .

Write the equation.

$$\frac{120n}{120} = \frac{360}{120}$$

Divide each side by .

$$n = \text{$$

Since  $120^\circ$  divides evenly into  $360^\circ$ , the sum of the measures where the vertices meet is . So, Ms. Pena can make a tessellation with regular hexagons.

**Check Your Progress** **QUILTING** Emily is making a quilt using fabric pieces shaped as equilateral triangles. Can Emily tessellate the quilt with these fabric pieces?

## HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

### MAIN IDEA

- Graph translations of polygons on a coordinate plane.

### BUILD YOUR VOCABULARY (pages 225–226)

A transformation maps one figure onto another.

A **translation** is a transformation where a figure is moved without turning it.

The original figure and the translated figure are **congruent** figures.

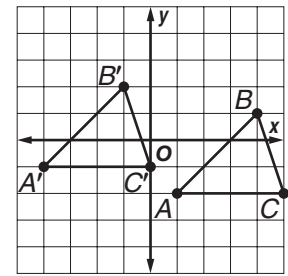
### EXAMPLE Graph a Translation

1 Translate  $\triangle ABC$  5 units left and 1 unit up.

- Move each vertex of the figure 5 units left and 1 unit up. Label the new vertices  $A'$ ,  $B'$ , and  $C'$ .
- Connect the vertices to draw the triangle. The coordinates of the vertices of the new figure are

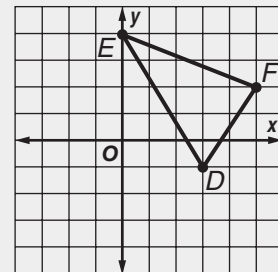
, ,

and .



### Check Your Progress

Translate  $\triangle DEF$  3 units left and 2 units down.



### REMEMBER IT



The order of a translation of a figure does not matter. Moving a figure to the side  $x$  units and then up  $y$  units is the same as moving it up  $y$  units and then to the side  $x$  units.

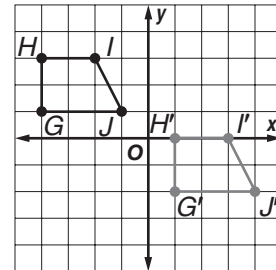
**EXAMPLE** Find Coordinates of a Translation

**2** Trapezoid  $GHIJ$  has vertices  $G(-4, 1)$ ,  $H(-4, 3)$ ,  $I(-2, 3)$ , and  $J(-1, 1)$ . Find the vertices of trapezoid  $G'H'I'J'$  after a translation of 5 units right and 3 units down. Then graph the figure and its translated image.

Add  to each  $x$ -coordinate. Add  to each  $y$ -coordinate.

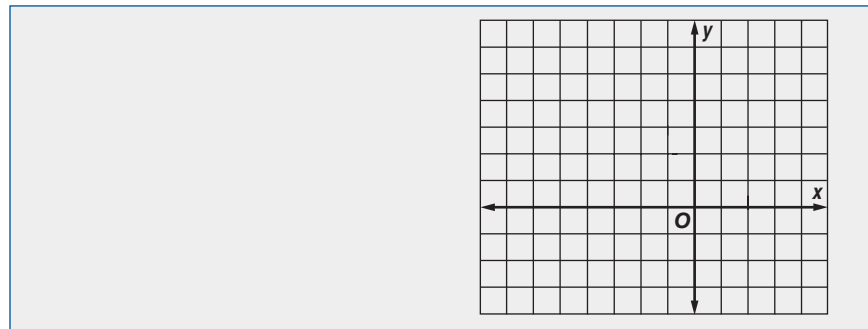
Vertices of Trapezoid $GHIJ$	$(x + 5, y - 3)$	Vertices of Trapezoid $G'H'I'J'$
$G(-4, 1)$	<input type="text"/>	$G'(1, -2)$
$H(-4, 3)$	$(-4 + 5, 3 - 3)$	<input type="text"/>
<input type="text"/>	$(-2 + 5, 3 - 3)$	<input type="text"/>
$J(-1, 1)$	<input type="text"/>	$J'(4, -2)$

The coordinates of trapezoid  $G'H'I'J'$  are  $G'$  ,  $H'$  ,  $I'$  , and  $J'$  .



**Check Your Progress**

Triangle  $MNO$  has vertices  $M(-5, -3)$ ,  $N(-7, 0)$ , and  $O(-2, 3)$ . Find the vertices of triangle  $M'N'O'$  after a translation of 6 units right and 3 units up. Then graph the figure and its translated image.



**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

# 10-10 Reflections

## MAIN IDEA

- Identify figures with line symmetry and graph reflections on a coordinate plane.

## BUILD YOUR VOCABULARY (pages 225–226)

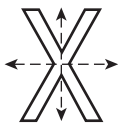
Figures that  exactly when they are folded in  have **line symmetry**.

Each fold line is called a **line of symmetry**.

## EXAMPLES Identify Lines of Symmetry

**LETTERS** Determine whether each letter has a line of symmetry. If so, copy the figure and draw all lines of symmetry.

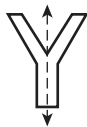
1



This figure has line .

There are  lines of symmetry.

2



This figure has line symmetry.

There is  line of symmetry.

3

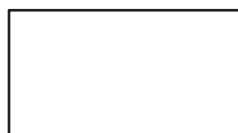


This figure  have line symmetry.

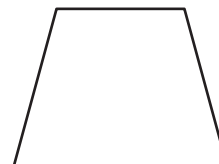
## Check Your Progress

Determine whether each figure has line symmetry. If so, copy the figure and draw all lines of symmetry.

a.



b.



**REMEMBER IT**



Vertices of a figure receive double prime symbols (") after they have been transformed twice.

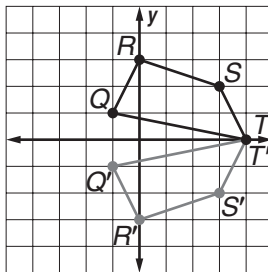
**BUILD YOUR VOCABULARY** (pages 225–226)

A reflection is a mirror  of the original figure that is the result of a transformation over a  called a **line of reflection**.

**EXAMPLE** Reflect a Figure Over the  $x$ -axis

**1** Quadrilateral  $QRST$  has vertices  $Q(-1, 1)$ ,  $R(0, 3)$ ,  $S(3, 2)$ , and  $T(4, 0)$ . Graph the figure and its reflected image over the  $x$ -axis. Then find the coordinates of the reflected image.

The  $x$ -axis is the line of reflection. So, plot each vertex of  $Q'R'S'T'$  the same distance from the  $x$ -axis as its corresponding vertex on  $QRST$ .



$Q'$

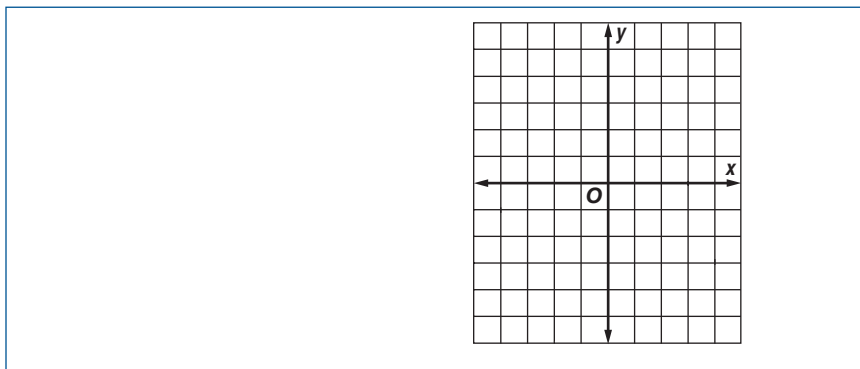
$R'$

$S'$

$T'$

**Check Your Progress**

Quadrilateral  $ABCD$  has vertices  $A(-3, 2)$ ,  $B(-1, 5)$ ,  $C(3, 3)$ , and  $D(2, 1)$ . Graph the figure and its reflection over the  $x$ -axis. Then find the coordinates of the reflected image.



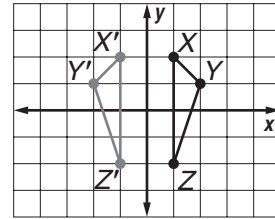


**EXAMPLE** Reflect a Figure over the *y*-axis

5 Triangle *XYZ* has vertices *X*(1, 2), *Y*(2, 1), and *Z*(1, -2). Graph the figure and its reflected image over the *y*-axis. Then find the coordinates of the reflected image.

The *y*-axis is the line of reflection. So, plot each vertex of *X'Y'Z'* the same distance from the *y*-axis and its corresponding vertex on *XYZ*.






**Check Your Progress** Triangle *QRS* has vertices *Q*(3, 4), *R*(1, 0), and *S*(6, 2). Graph the figure and its reflection over the *y*-axis. Then find the coordinates of the reflected image.

Copyright © Glencoe/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.

## HOMEWORK ASSIGNMENT

Page(s):
Exercises:

## STUDY GUIDE

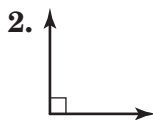
	VOCABULARY PUZZLEMAKER	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 10 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 10, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (pages 225–226) to help you solve the puzzle.

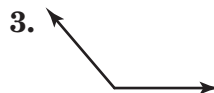
## 10-1

## Angle Relationships

Classify each angle as *acute*, *obtuse*, or *right*.








## 10-2

## Complementary and Supplementary Angles

Complete each sentence.

4. The sum of the measures of  angles is  $180^\circ$ .

5. The sum of the measures of  angles is  $90^\circ$ .

6. If  $\angle A$  and  $\angle B$  are supplementary angles and  $m\angle B = 43^\circ$ , find  $m\angle A$ .

## 10-3

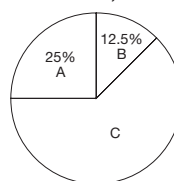
## Statistics: Display Data in a Circle Graph

Find the number of degrees for each part of the graph at the right.

7. A

8. B

9. C



10-4

Triangles

Complete the table to help you remember the ways to classify triangles.

	Type of Triangle	Classified by Angles or Sides	Description
10.	acute	angles	<input type="text"/>
11.	obtuse	<input type="text"/>	<input type="text"/>
12.	<input type="text"/>	sides	no congruent sides
13.	<input type="text"/>	<input type="text"/>	1 right angle
14.	equilateral	<input type="text"/>	<input type="text"/>

10-5

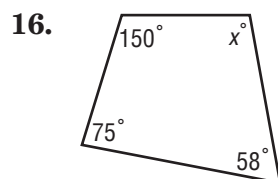
Problem-Solving Investigation: Logical Reasoning

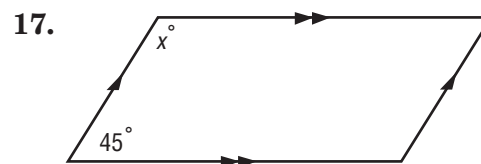
15. **RACES** Marcus, Elena, Pedro, Keith, and Darcy ran a 2-mile race. Darcy finished directly after Pedro, Elena finished before Marcus, and Keith finished first. If Pedro finished third, order the runners from first to last.

10-6

Quadrilaterals

Find the value of  $x$  in the quadrilateral.

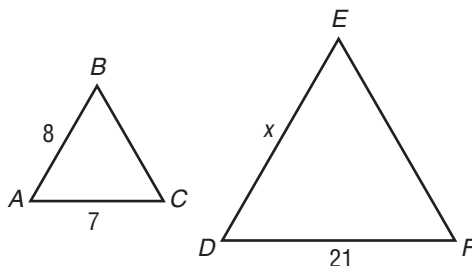
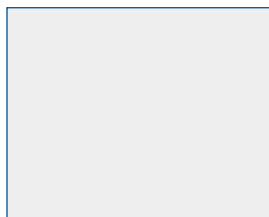




10-7

Similar Figures

18. Find the value of  $x$  if  $\triangle ABC \sim \triangle DEF$ .



10-8

Polygons and Tessellations

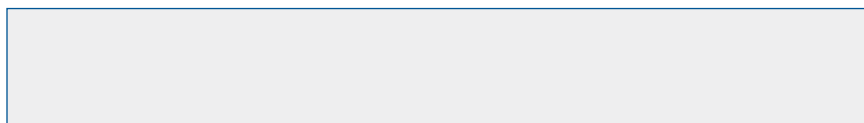
Underline the correct term to complete each sentence.

- 19. A polygon can have (two, three) or more straight lines.
- 20. To find the sum of the angle measures in a regular polygon, draw all the diagonals from one vertex, count the number of (angles, triangles) formed, and multiply by  $180^\circ$ .

10-9

Translations

21. Triangle  $ABC$  with vertices  $A(2, 4)$ ,  $B(-4, 6)$ , and  $C(1, -5)$  is translated 2 units right and 3 units down. What are the coordinates of  $B$ ?

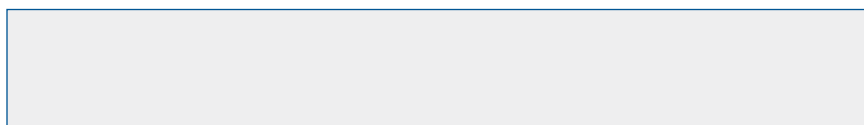


10-10

Reflections

Underline the correct word(s) to complete the sentence.

- 22. The image of a reflection is (larger than, the same size as) the original figure.
- 23. Triangle  $DEF$  has vertices  $D(-5, 2)$ ,  $E(-4, -2)$ , and  $F(-3, 0)$ . It is reflected over the  $y$ -axis. What are the coordinates of  $D$ ?



## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 10.

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 10 Practice Test on page 567 of your textbook as a final check.

I used my Foldable or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 10 Study Guide and Review on pages 563–566 of your textbook.
- If you are unsure of any concepts or skills, refer to the specific lesson(s).
- You may want to take the Chapter 10 Practice Test on page 567 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 10 Foldable.
- Then complete the Chapter 10 Study Guide and Review on pages 563–566 of your textbook.
- If you are unsure of any concepts or skills, refer to the specific lesson(s).
- You may also want to take the Chapter 10 Practice Test on page 567 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

## Measurement: Two- and Three-Dimensional Figures

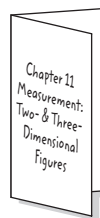


Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

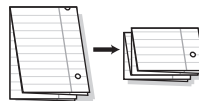
**Begin with a sheet of  $8\frac{1}{2}$ " by 11" construction paper and two sheets of notebook paper.**

**STEP 1**

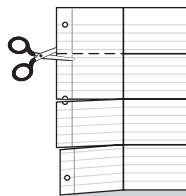
**Fold** the construction paper in half lengthwise. Label the chapter title on the outside.

**STEP 2**

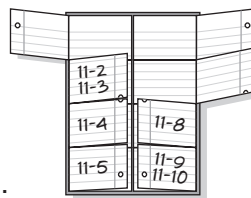
**Fold** the sheets of notebook paper in half lengthwise. Then fold top to bottom twice.

**STEP 3**

**Open** the notebook paper. Cut along the second folds to make four tabs.

**STEP 4**

**Glue** the uncut notebook paper side by side onto the construction paper. Label each tab as shown.



**NOTE-TAKING TIP:** When you take notes, it is helpful to write key vocabulary words, definitions, concepts, or procedures as clearly and concisely as possible.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 11. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
base			
circle			
circumference			
composite figure			
cone			
cylinder			
diameter			
edge			
face			

(continued on the next page)

Vocabulary Term	Found on Page	Definition	Description or Example
height			
lateral face			
prism			
pyramid			
radius			
rectangular prism			
solid			
sphere			
three-dimensional figure			
triangular prism			
vertex			
volume			



### MAIN IDEA

- Find the areas of parallelograms.

### KEY CONCEPT

#### Area of a Parallelogram

The area  $A$  of a parallelogram equals the product of its base  $b$  and height  $h$ .

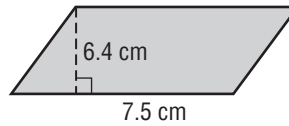
### BUILD YOUR VOCABULARY (pages 255–256)

The **base** is any  of a parallelogram.

The **height** is the length of the segment  to the  with endpoints on  sides.

### EXAMPLE Find the Area of a Parallelogram

- Find the area of the parallelogram.



**Estimate**  $A = \text{ } \cdot \text{ } \text{ or } \text{ } \text{ cm}^2$

$A = bh$  Area of a parallelogram

$A = \text{ } \cdot \text{ }$  Replace  with 7.5 and  with 6.4.

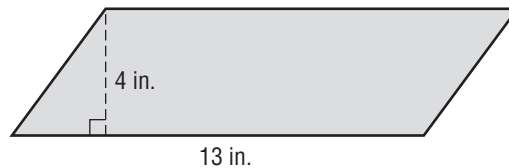
$A = \text{ }$  Multiply.

The area of the parallelogram is  square centimeters.

This is the same as the estimate.

### Check Your Progress

Find the area of the parallelogram.



### HOMEWORK ASSIGNMENT

Page(s):

Exercises:

# Areas of Triangles and Trapezoids

### MAIN IDEA

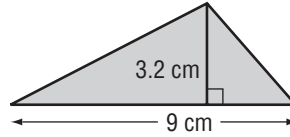
- Find the areas of triangles and trapezoids.

### KEY CONCEPT

**Area of a Triangle** The area  $A$  of a triangle equals half the product of its base  $b$  and height  $h$ .

### EXAMPLE Find the Area of a Triangle

1 Find the area of the triangle below.



Estimate  $\frac{1}{2}(9)(3) =$

$A = \frac{1}{2}bh$  Area of a triangle.

$A = \frac{1}{2}$    Replace  $b$  with  and  $h$  with .

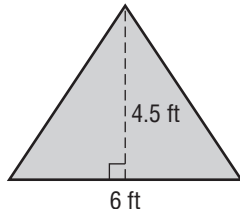
$A =$   Multiply.

The area of the triangle is 14.4 .

This is close to the estimate.

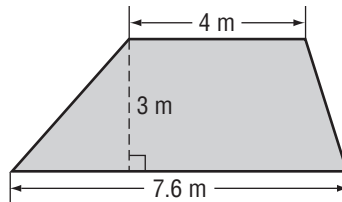
### Check Your Progress

Find the area of the triangle below.




### EXAMPLE Find the Area of a Trapezoid

2 Find the area of the trapezoid below.



The bases are  meters and  meters.

The height is  meters.

**KEY CONCEPT**

**Area of a Trapezoid** The area  $A$  of a trapezoid equals half the product of the height  $h$  and the sum of the bases  $b_1$  and  $b_2$ .

$$A = \frac{1}{2}h(b_1 + b_2)$$

Area of a trapezoid

$$A = \frac{1}{2}(3) \square$$

Replace  $h$  with  $\square$ ,  $b_1$  with  $\square$ , and  $b_2$  with  $\square$ .

$$A = \frac{1}{2} \square (11.6)$$

Add  $\square$  and  $\square$ .

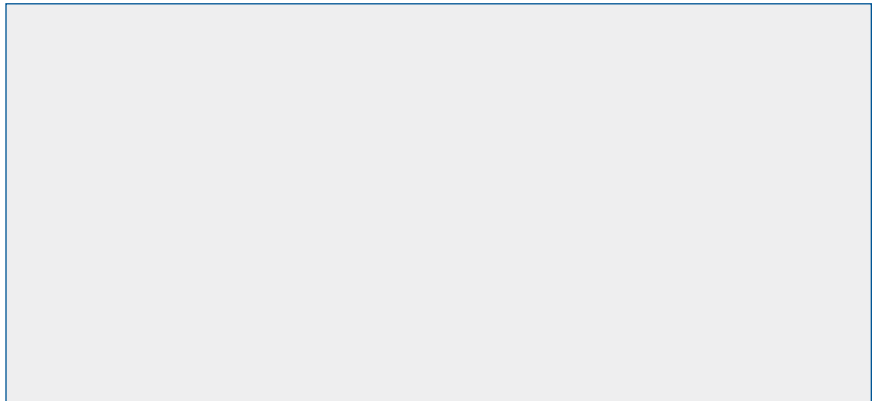
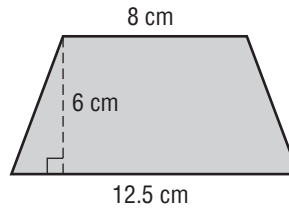
$$A = \square$$

Multiply.

The area of the trapezoid is  $\square$  square meters.

**Check Your Progress**

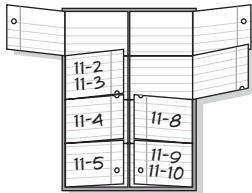
Find the area of the trapezoid below.



**FOLDABLES**

**ORGANIZE IT**

Under the tab for Lesson 11-2 of your Foldable, record in words and symbols how to find the area of triangles and trapezoids.



**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

### MAIN IDEA

- Find the circumference of circles.

### BUILD YOUR VOCABULARY (pages 255–256)

A **circle** is a set of all points in a plane that are the

distance from a given  called the **center**.

The **diameter** ( $d$ ) is the distance  a

The **circumference** ( $C$ ) is the distance  a circle.

The **radius** ( $r$ ) is the distance from the  to any point on a .

An approximation often used for  $\pi$  (**pi**) is .

### KEY CONCEPT

**Circumference of a Circle**  
The circumference  $C$  of a circle is equal to its diameter  $d$  times  $\pi$ , or 2 times its radius  $r$  times  $\pi$ .

### EXAMPLE Find Circumference

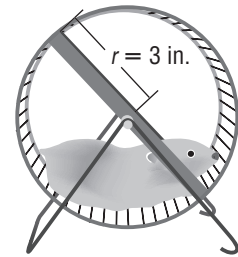
- 1 PETS** Find the circumference around the hamster's running wheel shown. Round to the nearest tenth.

$$C = 2\pi r$$

$$C = 2 \text{  } (3)$$

$$C = \text{  } \quad \text{Multiply.}$$

The circumference is about  inches.

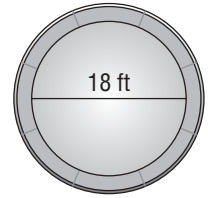


**REMEMBER IT**

All circumferences are estimates since 3.14 is an estimated value of pi.

**Check Your Progress** **SWIMMING POOL**

A new children's swimming pool is being built at the local recreation center. The pool is circular in shape with a diameter of 18 feet. Find the circumference of the pool. Round to the nearest tenth.

**EXAMPLE** Find Circumference

- 2 Find the circumference of a circle with a diameter of 49 centimeters.

Since 49 is a multiple of 7, use  for  $\pi$ .

$$C = \pi d \quad \text{Circumference of a circle}$$

$$C \approx \frac{22}{7} \cdot \text{$$

Replace  with  $\frac{22}{7}$  and  $d$  with .

$$C \approx \frac{22}{7} \cdot \frac{49}{1}$$

Divide by the , 7.

$$C \approx \text{$$

Multiply.

The circumference is about 154 .

**Check Your Progress** Find the circumference of a circle with a radius of 35 feet.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## EXAMPLES Find the Areas of Circles

### MAIN IDEA

- Find the areas of circles.

### KEY CONCEPT

**Area of a Circle** The area  $A$  of a circle equals the product of pi ( $\pi$ ) and the square of its radius  $r$ .

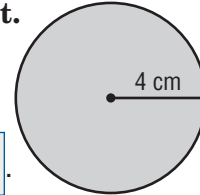
1 Find the area of the circle at the right.

$A =$   Area of a circle

$A = \pi \cdot$   Replace  $r$  with .

$\pi$   $\times$  2  $x^2$  ENTER

The area of the circle is approximately  square centimeters.



2 KOI Find the area of the koi pond shown.

The diameter of the pond is 3.6 meters, so the radius is  $\frac{1}{2}(3.6)$  or 1.8 meters.

$A = \pi r^2$  Area of a circle

$A = \pi$  ()<sup>2</sup> Replace  $r$  with .

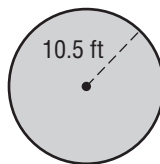
$A \approx$   Use a calculator.

The area is approximately 10.2 square meters.



### Check Your Progress

a. Find the area of the circle below.




b. COINS Find the area of a nickel with a diameter of 2.1 centimeters.

### HOMEWORK ASSIGNMENT

Page(s):

Exercises:

**BUILD YOUR VOCABULARY** (pages 255–256)

A **sector** of a circle is a region of a circle bounded by

radii.

**EXAMPLE**

**TEST EXAMPLE** Mr. McGowan made an apple pie with a diameter of 10 inches. He cut the pie into 6 equal slices. Find the approximate area of each slice.

- A  $3 \text{ in}^2$       B  $13 \text{ in}^2$       C  $16 \text{ in}^2$       D  $52 \text{ in}^2$

**Read the Item**

You can use the diameter to find the total area of the pie and then divide that result by 6 to find the area of each slice.

**Solve the Item**

Find the area of the whole pie.

$$A = \pi r^2$$

Area of a circle

$$A = \pi (\text{input})^2$$

Replace  $r$  with .

$$A \approx 78$$

Multiply.

Find the area of one slice.

$$78 \div \text{input} = 13$$

The area of each slice is approximately 13 square inches.

The correct answer is .

**Check Your Progress**

**MULTIPLE CHOICE** The floor of a merry-go-round at the amusement park has a diameter of 40 feet. The floor is divided evenly into eight sections, each having a different color. Find the area of each section of the floor.

**F**  $15.7 \text{ ft}^2$

**H**  $62.8 \text{ ft}^2$

**G**  $20 \text{ ft}^2$

**J**  $157 \text{ ft}^2$

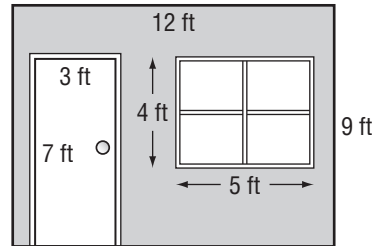
# Problem-Solving Investigation: Solve a Simpler Problem

## MAIN IDEA

- Solve problems by solving a simpler problem.

### EXAMPLE Use the Solve a Simpler Problem Strategy

**PAINT** Ben and Shelia are going to paint the wall of a room as shown in the diagram. What is the area that will be painted?



**UNDERSTAND** You know the dimensions of the wall including the door and window. You also know the dimensions of the door and window. You need to find the area of the wall not including the door and window.

**PLAN** Find the area of the wall including the door and window. Then subtract the area of the door and the window.

**SOLVE** area of wall including door and window:

$$A = lw$$

$$A = 12 \cdot 9 \text{ or } \boxed{\phantom{000}} \text{ square feet}$$

area of door:

$$A = lw$$

$$A = 3 \cdot 7 \text{ or } \boxed{\phantom{00}} \text{ square feet}$$

area of window:

$$A = lw$$

$$A = 5 \cdot 4 \text{ or } \boxed{\phantom{00}} \text{ square feet}$$

The total area to be painted is  $108 - 21 - 20$

or  $\boxed{\phantom{000}}$  square feet.

**CHECK** The area to be painted is 67 square feet. Add the area of the door and the window.  $67 + 21 + 20$  is 108 square feet. So, the answer is correct.

**Check Your Progress** Karen is placing a rectangular area rug measuring 8 feet by 10 feet in a rectangular dining room that measures 14 feet by 18 feet. Find the area of the flooring that is not covered by the area rug.

## HOMWORK ASSIGNMENT

Page(s):

Exercises:



### MAIN IDEA

- Find the areas of composite figures.

### BUILD YOUR VOCABULARY (pages 255–256)

A composite figure is made of triangles, quadrilaterals, semicircles, and other  figures.

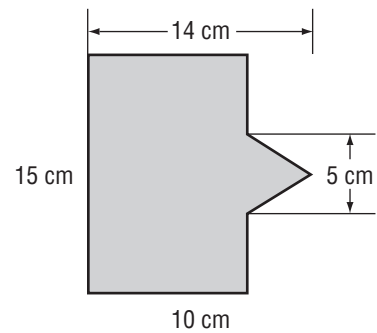
A semicircle is  of a circle.

### EXAMPLE Find the Area of a Composite Figure

- Find the area of the figure in square centimeters.

The figure can be separated into a  and a .

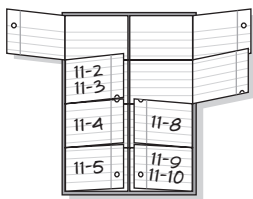
Find the area of each.



### FOLDABLES

### ORGANIZE IT

In the tab for Lesson 11-6 of your Foldable, record in words and symbols how you find the area of composite figures. Make up an example of your own and explain how you would find the area.



#### Area of Rectangle

$$A = lw$$

$$A = 15 \cdot 10 \text{ or } \text{$$

#### Area of Triangle

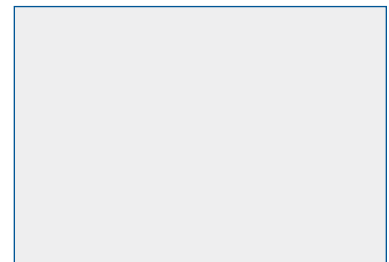
$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(5)(4) \text{ or } \text{$$

The area is  $150 + 10$  or  square centimeters.

### Check Your Progress

Find the area of the figure shown.



## WRITE IT

Explain in general terms how to subdivide a composite figure so you can find its area.

---



---



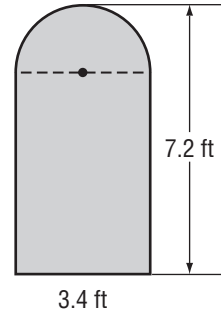
---



---

### EXAMPLE Find the Area of a Composite Figure

**2 WINDOWS** The diagram at the right shows the dimensions of a window. Find the area of the window. Round to the nearest tenth.



The figure can be separated into a semicircle and a rectangle.

#### Area of Semicircle

$$A = \boxed{\phantom{00}} \pi r^2 \quad \text{Area of a semicircle}$$

$$A = \frac{1}{2} \pi \boxed{\phantom{00}} \quad \text{Replace } r \text{ with } \boxed{\phantom{00}} \div \boxed{\phantom{00}} \text{ or } \boxed{\phantom{00}}.$$

$$A \approx \boxed{\phantom{00}} \quad \text{Simplify.}$$

#### Area of Rectangle

$$A = \ell w \quad \text{Area of a rectangle}$$

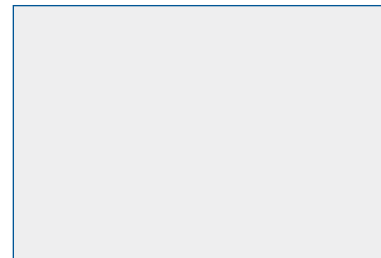
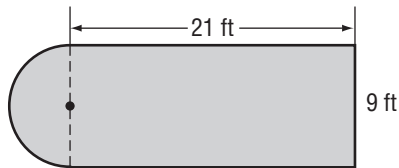
$$A = \boxed{\phantom{00}} \quad \text{Replace } \ell \text{ with } \boxed{\phantom{00}} - \boxed{\phantom{00}} \text{ or } \boxed{\phantom{00}}$$

and  $w$  with  $\boxed{\phantom{00}}$ .

$$A = \boxed{\phantom{00}} \quad \text{Multiply.}$$

The area of the window is approximately  $\boxed{\phantom{00}} + \boxed{\phantom{00}}$  or  $\boxed{\phantom{00}}$  square feet.

**Check Your Progress** The diagram below shows the dimensions of a new driveway. Find the area of the driveway. Round to the nearest tenth.



## HOMWORK ASSIGNMENT

Page(s):

Exercises:

### MAIN IDEA

- Classify three-dimensional figures.

### BUILD YOUR VOCABULARY (pages 255–256)

A three-dimensional figure has length, **width**, and **depth**.

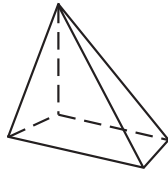
A **face** is a flat . The **edges** are the segments formed by intersecting .

The edges  at the **vertices**. The  are called **lateral faces**.

### EXAMPLES Classify Three-Dimensional Figures

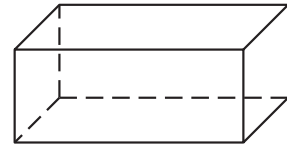
For each figure, identify the shape of the base(s). Then classify the figure.

1



The figure has four triangular faces and one rectangular base. The figure is a .

2

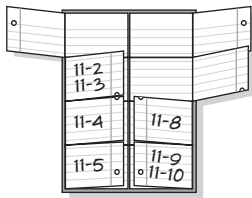


The base and all other faces are rectangles. The figure is a .

### FOLDABLES

### ORGANIZE IT

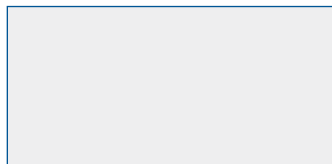
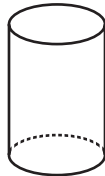
Record notes about classifying three-dimensional figures under the tab for Lesson 11-7 of your Foldable.



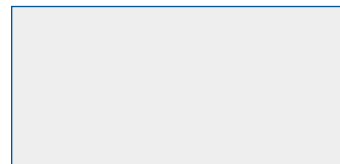
### Check Your Progress

For each figure, identify the shape of the base(s). Then classify the figure.

a.



b.



**BUILD YOUR VOCABULARY** (pages 255–256)

The top and bottom faces of a three-dimensional figure are called the **bases**.

A **prism** has at least three lateral faces that are rectangles.

A **pyramid** has at least three lateral faces that are **triangles**.

A **cone** has one base that is a  and one vertex.

A **cylinder** has two bases that are  circles.

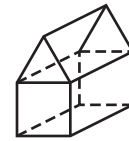
All of the points on a **sphere** are the same distance from the **center**.

**EXAMPLE**

- 3 HOUSES** Classify the shape of the house's roof as a **three-dimensional figure**.

The shape of the house's roof

is a .

**REMEMBER IT**

The base tells the name of the three-dimensional figure.

**Check Your Progress** Classify the shape of the house above, not including the roof.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

**EXAMPLE** Draw a Three-Dimensional Figure

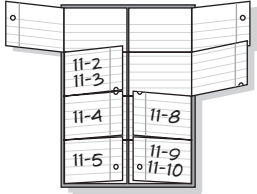
**MAIN IDEA**

- Draw a three-dimensional figure given the top, side, and front views.

**FOLDABLES**

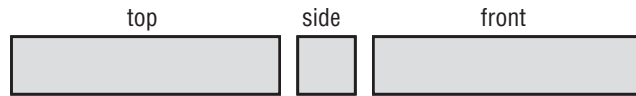
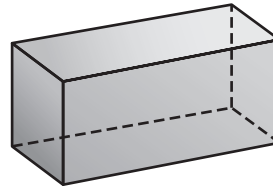
**ORGANIZE IT**

Record notes about drawing three-dimensional figures under the tab for Lesson 11-8 in your Foldable. Sketch examples of rectangular prisms and cylinders.

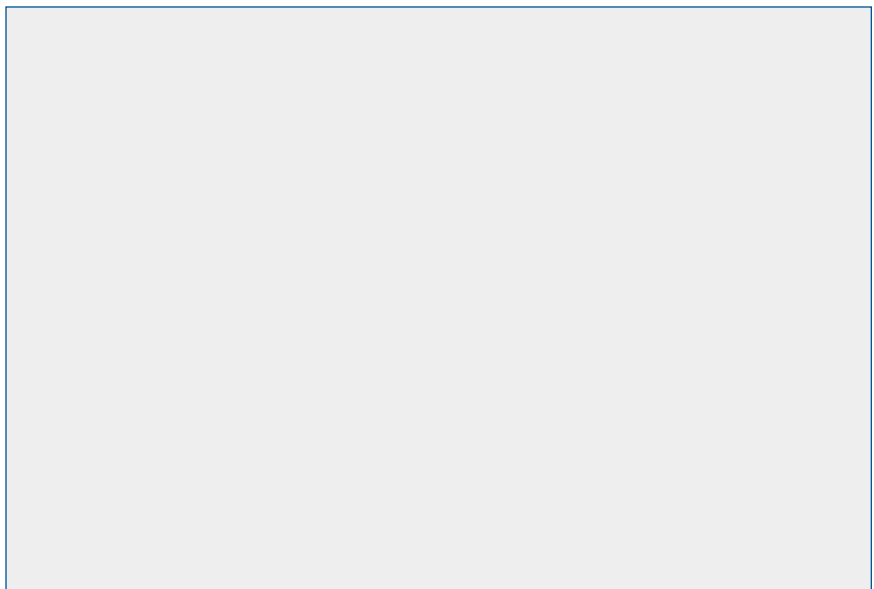
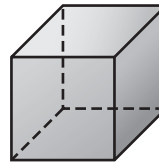


1 Draw a top, a side, and a front view of the figure below.

The top and front views are . The side view is a .



**Check Your Progress** Draw a top, a side, and a front view of the figure below.



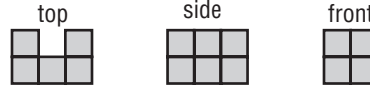
**EXAMPLE** Draw a Three-Dimensional Figure

**2** Draw the three-dimensional figure whose top, side, and front views are shown below. Use isometric dot paper.

**REMEMBER IT**



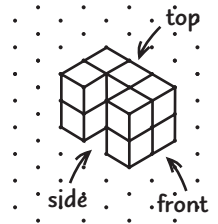
There is more than one way to draw the different views of a three-dimensional figure.



**Step 1** Use the top view to draw the base of the figure.

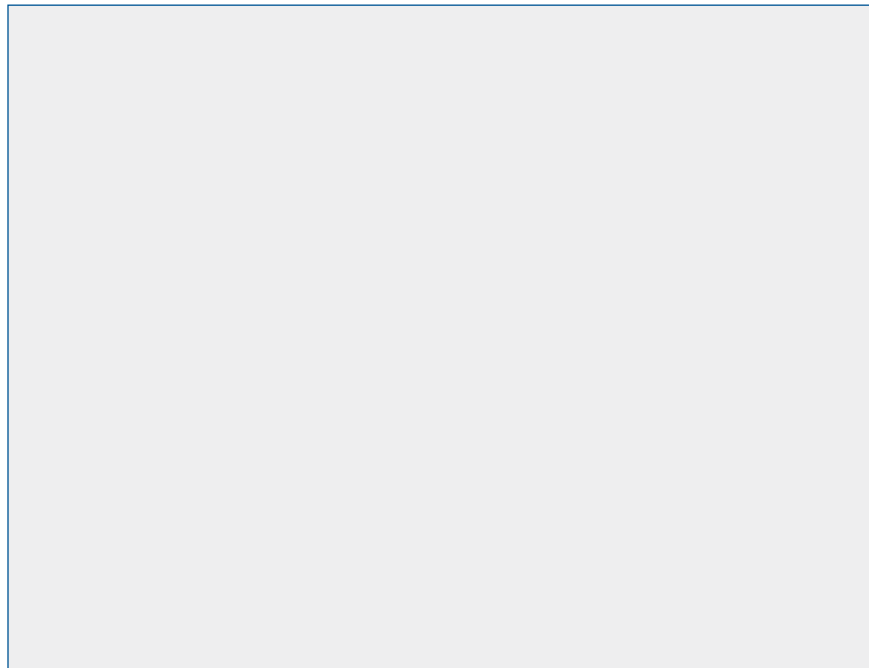
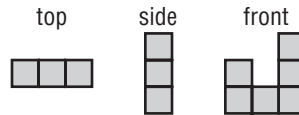
**Step 2** Add edges to make the base a solid figure.

**Step 3** Use the side and front views to complete the figure.



**Check Your Progress**

Draw a solid using the top, side, and front views shown below. Use isometric dot paper.



**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

### MAIN IDEA

- Find the volumes of rectangular and triangular prisms.

### BUILD YOUR VOCABULARY (pages 255-256)

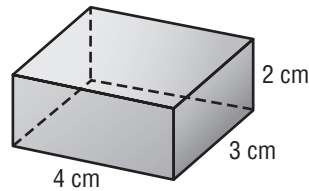
A **volume** of a three-dimensional figure is the measure of  occupied by it.

A **rectangular prism** is a prism that has **rectangular**

. A **triangular prism** has  bases.

### EXAMPLE Volume of a Rectangular Prism

- Find the volume of the rectangular prism.



$$V = \ell wh$$

Volume of a

$$V = \text{$$

Replace  $\ell$  with ,  $w$  with , and  $h$  with .

$$V = \text{$$

Multiply.

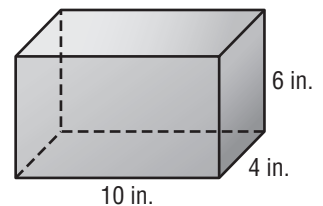
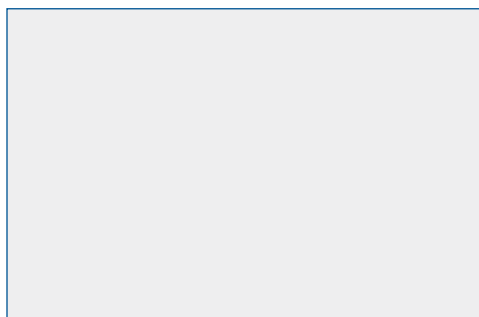
The volume is 24  centimeters.

### KEY CONCEPT

**Volume of a Rectangular Prism** The volume  $V$  of a rectangular prism is the area of the base  $B$  times the height  $h$ . It is also the product of the length  $\ell$ , the width  $w$ , and the height  $h$ .

### Check Your Progress

Find the volume of the rectangular prism.



### HOMEWORK ASSIGNMENT

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

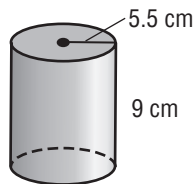
# 11-10 Volume of Cylinders

## EXAMPLE Find the Volume of a Cylinder

### MAIN IDEA

- Find the volumes of cylinders.

1 Find the volume of the cylinder. Round to the nearest tenth.



$$V = \boxed{\phantom{000}}$$

Volume of a cylinder

$$V = \pi \boxed{\phantom{000}}$$

Replace the variables.

$$V \approx \boxed{\phantom{000}}$$

Use 3.14 for  $\pi$ .

The volume is about  $\boxed{\phantom{000}}$  cubic centimeters.

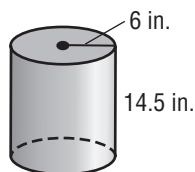
### KEY CONCEPT

**Volume of a Cylinder** The volume  $V$  of a cylinder with radius  $r$  is the area of the base  $B$  times the height  $h$ .

**FOLDABLES** Take notes on how to find the volume of cylinders under the tab for Lesson 11-10 of your Foldable.

### Check Your Progress

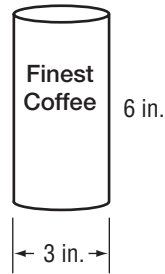
Find the volume of the cylinder. Round to the nearest tenth.





**EXAMPLE**

**2 COFFEE** How much coffee can the can hold?



$$V = \pi r^2 h$$

Volume of a cylinder

$$V = \pi (\boxed{\phantom{00}})^2 \boxed{\phantom{00}}$$

Replace  $r$  with  $\boxed{\phantom{00}}$  and  $h$  with  $\boxed{\phantom{00}}$ .

$$V \approx \boxed{\phantom{00}}$$

Simplify.

The coffee can holds about  $\boxed{\phantom{00}}$  cubic inches.

**Check Your Progress**

**JUICE** Find the volume of a cylinder-shaped juice can that has a diameter of 5 inches and a height of 8 inches.

**WRITE IT**

Explain how you would use a calculator to evaluate a power.

---



---



---



---



---

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

---



---

## STUDY GUIDE

## FOLDABLES

Use your **Chapter 11 Foldable** to help you study for your chapter test.

VOCABULARY  
PUZZLEMAKER

To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 11, go to:

[glencoe.com](http://glencoe.com)

BUILD YOUR  
VOCABULARY

You can use your completed **Vocabulary Builder** (pages 255–256) to help you solve the puzzle.

## 11-1

## Area of Parallelograms

State whether each sentence is *true* or *false*. If false, replace the underlined word to make a true sentence.

- To find the base of a parallelogram, draw a segment perpendicular to the base with endpoints on opposite sides of the parallelogram.
- The area of a parallelogram is found by multiplying its base times the height.
- What is the area of a parallelogram with a base of 15 feet and a height of 3.5 feet?

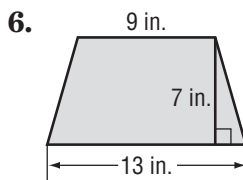
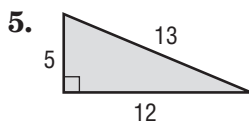
## 11-2

## Area of Triangles and Trapezoids

Complete the sentence.

- To find the  of a triangle, find the distance from the  to the  vertex.

Find the area.



11-3

## Circles and Circumference

Find the circumference of each circle. Use 3.14 or  $\frac{22}{7}$  for  $\pi$ . Round to the nearest tenth if necessary.

7. radius = 7.4 cm

8. radius =  $3\frac{1}{2}$  in.

9. diameter =  $6\frac{1}{8}$  ft

10. diameter = 1.7 mi

11-4

## Area of Circles

Complete each sentence.

11. To find the  of a circle when you are given the

, divide the length of the diameter by ,

square that, and  the result by pi.

12. The units for the  of a circle will always be measured

in  units.

13. Find the area of a circle with a diameter of 13.6 inches. Round

to the nearest tenth.

11-5

## Problem-Solving Investigation: Solve a Simpler Problem

14. **MOVIES** Five friends, Marcy, Luke, Shawnda, Jorge, and Lily sat in a row at the movie theater. Marcy and Luke sat next to each other, Jorge did not sit next to Luke, and Shawnda sat at the right end. If Lily sat next to Shawnda and Jorge, find the order of the friends' seating from left to right.

11-6

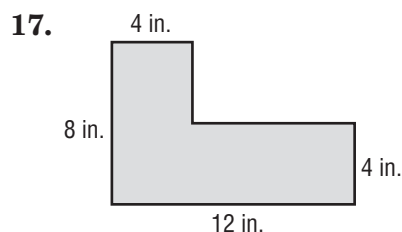
Area of Composite Figures

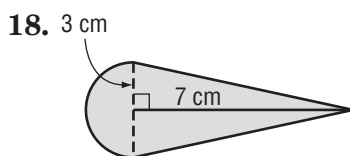
Name the two dimensions of the following figures.

15. rectangle

16. triangle

Find the area of each figure. Round to the nearest tenth if necessary.

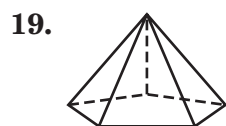





11-7

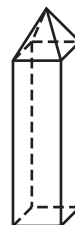
Three-Dimensional Figures

For each figure, identify the shape of the base(s). Then classify the figure.






21. **MONUMENTS** Ginger made a scale model of the Washington Monument as shown. What geometric figure is represented by the top figure of the monument?



11-8

### Drawing Three-Dimensional Figures

Complete each sentence.

22. A two-dimensional figure has two dimensions:   
and .

23. A three-dimensional figure has three dimensions: ,  
 and .

11-9

### Volume of Prisms

Find the volume of rectangular prisms with these dimensions.  
Round to the nearest tenth if necessary.

24. 4 ft by 12 ft by 7 ft

25. 9 in. by 8 in. by 5.5 in.

26. 2.5 in. by 6 in. by 5 in.

27. 3.8 cm by 2.4 cm by 2 cm

11-10

### Volume of Cylinders

Write C if the phrase is true of a cylinder, P if it is true of a  
prism, and CP if the phrase is true of both.

28.  has bases that are parallel and congruent.

29.  has sides and bases that are polygons.

30.  has bases that are circular.

31.  is a solid.

32.  has volume.

33.  is three-dimensional.

## Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 11.

## ARE YOU READY FOR THE CHAPTER TEST?

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 11 Practice Test on page 631 of your textbook as a final check.

I used my Foldable or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 11 Study Guide and Review on pages 626–630 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may want to take the Chapter 11 Practice Test on page 631 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 11 Foldable.
- Then complete the Chapter 11 Study Guide and Review on pages 626–630 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 11 Practice Test on page 631 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature

# Geometry and Measurement



Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

**Begin with a sheet of 11" by 17" paper.**

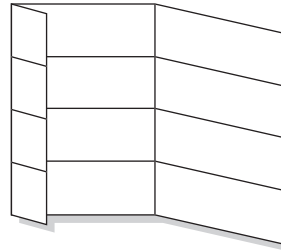
**STEP 1**

**Fold** the paper in fourths lengthwise.



**STEP 2**

**Fold** a 2" tab along the short side. Then fold the rest in half.



**STEP 3**

**Draw** lines along folds and label as shown.

Ch. 12	Rectangular Prisms	Cylinders
Draw Examples		
Find Volume		
Find Surface Area		



**NOTE-TAKING TIP:** When taking notes about 3-dimensional figures, it is important to draw examples. It also helps to record any measurement formulas.

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 12. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
hypotenuse			
irrational number			
leg			
Pythagorean Theorem			
surface area			



## MAIN IDEA

- Estimate square roots.

## EXAMPLE Estimate the Square Root

1 Estimate  $\sqrt{96}$  to the nearest whole number.

List some perfect squares.

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...



$$81 < 96 < 100$$

96 is between the

squares  and .

$$\text{[ ]} < \sqrt{96} < \text{[ ]}$$

Find the  $\sqrt{\quad}$  of each number.

$$\text{[ ]} < \sqrt{96} < \text{[ ]}$$

= 9 and

= 10

So,  $\sqrt{96}$  is between  and . Since 96 is closer

to  than 81, the best whole number estimate is

. Verify with a calculator.

**Check Your Progress** Estimate each square root to the nearest whole number.

a.  $\sqrt{41}$

b.  $\sqrt{86}$

c.  $\sqrt{138}$

**BUILD YOUR VOCABULARY** (page 280)

A number that cannot be written as a  is an irrational number.

**EXAMPLE** Use a Calculator to Estimate

2 Graph  $\sqrt{37}$  on a number line.

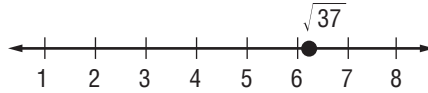
**REMEMBER IT**



Decimals used to represent irrational numbers are estimates, not exact values.

2nd [  $\sqrt{\quad}$  ] 37 ENTER

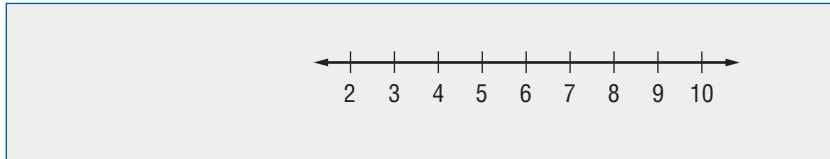
$\sqrt{37} \approx$



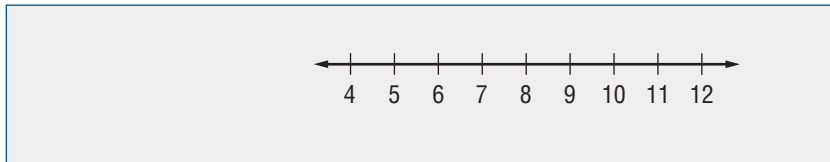
Check  = 36 and  = 49. Since  is between 36 and 49, the answer, , is reasonable.

**Check Your Progress** Graph each number on a number line.

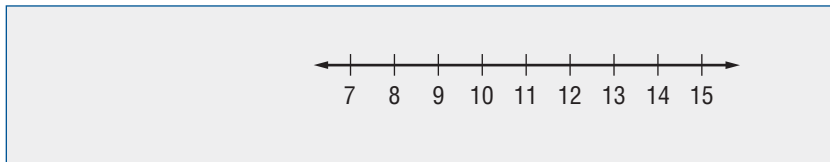
a.  $\sqrt{78}$



b.  $\sqrt{96}$



c.  $\sqrt{188}$



**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEA

- Find length using the Pythagorean Theorem.

## KEY CONCEPT

**Pythagorean Theorem**

In a right triangle, the square of the length of the hypotenuse equals the sum of the squares of the lengths of the legs.

**BUILD YOUR VOCABULARY** (page 280)

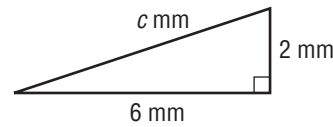
The two sides  to the right  of a right triangle are the **legs**.

The side  the right  of a right triangle is the **hypotenuse**.

The **Pythagorean Theorem** describes the relationship between the length of the  and the lengths of the .

**EXAMPLE** Find the Length of the Hypotenuse

- Find the length of the hypotenuse of the triangle.



$$c^2 = a^2 + b^2$$

Pythagorean Theorem

$$c^2 = \text{$$

Replace  $a$  with 2 and  $b$  with 6.

$$c^2 = 4 + 36$$

Evaluate  $2^2$  and  $6^2$ .

$$c^2 = 40$$

Add.

$$c = \pm\sqrt{40}$$

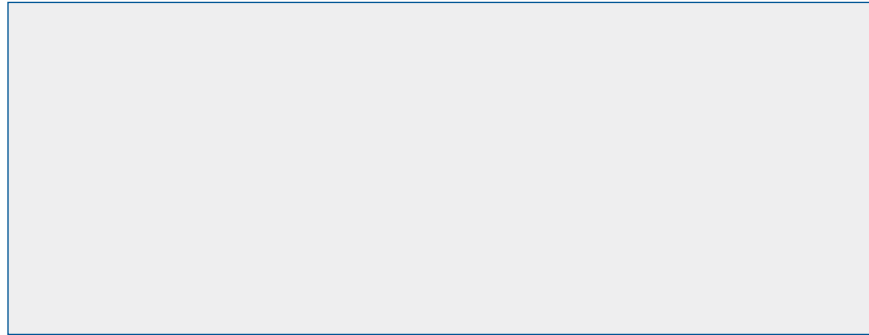
Definition of square root

$$c = \pm 6.3$$

Simplify.

The length of the hypotenuse is about  millimeters.

**Check Your Progress** Find the length of the hypotenuse of a right triangle if the legs are 5 centimeters and 7 centimeters.



**REVIEW IT**

How do you know if a triangle is a right triangle? (Lesson 10-4)

---



---



---



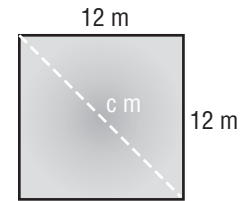
---



---

**EXAMPLE**

**2 SPORTS** A gymnastics tumbling floor is in the shape of a square. If a gymnast flips from one corner to the opposite corner, about how far has he flipped?



To solve, find the length of the hypotenuse  $c$ .

$$c^2 = a^2 + b^2$$

Pythagorean Theorem

$$c^2 = \boxed{\phantom{00}} + 12^2$$

Replace  $a$  with  $\boxed{\phantom{00}}$  and  $b$  with  $\boxed{\phantom{00}}$ .

$$c^2 = 144 + \boxed{\phantom{00}}$$

Evaluate  $\boxed{\phantom{00}}$ .

$$c^2 = \boxed{\phantom{00}}$$

Add.

$$\sqrt{c^2} = \pm \boxed{\phantom{00}}$$

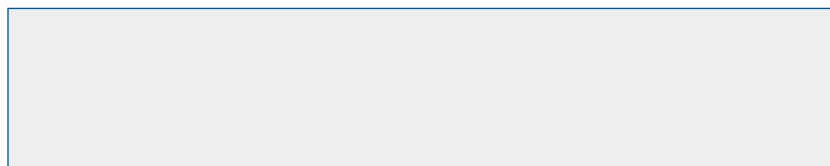
Take the  $\boxed{\phantom{00}}$  of each side.

$$c \approx \pm \boxed{\phantom{00}}$$

Simplify.

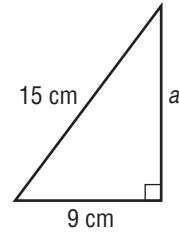
The gymnast will have flipped about  $\boxed{\phantom{00}}$ .

**Check Your Progress** **SEWING** Rose has a rectangular piece of fabric 28 inches long and 16 wide. She wants to decorate the fabric with lace sewn across both diagonals. How much lace will Rose need?



**EXAMPLE** Find the Length of a Leg

3 Find the missing measure of the triangle at the right.



$$c^2 = a^2 + b^2$$

$$\square^2 = a^2 + \square^2$$

$$\square = a^2 + \square$$

$$225 - \square = a^2 + 81 - \square$$

$$\square = a^2$$

$$\sqrt{144} = \sqrt{a^2}$$

$$\square = a$$

Pythagorean Theorem

Replace  $b$  with  $\square$  and  $c$  with  $\square$ .

Evaluate  $\square$  and  $\square$ .

Subtract  $\square$  from each side.

Simplify.

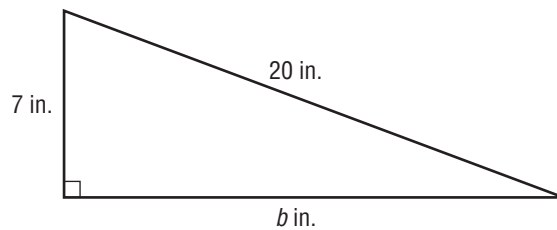
Take the  $\square$  of each side.

Simplify.

The length of the leg is  $\square$  centimeters.

**Check Your Progress**

Find the missing measure of the triangle. Round to the nearest tenth if necessary.



**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## Problem-Solving Investigation: Make a Model

### MAIN IDEA

- Solve problems by making a model.

### EXAMPLE Make a Model to Solve the Problem

**STORAGE** A daycare center plans to make simple wooden storage bins for the 3-inch square alphabet blocks. If each bin will hold 30 blocks, give two possible dimensions for the inside of the bin.

**UNDERSTAND** You know the dimensions of the blocks and that each bin holds 30 blocks. You need to give two possible dimensions for the inside of the bin.

**PLAN** Make a cardboard model of a cube with sides 3 inches long. Then use your model to determine the dimensions of the bin that will hold 30 cubes.

**SOLVE**



3 in.

A bin that holds 5 cubes in length, 3 cubes in width, and 2 cubes in height would hold 30 cubes. This bin would be 15 inches in length, 9 inches in width, and 6 inches in height. A bin that holds 6 cubes in length, 5 cubes in width, and 1 cube in height would also hold 30 cubes. This bin would be 18 inches in length, 15 inches in width, and 3 inches in height.

**CHECK**

A bin that is 15 in.  $\times$  9 in.  $\times$  6 in. would hold

$15 \div 3$  or  cubes by  $9 \div 3$  or 3 cubes by

$6 \div 3$  or  cubes in height.

This is  $5 \times 3 \times 2$  or  cubes.

A bin that is 18 in.  $\times$  15 in.  $\times$  3 in. would hold  $18 \div 3$  or 6 cubes by  $15 \div 3$  or 5 cubes by  $3 \div 3$  or 1 cube. This is  $6 \times 5 \times 1$  or 30 cubes.

### Check Your Progress

**FRAMES** A photo that is 5 inches by 7 inches will be placed in a frame that has a metal border of 1.5 inches on each side. What are the dimensions of the frame?

### HOMEWORK ASSIGNMENT

Page(s):

Exercises:

## BUILD YOUR VOCABULARY (page 280)

**MAIN IDEA**

- Find the surface areas of rectangular prisms.

The  of the areas of all of the , or faces, of a  figure is the surface area.

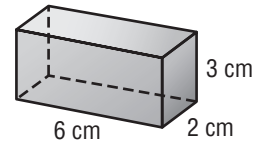
### EXAMPLE Use a Net to Find Surface Area

**KEY CONCEPT**

**Surface Area of Rectangular Prisms**  
 The surface area  $S$  of a rectangular prism with length  $l$ , width  $w$ , and height  $h$  is the sum of the areas of the faces.

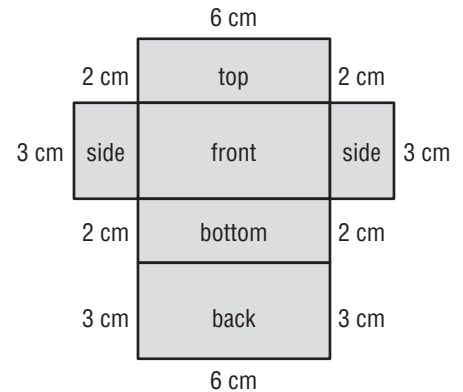
1 Find the surface area of the rectangular prism.

You can use a net of the rectangular prism to find its surface area. There are three pairs of congruent faces.



- top and bottom
- front and back
- two sides

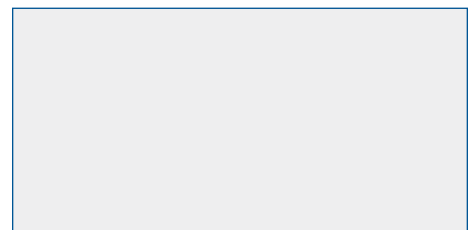
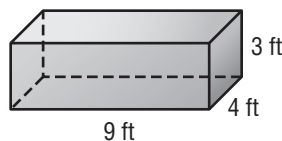
Faces	Area
top and bottom	$2(6 \cdot 2) = \square$
front and back	$2(6 \cdot 3) = \square$
two sides	$2(2 \cdot 3) = \square$



The surface area is  $\square + \square + \square$  or  $\square$  square centimeters.

### Check Your Progress

Find the surface area of the rectangular prism.



## FOLDABLES

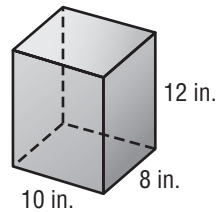
## ORGANIZE IT

Include information in words and symbols on how to find the surface area of rectangular prisms in the appropriate section of your Foldable table.

Ch. 12	Rectangular Prisms	Cylinders
Copy Examples		
Find Words		
Find Surface Area		

## EXAMPLE Use a Formula to Find Surface Area

- 2 Find the surface area of the rectangular prism.



Replace  $l$  with ,  $w$  with , and  $h$  with .

$$\text{surface area} = 2lw + 2lh + 2wh$$

$$= \text{} + \text{} + \text{$$

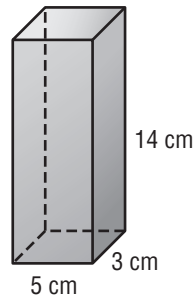
$$= \text{} + \text{} + \text{$$

Multiply first.  
Then add.

$$= \text{$$

The surface area of the prism is .

**Check Your Progress** Find the surface area of the rectangular prism.





**EXAMPLE**

- 3 BOXES** Drew is putting together a cardboard box that is 9 inches long, 6 inches wide, and 8 inches high. He bought a roll of wrapping paper that is 1 foot wide and 3 feet long. Did he buy enough to wrap the box? Explain.

**Step 1** Find the surface area of the box.

Replace  $l$  with ,  $w$  with , and  $h$  with .

$$\begin{aligned} \text{surface area} &= \text{} + \text{} + \text{} \\ &= \text{} \end{aligned}$$

**Step 2** Find the area of the wrapping paper.

$$\begin{array}{ccc} \boxed{1 \text{ ft}} & \searrow & \boxed{3 \text{ ft}} \\ & \downarrow & \downarrow \\ \text{area} & = & 12 \text{ in.} \cdot 36 \text{ in. or } 432 \text{ in}^2 \end{array}$$

Since 432  348, Drew bought enough wrapping paper.

**Check Your Progress**

**FABRIC** Angela needs to cover a cardboard box that is 15 inches long, 5 inches wide, and 4 inches high with felt. She bought a piece of felt that is 1 foot wide and  $2\frac{1}{2}$  feet long. Did she buy enough felt to cover the box? Explain.

**HOMEWORK ASSIGNMENT**

Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

# Surface Area of Cylinders

## EXAMPLE Find Surface Area of a Cylinder

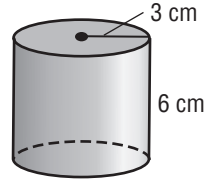
### MAIN IDEA

- Find the surface areas of cylinders.

### KEY CONCEPT

**Surface Area of a Cylinder** The surface area  $S$  of a cylinder with height  $h$  and radius  $r$  is the sum of the areas of circular bases and the area of the curved surface.

- 1 Find the surface area of the cylinder. Round to the nearest tenth.



$$\begin{aligned}
 S &= \boxed{\phantom{000000}} && \text{Surface area of a cylinder} \\
 &= 2\pi \boxed{\phantom{00}} + 2\pi \boxed{\phantom{0000}} && r = \boxed{\phantom{00}}, h = \boxed{\phantom{00}} \\
 &\approx \boxed{\phantom{000000}} && \text{Simplify.} \\
 \text{The surface area is about } &\boxed{\phantom{000000}} && \text{square centimeters.}
 \end{aligned}$$

## EXAMPLE

- 2 **GIFT WRAP** A poster is contained in a cardboard cylinder that is 10 inches high. The cylinder's base has a diameter of 8 inches. How much paper is needed to wrap the cardboard cylinder if the ends are to be left uncovered?

Since only the curved side of the cylinder is to be covered, you do not need to include the areas of the top and bottom of the cylinder.

$$\begin{aligned}
 S &= \boxed{\phantom{000000}} && \text{Curved surface of a cylinder} \\
 &= \boxed{\phantom{0000000000}} && r = 4, h = 10 \\
 &\approx \boxed{\phantom{000000}} && \text{Simplify.}
 \end{aligned}$$

About 251.3  $\boxed{\phantom{000000}}$  of paper is needed.

**FOLDABLES**

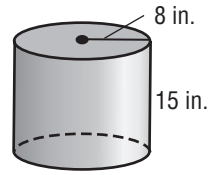
**ORGANIZE IT**

Include information in words and symbols about how to find the surface area of a cylinder in the appropriate section of your Foldable table.

Ch.	Rectangular Prisms	Cylinders
12		
Clear Examples		
Find Volume		
Find Surface Area		

**Check Your Progress**

- a. Find the surface area of the cylinder. Round to the nearest tenth.



- b. **LABELS** A can of fruit juice is in the shape of a cylinder with a diameter of 6 inches and a height of 12 inches. How much paper is needed to create the label if the ends are to be left uncovered?

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## STUDY GUIDE

## FOLDABLES

Use your Chapter 12 Foldable to help you study for your chapter test.

VOCABULARY  
PUZZLEMAKER

To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 12, go to:

[glencoe.com](http://glencoe.com)

BUILD YOUR  
VOCABULARY

You can use your completed Vocabulary Builder (page 280) to help you solve the puzzle.

## 12-1

## Estimating Square Roots

Estimate each square root to the nearest whole number.

1.  $\sqrt{95}$

2.  $\sqrt{51}$

3.  $\sqrt{150}$

4.  $\sqrt{230}$

## 12-2

## The Pythagorean Theorem

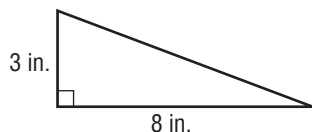
State whether each sentence is *true* or *false*. If *false*, replace the underlined word to make a true sentence.

5. The Pythagorean Theorem states that  $c^2 = a^2 + b^2$ , where  $a$  represents the length of the hypotenuse.

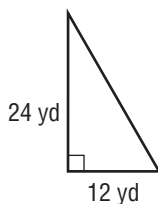
6. The hypotenuse is always the longest of the three sides of a right triangle.

Find the missing measure of each right triangle. Round to the nearest tenth if necessary.

7.



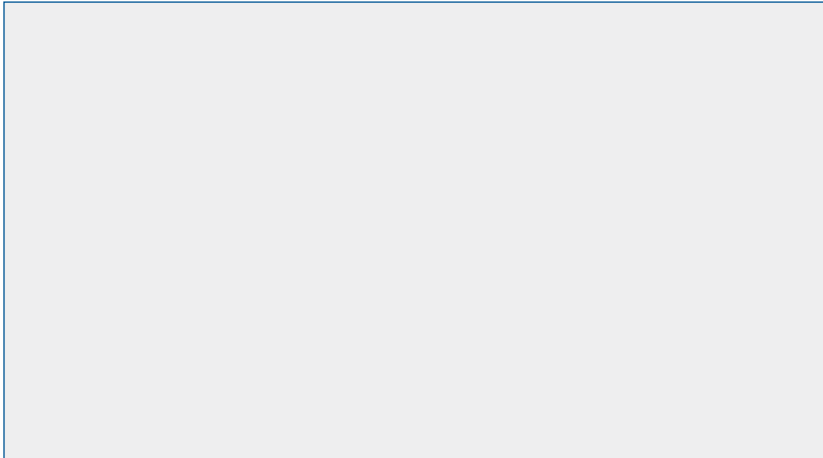

8.



12-3

**Problem-Solving Investigation: Make a Model**

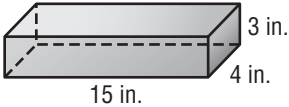
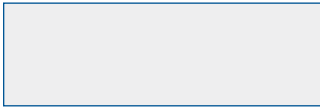
9. **BOOKS** A bookstore will arrange 4 books in a row in the store window. In how many different ways can the store arrange these 4 books?

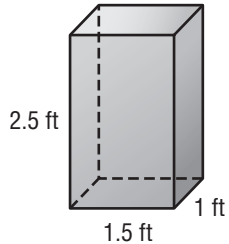
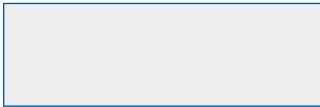


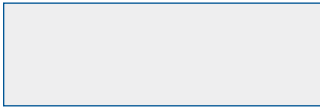
12-4

**Surface Area of Rectangular Prisms**

Find the surface area of each rectangular prism. Round to the nearest tenth if necessary.

10.  

11.  

12.  

Copyright © Glencoe/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.

12-5

Surface Area of Cylinders

Write the formula to find each of the following.

13. the area of a circle

14. the circumference of a circle

15. the area of a rectangle

Find the surface area of the cylinder. Round to the nearest tenth if necessary.

16. 

## ARE YOU READY FOR THE CHAPTER TEST?

### Math Online

Visit [glencoe.com](http://glencoe.com) to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 12.

Check the one that applies. Suggestions to help you study are given with each item.

I completed the review of all or most lessons without using my notes or asking for help.

- You are probably ready for the Chapter Test.
- You may want to take the Chapter 12 Practice Test on page 663 of your textbook as a final check.

I used my Foldable or Study Notebook to complete the review of all or most lessons.

- You should complete the Chapter 12 Study Guide and Review on pages 660–662 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may want to take the Chapter 12 Practice Test on page 663 of your textbook.

I asked for help from someone else to complete the review of all or most lessons.

- You should review the examples and concepts in your Study Notebook and Chapter 12 Foldable.
- Then complete the Chapter 12 Study Guide and Review on pages 660–662 of your textbook.
- If you are unsure of any concepts or skills, refer back to the specific lesson(s).
- You may also want to take the Chapter 12 Practice Test on page 663 of your textbook.

Student Signature

Parent/Guardian Signature

Teacher Signature