Glencoe Mathematics

Pre-Algebra

Noteables™
Interactive Study Notebook with Foldables™

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Foldables™

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Pre-Algebra (*Student Edition*)
Noteables™: *Interactive Study Notebook with Foldables*™

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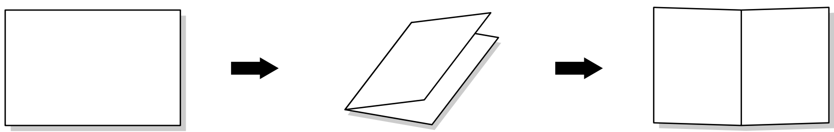
Contents

Contents

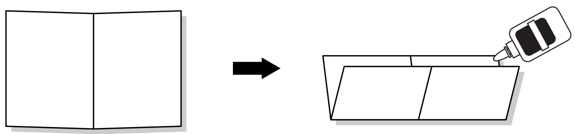
Organizing Your Foldables

FOLDABLES™ Make this Foldable to help you organize and store your chapter Foldables. Begin with one sheet of 11" × 17" paper.

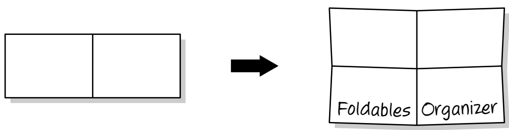
STEP 1 **Fold**
Fold the paper in half lengthwise. Then unfold.



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.

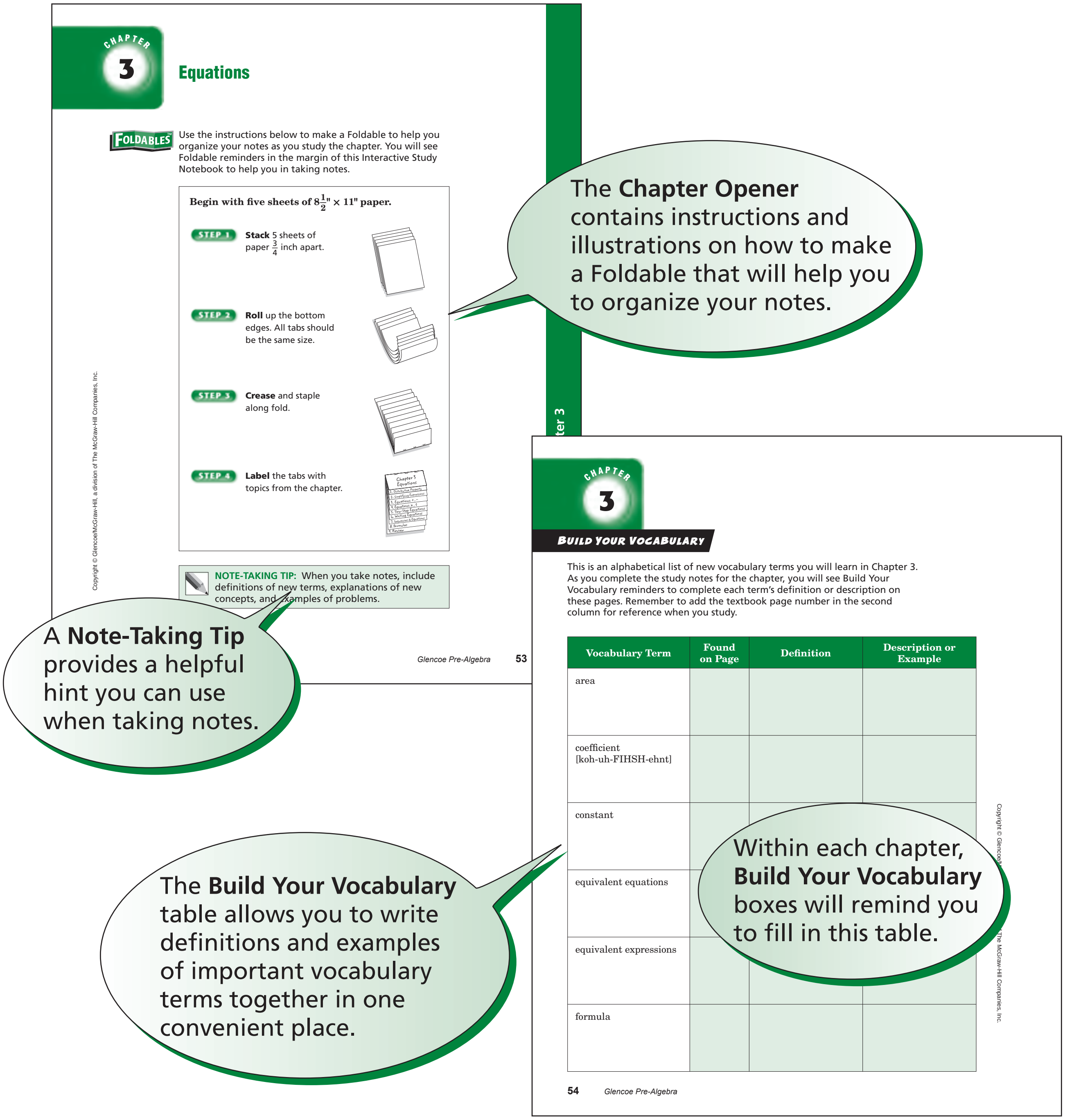


Reading and Taking Notes As you read and study each chapter, record notes in your chapter Foldable. Then store your chapter Foldables inside this Foldable organizer.

Using Your Noteables™ with Foldables™

Interactive Study Notebook

This note-taking guide is designed to help you succeed in *Pre-Algebra*. Each chapter includes:


Chapter 3 Equations

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 $8\frac{1}{2}$" × 11" paper.

STEP 1 **Stack** 5 sheets of paper $\frac{3}{4}$ inch apart.

STEP 2 **Roll** up the bottom edges. All tabs should be the same size.

STEP 3 **Crease** and staple along fold.

STEP 4 **Label** the tabs with topics from the chapter.

NOTE-TAKING TIP: When you take notes, include definitions of new terms, explanations of new concepts, and examples of problems.

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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
area			
coefficient [koh-uh-FIHSH-ehnt]			
constant			
equivalent equations			
equivalent expressions			
formula			

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3–5 Solving Two-Step Equations

Main Idea
- Solve two-step equations.

Build Your Vocabulary (page 55)

A two-step equation contains ☐ operations.

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.

EXAMPLE Solve Two-Step Equations

1 **a. Solve $3x - 4 = 17$.**

$3x - 4 + \boxed{} = 17 + \boxed{}$ Add ☐ to each side.

$\boxed{} = \boxed{}$ Simplify.

$\frac{3x}{\boxed{}} = \frac{21}{\boxed{}}$ Undo ☐.

Divide each side by ☐.

$\boxed{} = \boxed{}$ Simplify.

b. $3 = \frac{n}{3} + 8$

$3 - \boxed{} = \frac{n}{3} + 8 - \boxed{}$ Subtract ☐ from each sid

$-5 = \frac{n}{3}$ Simplify.

$\boxed{}(-5) = \left(\frac{n}{3}\right)\boxed{}$ Multiply each side by ☐.

$\boxed{} = n$ Simplify.

Foldables

Organize It

Under *Two-Step Equations* tab, write a two-step equation. Then write the order of the steps you would use to solve that equation.

Check Your Progress **Solve each equation.**

a. $4x + 3 = 19$ **b.** $\frac{w}{6} - 8 = -4$

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Examples parallel the examples in your textbook.

3–6

EXAMPLE Write and Solve a Two-Step Equation

3 EARNINGS **Ms. Parsons earns \$48,400 per year. This is \$4150 more than three times as much as her daughter earns. How much does her daughter earn?**

Words Ms. Parsons earns \$4150 more than three times as much as her daughter.

Variable Let d = daughter's earnings

Equation Ms. Parsons | earns | \$4150 | more than | three times as much as her daughter

☐ = \$4150 + ☐

☐ = 4150 + ☐ Write the equation.

Subtract ☐ from each side.

☐ – ☐ = 4150 + ☐ – ☐

☐ = ☐ Simplify.

☐ = ☐ Divide each side by ☐.

☐ = ☐ Simplify.

Ms. Parsons' daughter earns ☐.

Check Your Progress **SHOPPING** Tami spent \$175 at the grocery store. That is \$25 less than four times as much as Ted spent. How much did Ted spend?

Homework Assignment

Page(s):

Exercises:

Foldables feature reminds you to take notes in your Foldable.

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

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

Build Your Vocabulary

You can use your c… **Vocabulary Builde…** (*pages 54–55*) to h… solve the puzzle.

3-1 The Distributive Property

Match each expression with an equivalent expression.

1. $5(4 + 7)$ ☐

2. $(5 + 4)7$ ☐

3. $-4(5 + 7)$ ☐

4. $(5 - 7)4$ ☐

5. $-4(5 - 7)$ ☐

a. $5 \cdot 7 + 4 \cdot 7$

b. $(-4) \cdot 5 + (-4) \cdot (-7)$

c. $5 \cdot 4 + 5 \cdot 7$

d. $(-4) \cdot 5 + (-4) \cdot 7$

e. $-5 \cdot 7 + (-5) \cdot 4$

f. $5 \cdot 4 + (-7) \cdot 4$

6. In rewriting $3(x + 2)$, which term is "distributed" to the other terms in the expression? ☐

3-2 Simplifying Algebraic Expressions

Underline the term that best completes each statement.

7. A term without a variable is a (coefficient, constant).

8. The expression $5z + 2z + 9 + 6z$ has three (like terms, terms).

Simplify each expression.

9. $6q + 2q$ ☐ **10.** $12y - y$ ☐

11. $5 + 7x - 3$ ☐ **12.** $4(b + 1) + b$ ☐

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

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.

CHAPTER 1

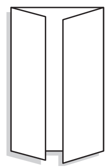
The Tools of Algebra

FOLDABLES™

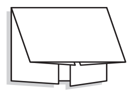
Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with a sheet of unlined paper.

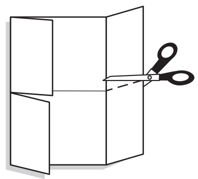
STEP 1 **Fold** the short sides so they meet in the middle.



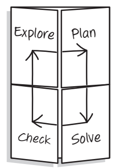
STEP 2 **Fold** the top to the bottom.



STEP 3 **Unfold.** 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, be sure to describe steps in detail. Include examples of questions you might ask yourself during problem solving.

CHAPTER 1

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]			
conjecture [cuhn-JEHK-shoor]			
coordinate plane or coordinate system			
counterexample			
deductive reasoning			
domain			
equation			
evaluate			
inductive reasoning [in DUHK-tihv]			

Vocabulary Term	Found on Page	Definition	Description or Example
numerical expression			
open sentence			
order of operations			
ordered pair			
properties			
range			
relation			
scatter plot			
simplify			
solution			
variable			

1–1 Using a Problem-Solving Plan

MAIN IDEAS

- Use a four-step plan to solve problems.
- Choose an appropriate method of computation.

EXAMPLE Use the Four-Step Problem-Solving Plan

1 PIZZA **The price of a large cheese pizza at Paul's Pizza is $9.25. You receive a $0.50 discount for each additional pizza ordered, up to 10. So, one pizza costs $9.25, two pizzas cost $8.75 each, three pizzas cost $8.25, and so on. If you need 8 pizzas for a party, what is the cost per pizza?**

EXPLORE The problem gives the cost for the first pizza and the discount for each additional pizza ordered. Find the cost per pizza for 8 pizzas.

PLAN Look for a pattern in the costs. Extend the pattern to find the cost per pizza for 8 pizzas.

SOLVE First, find the pattern.

1 pizza: ______

2 pizzas: ______ – ______ or ______

3 pizzas: ______ – ______ or ______

Now, extend the pattern.

4 pizzas: ______ – ______ or ______

5 pizzas: ______ – ______ or ______

6 pizzas: ______ – ______ or ______

7 pizzas: ______ – ______ or ______

8 pizzas: ______ – ______ or ______

The cost per pizza for 8 pizzas is ______.

CHECK It costs $9.25 for one pizza with a discount of $0.50 for each additional pizza ordered. For an order of 8 pizzas, the cost per pizza would be

$9.25 – (7 × ______) or

$9.25 – ______ = ______.

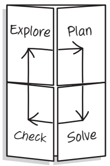
REMEMBER IT

Always check to be sure your answer is reasonable. If the answer seems unreasonable, solve the problem again.

FOLDABLES™

ORGANIZE IT

Write this Your Turn Exercise under the Check tab of the Foldable. Then under the remaining tabs, record how you will explore, plan, and solve to reach a solution.



Check Your Progress The cost of renting movies at Mike's Marvelous Movie House is advertised as $5 for the first movie and $3.50 for each additional movie. Find the cost of renting 6 movies.

BUILD YOUR VOCABULARY (page 2)

A **conjecture** is an ______ guess.

When you make a conjecture based on a pattern of examples or past events, you are using **inductive reasoning**.

EXAMPLE Use Inductive Reasoning

2 **a. Find the next term in 1, 4, 16, 64, 256, . . .**

1, 4, 16, 64, 256 ______

× ______ × ______ × ______ × ______ × ______

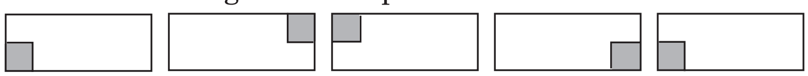
b. Draw the next figure in the pattern.

The shaded point on the triangle moves in the pattern: right, top, bottom, left, right, etc. If the pattern continues, the shaded point will be at the ______ of the next figure.

Check Your Progress

a. Find the next term in 48, 43, 38, 33, 28, . . .

b. Draw the next figure in the pattern.



EXAMPLE Choose the Method of Computation

3 PLANETS The chart shows the distance of selected planets from the Sun. About how much farther is it from Earth to the Sun than from Mercury to the Sun?

Planet	Distance from Sun (millions of miles)
Mercury	36.00
Venus	67.24
Earth	92.90
Mars	141.71

EXPLORE You know the distance from Earth to the ______ and the distance from ______ to the Sun. You need to find *about* how much farther it is from ______ to the ______.

PLAN The question uses the word about, so an exact answer is not needed. We can solve the problem using ______. Estimate each distance and then ______.

SOLVE Distance from Earth to the Sun: 92.9 ⟶ ______

Distance from Mercury to the Sun: 36.0 ⟶ ______

So, Earth is about ______ – ______ or ______ million miles further from the Sun than Mercury.

CHECK Since ______ + ______ = 93, the answer makes sense.

Check Your Progress **SCHOOL ENROLLMENT** East Elementary School has 792 students enrolled. West Elementary School has 518 students enrolled. About how many more students does East Elementary have than West Elementary?

______

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

1–2 Numbers and Expressions

Main Ideas

- Use the order of operations to evaluate expressions.
- Translate verbal phrases into numerical expressions.

Build Your Vocabulary (pages 2–3)

Numerical expressions contain a combination of numbers and operations such as addition, subtraction, multiplication, and division.

When you **evaluate** an expression, you find its numerical value.

To avoid confusion when evaluating expressions, mathematicians have agreed upon an **order of operations**.

Review It

Explain how to simplify expressions inside grouping symbols. *(Prerequisite Skill)*

____

____

____

____

____

EXAMPLE Evaluate Expressions

1 Find the value of each expression.

a. $24 \div 8 \times 3$

$24 \div 8 \times 3 = \boxed{} \times 3$	Divide 24 by 8.
$= 9$	Multiply 3 and $\boxed{}$.

b. $5(4 + 6) - 7 \cdot 7$

$5(4 + 6) - 7 \cdot 7 = 5\left(\boxed{}\right) - 7 \cdot 7$	Evaluate $(4 + 6)$.
$= \boxed{} - 7 \cdot 7$	Multiply 5 and $\boxed{}$.
$= \boxed{} - \boxed{}$	Multiply 7 and 7.
$= \boxed{}$	Subtract.

c. $3[(18 - 6) + 2(4)]$

$3[(18 - 6) + 2(4)] = 3[\boxed{} + 2(4)]$	Evaluate $(18 - 6)$.
$= 3\left(\boxed{} + \boxed{}\right)$	Multiply 2 and 4.
$= 3\left(\boxed{}\right)$	Add.
$= \boxed{}$	Multiply.

REMEMBER IT

Grouping symbols include parentheses, brackets, and fraction bars.

d. $\dfrac{\mathbf{49 + 31}}{\mathbf{19 - 14}}$

$\dfrac{49 + 31}{19 - 14}$

$= (49 + 31) \boxed{} (19 - 14)$ Rewrite as a division expression.

$= \boxed{} \div \boxed{}$ Evaluate each expression.

$= \boxed{}$ Divide $\boxed{}$ by $\boxed{}$.

Check Your Progress **Find the value of each expression.**

a. $63 \div 7 + 2$ $\boxed{}$

b. $3(12 - 10) + 14 \div 2$ $\boxed{}$

c. $4[(3 + 8) - 2(4)]$ $\boxed{}$

d. $\dfrac{(21 - 3)}{4(2) + 1}$ $\boxed{}$

EXAMPLE Translate Phrases into Expressions

2 **Write a numerical expression for each verbal phrase.**

a. the quotient of eighteen and six

Phrase the quotient of eighteen and six

Key Word $\boxed{}$

Expression $\boxed{}$

b. the sum of nine and five

Phrase the sum of nine and five

Key Word $\boxed{}$

Expression $\boxed{}$

Check Your Progress **Write a numerical expression for each verbal phrase.**

a. the product of three and five

b. the difference of seventeen and six

EXAMPLE Use an Expression to Solve a Problem

3 EARNINGS **Madison earns an allowance of $5 per week. She also earns $4 per hour baby-sitting, and usually baby-sits 6 hours each week. Write and evaluate an expression for the total amount of money she earns in one week.**

First, write an expression.

$5 allowance per week | plus | $4 per hour spent baby-sitting

+

Then evaluate the expression.

5 + 4 × 6 = Multiply.

= Add.

Madison earns in one week.

Check Your Progress **SHOPPING** The Good Price Grocery Store advertises a special on 2-liter bottles of soft drinks. The first bottle purchased is $1.50 and each bottle after that is $1.20. Write and evaluate an expression for the total cost when 8 bottles are purchased.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

1–3 Variables and Expressions

Main Ideas

- Evaluate expressions containing variables.
- Translate verbal phrases into algebraic expressions.

BUILD YOUR VOCABULARY (pages 2–3)

A **variable** is a ______ for any ______.

An **algebraic expression** contains sums and/or products of ______ and ______.

EXAMPLE Evaluate Expressions

1 **Evaluate $x - y + 6$ if $x = 27$ and $y = 12$.**

$x - y + 6 =$ ______ Replace x with ______ and y with ______.

$=$ ______ Subtract ______ from ______.

$=$ ______ Add ______ and ______.

Check Your Progress Evaluate $12 + a - b$ if $a = 7$ and $b = 11$.

EXAMPLE Evaluate Expressions

2 **Evaluate each expression if $x = 3$, $y = 4$, and $z = 7$.**

a. $6y - 4x$

$6y - 4x = 6(\quad) - 4(\quad)$ $y =$ ______, $x =$ ______.

$=$ ______ Multiply.

$=$ ______ Subtract.

b. $\dfrac{(z - x)}{y}$

$\dfrac{(z - x)}{y} = (\boxed{}) \div \boxed{}$ Rewrite as a division expression.

$= (\boxed{} - \boxed{}) \div \boxed{}$ Replace *z* with 7, *x* with 3, and *y* with 4.

$= \boxed{} \div 4$ Subtract.

$= \boxed{}$ Divide.

c. $5z + (x + 4y) - 15$

$5z + (x + 4y) - 15$

$= 5\boxed{} + (\boxed{} + 4 \cdot \boxed{}) - 15$ Replace *z* with 7, *x* with 3, and *y* with 4.

$= 5\boxed{} + (\boxed{} + \boxed{}) - 15$ Multiply $\boxed{}$ and $\boxed{}$.

$= 5\boxed{} + \boxed{} - 15$ Add $\boxed{}$ and $\boxed{}$.

$= \boxed{} + \boxed{} - 15$ Multiply $\boxed{}$ and $\boxed{}$.

$= \boxed{} - 15$ Add $\boxed{}$ and $\boxed{}$.

$= \boxed{}$ Subtract.

Check Your Progress **Evaluate each expression if $m = 9$, $n = 4$, and $p = 6$.**

a. $5p - 3m$

b. $\dfrac{mn}{p}$

c. $p + (8n - 3m)$

REVIEW IT **List** eight words or phrases that suggest addition or subtraction. *(Prerequisite Skill)*

____

____

____

____

____

____

____

____

EXAMPLE Translate Verbal Phrases into Expressions

3 **Translate each phrase into an algebraic expression.**

a. 35 more than the number of tickets sold

Words	35 more than the number of tickets sold
Variable	Let t represent the number of tickets sold
Equation	$\underbrace{\text{35}}_{\boxed{}}$ $\underbrace{\text{more than}}_{\boxed{}}$ $\underbrace{\text{the number of tickets sold}}_{\boxed{}}$

The expression is ______.

b. the difference of six times a number and ten

Words	the difference of six times a number and ten
Variable	Let n represent the number.
Equation	$\underbrace{\text{the difference of}}$ $\underbrace{\text{six times a number}}_{\boxed{}}$ and $\underbrace{\text{ten}}_{\boxed{}}$ $\boxed{}$

The expression is ______.

Check Your Progress **Translate each phrase into an algebraic expression.**

a. eight less than the number of cookies baked

b. the sum of twelve and five times a number

EXAMPLE Use an Expression to Solve a Problem

4 THEATER **East Middle School sold tickets for a school play. The price of an adult ticket was \$3, and the price of a student ticket was \$1.**

a. Write an expression that represents the total amount of money collected.

Words	\$3 for an adult ticket and \$1 for a student ticket
Variables	Let a = number of adult tickets and s = number of student tickets.
Equation	\$3 for an adult ticket and \$1 for a student ticket.

The expression is ______.

b. Suppose 70 adult tickets and 85 student tickets were sold. How much money was collected?

$3a + 1s = 3(\quad) + 1(\quad)$ $a = 70$, $s = 85$.

$=$ ______ Multiply.

$=$ ______ Add.

The amount of money collected was ______.

Check Your Progress **RETAIL The Read It Bookstore is advertising a sale. The price of hardback books is \$9.50 and the price of paperback books is \$4.50.**

a. Write an expression that can be used to find the total amount of money spent at the bookstore.

b. Suppose Emily buys 5 hardback books and 4 paperback books. Find the total amount she spent at the book sale.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

1–4 Properties

MAIN IDEAS

- Identify and use properties of addition and multiplication.
- Use properties of addition and multiplication to simplify algebraic expressions.

BUILD YOUR VOCABULARY (page 3)

In algebra, **properties** are statements that are true for any numbers.

KEY CONCEPTS

Commutative Properties of Addition and Multiplication The order in which numbers are added or multiplied does not change the sum or product.

Associative Properties of Addition and Multiplication The way in which numbers are grouped when added or multiplied does not change the sum or product.

Additive Identity When 0 is added to any number, the sum is the number.

Multiplicative Identity When any number is multiplied by 1, the product is the number.

Multiplicative Property of Zero When any number is multiplied by 0, the product is 0.

EXAMPLE Identify Properties

1 Name the property shown by each statement.

a. $3 \cdot 10 \cdot 2 = 3 \cdot 2 \cdot 10$

The order of the numbers changed. This is the

______________________.

b. $(2 + 5) + m = 2 + (5 + m)$

The way in which numbers are grouped changed.

____

Check Your Progress Name the property shown by each statement.

a. $(4 \cdot 6) \cdot 2 = 4 \cdot (6 \cdot 2)$ ______________________

b. $12 + 9 = 9 + 12$ ______________________

EXAMPLE Mental Math

2 Find $(18 \cdot 20) \cdot 5$ mentally.

$(18 \cdot 20) \cdot 5 = 18 \cdot (\_\_\_\_)$	Associative Property of Multiplication
$= 18 \cdot \_\_\_\_$	Multiply ____ and ____ mentally.
$= \_\_\_\_$	Multiply 18 and ____ mentally.

Check Your Progress Find $4 \cdot 8 \cdot 25$ mentally.

BUILD YOUR VOCABULARY (page 3)

To **simplify** algebraic expressions means to write them in a ________.

The process of using facts, properties, or rules to ________ or reach valid ________ is called **deductive reasoning**.

EXAMPLE Simplify Algebraic Expressions

3 Simplify each expression.

a. $5 \cdot (3 \cdot r)$

$5 \cdot (3 \cdot r) =$ ________ Associative Property of Multiplication

$=$ ________ Substitution Property of Equality

b. $12 + (x + 18)$

$12 + (x + 18)$

$= 12 +$ ________ Commutative Property of Addition

$=$ ________ $+ x$ Associative Property of Addition

$=$ ________ Substitution Property of Equality

Check Your Progress **Simplify each expression.**

a. $7 + (12 + m)$

b. $(6 \cdot a) \cdot 4$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

1–5 Variables and Equations

MAIN IDEAS

- Identify and solve open sentences.
- Translate verbal sentences into equations.

BUILD YOUR VOCABULARY (pages 2–3)

A mathematical ______ that contains an ______ is called an **equation**.

An ______ that contains a ______ is an **open sentence**.

A ______ for the variable that makes an ______ true is called a **solution**.

EXAMPLE Solve an Equation

1 **Find the solution of $44 + p = 53$. Is it 11, 9, or 7?**

Replace p with each value.

Value for p	$44 + p = 53$	True or False?
11	$44 + \square \stackrel{?}{=} 53$	
9	$44 + \square \stackrel{?}{=} 53$	
7	$44 + \square \stackrel{?}{=} 53$	

Check Your Progress Find the solution of $24 - a = 9$. Is it 11, 13, or 15?

EXAMPLE

2 TEST EXAMPLE Which value of x makes the equation $4x - 1 = 11$ true?

A 5 **B** 4 **C** 3 **D** 2

Test each value.

$4x - 1 = 11$

$4(\square) - 1 = 11$

$19 \ \square \ 11$

$4x - 1 = 11$

$4(\square) - 1 = 11$

$15 \ \square \ 11$

$4x - 1 = 11$

$4(\square) - 1 = 11$

$11 \ \square \ 11$

$4x - 1 = 11$

$4(\square) - 1 = 11$

$7 \ \square \ 11$

The answer is letter $\square$.

Check Your Progress Which value of x makes the equation $10 + 8x = -6$?

F -2 **G** 0 **H** 2 **J** 4

EXAMPLE

3 MAPLE SYRUP It takes about 45 gallons of tree sap to make about 1 gallon of maple syrup. The table shows the relationship between the number of gallons of tree sap and the number of gallons of maple syrup.

Gallons of Tree Sap, t	Gallons of Maple Syrup, m
45	1
90	2
135	3
180	4

a. Given t, the number of gallons of tree sap used, write an equation to find m, the number of gallons of maple syrup.

(continued on the next page)

Words	Number of gallons of tree sap is 45 times the number of gallons of maple syrup.
Variables	Let m = ______. Let t = ______.
Equation	☐ = ☐

The equation is ______

b. How many gallons of tree sap are needed to make 5 gallons?

$t = 45m$

$t = 45(\square)$

$t = \square$

Check Your Progress **AUTO SERVICE It takes about 4 quarts of motor oil to fill the oil reservoir in an automobile. The table shows the relationship between the number of automobiles and the number of quarts of oil.**

Number of Automobiles, a	Quarts of Oil, q
1	4
2	8
3	12
4	6

a. Given a, the number of automobiles, write an equation to find q, the number of quarts of oil needed. ______

b. How many quarts of oil are needed if the service shop needs to change the oil in 18 automobiles during the day? ______

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

1–6 Ordered Pairs and Relations

MAIN IDEAS

- Use ordered pairs to locate points.
- Use tables and graphs to represent relations.

BUILD YOUR VOCABULARY (pages 2–3)

The **coordinate system** is formed by the intersection of two number lines that meet at right angles at their zero points.

The ______ is also called the **coordinate plane**.

An **ordered pair** of numbers is used to locate any ______ on a coordinate plane.

The ______ number of an ______ is called the ***x*-coordinate**.

EXAMPLE Graph Ordered Pairs

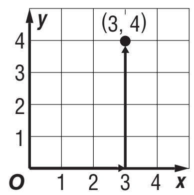
1 **Graph each ordered pair on a coordinate system.**

a. (3, 4)

Step 1 Start at the ______.

Step 2 Since the x-coordinate is 3, move ______ units to the ______.

Step 3 Since the y-coordinate is 4, move ______ units ______. Draw a dot.

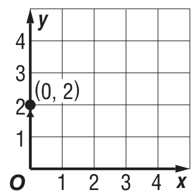


b. (0, 2)

Step 1 Start at the origin.

Step 2 Since the ______ is ______, you will not need to move to the right.

Step 3 Since the ______ is 2, move ______ units up. Draw a dot.



WRITE IT

Where is the graph of (5, 0) located?

____

____

____

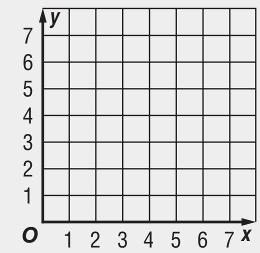
____

____

Check Your Progress **Graph each ordered pair on a coordinate system.**

a. (2, 5)

b. (4, 0)

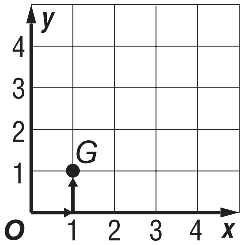


EXAMPLE Identify Ordered Pairs

2 **Write the ordered pair that names each point.**

a. Point *G*

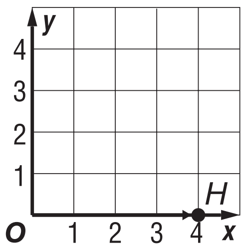
Start at the origin. Move right on the x-axis to find the x-coordinate of point G, which is ____. Move up the y-axis to find the y-coordinate, which is ____.



The ordered pair for point G is ____.

b. Point *H*

Start at the origin. Move right on the x-axis to find the x-coordinate of point H, which is ____. Since the y-coordinate is ____, you will not need to move up.

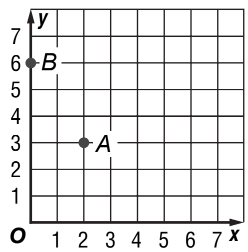


The ordered pair for point H is ____.

Check Your Progress **Write the ordered pair that names each point.**

a. A ____

b. B ____



BUILD YOUR VOCABULARY (pages 2–3)

A set of ______ such as {(1, 2), (2, 4), (3, 0), (4, 5)} is a **relation**.

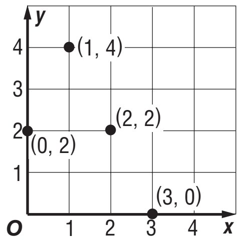
The **domain** of a relation is the set of ______ coordinates.

The **range** of a relation is the set of ______ coordinates.

EXAMPLE Relations as Tables and Graphs

3 Express the relation {(1, 4), (2, 2), (3, 0), (0, 2)} as a table and as a graph. Then determine the domain and range.

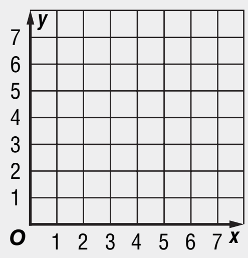
x	y
	4
2	
3	
	2



The domain is { ______ }. The range is { ______ }.

REMEMBER IT When stating the domain and range of a relation, each value is listed only once, even if it occurs more.

Check Your Progress Express the relation {(4, 1), (3, 2), (0, 1), (2, 3)} as a table and as a graph. Then determine the domain and range.



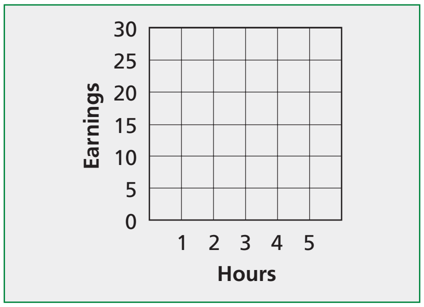
EXAMPLE

4 EARNINGS Austin earns $5 an hour doing yard work. Suppose x represents the number of hours Austin works.

a. Make a table of ordered pairs in which the x-coordinate represents the hours worked and the y-coordinate represents the amount of money Austin earns for 1, 2, 3, 4, and 5 hours of work.

x	y
1	
	10
3	
4	
	25

b. Graph the ordered pairs.

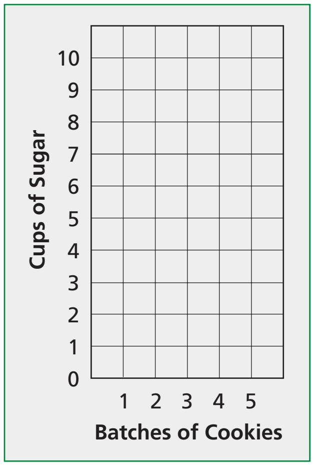


c. Describe the graph.

Check Your Progress **BAKING Sue is following a recipe for cookies which requires 2 cups of sugar for each batch of cookies made. Suppose x represents the number of batches made.**

a. Make a table of ordered pairs in which the x-coordinate represents the number of batches made and y represents the number of cups of sugar needed for 1, 2, 3, 4, and 5 batches made.

b. Graph the ordered pairs.



c. Describe the graph.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

1–7 Scatter Plots

MAIN IDEAS

- Construct scatter plots.
- Analyze trends in scatter plots.

BUILD YOUR VOCABULARY (pages 2–3)

A **scatter plot** is a that shows the between two sets of data. The two sets of data are graphed as on a coordinate system.

EXAMPLE Construct a Scatter Plot

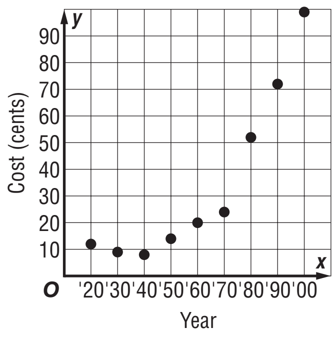
1 BREAD **The table shows the average cost of a loaf of bread from 1920–2000. Make a scatter plot of the data.**

Year	1920	1930	1940	1950	1960	1970	1980	1990	2000
Cents	12	9	8	14	20	24	52	72	99

Let the horizontal axis, or x-axis, represent the .

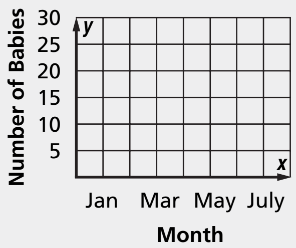
Let the vertical axis, or y-axis, represent the .

Then graph ordered pairs .



Check Your Progress **BIRTH STATISTICS** The table shows the number of babies born at Central Hospital during the past eight months. Make a scatter plot of the data.

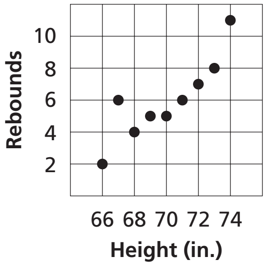
Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Babies	12	21	17	9	15	26	18	11



EXAMPLE Interpret Scatter Plots

2 **Determine whether a scatter plot of the data for the following might show a *positive, negative,* or *no* relationship. Explain your answer.**

height of basketball player and number of rebounds



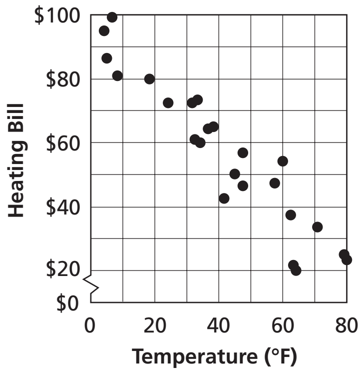
As the height ________, the number of rebounds ________. ________ relationship

REMEMBER IT

Data show a **positive relationship** if they appear to go *uphill* from left to right, and show a **negative relationship** if they appear to go *downhill* from left to right.

Check Your Progress Determine whether a scatter plot of the data for the following might show a *positive, negative,* or *no* relationship. Explain your answer.

outside temperature and heating bill

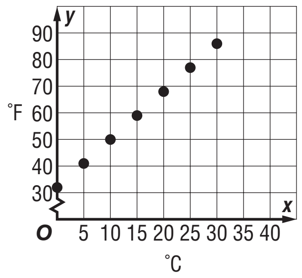


EXAMPLE Use Scatter Plots to Make Predictions

3 **a.** TEMPERATURE **The table shows temperatures in degrees Celsius and the corresponding temperatures in degrees Fahrenheit. Make a scatter plot of the data.**

°F	32	41	50	59	68	77	86
°C	0	5	10	15	20	25	30

Let the horizontal axis represent degrees ______.
Let the vertical axis represent degrees ______.
Graph the data.

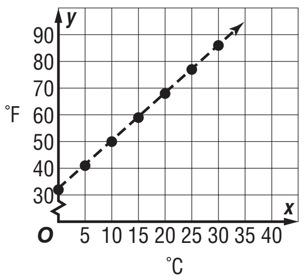


b. Does the scatter plot show a relationship between °C and °F? Explain.

Yes, a ______ relationship. As ______ increase, so do ______.

c. Predict the Fahrenheit temperature for 35°C.

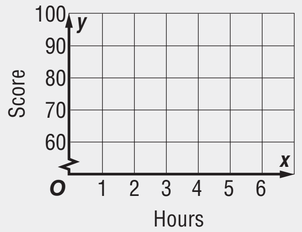
By looking at the pattern on the graph, we can predict that the Fahrenheit temperature corresponding to 35°C would be about ______.



Check Your Progress **The table shows hours spent studying for a test and the corresponding test score.**

Hours	3	2	5	1	4	2	6
Score	72	75	90	68	85	70	92

a. Make a scatter plot of the data.



b. Does the scatter plot show a relationship between hours studied and a student's test score? Explain.

c. Predict the test score for a student who spends 7 hours studying.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 1

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 1 Foldable** 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: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 2–3*) to help you solve the puzzle.

1-1 Using a Problem-Solving Plan

Underline the correct term or phrase to fill the blank in each sentence.

1. A _____________ is an educated guess. (reason, strategy, conjecture)

2. When you make a conjecture based on a pattern of examples or past events, you are using _________________________. (inductive reasoning, reasonableness, problem-solving)

3. What is the next term: 3, 6, 12, 24 …? Explain.

4. Complete this sentence. In the ________ step of the four-step problem-solving plan, you check the reasonableness of your answer.

1-2 Numbers and Expressions

State whether each sentence is true or false. If false, replace the underlined word to make a true sentence.

5. Numerical expressions contain a combination of numbers and <u>operations</u>.

6. When you evaluate an expression, you find its <u>numerical</u> value.

1-3

Variables and Expressions

State whether each sentence is true or false. If false, replace the underlined word to make a true sentence.

7. A variable is a placeholder for any <u>operator</u>.

8. Any <u>letter</u> can be used as a variable.

9. Name three things that make an algebraic expression.

1-4

Properties

Match each statement with the property it shows.

10. $8 \cdot 2 = 2 \cdot 8$

11. $(3 + 2) + 7 = 3 + (2 + 7)$

12. $3x + 0 = 3x$

13. $6(st) = 6s(t)$

14. $10 + 2 = 2 + 10$

a. Additive Identity Property
b. Associative Property of Addition
c. Commutative Property of Addition
d. Associative Property of Multiplication
e. Commutative Property of Multiplication

1-5

Variables and Equations

Underline the correct term or phrase to fill the blank in each sentence.

15. A mathematical sentence that contains an equals sign (=) is called an ________________. (equation, expression, operation)

16. A value for the variable that makes an equation ____________ is called a solution. (reasonable, true, false)

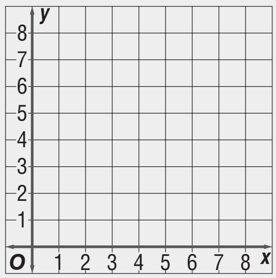
17. Consider $x - 4 = 6$. Find a value for x that makes the sentence true and another value that makes it false.

1-6 Ordered Pairs and Relations

For Exercises 18–20, use the relation {(2, 1), (4, 7), (3, 2), (5, 4)}.

18. Express the relation as a table.

19. Express the relation as a graph.



20. Determine the domain and range of the relation.

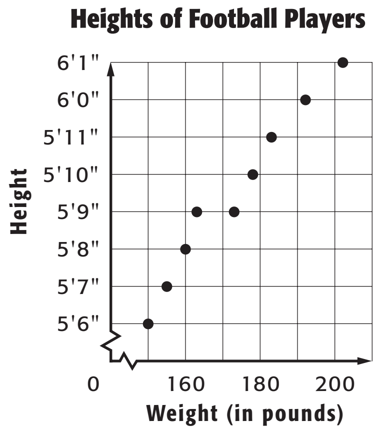
1-7 Scatter Plots

Underline the correct term or phrase to complete each sentence about the relationship shown by a scatter plot.

21. For a positive relationship, as x increases, y ____________________ (increases, decreases, stays constant).

22. For a negative relationship, as x increases, y ____________________ (increases, decreases, stays constant).

The scatter plot compares the weights and heights of the players on a high school football team.



23. What type of relationship exists, if any?

24. Based on the scatter plot, predict the weight of a 5'5" player who decided to join the team.

CHAPTER 1

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Visit **glencoe.com** to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 1.

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 73 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 69–72 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 73.

☐ **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 69–72 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 73.

Student Signature

Parent/Guardian Signature

Teacher Signature

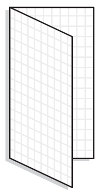
CHAPTER 2

Integers

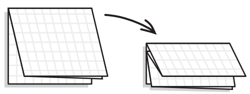
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with a piece of grid paper.

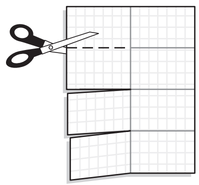
STEP 1 **Fold** in half.



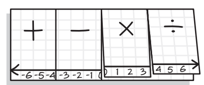
STEP 2 **Fold** the top to the bottom twice.



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



STEP 3 **Fold** lengthwise. Draw a number line on the outside. Label each tab as shown.



NOTE-TAKING TIP: When searching for the main idea of a lesson, ask yourself, "What is this paragraph or lesson telling me?"

CHAPTER 2

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			
average			
coordinate			
inequality			

Vocabulary Term	Found on Page	Definition	Description or Example
integer			
mean			
negative number			
opposites			
quadrants			

2–1 Integers and Absolute Value

MAIN IDEAS

- Compare and order integers.
- Find the absolute value of an expression.

BUILD YOUR VOCABULARY (pages 32–33)

A **negative number** is a number less than zero.

Negative numbers like –8, positive numbers like +6, and ______ are members of the set of **integers**.

The ______ that corresponds to a ______ is called the **coordinate** of that point.

Any mathematical sentence containing ______ or ______ is called an **inequality**.

WRITE IT

List 5 words or phrases that indicate positive or negative numbers.

______

______

______

______

______

EXAMPLE Write Integers for Real-World Situations

1 **Write an integer for each situation.**

a. 32 feet underground

The integer is ______.

b. 8 weeks after birth

The integer is ______.

c. a loss of 6 pounds

The integer is ______.

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

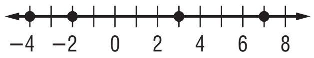
a. a loss of 12 yards ______

b. 15 feet above sea level ______

c. the temperature decreased 4 degrees ______

EXAMPLE Compare Two Integers

2 **Use the integers graphed on the number line below.**



a. Write two inequalities involving 7 and −4.

Since 7 is to the of −4, 7 −4.

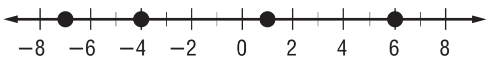
Since −4 is to the of 7, −4 7.

b. Replace the ● with < or > in −2 ● 3 to make a true sentence.

3 is since it lies to the of −2.

So, −2 3.

Check Your Progress **Use the integers graphed on the number line below.**



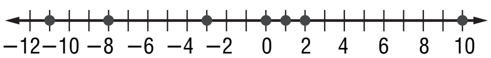
a. Write two inequalities involving −4 and 1.

b. Replace the ● with <, >, or = in 6 ● −7 to make a true sentence.

EXAMPLE Order Integers

3 WEATHER **The high temperatures for the first seven days of January were −8°, 10°, 2°, −3°, −11°, 0°, and 1°. Order the temperatures from least to greatest.**

Graph each integer on a number line.



The order from least to greatest is .

Check Your Progress

FOOTBALL The yards gained during the first six plays of the football game were 5, −3, 12, −9, 6 and −1. Order the yards from least to greatest.

KEY CONCEPT

Absolute Value The absolute value of a number is the distance the number is from zero on the number line. The absolute value of a number is always greater than or equal to zero.

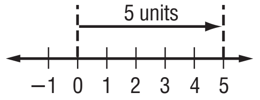
BUILD YOUR VOCABULARY (page 32)

Two numbers have the same **absolute value** if they are on ______ sides of zero, and are the same ______ from zero.

EXAMPLE Expressions with Absolute Value

4 **Evaluate each expression.**

a. $|5|$



The graph of 5 is 5 units from 0.

$|5| =$ ______

b. $|-8| + |-1|$

$|-8| + |-1| =$ ______ $\qquad |-8| =$ ______, $|-1| =$ ______

$=$ ______ $\qquad$ Simplify.

Check Your Progress

Evaluate each expression.

a. $|-9|$ ______ $\qquad$ **b.** $|-3| + |2|$ ______

EXAMPLE Algebraic Expressions with Absolute Value

5 ALGEBRA **Evaluate the expression $|x| - 8$ if $x = -2$.**

$|x| - 8 =$ ______ $- 8$ $\qquad$ Replace x with ______.

$=$ ______ $- 8$ $\qquad$ The absolute value of ______ is ______.

$=$ ______ $\qquad$ Simplify.

Check Your Progress

ALGEBRA Evaluate the expression $5 - |x|$ if $x = 9$.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

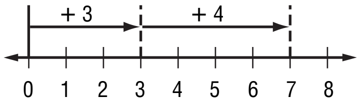
2–2 Adding Integers

MAIN IDEAS

- Add two integers.
- Add more than two integers.

EXAMPLE Add Integers on a Number Line

1 Find 3 + 4.



Start at ______.

Move ______ units to the ______.

From there, move ______ more units to the ______.

$3 + 4 =$ ______

Check Your Progress Find $-2 + -5$.

KEY CONCEPT

Adding Integers with the Same Sign To add integers with the same sign, add their absolute values. Give the result the same sign as the integers.

EXAMPLE Add Integers with the Same Sign

2 Find $-5 + (-4)$.

$-5 + (-4) =$ ______ Add ______ and ______.

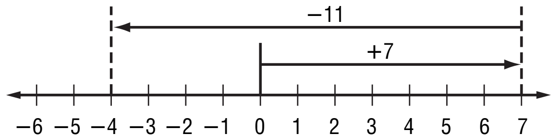
Both numbers are ______

so the sum is ______.

Check Your Progress Find $-3 + -8$.

EXAMPLE Add Integers on a Number Line

3 **Find 7 + (–11).**



Start at ____.

Move ____ units to the ____.

From there, move ____ units to the ____.

$7 + (-11) =$ ____

Check Your Progress **Find each sum.**

a. $-5 + 8$

b. $3 + (-6)$

EXAMPLE Add Integers with Different Signs

4 **a. Find –9 + 10.**

$-9 + 10 =$ ____

To find –9 + 10, subtract ____ from ____. The sum is positive because |10| > |–9|.

b. Find 8 + (–15).

$8 + (-15) = -7$

To find 8 + (–15), subtract ____ from ____. The sum is negative because |–15| > |8|.

Check Your Progress **Find each sum.**

a. $-6 + 11$

b. $4 + (-7)$

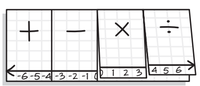
KEY CONCEPT

Adding Integers with Different Signs To add integers with different signs, subtract their absolute values. Give the result the same sign as the integer with the greater absolute value.

FOLDABLES™

ORGANIZE IT

Under the "+" tab, write a sum of integers with different signs, and explain how to add them on a number line.



BUILD YOUR VOCABULARY (pages 32–33)

Two numbers with same absolute value but different ______ are called **opposites**.

An integer and its ______ are called **additive inverses**.

EXAMPLE

5 WEATHER **On February 1, the temperature at dawn was –22°F. By noon, it has risen 19 degrees. What was the temperature at noon?**

Words	temperature at dawn	plus	increase by noon	equals	temperature at noon
Variable	Let ___ = ______.				
Equation	___ + ___ = ___				

$-22 + 19 =$ ___ To find the sum, subtract ___ from ___. The sum is negative because ___ < ___.

The temperature at noon was ___.

Check Your Progress **HIKING** Dave started his hike at 32 feet below sea level. During the hike he gained an altitude of 29 feet. At what altitude did Dave complete his hike?

EXAMPLE Add Three or More Integers

6 a. Find –8 + (–4) + 8.

$-8 + (-4) + 8 = -8 + \boxed{}$ Commutative Property

$= \boxed{} + -4$ Additive Inverse Property

$= \boxed{}$ Identity Property of Addition

b. Find 6 + (–3) + (–9) + 2.

$6 + (-3) + (-9) + 2$

$= 6 + \boxed{}$ Commutative Property

$= [6 + 2] + \boxed{}$ Associative Property

$= 8 + \boxed{}$ or $\boxed{}$ Simplify.

KEY CONCEPT

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

Check Your Progress **Find each sum.**

a. $3 + (-9) + (-3)$

b. $-2 + 11 + (-4) + 5$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

2–3 Subtracting Integers

MAIN IDEAS

- Subtract integers.
- Evaluate expressions containing variables.

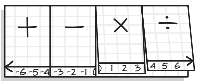
KEY CONCEPT

Subtracting Integers To subtract an integer, add its additive inverse.

FOLDABLES™

ORGANIZE IT

Write two examples of subtracting a negative number from a positive number under the "–" tab.



EXAMPLE Subtract a Positive Integer

1 **Find each difference.**

a. $\mathbf{9 - 14}$

$9 - 14 = 9 + \underline{\qquad}$ To subtract 14, add $\underline{\qquad}$.

$= \underline{\qquad}$ Simplify.

b. $\mathbf{-10 - 8}$

$-10 - 8 = -10 + \underline{\qquad}$ To subtract 8, add $\underline{\qquad}$.

$= \underline{\qquad}$ Simplify.

Check Your Progress **Find each difference.**

a. $6 - 8$ $\underline{\qquad}$

b. $-9 - 13$ $\underline{\qquad}$

EXAMPLE Subtract a Negative Integer

2 **Find each difference.**

a. $\mathbf{15 - (-4)}$

$15 - (-4) = 15 + \underline{\qquad}$ To subtract −4, add $\underline{\qquad}$.

$= \underline{\qquad}$ Simplify.

b. $\mathbf{-11 - (-7)}$

$-11 - (-7) = -11 + \underline{\qquad}$ To subtract −7, add $\underline{\qquad}$.

$= \underline{\qquad}$ Simplify.

Check Your Progress **Find each difference.**

a. $8 - (-2)$ $\underline{\qquad}$

b. $-12 - (-5)$ $\underline{\qquad}$

EXAMPLE Evaluate Algebraic Expressions

3 a. Evaluate $m - (-2)$ if $m = 4$.

$m - (-2) = \boxed{} - (-2)$ Replace m with $\boxed{}$.

$= \boxed{}$ To subtract -2, add $\boxed{}$.

$= \boxed{}$ Add $\boxed{}$ and $\boxed{}$.

b. Evaluate $x - y$ if $x = -14$ and $y = -2$.

$x - y = \boxed{} - \left(\boxed{}\right)$ Replace x with $\boxed{}$ and y with $\boxed{}$.

$= \boxed{}$ To subtract -2, add $\boxed{}$.

$= \boxed{}$ Add $\boxed{}$ and $\boxed{}$.

Check Your Progress

a. Evaluate $p - (-6)$ if $p = -4$.

b. Evaluate $m - n$ if $m = -9$ and $n = -3$.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

2–4 Multiplying Integers

Main Ideas

- Multiply integers.
- Simplify algebraic expressions.

Key Concept

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

The product of two integers with the same sign is positive.

EXAMPLE Multiply Integers with Different Signs

1 Find 8(−9).

8(−9) =

The factors have different signs.

The product is .

EXAMPLE Multiply Integers with the Same Sign

2 Find −4(−16).

−4(−16) =

The two factors have the same sign.

The product is .

Check Your Progress **Find each product.**

a. −4(12)

b. −3(−8)

EXAMPLE

3 TEST EXAMPLE A student missed only four problems on a test, each worth 20 points. What integer represents the total number of points earned for those questions?

A −5 **B** −20 **C** 24 **D** −80

4(−20) =

The product is .

The answer is .

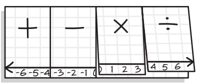
Check Your Progress **TEST EXAMPLE** A football team loses 3 yards on each of 3 consecutive plays. What integer represents the total loss?

A −9 **C** 6

B −6 **D** 9

FOLDABLES™ ORGANIZE IT

In your own words, describe how to multiply integers under the "×" tab. Give examples of all cases.



EXAMPLE Simplify and Evaluate Algebraic Expressions

4 **a. Simplify $8a(-5b)$.**

$8a(-5b) = (8)(a)(-5)(b)$

$= (8 \cdot -5)(ab)$ Commutative Property of Multiplication

$=$ ______ $8 \cdot -5 =$ ______, $a \cdot b =$ ______

b. Evaluate $-3xy$ if $x = -4$ and $y = 9$.

$-3xy = -3$ ______ $x = -4$ and $y = 9$.

$=$ ______ (9) Associative Property of Multiplication

$=$ ______ (9) The product of ______ and ______ is positive.

$=$ ______ The product of ______ and ______ is positive.

WRITE IT

What is the name of the property that allows you to regroup the numbers and the variables being multiplied?

______

______

______

______

______

Check Your Progress

a. Simplify $5m(-7n)$.

b. Evaluate $-9ab$ if $a = -3$ and $b = -6$.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

2–5 Dividing Integers

MAIN IDEAS

- Divide integers.
- Find the average of a set of data.

KEY CONCEPTS

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

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

EXAMPLE 1 Divide Integers with the Same Sign

a. Find $-28 \div (-4)$.

$-28 \div (-4) = \boxed{}$ The dividend and the divisor have the same sign. The quotient is $\boxed{}$.

b. Find $\frac{96}{8}$.

$\frac{96}{8} = 96 \div 8$ The dividend and the divisor have the same sign.

$= \boxed{}$ The quotient is $\boxed{}$.

Check Your Progress **Find each quotient.**

a. $35 \div 7$

b. $\frac{-64}{-4}$

EXAMPLE 2 Divide Integers with Different Signs

a. Find $54 \div (-3)$.

$54 \div (-3) = \boxed{}$ The signs are different. The quotient is $\boxed{}$.

b. Find $\frac{-42}{6}$.

$\frac{-42}{6} = -42 \div 6$ The signs are different. The quotient is $\boxed{}$.

$= \boxed{}$ Simplify.

Check Your Progress **Find each quotient.**

a. $72 \div (-8)$

b. $\frac{-36}{4}$

EXAMPLE Evaluate Algebraic Expressions

3 **Evaluate $6x \div y$ if $x = -4$ and $y = -8$.**

$6x \div y = 6\boxed{} \div \boxed{}$ $x = -4$ and $y = -8$

$= \boxed{} \div (-8)$ $6(-4) = \boxed{}$

$= \boxed{}$ The quotient is $\boxed{}$.

Check Your Progress Evaluate $-4m \div n$ if $m = -9$ and $n = -3$.

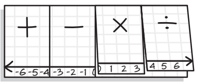
BUILD YOUR VOCABULARY (pages 32–33)

To find the **average**, or **mean**, of a set of numbers, find the $\boxed{}$ of the numbers and then $\boxed{}$ by the number in the set.

FOLDABLES™

ORGANIZE IT

Describe how to find the average of a set of numbers in your own words under the "÷" tab.



EXAMPLE Find the Mean

4 **a. Ian had exam scores of 89, 98, 96, 97, and 95. Find the average (mean) of his scores.**

$\dfrac{89 + 98 + 96 + 97 + 95}{\boxed{}}$ Find the sum of the scores. Then divide by the number of scores.

$= \boxed{}$ or $\boxed{}$ Simplify.

Check Your Progress Kyle had test scores of 89, 82, 85, 93, and 96. Find the average (mean) of his test scores.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

2–6 The Coordinate System

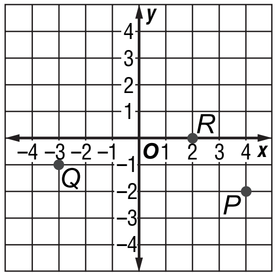
MAIN IDEAS

- Graph points on a coordinate plane.
- Graph algebraic relationships.

EXAMPLE Write Ordered Pairs

1 Write the ordered pair that names each point.

a. ***P***



The x-coordinate is ______.

The y-coordinate is ______.

The ordered pair is ______.

REMEMBER IT

The coordinates in an ordered pair (x, y) are listed in alphabetical order.

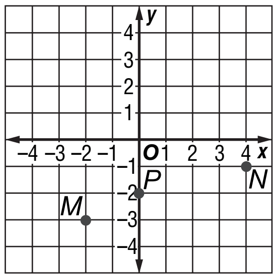
b. ***Q***

The x-coordinate is ______.

The y-coordinate is ______.

The ordered pair is ______.

Check Your Progress **Write the ordered pair that names each point.**



a. M ______

b. N ______

c. P ______

BUILD YOUR VOCABULARY (pages 32–33)

The x-axis and the y-axis separate the coordinate plane into ______ regions, called **quadrants**.

EXAMPLE **Graph Points and Name Quadrant**

REVIEW IT

Give a definition for the origin of a coordinate system. *(Lesson 1-5)*

____

____

____

____

____

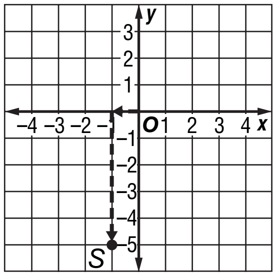
____

____

____

2 **Graph and label each point on a coordinate plane. Then name the quadrant in which each point lies.**

a. ***S*(–1, –5)**



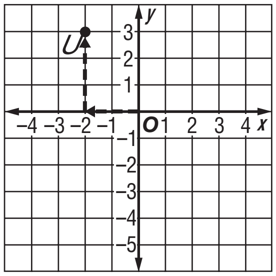
Start at the origin.

Move ____ unit ____.

Then move ____ units ____

and draw a dot. Quadrant ____.

b. ***U*(–2, 3)**



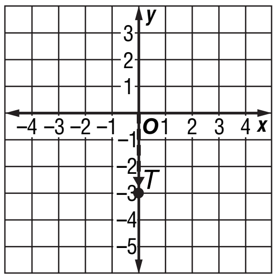
Start at the origin.

Move ____ units ____.

Then move ____ units ____

and draw a dot. Quadrant ____.

c. ***T*(0, –3)**



Start at the origin.

Since the x-coordinate is 0,

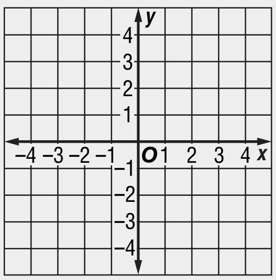
the point lies on the ____.

Move 3 units down, and

draw a dot. Point T is not in any quadrant.

Check Your Progress **Graph and label each point on a coordinate plane. Name the quadrant in which each point lies.**

a. $A(3, -4)$ **b.** $B(-2, 1)$ **c.** $C(-4, 0)$



EXAMPLE Graph an Algebraic Relationship

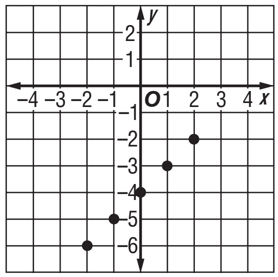
3 The difference between two integers is 4. If x represents the first integer and y is subtracted from it, make a table of possible values for x or y. Then graph the ordered pairs and describe the graph.

First, make a table. Choose values for x and y that have a difference of 4.

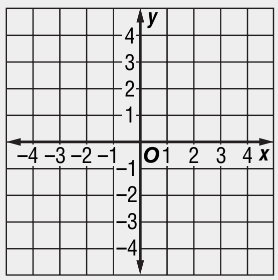
$x - y = 4$		
x	y	(x, y)
2		
1		
0		
−1		
−2		

Then graph the ordered pairs on a coordinate plane.

The points on the graph are in a line that slants upward to the right. The line crosses the y-axis at −4.



Check Your Progress The sum of two integers is 3. If x is the first integer and y represents the second number, make a table of possible values for x and y. Graph the ordered pairs and describe the graph.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 2

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 2 Foldable** 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: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 32–33*) to help you solve the puzzle.

2-1

Integers and Absolute Value

1. Order the integers {21, –1, 9, 7, 0 –4, –11} from least to greatest.

Evaluate each expression if $r = 3$, $s = -2$, and $t = -7$.

2. $|t| - 6$

3. $12 - |s - 5|$

4. $|s + t| - r$

5. $|rt - 1| \div s$

2-2

Adding Integers

Find each sum.

6. $-52 + 9$

7. $7 + (-31) + 4$

8. $(-8) + 22 + (-15) + 5$

9. $6 + (-10) + (-12) + 4$

2-3

Subtracting Integers

Find each difference.

10. $-17 - 26$

11. $35 - (-14)$

12. $42 - 19$

13. $11 - (-18)$

Evaluate each expression if $p = -6$, $q = 9$, and $r = -2$.

14. $q - 16$

15. $r - 4$

16. $p - q - r$

17. $q - r - p$

2-4

Multiplying Integers

Find each product.

18. $-4(-16)$

19. $3(-4)(-11)(2)$

Simplify each expression.

20. $5b \cdot (-7c)$

21. $2p(-7q)(-3)$

2-5

Dividing Integers

Find each quotient.

22. $72 \div -9$

23. $-28 \div 4$

24. $\frac{-49}{-7}$

25. $\frac{-144}{18}$

26. Find the average (mean) of 9, −6, 11, 7, 2, and −5.

2-6

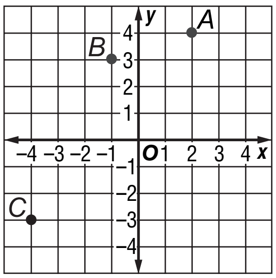
The Coordinate System

Name the ordered pair for each point graphed on the coordinate plane.

27. A

28. B

29. C



ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **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 119 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 116–118 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 119.

☐ **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 Foldable.
- Then complete the Chapter 2 Study Guide and Review on pages 116–118 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 119.

Student Signature

Parent/Guardian Signature

Teacher Signature

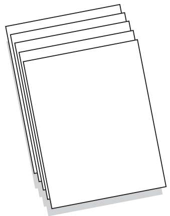
CHAPTER 3

Equations

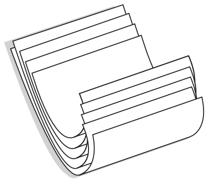
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

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

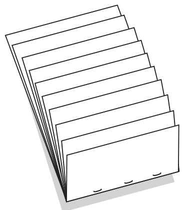
STEP 1 **Stack** 5 sheets of paper $\frac{3}{4}$ inch apart.



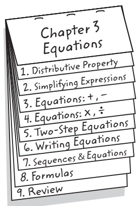
STEP 2 **Roll** up the bottom edges. All tabs should be the same size.



STEP 3 **Crease** and staple along fold.



STEP 4 **Label** the tabs with topics from the chapter.



NOTE-TAKING TIP: When you take notes, include definitions of new terms, explanations of new concepts, and examples of problems.

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
area			
coefficient [koh-uh-FIHSH-ehnt]			
constant			
equivalent equations			
equivalent expressions			
formula			

Vocabulary Term	Found on Page	Definition	Description or Example
inverse operations			
like terms			
perimeter			
sequence			
simplest form			
term			
two-step equation			

3–1 The Distributive Property

Main Ideas

- Use the Distributive Property to write equivalent numerical expressions.
- Use the Distributive Property to write equivalent algebraic expressions.

Build Your Vocabulary (pages 54–55)

The ______ $3(4 + 2)$ and $3 \cdot 4 + 3 \cdot 2$ are **equivalent expressions** because they have the same ______, 18.

Key Concept

Distributive Property To multiply a number by a sum, multiply each number inside the parentheses by the number outside the parentheses.

FOLDABLES™ Include the Distributive Property in your Foldable.

EXAMPLE Use the Distributive Property

1 Use the Distributive Property to write each expression as an equivalent expression. Then evaluate the expression.

a. $\mathbf{4(5 + 8)}$

$4(5 + 8) =$ ______ $+$ ______

$=$ ______ $+$ ______ Multiply.

$=$ ______ Add.

b. $\mathbf{(6 + 9)2}$

$(6 + 9)2 =$ ______ $+$ ______

$=$ ______ $+$ ______ Multiply.

$=$ ______ Add.

Check Your Progress **Use the Distributive Property to write each expression as an equivalent expression. Then evaluate the expression.**

a. $3(9 + 2)$

b. $(7 + 3)5$

EXAMPLE

2 RECREATION A Canoe Camping class costs $80 per person, including the cost for canoe rental. The cost of food is an additional $39 per person.

a. Write two equivalent expressions to find the total cost of one trip for a family of four.

METHOD 1 Find the cost for ____ person, then multiply by ____.

____(____ + ____) ____ times the cost for ____ person

METHOD 2 Find the cost of ____ classes and food for ____ people.

$\underbrace{\square(\square)}_{\text{cost of } \square \text{ classes}} + \underbrace{\square(\square)}_{\text{cost of food for } \square \text{ people}}$

b. Find the total cost.

$4(\$80 + \$39) = \square + \square$

$= \square + \square$

$= \square$

Check Your Progress **MOVIES The cost of a movie ticket is $7 and the cost of a box of popcorn is $2.**

a. Write two equivalent expressions to find the total cost for a family of five to go to the movies if each member of the family gets a box of popcorn.

b. Find the total cost.

REVIEW IT

Write a definition of algebraic expression in your own words. *(Lesson 1–3)*.

EXAMPLE Simplify Algebraic Expressions

3 **Use the Distributive Property to write $2(x + 4)$ as an equivalent algebraic expression.**

$2x + 4 = \square + \square$ ______ Property

$= \square$ Simplify.

Check Your Progress Use the Distributive Property to write $4(m + 7)$ as an equivalent algebraic expression.

EXAMPLE Simplify Expressions with Subtraction

4 **Use the Distributive Property to write each expression as an equivalent algebraic expression.**

a. $\mathbf{4(x - 2)}$

$4(x - 2)$

$= 4[\square]$ Rewrite $x - 2$ as ______.

$= \square + \square$ ______ Property

$= \square + \square$ Simplify.

$= \square$ Definition of subtraction

b. $\mathbf{-2(n - 3)}$

$-2(n - 3)$

$= -2[\square]$ Rewrite $n - 3$ as ______.

$= \square + \square$ ______ Property

$= \square$ Simplify.

Check Your Progress **Use the Distributive Property to write each expression as an equivalent algebraic expression.**

a. $2(a - 9)$

b. $-7(b - 3)$

HOMEWORK ASSIGNMENT

Page(s):

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3–2 Simplifying Algebraic Expressions

MAIN IDEAS

- Use the Distributive Property to simplify algebraic expressions.

BUILD YOUR VOCABULARY (pages 54–55)

When plus or minus signs separate an algebraic expression into parts, each part is a **term**.

The ______ part of a term that contains a variable is called the **coefficient** of the ______.

Like terms are terms that contain the same ______, such as $2n$ and $5n$ or $6xy$ and $4xy$.

A term without a variable is called a **constant**.

REMEMBER IT

If an expression does not have any plus or minus signs, then the entire expression is a single term.

EXAMPLE Identify Parts of Expressions

1 **Identify the terms, like terms, coefficients, and constants in the expression $4x - x + 2y - 3$.**

Rewrite $4x - x + 2y - 3$ as $4x + (-x) + 2y + (-3)$.

The terms are ______, ______, ______, and ______.

The like terms are ______ and ______.

The coefficients are ______, ______, and ______.

The constant is ______.

Check Your Progress Identify the terms, like terms, coefficients, and constants in the expression $5x + 3y - 2y + 6$.

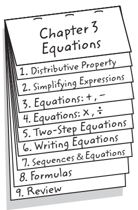
BUILD YOUR VOCABULARY (pages 54–55)

An algebraic expression is in **simplest form** if it has no ______ and no parentheses.

When you use the Distributive Property to ______ like terms, you are **simplifying the expression**.

FOLDABLES ORGANIZE IT

Under the *Simplifying Expressions* tab, explain how you know when an expression can be simplified. Write an expression that can be simplified and one that cannot.



EXAMPLE Simplify Algebraic Expressions

2 **Simplify each expression.**

a. $8n + 4 + 4n$

$8n + 4 + 4n$

$= 8n +$ ______ Commutative Property

$=$ ______ Distributive Property

$=$ ______ Simplify.

b. $6x + 4 - 5x - 7$

$6x + 4 - 5x - 7$

$= 6x + 4 +$ ______ $+$ ______ Definition of subtraction

$= 6x +$ ______ $+ 4 +$ ______ Commutative Property

$=$ ______ $+ 4 + (-7)$ Distributive Property

$=$ ______ Simplify.

WRITE IT

What does it mean for two expressions to be equivalent?

______

______

______

______

Check Your Progress Simplify each expression.

a. $5x + 3 + 7x$ ______

b. $3m + 9 - m - 6$ ______

c. $7b + 3(c - 2b)$ ______

EXAMPLE Translate Verbal Phrases into Expressions

3 **WORK** **Suppose you and a friend worked in the school store last week. You worked 4 hours more than your friend. Write an expression in simplest form that represents the total number of hours you both worked.**

Words: Your friend worked some hours. You worked 4 hours more than your friend.

Variable: Let h = number of hours your friend worked. Let $h + 4$ = number of hours you worked.

Expression: To find the total, add the expressions.

$\square + \square = (\square) + 4$	Associative Property
$= (\square) + 4$	Identity Property
$= \square + 4$	Distributive Property
$= \square$	Simplify.

The expression $\square$ represents the total number of hours you both worked.

Check Your Progress You and a friend went to the library. Your friend borrowed three more books than you did. Write an expression in simplest form that represents the total number of books you both borrowed.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

3–3 Solving Equations by Adding or Subtracting

MAIN IDEAS

- Solve equations by using the Subtraction Property of Equality.
- Solve equations by using the Addition Property of Equality.

BUILD YOUR VOCABULARY (pages 54–55)

Inverse operations "undo" each other.

The equations x + 4 = 7 and $x = 3$ are **equivalent equations** because they have the same ____, 3.

EXAMPLE Solve Equations by Subtraction

1 **Solve $x + 4 = -3$.**

$x + 4 = -3$

$x + 4 - \text{____} = -3 - \text{____}$ Subtract ____ from each side.

$\text{____} = \text{____}$ $4 - 4 =$ ____ and $-3 - 4 =$ ____

$\text{____} = \text{____}$ Identity Property

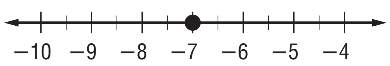
To check your solution, replace x with ____.

CHECK $\text{____} + 4 = -3$

$\text{____} + 4 = -3$

$\text{____} = -3$

The solution is ____. To graph it, draw a dot at ____ on a number line.



KEY CONCEPT

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

Check Your Progress Solve $y + 7 = 3$. Check your solution and graph it on a number line.

KEY CONCEPT

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

FOLDABLES™ Under the *Equations:* +, – tab, write one equation that can be solved by subtracting and one that can be solved by adding.

EXAMPLE Solve Equations by Adding

2 Solve $y - 3 = -14$

$y - 3 = -14$	
$y + \underline{\quad} = -14$	Rewrite $y - 3$ as $\underline{\quad}$.
$y + (-3) + \underline{\quad} = -14 + \underline{\quad}$	Add $\underline{\quad}$ to each side.
$y + \underline{\quad} = -14 + \underline{\quad}$	Additive Inverse Property
$y = \underline{\quad}$	Identity Property

Check Your Progress Solve $x - 2 = -9$.

EXAMPLE Use an Equation to Solve a Problem

3 ENTERTAINMENT Movie A earned \$225 million at the box office. That is \$38 million less than Movie B earned. Write and solve an equation to find the amount Movie B earned.

Words Movie A earned \$38 million less than Movie B earned.

Variable Let B = amount Movie B earned.

Expression Movie A earned \$38 million less than Movie B.

$\underbrace{\text{Movie A}}_{\underline{\quad}}\ \underbrace{\text{earned}}_{\underline{\quad}}\ \underbrace{\text{\$38 million less than Movie B.}}_{\underline{\quad}}$

(continued on the next page)

Solve the equation.

Write the equation.

225 ☐ = $B - 38$ ☐ Add ☐ to each side.

☐ = ☐ Simplify.

Movie B earned ☐ at the box office.

Check Your Progress **CONSTRUCTION** Board A measures 22 feet. That is 9 feet more than the measure of board B. Write and solve an equation to find the measure of board B.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

3–4 Solve Equations by Multiplying or Dividing

Main Ideas

- Solve equations by using the Division Property of Equality.
- Solve equations by using the Multiplication Property of Equality.

Key Concepts

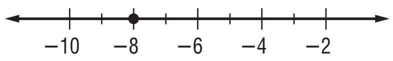
Division Property of Equality When you divide each side of an equation by the same nonzero number, the two sides remain equal.

Multiplication Property of Equality When you multiply each side of an equation by the same number, the two sides remain equal.

EXAMPLE Solve Equations by Dividing

1 Solve $7x = -56$. Check your solution and graph it on a number line.

$7x = -56$	Write the equation.
$\dfrac{7x}{\boxed{}} = \dfrac{-56}{\boxed{}}$	Divide each side by $\boxed{}$.
$\boxed{} = \boxed{}$	$7 \div \boxed{} = \boxed{}$, $-56 \div \boxed{} = \boxed{}$
$\boxed{} = \boxed{}$	Identity Property; $1x = \boxed{}$



Check Your Progress Solve $4x = -12$. Graph the solution on a number line.

EXAMPLE Use an Equation to Solve a Problem

2 HOBBIES Esteban spent \$112 on boxes of baseball cards If he paid \$14 per box, how many boxes of cards did Esteban buy?

Words \$14 times the number of boxes equals the total.

Variable Let x represent the number of boxes.

Equation

cost per box	times	number of boxes	equals	total
$\boxed{}$	$\cdot$	$\boxed{}$	$=$	$\boxed{}$

Solve the equation.

$\square = \square$ Write the equation.

$\square = \square$ Divide each side by $\square$.

Check Your Progress **TOY CARS** Drew spent \$18 on toy cars. If the cars cost \$2 each, how many cars did Drew buy?

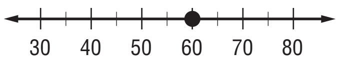
EXAMPLE Solve Equations by Multiplying

3 **Solve $\frac{y}{-5} = -12$. Check your solution and graph it on a number line.**

$\frac{y}{-5} = -12$ Write the equation.

$\frac{y}{-5}\square = -12\square$ Multiply each side by $\square$ to undo the division.

$\square = \square$ Simplify.

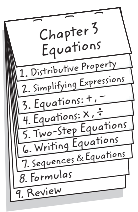


Check Your Progress Solve $\frac{m}{4} = -9$. Check your solution and graph it on a number line.

FOLDABLES™

ORGANIZE IT

Under the *Equations:* ×, ÷ tab, write one equation that can be solved by multiplying and one that can be solved by dividing.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

3–5 Solving Two-Step Equations

MAIN IDEA

- Solve two-step equations.

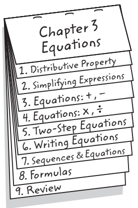
BUILD YOUR VOCABULARY (page 55)

A two-step equation contains $\square$ operations.

FOLDABLES™

ORGANIZE IT

Under *Two-Step Equations* tab, write a two-step equation. Then write the order of the steps you would use to solve that equation.



EXAMPLE Solve Two-Step Equations

1 **a. Solve $3x - 4 = 17$.**

$3x - 4 + \square = 17 + \square$ Add $\square$ to each side.

$\square = \square$ Simplify.

$\dfrac{3x}{\square} = \dfrac{21}{\square}$ Undo $\square$.

Divide each side by $\square$.

$\square = \square$ Simplify.

b. $3 = \dfrac{n}{3} + 8$

$3 - \square = \dfrac{n}{3} + 8 - \square$ Subtract $\square$ from each side.

$-5 = \dfrac{n}{3}$ Simplify.

$\square(-5) = \left(\dfrac{n}{3}\right)\square$ Multiply each side by $\square$.

$\square = n$ Simplify.

Check Your Progress **Solve each equation.**

a. $4x + 3 = 19$

b. $\dfrac{w}{6} - 8 = -4$

EXAMPLE

2 MEASUREMENT **The formula $F = 1.8C + 32$ is used to convert Celsius degrees to Fahrenheit degrees. Solve the equation to find the equivalent Celsius temperature for 59°F.**

$\boxed{} = 1.8C + 32$	Substitute 59° for *F*.
$59 - \boxed{} = 1.8C + 32 - \boxed{}$	Subtract $\boxed{}$ from each side.
$27 = 1.8C$	Simplify.
$\dfrac{27}{\boxed{}} = \dfrac{1.8C}{\boxed{}}$	Divide each side by 1.8.
$\boxed{} = \boxed{}$	Simplify.

59°F is equal to $\boxed{}$.

Check Your Progress **CELL PHONES** Sue signed up for a cell phone plan that charges \$19 per month plus \$0.10 per minute used. Her first bill was \$23.30. Solve $19 + 0.10x = 23.30$ to find out how many minutes Sue used this month.

$\boxed{}$

EXAMPLE **Equations with Negative Coeff cients**

3 Solve $5 - x = 7$.

$5 - \boxed{} = 7$	Identity Property
$5 + (-1x) = 7$	Definition of subtraction
$5 + (-1x) + (-5) = 7 + (-5)$	Add –5 to each side.
$(-1x) = \boxed{}$	Simplify.
$\boxed{} = \boxed{}$	Divide each side by $\boxed{}$.
$\boxed{} = \boxed{}$	Simplify.

EXAMPLE Combine Like Terms Before Solving

4 **Solve $b - 3b + 8 = 18$.**

$\boxed{} - 3b + 8 = 18$	Identity Property
$\boxed{} + 8 = 18$	Combine like terms.
$\boxed{} + 8 \boxed{} = 18 \boxed{}$	Subtract $\boxed{}$ from each side.
$\boxed{} = \boxed{}$	Simplify.
$\boxed{} = \boxed{}$	Divide each side by $\boxed{}$.
$\boxed{} = \boxed{}$	Simplify.

Check Your Progress **Solve each equation.**

a. $9 = -4 - m$.

b. $9 = 13 - x + 5x$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

3–6 Writing Two-Step Equations

MAIN IDEAS

- Write verbal sentences as two-step equations.
- Solve verbal problems by writing and solving two-step equations.

EXAMPLE Translate Sentences into Equations

1 **Translate *twice a number increased by 5 equals –25* into an equation.**

Check Your Progress Translate *five times a number decreased by 9 equals –6* into an equation.

EXAMPLE Translate and Solve an Equation

2 **Nine more than four times a number is 41. Find the number.**

Words	Nine more than four times a number is 41.
Variable	Let n = the number.
Equation	$9 + 4n = 41$

$9 + 4n = 41$ Write the equation.

$9 + 4n - \square = 41 - \square$ Subtract $\square$ from each side.

$\square = \square$ Simplify.

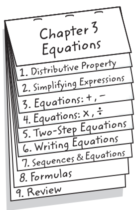
$\square = \square$ Divide each side by $\square$.

Check Your Progress Six less than three times a number is 15. Find the number.

FOLDABLES™

ORGANIZE IT

Under the *Writing Equations* tab, list two words or phrases that can be translated into each of the four basic operations.



EXAMPLE Write and Solve a Two-Step Equation

3 **EARNINGS** **Ms. Parsons earns $48,400 per year. This is $4150 more than three times as much as her daughter earns. How much does her daughter earn?**

Words — Ms. Parsons earns $4150 more than three times as much as her daughter.

Variable — Let d = daughter's earnings

Equation

Ms. Parsons	earns	$4150	more than	three times as much as her daughter
______	=	$4150	+	______

______ = 4150 + ______ Write the equation.

Subtract ______ from each side.

______ − ______ = 4150 + ______ − ______

______ = ______ Simplify.

______ = ______ Divide each side by ______.

______ = ______ Simplify.

Ms. Parsons' daughter earns ______.

Check Your Progress **SHOPPING** Tami spent $175 at the grocery store. That is $25 less than four times as much as Ted spent. How much did Ted spend?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

3–7 Sequences and Equations

MAIN IDEAS

- Describe sequences using words and symbols.
- Find the terms of arithmetic sequences.

EXAMPLE Describe an Arithmetic Sequence

1 **Describe the sequence 3, 6, 9, 12, … using words and symbols.**

Term Number (n)	1	2	3	4
Term (t)	3	6	9	12

The difference of the term numbers is ______. The terms have a common difference of ______. Also, a term is ______ times the ______. The equation ______ describes the sequence.

Check Your Progress Describe the sequence 7, 14, 21, 28, … using words and symbols.

EXAMPLE Find a Term in an Arithmetic Sequence

2 **Find the 11th term of 6, 9, 12, 15, … .**

Term Number (n)	1	2	3	4
Term (t)	6	9	12	15

The difference of the term numbers is ____.

The terms have a common difference of ____.

The common difference is ____ times the ____ of the term numbers. This suggests that ____. However, you need to add ____ to get the exact value of t. Thus, $t =$ ____.

Check Your Progress Find the 14th term of 4, 9, 14, 19, … .

____

EXAMPLE

3 **TELEPHONE CHARGES For a telephone call to India, a telephone company charges $8 for the first minute and $4 for each additional minute. How much does it cost for a 10-minute call?**

Make a table to organize the sequence and find a rule.

Number of Minutes (m)	1	2	3
Cost (c)	8	12	16

The difference of the term numbers is ____.

The terms have a common difference of ____.

The pattern in the table shows the equation ____.

If $c =$ ____ and $m =$ ____, then $c =$ ____ or $c =$ ____.

Check Your Progress **READING** During one month, Mitch read 3 books. Each month after, he read only 2 books. After 12 months, how many books did Mitch read?

____

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

3–8 Using Formulas

Main Ideas

- Solve problems using formulas.
- Solve problems involving the perimeters and areas of rectangles.

Build Your Vocabulary (pages 54–55)

A **formula** is an ______ that shows a relationship among certain quantities.

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

EXAMPLE Use the Distance Formula

1 TRAVEL **If you travel 135 miles in 3 hours, what is your average speed in miles per hour?**

$d = rt$	Write the formula.
______ = ______	$d =$ ______, $t =$ ______
______ = ______	Divide each side by ______.
______ = ______	Simplify.

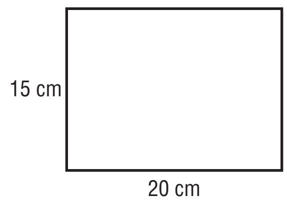
Check Your Progress **VACATION** If you drive 520 miles in 8 hours, what is your average speed in miles per hour?

Key Concept

Perimeter of a Rectangle The perimeter of a rectangle is twice the sum of the length and width.

EXAMPLE Find the Perimeters and Lengths of Rectangles

2 **a. Find the perimeter of the rectangle.**



$P =$ ______ Write the formula.

$P =$ ______ $\ell =$ ______ , $w =$ ______

$P =$ ______ Add ______ and ______.

$P =$ ______ Simplify.

b. The perimeter of a rectangle is 60 feet. Its width is 9 feet. Find its length.

$P = 2(\ell + w)$ Write the formula.

$P =$ ______ Distributive Property

______ $=$ ______ $P =$ ______ , $w =$ ______

______ $=$ ______ Simplify.

______ $=$ ______ Subtract ______ from each side.

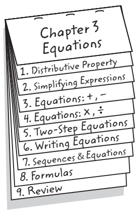
______ $=$ ______ Simplify.

______ $=$ ______ Divide each side by ______.

The length is ______ feet.

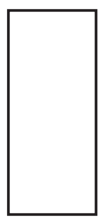
FOLDABLES™ ORGANIZE IT

Locate a rectangular object in your classroom and measure its length and width. Under the *Formulas* tab, describe how to determine its perimeter using the perimeter formula.



Check Your Progress

a. Find the perimeter of the rectangle.



b. The perimeter of a rectangle is 36 meters. Its width is 6 meters. Find its length.

BUILD YOUR VOCABULARY (page 54)

The measure of the surface enclosed by a figure is its **area**.

KEY CONCEPT

Area of a Rectangle The area of a rectangle is the product of the length and width.

EXAMPLE Find the Areas and Widths of Rectangles

3 **a. Find the area of a rectangle with length 14 feet and width 6 feet.**

$A = \square$ Write the formula.

$A = \square \cdot \square$ $\ell = \square$, $w = \square$

$A = \square$ Simplify.

The area is $\square$ square feet.

b. The area of a rectangle is 40 square meters. Its length is 8 meters. Find its width.

$A = \square$ Write the formula.

$\square = \square$ $A = \square$, $\ell = \square$

$\square = \square$ Divide each side by $\square$.

The width is $\square$ meters.

Check Your Progress

a. Find the area of a rectangle with length 11 yards and width 6 yards.

b. The area of a rectangle is 42 square inches. Its length is 14 inches. Find its width.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 3

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	Build your Vocabulary
Use your **Chapter 3 Foldable** to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 3, go to: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 54–55*) to help you solve the puzzle.

3-1 The Distributive Property

Match each expression with an equivalent expression.

1. $5(4 + 7)$

2. $(5 + 4)7$

3. $-4(5 + 7)$

4. $(5 - 7)4$

5. $-4(5 - 7)$

a. $5 \cdot 7 + 4 \cdot 7$

b. $(-4) \cdot 5 + (-4) \cdot (-7)$

c. $5 \cdot 4 + 5 \cdot 7$

d. $(-4) \cdot 5 + (-4) \cdot 7$

e. $-5 \cdot 7 + (-5) \cdot 4$

f. $5 \cdot 4 + (-7) \cdot 4$

6. In rewriting $3(x + 2)$, which term is "distributed" to the other terms in the expression?

3-2 Simplifying Algebraic Expressions

Underline the term that best completes each statement.

7. A term without a variable is a (coefficient, constant).

8. The expression $5z + 2z + 9 + 6z$ has three (like terms, terms).

Simplify each expression.

9. $6q + 2q$

10. $12y - y$

11. $5 + 7x - 3$

12. $4(b + 1) + b$

3-3

Solving Equations by Adding or Subtracting

Underline the term that best completes each statement.

13. To undo the addition of 8 in the expression $y + 8$, you would add -8. This is an example of (inverse operations, simplest form.)

14. The equations $x + 3 = 12$ and $x = 9$ are equivalent equations because they have the same (solution, variable).

Solve each equation.

15. $7 + z = 19$

16. $19 = x - 8$

17. Write and solve an equation for the sentence. The sum of –13 and a number is –16.

3-4

Solving Equations by Multiplying or Dividing

Solve each equation.

18. $3m = 39$

19. $\frac{c}{8} = -6$

20. What value of h makes $\frac{h}{-2} = 16$ a true statement?

A -8 **B** -32 **C** 8 **D** 32

3-5

Solving Two-Step Equations

Solve each equation.

21. $4y + 3 = 15$

22. $17 = 6q - 7$

23. $9 = \frac{b}{3} - 12$

24. $31 = 2x + 6 - 7x$

3-6 Writing Two-Step Equations

Translate each sentence into an equation. Then find the number.

25. Six decreased by four times a number is 18.

26. Thirteen more than the quotient of a number and 3 is -5.

3-7 Sequences and Equations

Write an equation that describes each sequence. Then find the indicated term.

27. 9, 10, 11, 12, …; 29th term

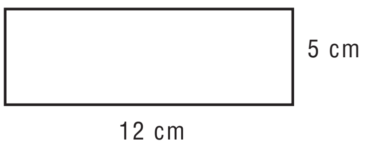
28. 13, 26, 39, 52, …; 13th term

3-8 Using Formulas

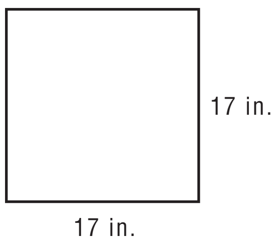
29. What is the speed in miles per hour of a raft that travels 18 miles in 3 hours?

Find the perimeter and area of each rectangle.

30.



31.



CHAPTER 3

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **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 Foldable 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 also 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 want to take the Chapter 3 Practice Test on page 173.

Student Signature

Parent/Guardian Signature

Teacher Signature

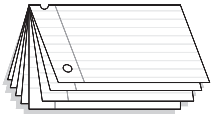
CHAPTER 4

Factors and Fractions

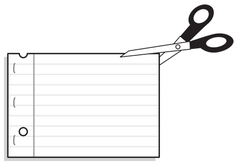
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with four sheets of notebook paper.

STEP 1 **Fold** four sheets of notebook paper in half from top to bottom.

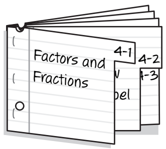


STEP 2 **Cut** along fold. Staple eight half-sheets together to form a booklet.



STEP 3 **Cut** tabs into margin. Make the top tab 2 lines wide, the next tab 4 lines wide, and so on.

STEP 4 **Label** each of the tabs with the lesson number and title.



NOTE-TAKING TIP: At the end of each lesson, write a summary of the lesson, or write in your own words what the lesson was about.

CHAPTER 4

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
algebraic fraction			
base			
composite number			
exponent			
factor			
factor tree			

Vocabulary Term	Found on Page	Definition	Description or Example
greatest common factor (GFC)			
monomial			
power			
prime factorization			
prime number			
scientific notation			
simplest form			
standard form			
Venn Diagram			

4–1 Powers and Exponents

MAIN IDEAS

- Write expressions using exponents.
- Evaluate expressions containing exponents.

BUILD YOUR VOCABULARY (pages 82–83)

In an expression like 2^4, the **base** is the number that is ______.

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

The number that can be expressed using an ______ is called a **power**.

EXAMPLE Write Expressions Using Exponents

1 **Write each expression using exponents.**

a. 6 • 6 • 6 • 6

The base is ______. It is a factor ______ times, so the exponent is ______.

$6 \cdot 6 \cdot 6 \cdot 6 =$ ______

b. ***p***

The base is ______. It is a factor ______ time, so the exponent is ______.

$p =$ ______

c. (–1)(–1)(–1)

The base is ______. It is a factor ______ times, so the exponent is ______.

$(-1)(-1)(-1) =$ ______

d. $(5x + 1)(5x + 1)$

The base is ____. It is a factor ____ times, so the exponent is ____.

$(5x + 1)(5x + 1) =$ ____

e. $\frac{1}{2} \cdot x \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y$

First group the factors with like bases. Then write using exponents.

$= \frac{1}{2} \cdot (x \cdot x \cdot x \cdot x) \cdot (y \cdot y \cdot y)$

$=$ ____

WRITE IT

What is the difference between $(-5)^2$ and -5^2? Explain.

Check Your Progress **Write each expression using exponents.**

a. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

b. $m \cdot m \cdot m$

c. $(-6)(-6)(-6)(-6)$

d. $(4 - 2x)(4 - 2x)$

e. $9 \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b \cdot b \cdot b$

EXAMPLE Evaluate Expressions

2 **Evaluate each expression.**

a. $4^2 =$ ____ $\cdot$ ____ ____ is a factor two times.

$=$ ____ Multiply.

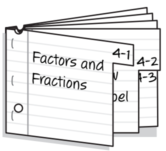
b. $2 \cdot 3^2 = 2 \cdot$ ____ $\cdot$ ____ ____ is a factor two times.

$=$ ____ Multiply.

FOLDABLES™

ORGANIZE IT

Under the tab for Lesson 4-1, write a summary about the relationship between base, exponent, and factor.



Check Your Progress **Evaluate each expression.**

a. 3^4

$\boxed{}$

b. $4^3 \cdot 2$

$\boxed{}$

EXAMPLE

3 Evaluate each expression.

a. $\mathbf{r^3 - 3}$ **if** $\mathbf{r = -2}$

$$r^3 - 3 = \left(\boxed{}\right)^3 - 3$$ Replace r with $\boxed{}$

$$= \left(\boxed{}\right)\left(\boxed{}\right)\left(\boxed{}\right) - 3$$ Rewrite $\boxed{}^3$.

$$= \boxed{} - 3$$ Multiply.

$$= \boxed{}$$ Subtract.

b. $\mathbf{x(y^2 + 2)^2}$ **if** $\mathbf{x = 2}$ **and** $\mathbf{y = -2}$

$$x(y^2 + 2)^2 = \left(\boxed{}\right)\left[\left(\boxed{}\right)^2 + 2\right]^2$$ Replace x with 2 and y with -2.

$$= (2)\left[\boxed{} + 2\right]^2$$ Rewrite $(-2)^2$.

$$= (2)\left(\boxed{}\right)^2$$ Simplify.

$$= (2)\left(\boxed{}\right)$$ Multiply.

$$= \boxed{}$$

Check Your Progress **Evaluate each expression.**

a. $100 - x^4$ if $x = 2$

$\boxed{}$

b. $m(5 - n)^3$ if $m = -3$ and $n = 3$

$\boxed{}$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

4–2 Prime Factorization

MAIN IDEAS

- Write the prime factorization of composite numbers.
- Factor monomials.

BUILD YOUR VOCABULARY (pages 82–83)

A **prime number** is a whole number that has exactly two factors, 1 and itself.

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

EXAMPLE Identify Numbers as Prime or Composite

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

a. 31

Find factors of 31 by listing the whole number pairs whose product is 31.

31 = ______

The number 31 has only two factors. So, it is a ______ number.

REMEMBER IT

Zero and 1 are neither prime nor composite.

b. 36

Find factors of 36 by listing the ______ whose product is 36.

36 = ______ 36 = ______

36 = ______ 36 = ______

36 = ______

The factors of 36 are ______.

Since the number has more than two factors, it is a ______ number.

Check Your Progress **Determine whether each number is *prime* or *composite*.**

a. 49 ______ **b.** 29 ______

BUILD YOUR VOCABULARY (page 83)

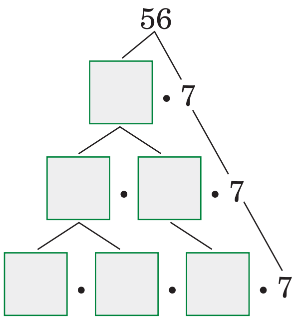
When a composite number is expressed as the product of prime factors, it is called the **prime factorization** of the number.

One way to find the prime factorization of a number is to use a **factor tree**.

To **factor** a number means to write it as a product of its factors.

EXAMPLE Write Prime Factorization

2 Write the prime factorization of 56.



The prime factorization of 56 is $\square$.

EXAMPLE Factor Monomials

3 a. Factor $16p^2q^4$.

$$16p^2q^4 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot p^2 \cdot q^4$$

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

b. Factor $-21x^2y$.

$$-21x^2y = -1 \cdot \square \cdot \square \cdot x^2 \cdot y$$

$$= -1 \cdot \square \cdot \square \cdot \square \cdot \square \cdot \square$$

Check Your Progress

a. Write the prime factorization of 72.

$\square$

b. Factor $12a^3b$.

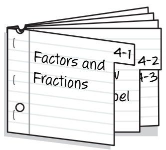
$\square$

c. Factor $-18mn^2$.

$\square$

FOLDABLES ORGANIZE IT

Under the Lesson 4-2 tab, describe how to use a factor tree to find the prime factorization of a number.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

4–3 Greatest Common Factor (GCF)

MAIN IDEAS

- Find the greatest common factor of two or more numbers or monomials.
- Use the Distributive Property to factor algebraic expressions.

BUILD YOUR VOCABULARY (page 83)

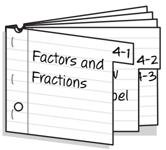
A **Venn diagram** shows the relationship among sets of ________ or objects by using overlapping ________ in a rectangle.

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

FOLDABLES™

ORGANIZE IT

Under the Lesson 4-3 tab, describe the two methods for finding the GCF of two or more numbers.



EXAMPLE Find the GCF

1 **Find the GCF of 16 and 24.**

Method 1 List the factors.

factors of 16: ________

factors of 24: ________

The greatest common factor of 16 and 24 is ____.

Method 2 Use prime factorization.

$16 = 2 \cdot 2 \cdot 2 \cdot 2$

$24 = 2 \cdot 2 \cdot 2 \cdot 3$

The GFC is the product of the common ________.

$2 \cdot 2 \cdot 2 =$ ____

Check Your Progress Find the GCF of 18 and 30.

EXAMPLE Find the GCF of Monomials

2 Find the GCF of $18x^3y^2$ and $42xy^2$.

Completely factor each expression.

$$18x^3y^2 = 2 \cdot 3 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y$$
$$42xy^2 = 2 \cdot 3 \cdot 7 \cdot x \cdot y \cdot y$$

Circle the common factors.

The GCF of $18x^3y^2$ and $42xy^2$ is ______ or ______.

Check Your Progress Find the GCF of $32mn^4$ and $80m^3n^2$.

EXAMPLE Factor Expressions

3 Factor $3x + 12$.

First, find the GCF of $3x$ and 12.

$$3x = 3 \cdot x$$
$$12 = 2 \cdot 2 \cdot 3$$

The GCF is ______.

Now, write each term as a product of the ______ and its remaining factors.

$$3x + 12 = 3(\quad) + 3(\quad)$$
$$= 3(\quad)$$ ______ Property

Check Your Progress Factor $4x + 20$.

REVIEW IT

Name the operations that are combined by the Distributive Property. *(Lesson 3-1)*

______

______

______

______

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

4–4 Simplifying Algebraic Fractions

MAIN IDEAS

- Simplify fractions using the GCF.
- Simplify algebraic fractions.

BUILD YOUR VOCABULARY (pages 82–83)

A fraction is in **simplest form** when the GCF of the ______ and the ______ is 1.

A fraction with ______ in the ______ or ______ is called an **algebraic fraction**.

EXAMPLES Simplify Fractions

Write each fraction in simplest form.

1 $\frac{16}{24}$

$16 = 2 \cdot 2 \cdot 2 \cdot 2$ Factor the ______.

$24 = 2 \cdot 2 \cdot 2 \cdot 3$ Factor the ______.

The ______ of 16 and 24 is ______ • ______ • ______ or ______.

$\frac{16}{24} = \frac{16 \div \square}{24 \div \square} = \square$ Divide the numerator and denominator by the ______.

2 $\frac{72}{120}$

$\frac{72}{120} = \frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{3}} \cdot 3}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{3}} \cdot 5} = \square$ Divide the numerator and the denominator by the GCF.

Check Your Progress **Write each fraction in simplest form.**

a. $\frac{12}{40}$

b. $\frac{48}{80}$

WRITE IT

Describe the result if a common factor other than the GCF is used to simplify a fraction.

______

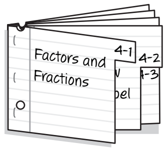
______

______

______

FOLDABLES™ ORGANIZE IT

Under the Lesson 4-4 tab, explain how to simplify both numeric and algebraic fractions.



EXAMPLE

3 TEST EXAMPLE 250 pounds is what part of 1 ton?

A $\frac{1}{10}$ **B** $\frac{1}{8}$ **C** $\frac{1}{4}$ **D** $\frac{1}{2}$

There are ______ pounds in ______ ton. Write the fraction ______ in simplest form.

$$\frac{250}{2000} = \frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{5}} \cdot \overset{1}{\cancel{5}} \cdot \overset{1}{\cancel{5}}}{\underset{1}{\cancel{2}} \cdot 2 \cdot 2 \cdot 2 \cdot \underset{1}{\cancel{5}} \cdot \underset{1}{\cancel{5}} \cdot \underset{1}{\cancel{5}}} = \boxed{}$$

So, 250 pounds is ______ of 1 ton. The answer is ______.

Check Your Progress **TEST EXAMPLE** 80 feet is what part of 40 yards?

A $\frac{2}{3}$ **B** $\frac{1}{2}$ **C** $\frac{3}{40}$ **D** $\frac{1}{3}$

EXAMPLE Simplify Algebraic Fractions

4 Simplify $\frac{20m^3n^2}{65mn}$.

$$\frac{20m^3n^2}{65mn} = \frac{2 \cdot 2 \cdot \overset{1}{\cancel{5}} \cdot \overset{1}{\cancel{m}} \cdot m \cdot m \cdot \overset{1}{\cancel{n}} \cdot n}{\underset{1}{\cancel{5}} \cdot 13 \cdot \underset{1}{\cancel{m}} \cdot \underset{1}{\cancel{n}}}$$ Divide the numerator and the denominator by the GCF.

$= \boxed{}$ Simplify.

Check Your Progress Simplify $\frac{14x^4y^2}{49x^2y^2}$.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

4–5 Multiplying and Dividing Monomials

MAIN IDEAS

- Multiply monomials.
- Divide monomials.

EXAMPLE Multipl y Powers

1 **Find $3^4 \cdot 3^6$.**

$3^4 \cdot 3^6 = 3^{\square + \square}$ The common base is $\square$.

$= 3^{\square}$ $\square$ the exponents.

Check Your Progress Find $4^3 \cdot 4^5$.

EXAMPLE Multipl y Monomials

2 **Find each product.**

a. $\boldsymbol{y^4 \cdot y}$

$y^4 \cdot y = y^{\square + \square}$ The common base is $\square$.

$= y^{\square}$ $\square$ the exponents.

b. $\boldsymbol{(3p^4)(-2p^3)}$

$(3p^4)(-2p^3) = (3 \cdot \square)(p^4 \cdot \square)$ Use the Commutative and Associative Properties.

$= (\square)(p^{\square + \square})$ The common base is p.

$= \square$ $\square$ the exponents.

KEY CONCEPT

Product of Powers You can multiply powers with the same base by adding their exponents.

Check Your Progress **Find each product.**

a. $w^2 \cdot w^5$

b. $(-4m^3)(6m^2)$

KEY CONCEPT

Quotient of Powers
You can divide powers with the same base by subtracting their exponents.

EXAMPLE Divide Powers

3 a. Find $\frac{8^{11}}{8^5}$.

$\frac{8^{11}}{8^5} =$ ______ $=$ ______

The common base is ______.
______ the exponents.

b. Find $\frac{x^{12}}{x}$.

$\frac{x^{12}}{x} =$ ______ $=$ ______

The common base is ______.
______ the exponents.

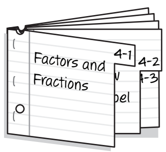
Check Your Progress **Find each quotient.**

a. $\frac{7^5}{7^3}$ ______

b. $\frac{r^4}{r^1}$ ______

FOLDABLES ORGANIZE IT

Under the tab for Lesson 4-5, write a summary of the way you can use exponents to multiply and divide polynomials.



EXAMPLE

4 FOLDING PAPER **If you fold a sheet of paper in half, you have a thickness of 2 sheets. Folding again, you have a thickness of 4 sheets. Continue folding in half and recording the thickness. How many times thicker is a sheet that has been folded 4 times than a sheet that has not been folded?**

Write a ______ expression to compare the thicknesses.

$\frac{2^4}{2^0} =$ ______ $= 2^{\square}$ or ______

The sheet that has been folded 4 times is ______ times thicker than a sheet that has not been folded.

Check Your Progress **RACING** Car A can run at a speed of 2^8 miles per hour and car B runs at a speed of 2^7 miles per hour. How many times faster is car A than car B?

______

HOMEWORK ASSIGNMENT

Page(s):
Exercises:

4–6 Negative Exponents

MAIN IDEAS

- Write expressions using negative exponents.
- Evaluate numerical expressions containing negative exponents.

EXAMPLE Use Positive Exponents

1 Write each expression using a positive exponent.

a. 3^{-4}

$3^{-4} = \square$ Definition of ______ exponent

b. m^{-2}

$m^{-2} = \square$ Definition of ______ exponent

Check Your Progress **Write each expression using a positive exponent.**

a. 5^{-3}

b. y^{-6}

EXAMPLE Use Negative Exponents

REMEMBER IT A negative exponent in an expression does not change the sign of the expression.

2 Write $\frac{1}{125}$ as an expression using a negative exponent.

$\frac{1}{125} = \frac{1}{\square}$ Find the ______ of 125.

$= \frac{1}{\square}$ Definition of exponents

$= \square$ Definition of negative exponent

Check Your Progress Write $\frac{1}{32}$ as an expression using a negative exponent.

EXAMPLE Use Exponents to Solve a Problem

3 ATOM An atom is an incredibly small unit of matter. The smallest atom has a diameter of approximately $\frac{1}{10}$ of a nanometer, or 0.0000000001 meter. Write the decimal as a fraction and as a power of 10.

0.0000000001 = ______ Write the decimal as a fraction.

= ______ 10,000,000,000 = ______

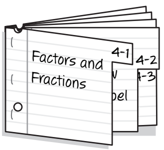
= ______ Definition of negative exponent

Check Your Progress **AIR POLLUTION** Small particles in the air produced by a combustion process are called smoke. These particles are usually less than one micrometer, or 0.000001 m, in size. Write the decimal as a fraction and as a power of 10.

______

FOLDABLES™ ORGANIZE IT

Under the tab for Lesson 4-6, explain negative exponents. Give an example of a number written with a negative exponent and an equivalent expression using a positive exponent.



EXAMPLE Algebraic Expressions with Negative Exponents

4 Evaluate r^{-2} if $r = -4$.

$r^{-2} = (\text{______})^{-2}$ Replace r with ______.

= ______ Definition of ______ exponent

= ______ Find $(-4)^2$.

Check Your Progress Evaluate d^{-3} if $d = 5$.

______

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

4–7 Scientific Notation

MAIN IDEAS

- Express numbers in standard form and in scientific notation.
- Compare and order numbers written in scientific notation.

KEY CONCEPT

Scientific Notation A number is expressed in scientific notation when it is written as the product of a factor and a power of 10. The factor must be greater than or equal to 1 and less than 10.

EXAMPLE Express Numbers in Standard Form

1 Express each number in standard form.

a. 4.395×10^4

$4.395 \times 10^4 = 4.395 \times$ ______ $\qquad 10^4 =$ ______

$= 43{,}950$ $\qquad$ Move the decimal point ______ places to the right.

$=$ ______

b. 6.79×10^{-6}

$6.79 \times 10^{-6} = 6.79 \times$ ______ $\qquad 10^{-6} =$ ______

$= 0.00000679$ $\qquad$ Move the decimal point ______ places to the ______.

$=$ ______

Check Your Progress **Express each number in standard form.**

a. 2.614×10^6

b. 8.03×10^{-4}

EXAMPLE Express Numbers in Scientif c Notation

2 Express each number in scientific notation.

a. 800,000

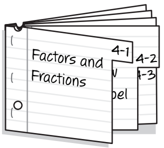
______ $= 8.0 \times$ ______ $\qquad$ The decimal point moves ______ places.

$= 8.0 \times$ ______ $\qquad$ The exponent is ______.

FOLDABLES™

ORGANIZE IT

Under the tab for Lesson 4-7, explain the significance of a positive or negative exponent in scientific notation. Give an example of a number with each, written in both standard form and in scientific notation.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

b. 0.0119

$0.0119 = \square \times \square$ The decimal point moves $\square$ places.

$= \square \times \square$ The exponent is $\square$.

Check Your Progress **Express each number in scientific notation.**

a. 65,000

b. 0.00042

EXAMPLE Compare Numbers in Scientif c Notation

3 SPACE **The diameters of Mercury, Saturn, and Pluto are 4.9×10^3 kilometers, 1.2×10^5 kilometers, and 2.3×10^3 kilometers, respectively. List the space objects in order of increasing diameter.**

First, order the numbers according to their exponents. Then, order the numbers with the same exponent by comparing the factors.

Step 1 Mercury and Pluto: 4.9×10^3, 2.3×10^3 $\square$ Saturn: 1.2×10^5

Step 2 Pluto: 2.3×10^3 $\square$ Mercury: 4.9×10^3 Compare the factors: $\square$.

So, the order is $\square$.

Check Your Progress Order the numbers 6.21×10^5, 2.35×10^4, 5.95×10^9, and 4.79×10^4 in decreasing order.

CHAPTER 4

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	Build your Vocabulary
Use your **Chapter 4 Foldable** 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: glencoe.com	You can use your completed **Vocabulary Builder** *(pages 82–83)* to help you solve the puzzle.

4-1 Powers and Exponents

Write each expression using exponents.

1. $4 \cdot 4 \cdot 4 \cdot 4$

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

3. $5 \cdot r \cdot r \cdot m \cdot m \cdot m$

Evaluate each expression if $x = 3$, $y = 1$, and $h = -2$.

4. $3h$

5. hx^3

6. $4(2x - 4y)^3$

4-2 Prime Factorization

Write the prime factorization of each number. Use exponents for repeated factors.

7. 64

8. 126

9. 735

Factor each monomial completely.

10. $32ac$

11. $49s^3t$

12. $144x^3$

13. $25pq^4$

4-3

Greatest Common Factor (GCF)

Find the GCF of each set of numbers or monomials.

14. 25, 45

15. 36, 54, 66

16. $28a^2$, $42ab^3$

Factor each expression.

17. $7x + 14y$

18. $50s - 10st$

4-4

Simplifying Algebraic Fractions

19. Six ounces is what part of a pound?

20. Use a Venn diagram to explain how to simplify $\frac{18}{45}$.

4-5

Multiplying and Dividing Monomials

Find each quotient.

21. $\frac{4^6}{4^4}$

22. $\frac{(-3)^3}{(-3)}$

23. $\frac{p^2 \cdot p^3}{p^4}$

Find a match for each product.

24. $2^4 \cdot 2^3$

25. $4^3 \cdot 4^4$

26. $2^5 \cdot 2^7$

a. 4^7
b. 4^{12}
c. 2^7
d. 2^{12}

4-6

Negative Exponents

Write each expression using a positive exponent.

27. 8^{-3}

28. 5^{-10}

29. x^{-2}

Evaluate each expression if $s = 4$ and $t = 3$.

30. t^{-3}

31. $(st)^{-1}$

32. s^{-t}

4-7

Scientific Notation

Tell direction and the number of places you need to move the decimal point to write each number in standard notation.

33. 2.3×10^4

34. 1.5×10^{-7}

35. 7.1×10^{11}

36. The table at the right shows the average wave lengths of 3 types of radiation. Write the radiation types in order from longest to shortest wave length.

Radiation	Wave length (meters)
X-rays	5.0×10^{-9}
Yellow light	5.8×10^{-7}
Blue light	4.7×10^{-7}

CHAPTER 4

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **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 223 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 4 Study Guide and Review on pages 219–222 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 223.

☐ **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 4 Study Guide and Review on pages 219–222 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 223.

Student Signature

Parent/Guardian Signature

Teacher Signature

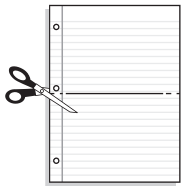
CHAPTER 5

Rational Numbers

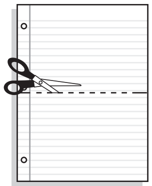
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

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

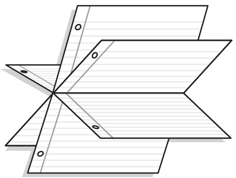
STEP 1 **Fold** the first two sheets in half from top to bottom. Cut along fold from edges to margin.



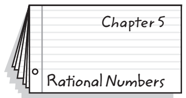
STEP 2 **Fold** the third sheet in half from top to bottom. Cut along fold from margin to edge.



STEP 3 **Insert** the first two sheets through the third sheet and align the folds.



STEP 4 **Label** each page with a lesson number and title.



NOTE-TAKING TIP: As you read each lesson, list examples of ways the new knowledge has been or will be used in your daily life.

CHAPTER 5

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
bar notation			
common multiple			
dimensional analysis [duh-MEHN-chuhn-uhl]			
least common denominator (LCD)			
least common multiple (LCM)			
mean			

Vocabulary Term	Found on Page	Definition	Description or Example
measure of central tendency			
median			
mixed number			
mode			
multiple			
multiplicative inverse [muhl-tuh-PLIH-kuh-tihv IHN-vuhrs]			
rational number [RASH-nuhl]			
reciprocal [rih-SIHP-ruh-kuhl]			
repeating decimal			
terminating decimal			

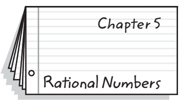
5–1 Writing Fractions as Decimals

MAIN IDEAS

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

FOLDABLES™ ORGANIZE IT

Under the tab for Lesson 5-1, write an example of when you might want to change two fractions to decimals in order to determine which is larger.



EXAMPLE Write a Fraction as a Terminating Decimal

1 **Write $\frac{1}{16}$ as a decimal.**

METHOD 1 Use paper and pencil. Divide 1 by 16.

______

METHOD 2 Use a calculator.

______ ÷ ______ ENTER 0.0625

So, $\frac{1}{16}$ = ______

EXAMPLE Write a Mixed Number as a Decimal

2 **Write $1\frac{1}{4}$ as a decimal.**

$1\frac{1}{4}$ = ______ + ______ Write as the sum of an integer and a ______.

= ______ + ______ ______ = ______

= ______ Add.

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

a. $\frac{5}{8}$

______

b. $2\frac{3}{5}$

______

BUILD YOUR VOCABULARY (pages 104–105)

A decimal with one or more ______ that repeat forever is called a **repeating decimal**.

You can use **bar notation** to indicate that a digit **repeats** forever.

EXAMPLE Write Fractions as Repeating Decimals

3 **Write each fraction as a decimal. Use a bar to show a repeating decimal.**

a. $-\frac{4}{33} \longrightarrow 33\overline{)-4.0000\ldots}$ with quotient $0.1212\ldots$

The digits ______ repeat.

$-\frac{4}{33} =$ ______

b. $\frac{2}{11} \longrightarrow 11\overline{)2.0000\ldots}$ with quotient $0.1818\ldots$

The digits ______ repeat.

$\frac{2}{11} =$ ______

Check Your Progress **Write each fraction as a decimal. Use a bar to show a repeating decimal.**

a. $-\frac{2}{3}$ ______

b. $\frac{4}{15}$ ______

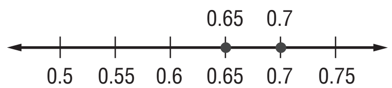
EXAMPLE Compare Fractions and Decimals

4 **Replace ● with <, >, or = to make 0.7 ● $\frac{13}{20}$ a true sentence.**

$0.7 \bullet \frac{13}{20}$ Write the sentence.

$0.7 \bullet$ ______ Write $\frac{13}{20}$ as a decimal.

0.7 ______ ______ In the tenths place, ______.



On a number line, 0.7 is to the right of 0.65, so 0.7 ______ $\frac{13}{20}$.

Check Your Progress Replace ● with <, >, or = to make $\frac{3}{8}$ ● 0.4 a true sentence.

EXAMPLE Compare Fractions to Solve a Problem

5 GRADES **Jeremy got a score of $\frac{16}{20}$ on his first quiz and $\frac{20}{25}$ on his second quiz. Which grade was the higher score?**

Write the fractions as ______ and then compare the ______.

Quiz #1: $\frac{16}{20}$ = ______ Quiz #2: $\frac{20}{25}$ = ______

The scores were the same, ______.

Check Your Progress **BAKING** One recipe for cookies requires $\frac{5}{8}$ of a cup of butter and a second recipe for cookies requires $\frac{3}{5}$ of a cup of butter. Which recipe uses less butter?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

5–2 Rational Numbers

MAIN IDEAS

- Write rational numbers as fractions.
- Identify and classify rational numbers.

BUILD YOUR VOCABULARY (page 105)

A number that can be written as a ______ is called a **rational number**.

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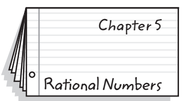
In your notes, describe the fractions you use during a normal day at school and at home.



EXAMPLE Write Mixed Numbers and Integers as Fractions

1 **Write each rational number as a fraction.**

a. $-4\frac{3}{8} =$ ______ Write $-4\frac{3}{8}$ as an ______ fraction.

b. $10 =$ ______

EXAMPLE Write Terminating Decimals as Fractions

2 **Write 0.26 as a fraction or mixed number in simplest form.**

thousands	hundreds	tens	ones	tenths	hundredths	thousandths	ten-thousandths
			0.	2	6		

$0.26 =$ ______ 0.26 is 26 ______.

$=$ ______ Simplify. The GCF of ______ and ______ is ______.

Check Your Progress **Write each number as a fraction or mixed number in simplest form.**

a. $2\frac{3}{5}$

b. -6

c. 0.84

EXAMPLE Write Repeating Decimals as Fractions

Write It

What would you multiply each side by if *three* digits repeat? Explain.

____

____

____

____

____

____

____

3 Write $0.\overline{39}$ as a fraction in simplest form.

$N = 0.3939\ldots$ Let N represent the number.

$\_\_\_ N = \_\_\_ (0.3939\ldots)$ Multiply each side by ___.

$\_\_\_ = \_\_\_$

Subtract N from ___ to eliminate the repeating part, 0.3939… .

$\_\_\_ = 39.3939\ldots$

$\underline{-(N = \quad 0.3939\ldots)}$

$\_\_\_ = \_\_\_$ ___

$\_\_\_ = \_\_\_$ Divide each side by ___.

$N = \_\_\_$ or ___ Simplify.

Check Your Progress Write $0.\overline{4}$ as a fraction in simplest form.

EXAMPLE Classify Numbers

4 Identify all sets to which the number 15 belongs.

15 is a ___ number, an ___, a natural number, and a rational number.

Check Your Progress Identify all sets to which the number −7 belongs.

Homework Assignment

Page(s):

Exercises:

5–3 Multiplying Rational Numbers

Main Ideas

- Multiply positive and negative fractions.
- Use dimensional analysis to solve problems.

EXAMPLE Multipl y Fractions

1 **Find $\frac{2}{5} \cdot \frac{5}{8}$. Write the product in simplest form.**

$$\frac{2}{5} \cdot \frac{5}{8} = \frac{\boxed{}}{\boxed{}}$$

Multiply the $\boxed{}$.

Multiply the $\boxed{}$.

$$= \frac{\boxed{}}{\boxed{}} \text{ or } \frac{\boxed{}}{\boxed{}}$$

Simplify. The GCF of $\boxed{}$ and $\boxed{}$ is $\boxed{}$.

Key Concept

Multiplying Fractions
To multiply fractions, multiply the numerators and multiply the denominators.

EXAMPLE Multiply Negative Fractions

2 **Find $-\frac{1}{4} \cdot \frac{2}{7}$. Write the product in simplest form.**

$$-\frac{1}{4} \cdot \frac{2}{7} = -\frac{1}{\cancel{4}_{2}} \cdot \frac{\cancel{2}^{1}}{7}$$

Divide 2 and 4 by their GCF, $\boxed{}$.

$$= -\frac{1 \cdot 1}{2 \cdot 7}$$

Multiply the numerators and multiply the denominators.

$$= \boxed{}$$

Simplify.

EXAMPLE Multiply Mixed Numbers

3 **Find $1\frac{1}{2} \cdot 3\frac{2}{3}$. Write the product in simplest form.**

$$1\frac{1}{2} \cdot 3\frac{2}{3} = \frac{3}{2} \cdot \frac{11}{3}$$

Rename the mixed numbers.

$$= \frac{\cancel{3}^{1}}{2} \cdot \frac{11}{\cancel{3}_{1}}$$

Divide by the GCF, $\boxed{}$.

$$= \boxed{}$$

Multiply.

$$= \boxed{} \text{ or } \boxed{}$$

Simplify.

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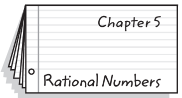
ORGANIZE IT

Under the tab for Lesson 5-3, write an expression in which you would multiply rational numbers and explain what it means.



Check Your Progress **Find each product. Write in simplest form.**

a. $\frac{3}{8} \cdot \frac{2}{9}$ **b.** $\frac{6}{14} \cdot -\frac{21}{40}$ **c.** $2\frac{2}{7} \cdot 3\frac{1}{4}$

EXAMPLE

4 **DONATIONS** **Rasheed collects cash donations for underprivileged children every October. This October he collected \$784. Last year he collected $\frac{5}{8}$ as much. How much did Rasheed collect last October?**

To find how much Rasheed collected last October, multiply ______ by ______.

$784 \cdot \frac{5}{8} = \_\_\_ \cdot \_\_\_$ Rename 784 as ______.

$= \frac{\overset{98}{\cancel{784}}}{1} \cdot \frac{5}{\underset{1}{\cancel{8}}}$ Divide by the GCF, ______.

$=$ ______ or ______ Simplify.

Rasheed collected ______ last October.

Check Your Progress **SHOPPING** Melissa is buying a sweater originally priced for \$81. The sweater is discounted by $\frac{2}{3}$. Find the amount of the discount.

EXAMPLE **Multiply Algebraic Fractions**

5 **Find $\frac{3p^2}{q} \cdot \frac{q^2}{r}$. Write the product in simplest form.**

$\frac{3p^2}{q} \cdot \frac{q^2}{r} = \frac{3p \cdot p}{\underset{1}{\cancel{q}}} \cdot \frac{\overset{1}{\cancel{q}} \cdot q}{r}$ The GCF of q^2 and q is ______.

$=$ ______ Simplify.

Check Your Progress Find $\frac{5mn^3}{p^2} \cdot \frac{mp}{n^2}$.

BUILD YOUR VOCABULARY (page 104)

Dimensional analysis is the process of including ______ when you compute. You can use dimensional analysis to check whether your answers are reasonable.

EXAMPLE Use Dimensional Analysis

6 **TRACK** **The track at Cole's school is $\frac{1}{4}$ mile around. If Cole runs one lap in two minutes, how far (in miles) does he run in 30 minutes?**

Words	Distance equals the rate multiplied by the time.
Variables	Let d = distance, r = rate, and t = time.
Formula	$d = rt$

$d = \square$ mile per 2 minutes $\cdot \square$ minutes

$= \frac{\square \text{ mile}}{\cancel{2}_{1} \cancel{\text{min}}} \cdot \cancel{30}^{15} \cancel{\text{min}}$ Divide by the common factors and units.

$= \square \cdot \square$ miles Multiply.

$= \square$ or $\square$ miles Simplify.

Cole runs ______ miles in ______ minutes.

Check Your Progress **WALKING** Bob walks $\frac{2}{3}$ mile in 12 minutes. How far does he walk in 30 minutes?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

5–4 Dividing Rational Numbers

MAIN IDEAS

- Divide positive and negative fractions using multiplicative inverses.
- Use dimensional analysis to solve problems.

KEY CONCEPTS

Inverse Property of Multiplication The product of a number and its multiplicative inverse is 1.

Dividing Fractions To divide by a fraction, multiply by its multiplicative inverse.

BUILD YOUR VOCABULARY (page 105)

Two numbers whose ____ is ____ are called **multiplicative inverses** or **reciprocals**.

EXAMPLE Find Multiplicatives Inverses

1 **Find the multiplicative inverse of $\frac{6}{7}$.**

$\frac{6}{7} \cdot$ ____ $= 1$ The product is 1.

The multiplicative inverse or reciprocal of $\frac{6}{7}$ is ____.

EXAMPLE Divide by a Fraction or Whole Number

2 **Find each quotient. Write in simplest form.**

a. $\frac{4}{5} \div \frac{3}{10}$

$\frac{4}{5} \div \frac{3}{10} = \frac{4}{5} \cdot$ ____ Multiply by the multiplicative ____ of $\frac{3}{10}$.

$= \frac{4}{\cancel{5}_1} \cdot \frac{\cancel{10}^2}{3}$ Divide ____ and ____ by their GCF, ____.

$=$ ____ or ____ Simplify.

b. $\frac{5}{6} \div 3$

$\frac{5}{6} \div 3 = \frac{5}{6} \div$ ____ Write 3 as ____.

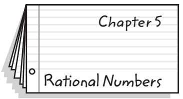
$= \frac{5}{6} \cdot$ ____ Multiply by the multiplicative inverse of $\frac{3}{1}$.

$=$ ____ Simplify.

FOLDABLES

ORGANIZE IT

Under the tab for Lesson 5-4, write a word problem in which you would divide rational numbers to solve the problem.



EXAMPLE Divide by a Mixed Number

3 **Find $4\frac{2}{3} \div -3\frac{1}{9}$. Write the quotient in simplest form.**

$4\frac{2}{3} \div -3\frac{1}{9} = \boxed{} \div \boxed{}$ Rename the mixed numbers as $\boxed{}$.

$= \boxed{} \cdot \boxed{}$ Multiply by the multiplicative inverse of $\boxed{}$.

$= \frac{\overset{1}{\cancel{14}}}{\underset{1}{\cancel{3}}} \cdot -\frac{\overset{3}{\cancel{9}}}{\underset{2}{\cancel{28}}}$ Divide out common factors.

$= \boxed{}$ or $\boxed{}$ Simplify.

EXAMPLE Divide by an Algebraic Fraction

4 **Find $\frac{5x}{8y} \div \frac{10}{16y}$. Write the quotient in simplest form.**

$\frac{5x}{8y} \div \frac{10}{16y} = \frac{5x}{8y} \cdot \boxed{}$ Multiply by the multiplicative inverse of $\boxed{}$.

$= \frac{\overset{1}{\cancel{5}}x}{\underset{1}{\cancel{8}}\underset{1}{\cancel{y}}} \cdot \frac{\overset{2}{\cancel{16}}\overset{1}{\cancel{y}}}{\underset{2}{\cancel{10}}}$ Divide out common factors.

$= \boxed{}$ or $\boxed{}$ Simplify.

Check Your Progress

a. Find the multiplication inverse of $\frac{4}{9}$. $\boxed{}$

Find each quotient. Write in simplest form.

b. $\frac{3}{8} \div \frac{5}{6}$

$\boxed{}$

c. $\frac{5}{12} \div 10$

$\boxed{}$

d. $3\frac{3}{4} \div 2\frac{5}{8}$

$\boxed{}$

e. $\frac{6m}{10p} \div \frac{9m}{4}$

$\boxed{}$

EXAMPLE

5 **TRAVEL** **How many gallons of gas are needed to travel $78\frac{3}{4}$ miles if a car gets $25\frac{1}{2}$ miles per gallon?**

To find how many gallons, divide $\boxed{}$ by $\boxed{}$.

$\boxed{} \div \boxed{} = \boxed{} \div \boxed{}$ Write as improper fractions.

$= \boxed{} \cdot \boxed{}$ Multiply by the reciprocal.

$= \dfrac{\overset{105}{\cancel{315}}}{\underset{2}{\cancel{4}}} \cdot \dfrac{\overset{1}{\cancel{2}}}{\underset{17}{\cancel{51}}}$ Divide out common factors.

$= \boxed{}$ or $\boxed{}$ Simplify.

So, $\boxed{}$ gallons of gas are needed.

Check Your Progress **SEWING** Emily has $32\frac{2}{3}$ yards of fabric. She wants to make pillows which each require $3\frac{5}{6}$ yards of fabric to complete. How many pillows can Emily make?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

5–5 Adding and Subtracting Like Fractions

MAIN IDEAS

- Add like fractions.
- Subtract like fractions.

KEY CONCEPTS

Adding Like Fractions To add fractions with like denominators, add the numerators and write the sum over the denominator.

Subtracting Like Fractions To subtract fractions with like denominators, subtract the numerators and write the difference over the denominator.

EXAMPLE Ad d Fractions

1 **Find $\frac{3}{4} + \frac{3}{4}$. Write the sum in simplest form.**

$\frac{3}{4} + \frac{3}{4} = \frac{\square}{\square}$ The denominators are the same. $\square$ the numerators.

$= \square$ or $\square$ or $\square$ Simplify and rename as a mixed number.

EXAMPLE Add Mixed Numbers

2 **Find $3\frac{4}{9} + 8\frac{2}{9}$. Write the sum in simplest form.**

$3\frac{4}{9} + 8\frac{2}{9} = (\square) + (\square)$ Add the whole numbers and fractions separately.

$= \square + \frac{\square}{\square}$ Add the numerators.

$= \square$ or $\square$ Simplify.

EXAMPLE Subtract Fractions

3 **Find $\frac{11}{12} - \frac{5}{12}$. Write the difference in simplest form.**

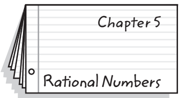
$\frac{11}{12} - \frac{5}{12} = \frac{\square}{\square}$ The denominators are the same. Subtract the numerators.

$= \square$ or $\square$ Simplify.

FOLDABLES™

ORGANIZE IT

Under the tab for Lesson 5-5, describe real-life situations in which you would add or subtract rational numbers.



Check Your Progress **Add or subtract. Write in simplest form.**

a. $\frac{2}{9} + \frac{8}{9}$ **b.** $5\frac{3}{14} + 2\frac{5}{14}$ **c.** $\frac{17}{20} - \frac{11}{20}$

EXAMPLE Subtract Mixed Numbers

4 **Evaluate $r - q$ if $r = 7\frac{3}{5}$ and $q = 9\frac{1}{5}$.**

$r - q = \square - \square$ $r = \square$, $q = \square$

$= \square - \square$ Write the mixed numbers as improper fractions.

$= \square$ Subtract the numerators.

$= \square$ Simplify.

EXAMPLE Add Algebraic Fractions

5 **Find $\frac{5}{2b} + \frac{3}{2b}$. Write the sum in simplest form.**

$\frac{5}{2b} + \frac{3}{2b} = \frac{\square}{\square}$ The denominators are the same. Add the numerators.

$= \square$ Add the numerators.

$= \square$ Simplify.

Check Your Progress

a. Evaluate $m - n$ if $m = 4\frac{7}{9}$ and $n = 8\frac{2}{9}$.

b. Find $\frac{3x}{16} + \frac{5x}{16}$. Write the sum in simplest form.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

5–6 Least Common Multiple

MAIN IDEAS

- Find the least common multiple of two or more numbers.
- Find the least common denominator of two or more fractions.

BUILD YOUR VOCABULARY (pages 104–105)

A **multiple** of a number is a ______ of that number and a whole number.

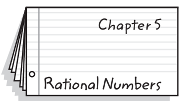
Sometimes numbers have some of the ______ multiples. These are called **common multiples**.

The **least** of the *nonzero* common multiples of two or more numbers is called the **least common multiple (LCM)**.

FOLDABLES™

ORGANIZE IT

Under the tab for Lesson 5-6, describe what a least common multiple is. Give two numbers and their least common multiple.



EXAMPLE Find the LCM

1 **Find the LCM of 168 and 180.**

Number	Prime Factorization	Exponential Form
168		
180		

The prime factors of both numbers are ______.

Multiply the greatest powers of ______ appearing in either factorization.

LCM = ______ = ______

EXAMPLE The LCM of Monomials

2 **Find the LCM of $12x^2y^2$ and $6y^3$.**

$12x^2y^2 =$ ______

$6y^3 =$ ______

LCM = ______ Multiply the greatest power of each prime factor.

= ______

Check Your Progress **Find the least common denominator (LCM) of each pair of numbers or monomials.**

a. 144, 96 ______ **b.** $18ab^3$, $24a^2b$ ______

BUILD YOUR VOCABULARY (page 104)

The **least common denominator (LCD)** of two or more fractions is the ______ of the ______.

EXAMPLE Find the LCD

3 **Find the LCD of $\frac{7}{8}$ and $\frac{13}{20}$.**

$8 =$ ______

$20 =$ ______

Write the prime factorization of 8 and 20. Highlight the greatest power of each prime factor.

LCM $=$ ______ or ______ Multiply.

The LCD of $\frac{7}{8}$ and $\frac{13}{20}$ is ______.

Check Your Progress Find the least common denominator (LCD) of $\frac{5}{9}$ and $\frac{11}{12}$. ______

EXAMPLE Compare Fractions

4 **Replace ● with <, >, or = to make $\frac{7}{15}$ ● $\frac{3}{7}$ a true statement.**

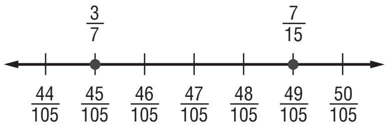
The LCD of the fractions is ______ or ______.

Rewrite the fractions using the LCD and then compare the ______.

$\frac{7}{15} = \frac{7 \cdot \square}{3 \cdot 5 \cdot \square} = \square$ Multiply the fraction by ______ to make the denominator 105.

$\frac{3}{7} = \frac{3 \cdot}{7 \cdot}\square = \square$ Multiply the fraction by ______ to make the denominator 105.

Since ___ > ___, then $\frac{7}{15}$ ___ $\frac{3}{7}$.



$\frac{3}{7}$ is to the ___ of $\frac{7}{15}$ on the number line.

Check Your Progress Replace ● with <, >, or = to make $\frac{5}{21}$ ● $\frac{9}{14}$ a true statement. ___

EXAMPLE Order Rational Numbers

5 **FOOTBALL** **Dane's football team usually practices for $2\frac{1}{2}$ hours. The table below shows how many hours from normal they practiced each day this week. Order the practices from shortest to longest.**

Mon	Tues	Wed	Thurs
$-\frac{3}{8}$	$1\frac{3}{4}$	$-\frac{5}{6}$	$1\frac{2}{3}$

Step 1 Order the negative fractions first. The LCD of 6 and 8 is ___. $-\frac{5}{6} =$ ___ $-\frac{3}{8} =$ ___

Compare the negative fractions. Since $-\frac{20}{24}$ ___ $-\frac{9}{24}$, then $-\frac{5}{6}$ ___ $-\frac{3}{8}$.

Step 2 Order the positive fractions. The LCD of 3 and 4 is ___. $1\frac{2}{3} =$ ___ $1\frac{3}{4} =$ ___

Compare the positive fractions. Since $1\frac{8}{12}$ ___ $1\frac{9}{12}$, then $1\frac{2}{3}$ ___ $1\frac{3}{4}$.

Since ___ < ___ < ___ < ___, the order of the practices from shortest to longest is ___.

Check Your Progress **Order the fractions from least to greatest.**

a. $-1\frac{1}{3}, -1\frac{5}{6}, -1\frac{3}{4}, -1\frac{1}{2}$

b. $\frac{17}{32}, \frac{5}{8}, \frac{9}{16}, \frac{25}{64}$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

5–7 Adding and Subtracting Unlike Fractions

MAIN IDEAS

- Add unlike fractions.
- Subtract unlike fractions.

EXAMPLE Add Unlike Fractions

1 **Find $\frac{3}{4} + \frac{1}{7}$. Write the sum in simplest form.**

$\frac{3}{4} + \frac{1}{7} = \frac{3}{4} \cdot \square + \frac{1}{7} \cdot \square$ — Use 4 • 7 or $\square$ as the common denominator.

$= \square + \square$ — Rename each fraction with the common denominator. Add the numerators.

$= \square$

EXAMPLE Add Fractions and Mixed Numbers

KEY CONCEPT

Adding Unlike Fractions
To add fractions with unlike denomintors, rename the fractions with a common denominator. Then add and simplify.

2 **Find each sum. Write in simplest form.**

a. $\frac{5}{6} + \left(-\frac{3}{10}\right)$

$\frac{5}{6} + \left(-\frac{3}{10}\right) = \frac{5}{6} \cdot \square + \left(-\frac{3}{10}\right) \cdot \square$ — The LCD is $\square$.

$= \square + \left(-\square\right)$ — Rename each fraction with the LCD.

$= \square$ or $\square$ — Add the numerators. Simplify.

b. $2\frac{1}{8} + \left(-3\frac{2}{3}\right)$

$2\frac{1}{8} + \left(-3\frac{2}{3}\right) = \frac{\square}{8} + \left(-\frac{\square}{3}\right)$ — Write the mixed numbers as improper fractions.

$= \square + \square$ — Rename fractions Using the LCD, $\square$.

$= \square$ — Add the numerators.

$= \square$ — Simplify.

Check Your Progress **Find each sum. Write in simplest form.**

a. $\frac{2}{3} + \frac{1}{8}$ **b.** $\frac{5}{12} + \frac{5}{9}$ **c.** $4\frac{2}{5} + \left(-6\frac{2}{3}\right)$

KEY CONCEPT

Subtracting Unlike Fractions To subtract fractions with unlike denominators, rename the fractions with a common denominator. Then subtract and simplify.

FOLDABLES™ Under the tab for Lesson 5-7, describe a situation in which you would add or subtract unlike fractions.

EXAMPLE Subtract Fractions and Mixed Numbers

3 **Find each difference. Write in simplest form.**

a. $\frac{9}{16} - \frac{5}{8}$

$\frac{9}{16} - \frac{5}{8} = \frac{9}{16} - \frac{5}{8} \cdot \square$ The LCD is $\square$.

$= \frac{9}{16} - \square$ Rename $\frac{5}{8}$ using the LCD.

$= \square$ Subtract the numerators.

b. $4\frac{2}{3} - 3\frac{6}{7}$

$4\frac{2}{3} - 3\frac{6}{7} = \frac{\square}{3} - \frac{\square}{7}$ Write the mixed numbers as improper fractions.

$= \square - \square$ Rename the fractions using the LCD. Subtract the numerators.

$= \square$ Simplify.

Check Your Progress **Find each difference. Write in simplest form.**

a. $\frac{11}{12} - \frac{2}{9}$ **b.** $3\frac{5}{6} - 2\frac{1}{8}$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

5–8 Solving Equations with Rational Numbers

MAIN IDEA

- Solve equations containing rational numbers.

EXAMPLE Solve by Using Addition and Subtraction

1 **Solve each equation.**

a. $m + 8.6 = 11.2$

$m + 8.6 = 11.2$ Write the equation.

$m + 8.6 - \square = 11.2 - \square$ Subtract $\square$ from each side.

$m = \square$ Simplify.

b. $y - \frac{3}{8} = \frac{3}{4}$

$y - \frac{3}{8} = \frac{3}{4}$ Write the equation.

$y - \frac{3}{8} + \square = \frac{3}{4} + \square$ Add $\square$ to each side.

$y = \frac{3}{4} + \square$ Simplify.

$y = \square + \square$ Rename the fractions using the $\square$ and add.

$y = \square$ or $\square$ Simplify.

REVIEW IT

Which properties allow you to add or subtract the same number from each side of an equation? *(Lesson 3–3)*

____

____

____

____

____

Check Your Progress **Solve.**

a. $15.4 = b + 9.3$ $\square$

b. $\frac{2}{3} = x - \frac{1}{2}$ $\square$

EXAMPLE Solve by Using Division

2 **Solve $9a = 3.6$.**

$9a = 3.6$ Write the equation.

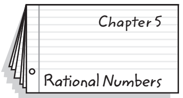
$\frac{9a}{\square} = \frac{3.6}{\square}$ Divide each side by $\square$.

$a = \square$ Simplify.

FOLDABLES™

ORGANIZE IT

Under the tab for Lesson 5–8, write an equation involving fractions that can be solved using division. Solve your problem.



EXAMPLE Solve by Using Multiplication

3 **Solve $-\frac{3}{5}t = -6$.**

$-\frac{3}{5}t = -6$ Write the equation.

$\square\left(-\frac{3}{5}t\right) = \square(-6)$ Multiply each side by $\square$.

$\square = \square$ Simplify.

Check Your Progress **Solve.**

a. $-6m = -4.8$ $\square$ **b.** $-\frac{5}{8}a = -10$ $\square$

EXAMPLE

4 CEREAL **Torrey eats $\frac{5}{6}$ cup of cereal each morning and another $\frac{2}{3}$ cup as a snack after school. If one box of cereal contains 10 cups of cereal, how many days will the box last?**

The amount of cereal that Torrey eats each day is

$\frac{5}{6} + \frac{2}{3} = \frac{5}{6} + \square = \square$ or $1\frac{1}{2}$ cups. $1\frac{1}{2}$ cups per day times the number of days equals 10 cups of cereal. If d represents the number of days, then $\square d = \square$.

$1\frac{1}{2}d = 10$ Write the equation.

$\square d = 10$ Rename $1\frac{1}{2}$ as an improper fraction.

$\square\left(\frac{3}{2}\right)d = \square(10)$ Multiply each side by $\square$.

$d = \square$ or about $\square$ Simplify.

The box of cereal will last approximately $6\frac{1}{2}$ days.

Check Your Progress Each morning Michael buys a cappuccino for \$4.50 and each afternoon he buys a regular coffee for \$1.25. If he put aside \$30 to buy coffee drinks, how many days will the money last?

$\square$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

5–9 Measures of Central Tendency

MAIN IDEAS

- Use the mean, median, and mode as measures of central tendency.
- Choose an appropriate measure of central tendency and recognize measures of statistics.

KEY CONCEPTS

Measures of Central Tendency

mean the sum of the data divided by the number of items in the data set

median the middle number of the ordered data, or the mean of the middle two numbers

mode the number or numbers that occur most often

EXAMPLE Find the Mean, Median, and Mode

1 a. MOVIES The revenue of the 10 highest grossing movies as of 2004 are given in the table. Find the mean, median, and mode of the revenues.

Top 10 Movie Revenues (millions of $)	
436	249
373	187
371	176
279	173
261	163

$$\text{mean} = \frac{\text{sum of revenues}}{\text{number of movies}}$$

$$= \frac{436 + 373 + 371 + 279 + 261 + 249 + 187 + 176 + 173 + 163}{\boxed{}}$$

$$= \frac{\boxed{}}{\boxed{}} \text{ or } \boxed{}$$

The mean revenue is ______

To find the median, order the numbers from least to greatest.

163, 173, 176, 187, $\underbrace{249, 261}$, 279, 371, 373, 436

$$\text{median} = \frac{\boxed{}}{\boxed{}} = \boxed{}$$

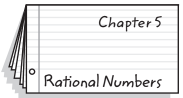
The median revenue is ______.

There is ______ because each number in the set occurs ______.

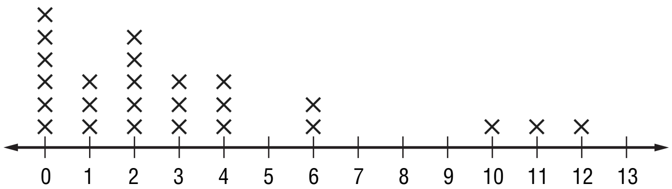
FOLDABLES™

ORGANIZE IT

Under the tab for Lesson 5–9, explain the differences between mean, median, and mode.



b. OLYMPICS The line plot shows the number of gold medals earned by each country that participated in the 2002 Winter Olympic games in Salt Lake City, Utah. Find the mean, median, and mode for the gold medals won.



Source: *Time Almanac*

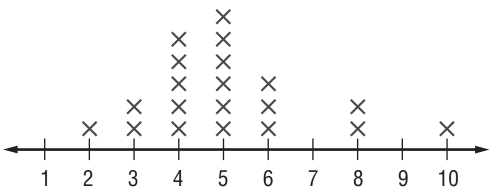
$$\text{mean} = \frac{6(0) + 3(1) + 5(2) + 3(3) + 3(4) + 2(6) + 1(10) + 1(11) + 1(12)}{25} = 3.16$$

There are ☐ numbers. The median number is the middle in an ordered data list. The median is ☐. The number ☐ occurs most frequently in the set of data. The mode is ☐.

Check Your Progress

a. TEST SCORES The test scores for a class of nine students are 85, 93, 78, 99, 62, 83, 90, 75, and 85. Find the mean, median, and mode of the test scores.

b. FAMILIES A survey of school-age children shows the family sizes displayed in the line plot. Find the mean, median, and mode.



EXAMPLE

2 TEST EXAMPLE The monthly salaries for the employees at Bob's Book Store are: $1290, $1400, $1400, $1600, $2650. Which measure of central tendency should Bob's Book Store's manager use to show new employees that the salaries are high?

A mode **B** median **C** mean **D** cannot be determined

Read the Test Item

To find which measure of central tendency to use, find the ______, ______, and ______ of the data and select the greatest measure.

Solve the Test Item

Mean: ______

Mode: ______

Median: ______

The ______ is the highest measure, so the answer is ______.

Check Your Progress **TEST EXAMPLE** The number of hours spent exercising each week by women are: 1, 6, 4, 2, 1, and 8. Which measure of central tendency should a person use to show that women do not spend enough time exercising?

A mode **B** median **C** mean **D** cannot be determined

______

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 5

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 5 Foldable** 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: glencoe.com	You can use your completed **Vocabulary Builder** *(pages 104–105)* to help you solve the puzzle.

5-1

Fractions as Decimals

Write each fraction or mixed number as a decimal. Use a bar to show a repeating decimal.

1. $\frac{5}{6}$

2. $\frac{7}{8}$

3. $-4\frac{1}{11}$

Replace each ● with <, >, or = to make a true sentence.

4. -5.43 ● -5.62

5. $\frac{4}{5}$ ● $\frac{9}{11}$

6. 0.76 ● $\frac{23}{29}$

5-2

Rational Numbers

Write each decimal as a fraction or mixed number in simplest form.

7. 0.62

8. 3.48

9. $1.\overline{7}$

5-3

Multiplying Rational Numbers

Find each product. Write in simplest form.

10. $\frac{3}{5}\left(-\frac{2}{3}\right)$

11. $-\frac{4}{15}\left(-\frac{55}{6}\right)$

12. $\frac{p}{15} \cdot \frac{3}{p^2}$

5-4

Dividing Rational Numbers

Find each quotient. Write in simplest form.

13. $\frac{2}{9} \div \left(\frac{1}{8}\right)$

14. $-\frac{3}{11} \div \left(\frac{7}{22}\right)$

15. $\frac{5pq}{t} \div \frac{6q}{t}$

16. Holly is wallpapering her kitchen. How many $8\frac{1}{2}$ feet lengths of wallpaper can she cut from a roll of wallpaper that is $59\frac{1}{2}$ feet long?

5-5

Adding and Subtracting Like Fractions

Find each sum or difference. Write in simplest form.

17. $\frac{3}{10} + \frac{6}{10}$

18. $-\frac{3}{11} - \left(\frac{9}{11}\right)$

19. $-3\frac{7}{18}m + 5\frac{5}{18}m$

5-6

Least Common Multiple

Find the least common multiple (LCM) of each set of numbers of monomials.

20. 12, 42

21. 8, 12, 18

22. 14, 63

Find the least common denominator (LCD) of each pair of fractions.

23. $\frac{5}{6}, \frac{7}{15}$

24. $\frac{11}{18}, \frac{23}{32}$

25. $\frac{1}{6}xy, \frac{7}{9}y$

5-7

Adding and Subtracting Unlike Fractions

Find each sum or difference. Write in simplest form.

26. $\frac{4}{7} + \frac{2}{5}$

27. $\frac{5}{8} - \frac{9}{20}$

28. $6\frac{1}{9} - 4\frac{5}{12}$

5-8 Solving Equations with Rational Numbers

Match each equation with the appropriate first step of its solution.

29. $y - 6 = 11.8$ ____

30. $6 + x = -9$ ____

31. $\frac{c}{6} = \frac{1}{2}$ ____

32. $-\frac{1}{6}p = -\frac{1}{6}$ ____

a. Multiply each side by 6.
b. Add 6 to each side.
c. Subtract 6 from each side.
d. Divide each side by -6.
e. Multiply each side by -6.

33. Dividing by a fraction is the same as multiplying by the ____.

5-9 Measures of Central Tendency

Find the mean, median, and mode for each set of data. If necessary, round to the nearest tenth.

34. 6, 8, 12, 7, 6, 11, 20 ____

35. 9.2, 9.7, 8.6, 9.8, 9.9, 8.9, 9.0, 8.5
____

36. Which measure of central tendency is most affected by an extreme value? ____

CHAPTER 5

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **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 285 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 5 Study Guide and Review on pages 281–284 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 5 Practice Test on page 285.

☐ **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 Foldables.
- Then complete the Chapter 5 Study Guide and Review on pages 281–284 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 285.

Student Signature

Parent/Guardian Signature

Teacher Signature

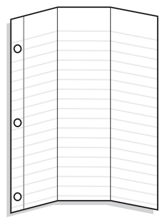
CHAPTER 6

Ratio, Proportion, and Percent

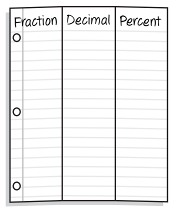
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with a piece of lined paper.

STEP 1 **Fold** in thirds lengthwise.



STEP 2 **Draw** lines along folds and label as shown.



NOTE-TAKING TIP: When you take notes, record real-life examples of how you can use fractions, decimals, and percents, such as telling time and making change.

CHAPTER 6

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
biased sample			
constant of proportionality			
cross products			
discount			
nonproportional			
percent			
percent equation			
percent of change			
percent proportion			

Vocabulary Term	Found on Page	Definition	Description or Example
population			
proportion			
proportional			
rate			
ratio			
sample			
scale			
scale drawing or scale model			
scale factor			
simple interest			
unbiased sample			
unit rate			

6–1 Ratios and Rates

MAIN IDEAS

- Write ratios as fractions in simplest form.
- Determine unit rates.

REVIEW IT

What does it mean for a fraction to be in simplest form? *(Lesson 4-4)*

____

____

____

____

____

____

BUILD YOUR VOCABULARY (pages 134–135)

A **ratio** is a ________ of two numbers by ________.

A **rate** is a ________ of two ________ having different kinds of units.

When a rate is simplified so that it has a denominator of ____, it is called a **unit rate**.

EXAMPLE Write Ratios as Fractions

1 **Express the ratio *10 roses out of 12 flowers* as a fraction in simplest form.**

$\frac{10}{12} = \square$ Divide the numerator and denominator by the ________, ____.

The ratio of roses to flowers is ____ to ____. This means that for every ____ flowers, ____ of them are roses.

EXAMPLE Write Ratios as Fractions

2 **Express the ratio *21 inches to 2 yards* as a fraction in simplest form.**

$\frac{21 \text{ inches}}{2 \text{ yards}} = \frac{21 \text{ inches}}{\square \text{ inches}}$ Convert ____ yards to inches.

$= \frac{\square \text{ inches}}{\square \text{ inches}}$ Divide the numerator and denominator by the ________, ____.

Written in simplest form, the ratio is ________.

Check Your Progress **Express each ratio as a fraction in simplest form.**

a. 8 golden retrievers out of 12 dogs

b. 4 feet to 18 inches

EXAMPLE Compare Unit Rates

3 SHOPPING A 12-oz bottle of cleaner costs $4.50. A 16-oz bottle of cleaner costs $6.56. Which costs less per ounce?

Find and compare the unit rates of the bottles.

$\frac{\$4.50}{12 \text{ ounces}} = \frac{\square}{1 \text{ ounce}}$ $\qquad \frac{\$6.56}{16 \text{ ounces}} = \frac{\square}{1 \text{ ounce}}$

The ______ bottle has the lower ______.

EXAMPLE Con vert Rates

4 ANIMALS A snail moved 30 feet in 2 hours. How many inches per minute did the snail move?

You need to convert feet to inches and hours to minutes.

$\frac{30 \text{ ft}}{2 \text{ hr}} = \frac{30 \text{ ft}}{2 \text{ hr}} \cdot \frac{12 \text{ in.}}{1 \text{ ft}} \div \frac{60 \text{ min}}{1 \text{ hr}}$

$= \frac{30 \text{ ft}}{2 \text{ hr}} \cdot \frac{12 \text{ in.}}{1 \text{ ft}} \cdot \square$ Write the reciprocal of $\frac{60 \text{ min}}{1 \text{ hr}}$.

$= \square = \square$ Divide the common factors and units. Simplify.

Check Your Progress

a. SHOPPING A 6-pack of a soft drink costs $1.50. A 12-pack of a soft drink costs $2.76. Which pack costs less per can?

b. JOGGING Dave jogs 2 miles in 22 minutes. How many feet per second is this?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–2 Proportional and Nonproportional Relationships

MAIN IDEAS

- Identify proportional and nonproportional relationships in tables and graphs.
- Describe a proportional relationship using an equation.

BUILD YOUR VOCABULARY (pages 134–135)

Ratios and rates that are constant are ________.

________ relationships contain ratios or rates that are not constant.

EXAMPLE Identify Proportional Relationships

1 **Determine whether the set of numbers in each table is proportional.**

a.

Baseballs	1	2	3	4
Cost (dollars)	2	3	4	5

Write the ratio of ________ to ________ for each number of baseballs in simplest form.

$\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{4}{5}$

The rates are ________, so the number of baseballs is ________ to the cost.

b.

Time (seconds)	1	2	3	4
Distance (inches)	4	8	12	16

Write the ratio of ________ to ________ for each time in simplest form.

$\frac{1}{4}$ $\frac{2}{8} = \frac{1}{4}$ $\frac{3}{12} = \frac{1}{4}$ $\frac{4}{16} = \frac{1}{4}$

The rates are ________, so time is ________ to the distance.

Check Your Progress **Determine whether the set of numbers in each table is proportional.**

a.

Chaperones	1	2	3	4
Students	15	30	45	60

b.

Number of Classes	1	2	3	4
Cost (dollars)	12	22	30	38

EXAMPLE

2 **WORK** **Nina charges $5 for each day of pet sitting. Write an equation relating the cost of pet sitting to the number of days. What would be the cost of pet sitting for 4 days?**

Determine the ______ between the cost and number of days.

$\frac{\text{cost}}{\text{day}} = \$5$

Words The cost is ____ times the number of days.

Variables Let c = cost and d = number of days.

Equation ______

$c = 5d$ Write the equation

$= 5(\ \ )$ Replace ____ with the number of days.

$=$ ____ Multiply.

The cost of pet sitting for 4 days is ____.

Check Your Progress **WORK** Robert gets paid $15 for each yard he mows. Write an equation relating the amount he gets paid to the number of yards he mows. What would be the total amount paid for mowing 8 yards?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–3 Using Proportions

MAIN IDEAS

- Solve proportions.
- Use proportions to solve real-world problems.

BUILD YOUR VOCABULARY (pages 134–135)

A **proportion** is a statement of ________ of two ________.

In the proportion $\frac{a}{b} = \frac{c}{d}$, the ________ ad and cb are called the **cross products** of the proportion.

KEY CONCEPTS

Proportion A proportion is an equation stating that two ratios are equal.

Property of Proportions The cross products of a proportion are equal.

EXAMPLE Solve Proportions

1 Solve each proportion.

a. $\frac{c}{36} = \frac{9}{15}$

$\frac{c}{36} = \frac{9}{15}$

$c \cdot 15 = 36 \cdot 9$ Cross products

________ = ________ Multiply.

________ = ________ Divide.

$c =$ ________

b. $\frac{16}{v} = \frac{4.8}{1.5}$

$\frac{16}{v} = \frac{4.8}{1.5}$

$16 \cdot 1.5 = v \cdot 4.8$ Cross products

________ = ________ Multiply.

________ = ________ Divide.

________ $= v$

Check Your Progress **Solve each proportion.**

a. $\frac{x}{12} = \frac{3}{8}$ ________

b. $\frac{5}{m} = \frac{3}{4.2}$ ________

EXAMPLE

2 ARCHITECTURE An architect builds a model of a building before the actual building is built. The model is 8 inches tall and the actual building will be 22 feet tall. The model is 20 inches wide. Find the width of the actual building.

Write and solve a proportion using ratios that compare actual height to model height.

$$\frac{\text{actual height}}{\text{model height}} = \frac{\text{actual width}}{\text{model width}}$$

$\boxed{} = \boxed{}$ Write a proportion.

$\boxed{} = \boxed{}$ Cross products

$\boxed{} = \boxed{}$ Multiply.

$\boxed{} = \boxed{}$ Divide.

$\boxed{} = w$ Simplify.

The actual width of the building is $\boxed{}$.

Check Your Progress A model of a jet airplane has a length of 9 inches and a wingspan of 6 inches. Find the wingspan of the actual plane if the length is 120 feet.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–4 Scale Drawings and Models

MAIN IDEAS

- Use scale drawings.
- Construct scale drawings.

BUILD YOUR VOCABULARY (page 135)

A **scale drawing** or **scale model** is used to represent an object that is too ______ or too ______ to be drawn or built at actual size.

The ______ of a length on a scale drawing or model to the corresponding length on the real object is called the **scale factor**.

EXAMPLE Find Actual Measurements

1 MAP **A map has a scale of 1 inch = 8 miles. Two towns are 3.25 inches apart on the map. What is the actual distance between the two towns?**

METHOD 1 Let x represent the actual distance between the two towns. Write and solve a proportion.

map distance → $\frac{1 \text{ inch}}{8 \text{ miles}} = \frac{\boxed{} \text{ inches}}{x \text{ miles}}$ ← map distance

actual distance → ← actual distance

$\boxed{} = \boxed{}$ Find the cross products.

$x = \boxed{}$ Simplify.

The actual distance between the two towns is ______.

METHOD 2 The actual distance is proportional to the distance on the scale drawing with a ratio of ______.

Find the scale factor.

$\frac{1 \text{ inch}}{8 \text{ miles}} = \boxed{}$ Convert 8 miles to inches.

The scale factor is ______. So, the actual distance is ______ times the map distance.

REMEMBER IT

When finding the scale factor, be sure to use the same units of measure.

$a = 506{,}880m$ Write the equation.

$= 506{,}880(\quad)$ or $\quad$ Simplify.

The actual distance is 1,647,360 inches or $\quad$.

Check Your Progress A scale drawing of a new house has a scale of 1 inch = 4 feet. The height of the living room ceiling is 2.75 inches on the scale drawing. What is the actual height of the ceiling?

EXAMPLE Determine the Scale

2 MODEL CAR A model car is 4 inches long. The actual car is 12 feet long. What is the scale of the model?

model length → $\frac{4 \text{ inches}}{12 \text{ feet}} = \frac{\quad}{\quad}$ ← model length

actual length → ← actual length

$\quad = \quad$ Find the cross products.

$\quad = \quad$ Simplify.

$\quad = \quad$ Divide each side by 4.

$x = \quad$

The scale is $\quad$.

Check Your Progress A model log cabin is 12 inches high. The actual log cabin is 42 feet high. What is the scale of the model?

EXAMPLE Construct a Scale Drawing

3 PATIO DESIGN **Sheila is designing a patio that is 16 feet long and 14 feet wide. Make a scale drawing of the patio. Use a scale of 0.5 inch = 4 feet.**

Step 1 Find the measure of the patio's length on the drawing.

$$\frac{\text{drawing length} \rightarrow 0.5 \text{ inch}}{\text{actual length} \rightarrow 4 \text{ feet}} = \frac{x \text{ inches} \leftarrow \text{drawing length}}{16 \text{ feet} \leftarrow \text{actual length}}$$

$0.5 \cdot 16 = 4 \cdot x$ Cross products

$8 = 4x$ Simplify.

$\boxed{} = x$ Divide.

On the drawing, the length is $\boxed{}$ inches.

Step 2 Find the measure of the patio's width on the drawing.

$$\frac{\text{drawing length} \rightarrow 0.5 \text{ inch}}{\text{actual length} \rightarrow 4 \text{ feet}} = \frac{w \text{ inches} \leftarrow \text{drawing width}}{14 \text{ feet} \leftarrow \text{actual width}}$$

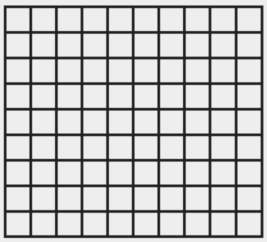
$0.5 \cdot 14 = 4 \cdot w$ Cross products

$7 = 4w$ Simplify.

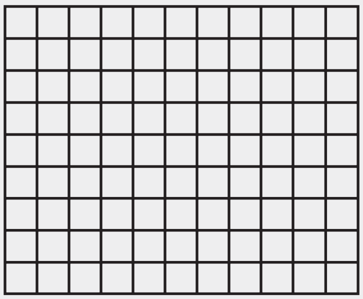
$\boxed{} = w$ Divide.

On the drawing, the width is $\boxed{}$ or $1\frac{3}{4}$ inches.

Step 3 Make the scale drawing. Use $\frac{1}{4}$-inch grid paper.



Check Your Progress **GARDENING** A garden is 18 feet long and 14 feet wide. Make a scale drawing of the garden. Use a scale of 0.5 inch = 4 feet.



WRITE IT

What two numbers do you need to construct a scale drawing of an object?

___

___

___

___

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–5 Fractions, Decimals, and Percents

MAIN IDEAS

- Express percents as fractions and vice versa.
- Express percents as decimals and vice versa.

BUILD YOUR VOCABULARY (page 134)

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

EXAMPLE Percents as Fractions

1 **Express each percent as a fraction in simplest form.**

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

$= \boxed{}$

b. $104\% = \frac{104}{100}$

$= \boxed{}$ or $\boxed{}$

c. $0.3\% = \frac{0.3}{100}$

$= \frac{0.3}{100} \cdot \boxed{}$

$= \boxed{}$

d. $56\frac{1}{4}\% = \frac{56\frac{1}{4}}{100}$

$= 56\frac{1}{4} \div \boxed{}$

$= \frac{\overset{9}{\cancel{225}}}{4} \cdot \frac{1}{\underset{4}{\cancel{100}}}$ or $\boxed{}$

EXAMPLE Fractions as Percents

2 **Express each fraction as a percent.**

a. $\frac{19}{20} = \boxed{}$ or $\boxed{}$

b. $\frac{8}{5} = \boxed{}$ or $\boxed{}$

Check Your Progress

Express each percent as a fraction in simplest form.

a. 35% $\boxed{}$

b. 160% $\boxed{}$

c. 0.8% $\boxed{}$

d. $32\frac{1}{2}\%$ $\boxed{}$

Express each fraction as a percent.

e. $\frac{17}{25}$ $\boxed{}$

f. $\frac{14}{10}$ $\boxed{}$

KEY CONCEPTS

Percents and Decimals

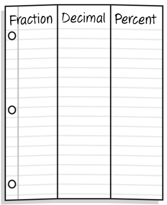
To write a percent as a decimal, divide by 100 and remove the percent symbol.

To write a decimal as a percent, multiply by 100 and add the percent symbol.

FOLDABLES™

ORGANIZE IT

Under each tab of your Foldable, describe a real-life situation where it would be helpful to convert to a fraction, decimal, or percent.



EXAMPLE Percents as Decimals

3 **Express each percent as a decimal.**

Divide by 100 and remove the %.

a. $\mathbf{60\%} = 60\% =$

b. $\mathbf{7\%} = 07\% =$

c. $\mathbf{658\%} = 6.58 =$

d. $\mathbf{0.4\%} = 00.4 =$

EXAMPLE Decimals as Percents

4 **Express each decimal as a percent.**

Multiply by 100 and add the %.

a. $\mathbf{0.4} = 0.40 =$

b. $\mathbf{0.05} = 0.05 =$

EXAMPLE Fractions as Percents

5 **Express each fraction as a percent. Round to the nearest tenth percent, if necessary.**

a. $\mathbf{\frac{5}{8}} = 0.625 =$

b. $\mathbf{\frac{1}{3}} = 0.333\ldots \approx$

c. $\mathbf{\frac{9}{1000}} = 0.009 =$

d. $\mathbf{\frac{23}{14}} \approx 1.643 =$

Check Your Progress

Express each percent as a decimal.

a. 84%

b. 7%

c. 302%

d. 0.9%

Express each decimal as a percent.

e. 0.84

f. 0.01

Express each fraction as a percent. Round to the nearest tenth percent, if necessary.

g. $\frac{3}{8}$

h. $\frac{5}{12}$

i. $\frac{13}{1000}$

j. $\frac{21}{17}$

EXAMPLE Compare Numbers

6 **BAKERY A baker said that 25% of his customers buy only bread and $\frac{2}{5}$ of his customers buy only cookies. Which group is larger?**

Write ______ as a percent. Then compare it with ______.

$\frac{2}{5}$ = ______ or ______

______ > ______

Since ______ is greater than ______, the group of customers that buy only ______ is larger.

Check Your Progress **SCHOOL** The school principal states that $\frac{3}{8}$ of the students are involved in instrumental music while 42% are involved in vocal music. Which group is larger?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–6 Using the Percent Proportion

MAIN IDEA

- Use the percent proportion to solve problems.

BUILD YOUR VOCABULARY (page 134)

In a **percent proportion**, one of the numbers, called the part, is being ______ to the ______, called the **base**, or whole.

KEY CONCEPT

Percent Proportion $\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$

EXAMPLE Find the Percent

1 a. Twenty is what percent of 25?

Twenty is being compared to 25. So, ______ is the part and ______ is the whole. Let n represent the ______.

$\frac{\quad}{\quad} = \frac{n}{100}$ Write the percent proportion.

______ = ______ Find the cross products.

______ $= n$ Simplify.

So, 20 is ______ of 25.

b. What percent of 8 is 12?

Twelve is being compared to 8. So, ______ is the part and ______ is the whole. Let n represent the ______.

$\frac{\quad}{\quad} = \frac{n}{100}$ Write the percent proportion.

______ = ______ Find the cross products.

______ $= n$ Simplify.

So, ______ of 8 is 12.

EXAMPLE Find the Part

2 **What number is 8.8% of 20?**

The percent is ____, and the whole is ____.

Let n represent the ____.

$$\frac{n}{\square} = \frac{\square}{100}$$ Write the percent proportion.

$\square = \square$ Find the cross products.

$n = \square$ Simplify.

So, 8.8% of 20 is ____.

EXAMPLE Find the Whole

3 **Seventy is 28% of what number?**

The percent is ____ and the part is ____.

Let n represent the ____.

$$\frac{\square}{n} = \frac{\square}{100}$$ Write the percent proportion.

$\square = \square$ Find the cross products.

$\square = n$ Simplify.

So, 70 is 28% of ____.

Check Your Progress **Use the percent proportion to solve each problem. Round to the nearest tenth.**

a. Twelve is what percent of 40?

b. What percent of 20 is 35?

c. What number is 42.5% of 90?

d. Ninety is 24% of what number?

EXAMPLE Apply the Percent Proportion

4 TENNIS **From the years 1999 through 2005, Serena Williams won the U.S. Open Tennis Championships two times and Wimbledon two times. What percent of both tournaments combined during those years was Serena Williams the women's champion? Round to the nearest tenth.**

The part is ____ and the whole is ____. Let n represent the percent.

$$\frac{\square}{\square} = \frac{n}{100}$$

$$\square \cdot 100 = \square \cdot n$$

$$\square = \square n$$

$$\square = \square$$ Divide each side by ____.

$$\square \approx n$$ Simplify.

Check Your Progress **BAKE SALE** At the school bake sale, 23 chocolate chip cookies, 18 oatmeal raisin cookies, and 7 peanut butter cookies were sold. If the sale started with a total of 90 cookies, what percent of the cookies were sold?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–7 Finding Percents Mentally

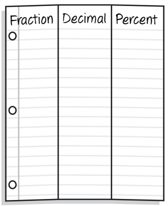
MAIN IDEAS

- Compute mentally with percents.
- Estimate with percents.

FOLDABLES™

ORGANIZE IT

Under the percents tab of your Foldable, write the percent-fraction equivalents found on page 327 of your textbook.



EXAMPLE **Find Percent of a Number Mentally**

1 **Find the percent of each number mentally.**

a. 50% of 46

50% of 46 = of 46 Think: 50% = .

= Think: of 46 is .

So, 50% of 46 is .

b. 25% of 88

25% of 88 = of 88 Think: 25% = .

= Think: of 88 is .

So, 25% of 88 is .

c. 70% of 110

70% of 110 = of 110 Think: 70% = .

= Think: of 110 is .

So, 70% of 110 is .

Check Your Progress **Find the percent of each number mentally.**

a. 50% of 82 **b.** 25% of 36 **c.** 80% of 60

EXAMPLE Estimate Percents

2 **a. Estimate 22% of 494.**

22% is about ☐ or ☐.

494 is about ☐.

☐ of ☐ is ☐.

So, 22% of 494 is about ☐.

b. Estimate $\frac{1}{4}$% of 1219.

$\frac{1}{4}\% = \frac{1}{4} \times$ ☐. 1219 is about ☐.

☐ of ☐ is ☐.

So, $\frac{1}{4}$% of 1219 is about ☐ × ☐ or ☐.

c. Estimate 155% of 38.

155% means about ☐ for every 100

or about ☐ for every 10.

38 has about ☐ tens.

☐ × ☐ = ☐.

So, 155% of 38 is about ☐.

Check Your Progress **Estimate.**

a. 38% of 400

b. $\frac{1}{5}$% of 2482

c. 183% of 93

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–8 Using Percent Equations

MAIN IDEAS

- Solve percent problems using percent equations.
- Solve real-life problems involving discount and interest.

BUILD YOUR VOCABULARY (page 134)

The **percent equation** is an equivalent form of the percent ______ in which the percent is written as a decimal.

REMEMBER IT

To determine whether your answer is reasonable, estimate *before* finding the exact answer.

EXAMPLE Find the Part

1 Find 38% of 22.

The percent is ______ and the whole is ______. You need to find the ______. Let n represent the part.

$n =$ ______ Write 38% as the decimal ______.

$n =$ ______ Simplify.

So, 38% of 22 is ______.

EXAMPLE Find the Percent

2 19 is what percent of 25?

You know that the whole is ______ and the part is ______. Let n represent the percent.

______ $= n($______$)$

______ $= n$ Divide each side by ______.

______ $= n$ Simplify.

So, 19 is ______ of 25.

Check Your Progress

a. Find 64% of 48.

______

b. 8 is what percent of 25?

______

EXAMPLE Find the Whole

3 **84 is 16% of what number?**

You know that the part is ______ and the part is ______.
Let n represent the whole.

$\boxed{} = \boxed{}\,n$ Write 16% as the decimal ______.

$\dfrac{\boxed{}}{0.16} = \dfrac{\boxed{}}{0.16}$ Divide each side by ______.

$\boxed{} = n$ Simplify.

So, 84 is 16% of ______.

Check Your Progress 315 is 42% of what number?

______

BUILD YOUR VOCABULARY (page 134)

Discount is the amount by which the regular price of an item is reduced.

EXAMPLE Find Discount

4 JEWELRY **The regular price of a ring is \$495. It is on sale at a 20% discount. What is the sale price of the ring?**

METHOD 1

First, use the percent equation to find 20% of 495. Let d represent the discount.

$d = \boxed{}$ The whole is ______ and the percent is ______.

$d = \boxed{}$ Simplify.

Then, find the sale price.

$495 - \boxed{} = \boxed{}$ Subtract the discount from the original price.

The sale price is ______.

METHOD 2

A discount of 20% means the ring will cost ______ – ______

or ______ of the original price. Use the percent equation to find 80% of 495. Let s represent the sale price.

$s = 0.80(495)$ The whole is ______ and the percent is ______.

$s =$ ______ The sale price of the ring will be ______.

Check Your Progress **RETAIL** The regular price of a stereo system is $1295. The system is on sale at a 15% discount. Find the sale price of the stereo system.

______

BUILD YOUR VOCABULARY (page 135)

Simple interest is the amount of money paid or earned for the use of money.

EXAMPLE Apply Simple Interest Formula

5 BANKING **Suppose you invest $2000 at an annual interest rate of 4.5%. How long will it take for it to earn $495 in interest?**

$I = prt$ Simple interest formula

$495 = 2000(0.045)t$ $I = 495$, $p = 2000$, $r = 0.045$

______ = ______ Simplify.

______ = ______ Divide each side by ______.

______ $= t$ Simplify.

It will take ______ years to earn $495.

Check Your Progress **BANKING** Suppose you invest $3500 at an annual interest rate of 6.25%. How long will it take for it to earn $875?

______

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–9 Percent of Change

BUILD YOUR VOCABULARY (page 134)

A **percent of change** tells the ______ an amount has increased or decreased in relation to the ______ amount.

MAIN IDEAS

- Find percent of increase.
- Find percent of decrease.

EXAMPLE Find Percent of Change

1 **Find the percent of change from 325 to 390.**

Step 1 Subtract to find the amount of change.

______ – ______ = ______ new amount – original amount

Step 2 percent of change = $\dfrac{\text{amount of change}}{\text{original amount}}$

= ______ = ______ or ______

The percent of change from 325 to 390 is ______.

EXAMPLE Find Percent of Increase

2 TUITION **In 1965, when John entered college, the tuition per year was \$7500. In 2000, when his daughter went to the same school, the tuition was \$25,500. Find the percent of change.**

Step 1 Subtract to find the amount of change.

______ – ______ = ______

Step 2 percent of change = $\dfrac{\text{amount of change}}{\text{original tuition}}$

= ______ = ______ or ______

The percent of change is ______.

Check Your Progress

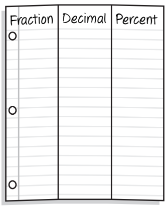
a. Find the percent of change from 84 to 105.

b. TEXTBOOKS In 1990, the price of a textbook was \$38. In 2000, the price of the same textbook was \$81. Find the percent of change.

FOLDABLES™

ORGANIZE IT

On the back of your Foldable, describe how to find a percent of increase and a percent of decrease.



EXAMPLE Find Percent of Decrease

3 **CLOTHING** **A \$110 sweater is on sale for \$88. What is the percent of change?**

Step 1 Subtract to find the amount of change.

☐ – ☐ = ☐ sale price – original price

Step 2 percent of change = $\frac{\text{amount of change}}{\text{original price}}$

= ☐ = ☐ or ☐

The percent of change is ☐. In this case, the percent of change is a percent of ☐.

Check Your Progress

SHOES A \$145 pair of tennis shoes is on sale for \$105. What is the percent of change?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

6–10 Using Sampling to Predict

Main Ideas

- Identify various sampling techniques.
- Determine the validity of a sample and predict the actions of a larger group.

BUILD YOUR VOCABULARY (pages 134–135)

A subgroup or subset of a population used to represent the whole is a called a ______.

An ______ sample is a random sample that is representative of a larger sample.

A ______ sample is a sample that is not representative of the population.

EXAMPLE Identify and Describe Sample

1 **Identify the sample as biased or unbiased and describe its type.**

a. Mr. Ackermen needs several volunteers to collect homework before each class. He randomly calls out a color and whoever is wearing that color is chosen.

Since the population is all ______ and they are selected randomly from students wearing a certain color, the sample is an ______ ______.

b. A hardware store wants feedback on their products and service. They include a telephone number on each receipt so customers can voluntarily call and participate.

Since the customers at this particular store probably prefer this store's products and service, the sample is ______.

The sample is a ______ since only customers of this store are given the chance to participate in the survey. It is also a ______ since only those who want to participate will respond.

Check Your Progress **Identify the sample as biased or unbiased and describe its type.**

a. To determine peoples favorite snack food, the first ten customers leaving a candy store are surveyed.

b. To determine 5 students to be class volunteers for the day, each student in the class is given a number. A computer is used to randomly select 5 numbers and the students with those numbers are chosen as the class volunteers.

EXAMPLE **Using Sampling to Predict**

2 **a.** **SPORTS** **Mr. Bacon surveyed every tenth student in the hallway to see which sport they preferred watching. 44% preferred football, 28% basketball, 20% soccer, and 8% tennis. Is this sampling method valid? If so, out of 560 students in the entire school, how many would you expect to say they preferred watching football?**

This is an ________

since Mr. Bacon selected students according to a specific ________. So, this sampling method is ________.

Since 44% of those surveyed preferred watching ________, to find how many would say they preferred watching football in the entire school, find ________ of ________.

Words	What number is ________ of ________?
Variable	Let n = ________
Equation	n = ________

(continued on the next page)

$n =$ ____

$=$ ____ Multiply.

So, you would expect about ____ students prefer watching ____.

b. MUSIC **A middle school planned to play music during lunch. To determine what type of music students preferred, 25 students with MP3 players were randomly surveyed and asked what type of music they preferred. Sixteen said they preferred country music. Is this sampling method valid? If so, how many of the 535 students in the school would you expect to prefer country music?**

This is a ____ sample since only students ____ were asked to respond. Also, only ____ (25 out of 535) of the students were surveyed. Therefore, this sampling method will not produce an ____ and ____ prediction of the type of music students prefer.

Check Your Progress

a. COLORS To determine favorite colors, students wearing either blue or red were surveyed. 32% preferred blue, 29% red, 23% yellow, and 16% green. Is this sampling method valid? If so, out of the 450 students in the entire school, how many would you expect to say they prefer red?

b. TELEVISIONS Jason surveyed every fifth classmate to find out how many televisions each had in their home. 63% responded that they had three or more televisions in their home. Is this sampling method valid? If so, how many of the 845 students in the school should Jason expect to have three or more televisions in their home?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 6

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 6 Foldable** 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: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 134–135*) to help you solve the puzzle.

6-1

Ratios and Rates

Underline the correct term or phrase to fill the blank in each sentence.

1. A ________________ is a ratio of two measurements having different kinds of units. (fraction, unit, rate)

2. A unit rate has a ________________ of 1. (numerator, denominator, simplest form)

3. A ratio is a comparison of two numbers by ________________. (addition, multiplication, division)

4. Express the ratio *16 novels out of 40 books* as a fraction in simplest form.

6-2

Proportional and Nonproportional Relationships

Determine whether the set of numbers in each table are proportional.

5.

Number of Guests	6	7	8	9	10
Cost (dollars)	42	49	56	63	70

6.

Number of hours	1	2	4	6	7
Price (dollars)	14	23	41	59	68

6-3

Using Proportions

Solve each proportion.

7. $\frac{8}{45} = \frac{1.6}{x}$

8. $\frac{y}{12} = \frac{1.6}{4}$

9. $\frac{5}{24} = \frac{z}{72}$

6-4

Scale Drawings and Models

10. A swimming pool is 36 feet long and 15 feet wide. Make a scale drawing of the pool that has a scale of $\frac{1}{4}$ in. = 3 ft.

11. The right arm of the Statue of Liberty is 42 feet long. A scale model of the statue has a 3-inch long right arm. What is the scale of the model?

6-5

Fractions, Decimals, and Percents

Underline the greatest number in each set.

12. $\{\frac{4}{7}$, 45%, 0.42, 5 out of 8$\}$

13. $\{\frac{2}{11}$, 11%, 0.17, 1 out of 12$\}$

6-6

Using the Percent Proportion

14. 11 is 20% of what number?

15. What is 36% of 75?

16. 18 is what percent of 60?

6-7

Finding Percents Mentally

Estimate.

17. $\frac{2}{3}$% of 155

18. 147% of 78

19. 84% of 31

6-8 Using Percent Equations

Solve each problem using the percent equation.

20. 7 is what percent of 25?

21. What is 40.4% of 50?

22. 32 is 5% of what number?

23. Find 140% of 75.

24. A CD player is on sale at a 20% discount. If it normally sells for $49.95, what is the sale price?

25. What is the annual interest rate if $2800 is invested for 4 years and $364 in interest is earned?

6-9 Percent of Change

26. A $775 computer is marked down to $620. Find the percent of change.

27. Refer to the table shown. Which school had the smallest percent of increase in the number of students from 1994 to 2004?

School	1994	2004
Oakwood	672	702
Jefferson	433	459
Marshall	764	780

6-10 Using Sampling to Predict

28. COOKIES The students in the life skills class took a survey during lunch time about the type of cookies they should make for the bake sale. They randomly surveyed a total of 67 students and their results are shown in the table. Is this sampling method valid? If so, how many of the cookies should be peanut butter if they make 800 cookies? Explain your reasoning.

Type	Number
Chocolate Chip	29
Peanut butter	15
Chocolate	12
Sugar	11

CHAPTER 6

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **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 353 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 6 Study Guide and Review on pages 348–352 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 6 Practice Test on page 353.

☐ **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 Foldables.
- Then complete the Chapter 6 Study Guide and Review on pages 348–352 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 353.

Student Signature

Parent/Guardian Signature

Teacher Signature

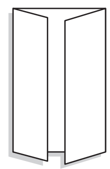
CHAPTER 7

Functions and Graphing

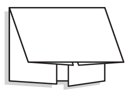
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with an 11" × 17" sheet of paper.

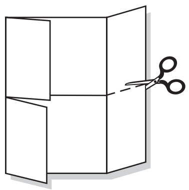
STEP 1 **Fold** the short sides so they meet in the middle.



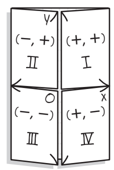
STEP 2 **Fold** the top to the bottom.



STEP 3 **Open** and cut along second fold to make four tabs. Staple a sheet of grid paper inside.



STEP 4 **Add** axes as shown. Label the quadrants on the tabs.



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

CHAPTER 7

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
constant of variation [VEHR-ee-Ay-shuhn]			
constant rate of change			
direct variation			
function			
line of fit			
linear equation [LINH-ee-uhr]			

Vocabulary Term	Found on Page	Definition	Description or Example
linear relationships			
rate of change			
slope			
slope-intercept form [IHNT-uhr-sehpt]			
vertical line test			
y-intercept			

7–1 Functions

MAIN IDEAS

- Determine whether relations are functions.
- Use functions to describe relationships between two quantities.

BUILD YOUR VOCABULARY (page 166)

A **function** is a special relation in which each member of the domain is paired with *exactly* one member in the range.

EXAMPLE Ordered Pairs and Tables as Functions

1 Determine whether each relation is a function. Explain.

a. {(–3, –3), (–1, –1), (0, 0), (–1, 1), (3, 3)}

; –1 in the domain is paired with both and

in the .

b.

x	7	6	5	2	–3	–6
y	2	4	6	4	2	–2

, each x value is paired with y value.

Check Your Progress **Determine whether each relation is a function. Explain.**

a. {(2, 5), (4, –1), (3, 1), (6, 0), (–2, –2)}

b.

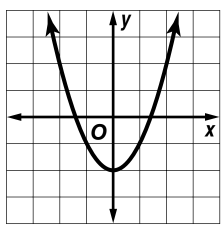
x	3	1	–1	–3	1	–5
y	5	4	3	–4	2	1

REMEMBER IT

If any vertical line drawn on the graph of a relation passes through no more than one point on the graph, then the relation is a function. This is a **vertical line test**.

EXAMPLE Use a Graph to Identify Functions

2 Determine whether the graph is a function. Explain.

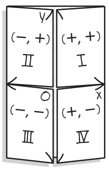


, it passes the .

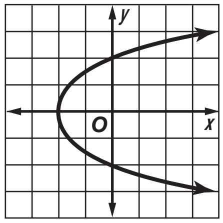
FOLDABLES™

ORGANIZE IT

In your notes, draw a graph of a relation that is a function and a graph of a relation that is not a function. Explain why the second relation is not a function.



Check Your Progress Determine whether the graph is a function. Explain.



EXAMPLE

3 BUSINESS The table shows the number of boxes made.

Number of Hours	Number of Boxes
0	0
10	3000
20	6000
30	9000

a. Do these data represent a function? Explain.

______; for each 10 hours, only ______ of boxes is made.

b. Describe how box production is related to hours of operation.

As the number of hours ______, the number of boxes produced ______.

Check Your Progress

BUSINESS The table shows the number of chairs made.

Number of Hours	Number of Boxes
5	120
10	240
15	360
20	480

a. Do these data represent a function? Explain.

b. Describe how chair production is related to hours of operation.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

7–2 Representing Linear Functions

MAIN IDEAS

- Solve linear equations with two variables.
- Graph linear equations using ordered pairs.

BUILD YOUR VOCABULARY (page 166)

A **linear equation** in two variables is an equation in which the ______ appear in ______ terms and neither variable contains an ______ other than 1.

EXAMPLE Use a Table of Ordered Pairs

1 **Find four solutions of $y = 4x + 3$.**

Choose four values for x. Then substitute each value into the equation to solve for y.

x	$y = 4x + 3$	y	(x, y)
0	$y = 4$ ______ $+ 3$		
1	$y = 4$ ______ $+ 3$		
2	$y = 4$ ______ $+ 3$		
3	$y = 4$ ______ $+ 3$		

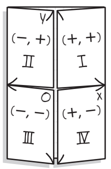
Four solutions are ______, ______, ______, and ______.

Check Your Progress Find four solutions of $y = 2x - 4$.

FOLDABLES™

ORGANIZE IT

In your notes, write a linear equation, then explain how to solve it using the four steps for finding solutions of equations.



EXAMPLE Solve an Equation for y

2 **BUSINESS At a local software company, Level 1 employees x earn \$48,000 and Level 2 employees y earn \$24,000. Find four solutions of $48{,}000x + 24{,}000y = 216{,}000$ to determine how many employees at each level the company can hire for \$216,000.**

$48{,}000x + 24{,}000y = 216{,}000$	Write the equation.
$24{,}000y = 216{,}000 - \boxed{}$	Subtract $\boxed{}$ from each side.
$\dfrac{24{,}000y}{\boxed{}} = \dfrac{216{,}000}{\boxed{}} - \dfrac{48{,}000x}{\boxed{}}$	Divide each side by $\boxed{}$.
$y = \boxed{}$	Simplify.

Choose four x values and substitute them into $\boxed{}$.

x	$y = 9 - 2x$	y	(x, y)
0	$y = 9 - 2\boxed{}$	$\boxed{}$	$\boxed{}$
1	$y = 9 - 2\boxed{}$	$\boxed{}$	$\boxed{}$
2	$y = 9 - 2\boxed{}$	$\boxed{}$	$\boxed{}$
3	$y = 9 - 2\boxed{}$	$\boxed{}$	$\boxed{}$

$(0, \boxed{})$ 0 Level 1, $\boxed{}$ Level 2

$(1, \boxed{})$ 1 Level 1, $\boxed{}$ Level 2

$(2, \boxed{})$ 2 Level 1, $\boxed{}$ Level 2

$(3, \boxed{})$ 3 Level 1, $\boxed{}$ Level 2

The company can hire 0 Level 1 and $\boxed{}$ Level 2 employees, 1 Level 1 and $\boxed{}$ Level 2 employees, 2 Level 1 and $\boxed{}$ Level 2 employees, or 3 Level 1 and $\boxed{}$ Level 2 employees.

Check Your Progress **BOOKS** At a local bookstore, hardbacks are on sale for $6 and paperbacks are on sale for $3. Bob has $42 to spend on books. Find four solutions to determine how many books of each type Bob can buy with his $42.

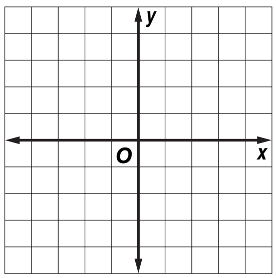
EXAMPLE Graph a Linear Equation

3 Graph $y = x - 3$ by plotting ordered pairs.

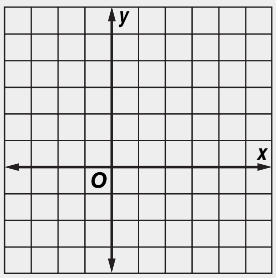
First, find ordered pair solutions.

x	$y = x - 3$	y	(x, y)
-1	$y = \square - 3$		
0	$y = \square - 3$		
1	$y = \square - 3$		
2	$y = \square - 3$		

Plot these ordered pairs and draw a line through them. The line is a complete graph of the function.



Check Your Progress Graph $y = 5 - x$ by plotting ordered pairs.



REVIEW IT

What are the signs of the x and y coordinates in the four quadrants of the coordinate plane? *(Lesson 2–6)*

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

7–3 Rate of Change

MAIN IDEAS

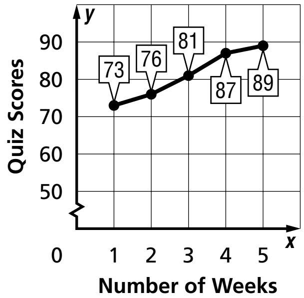
- Find rates of change.
- Solve problems involving rates of change.

BUILD YOUR VOCABULARY (page 167)

A ______ in one ______ with respect to another quantity is called the **rate of change**.

EXAMPLE

1 SCHOOL **The graph shows Jared's quiz scores for the first five weeks after he joined a study group. Find the rate of change from Week 2 to Week 5.**



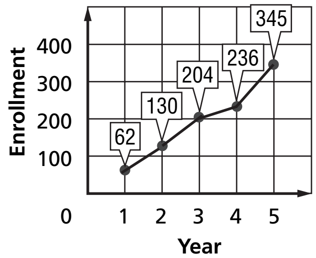
= ______ ← change in quiz score
  ______ ← change in time

≈ ______

So, the expected rate of change in quiz scores is an increase of about ______ per week.

Check Your Progress

SUMMER CAMP The graph shows the number of campers enrolled at a summer camp during its first five years of operation. Find the rate of change from Year 2 to Year 5.



EXAMPLE Compare Rates of Change

2 INCOME The table shows the yearly incomes of two families. Compare the rates of change.

Year	Income ($)	
	Milers	Joneses
2001	49,000	50,000
2002	51,000	52,000
2003	52,500	54,500
2004	55,000	57,000

Milers' rate of change $= \dfrac{\text{change in } y}{\text{change in } x}$

$=$ ______

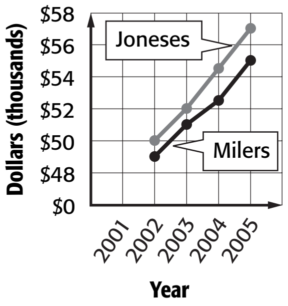
$=$ ______ or ______

Joneses' rate of change $= \dfrac{\text{change in } y}{\text{change in } x}$

$=$ ______

$=$ ______ or ______

The income of the Joneses increases at a faster rate than the income of the Milers.



Check Your Progress

INCOME The table shows the yearly incomes of two families. Compare the rates of change.

Year	Income ($)	
	Longs	Greens
1998	45,000	43,000
1999	48,000	46,000
2000	51,500	49,500
2001	55,000	54,000

7–4 Constant Rate of Change and Direct Variation

MAIN IDEAS

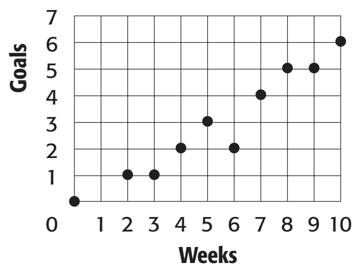
- Identify proportional and nonproportional relationships by finding a constant rate of change.
- Solve problems involving direct variation.

BUILD YOUR VOCABULARY (pages 166–167)

______ have straight line graphs.

EXAMPLE Use a Graph to Find a Constant Rate of Change

1 SOCCER **The graph shows Yen's soccer goals for the ten-week season. Find the constant rate of change from Week 2 to Week 8. Describe what the rate means.**



Choose any two points on the line and find the rate of change between them. We will use the points at (2, 1) and (8, 5).

______ → week 2, 1 goal ______ → week 8, 5 goals

rate of change $= \dfrac{\text{change in goals}}{\text{change in time}}$

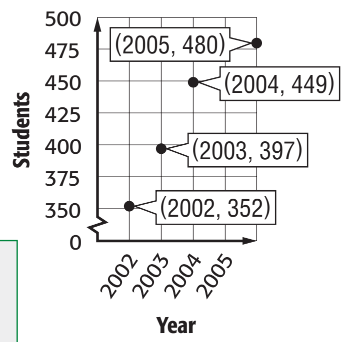
$= \dfrac{\quad}{\quad}$

$=$ ______

The rate of change ______ goals per week means that Yen scored ______ goals every ______ weeks.

Check Your Progress

SCHOOL The graph shows the number of students at Lincoln Elementary school. Find the constant rate of change from 2002 to 2005. Describe what the rate means.



EXAMPLE Use Direct Variation to Solve Problems

3 LANDSCAPING As it is being dug, the depth of a wide hole for a backyard pond is recorded in a table.

Time (min)	Hole Depth (in.)
x	y
10	8
20	15
30	24
40	31

a. Write an equation that relates time and hole depth.

Step 1 Find the value of k using the equation $y = kx$.

Choose any point in the table. Then solve for ____.

$y = kx$ Direct Variation

____ $= k($____$)$ Replace y with ____ and x with ____.

____ $= k$ Simplify.

Step 2 Use ____ to write an equation.

$y = kx$ Direct Variation

____ Replace k with ____.

b. Predict how long it will take to dig a depth of 36 inches.

$y = 0.8x$ Write the direct variation equation.

____ $= 0.8x$ Replace y with ____.

____ $= x$ Divide.

It will take ____ to dig a ____ hole.

Check Your Progress

WAGES Kelly recorded the hours she worked and the amount she was paid in a table.

Time (hr)	Amount ($)
x	y
2	14.50
4	29.00
6	43.50
8	58.00

a. Write an equation that relates time and amount paid.

____

b. Predict how much Kelly will get paid for working 5 hours.

____

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

7–5 Slope

MAIN IDEA

- Find the slope of a line.

BUILD YOUR VOCABULARY (page 167)

Slope describes the ________ of a line. It is the ratio of the *rise*, or the ________ change, to the *run*, or the ________ change.

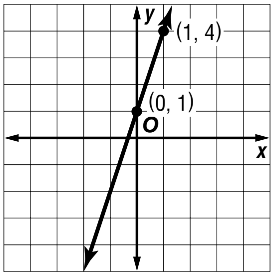
KEY CONCEPT

Slope The slope m of a line passing through points (x_1, y_1) and (x_2, y_2) is the ratio of the difference in y-coordinates to the corresponding difference in x-coordinates.

EXAMPLE Use a Graph to Find Slope

1 **Find the slope of each line.**

a.



$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

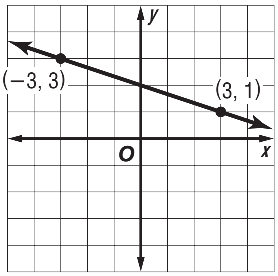
$m = \dfrac{\quad}{\quad}$ $(x_1, y_1) = (0, 1)$

$(x_2, y_2) = (1, 4)$

$m =$ ____ or ____

The slope is ____.

b.



$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \dfrac{\quad}{\quad}$ $(x_1, y_1) = (3, 1)$

$(x_2, y_2) = (-3, 3)$

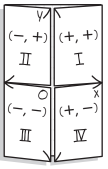
$m =$ ____ or ____

The slope is ____.

FOLDABLES™

ORGANIZE IT

In your notes, write a sample equation for each slope: positive, negative, zero, and undefined. Then graph each equation and write its slope.



EXAMPLE Positive and Negative Slopes

2 **Find the slope of the line that passes through each pair of points.**

a. $B(2, 7)$, $C(-3, -2)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \frac{\square}{\square}$ $(x_1, y_1) = (2, 7)$, $(x_2, y_2) = (-3, -2)$

$m = \square$

b. $F(-5, 1)$, $G(-3, -6)$

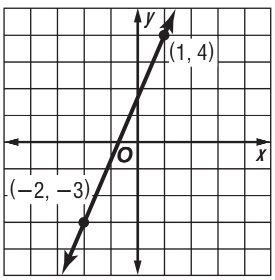
$m = \frac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \frac{\square}{\square}$ $(x_1, y_1) = (2, 7)$, $(x_2, y_2) = (-3, -2)$

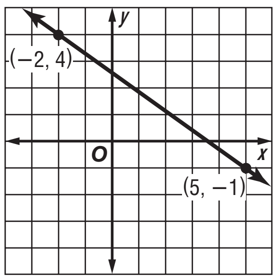
$m = \square$

Check Your Progress **Find the slope of each line.**

a.



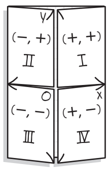
b.



FOLDABLES

ORGANIZE IT

In your notes, write an example of a linear equation in slope-intercept form. Graph the equation using its slope and *y*-intercept and list the steps involved.



WRITE IT

What are the two ways to interpret a negative slope when graphing an equation?

____

____

____

____

____

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

EXAMPLE Graph an Equation

1 **Graph $y = -3x + 9$ using the slope and y-intercept.**

Step 1 Find the slope and y-intercept.

slope = ☐ y-intercept = ☐

Step 2 Graph the y-intercept point at ☐.

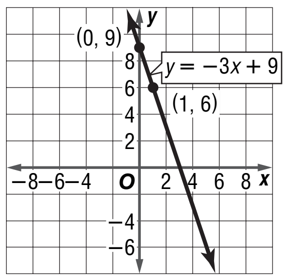
Step 3 Write the slope ☐ as ☐.

Use it to locate a second point on the line.

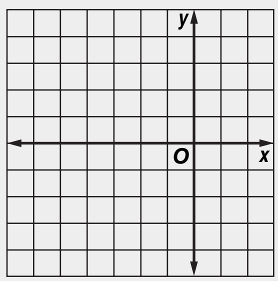
$m = \frac{\square}{\square}$ change in *y*: ☐ change in *x*: ☐

Another point on the line is at ☐.

Step 4 Draw a line through the two points.



Check Your Progress Graph $y = \frac{2}{3}x + 4$ using the slope and y-intercept.



7–7 Writing Linear Equations

MAIN IDEAS

- Write equations given the slope and y-intercept, a graph, a table, or two points.

EXAMPLE Write Equations From Slope and y-Intercept

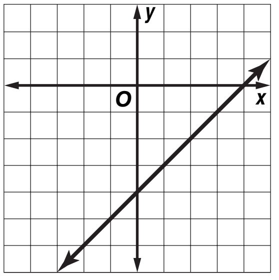
1 **Write an equation in slope-intercept form for the line having slope of $-\frac{1}{4}$ and a y-intercept of 7.**

$y = mx + b$ Slope-intercept form

$y = -\frac{1}{4}x + 7$ Replace m with ______ and b with ______.

EXAMPLE Write an Equation From a Graph

2 **Write an equation in slope-intercept form for the line graphed.**



The y-intercept is ______. From ______, you can go up ______ unit and to the ______ one unit to another point on the line. So, the slope is ______.

$y = mx + b$ Slope-intercept form

$y =$ ______ $x +$ ______ Replace m with ______ and b with ______.

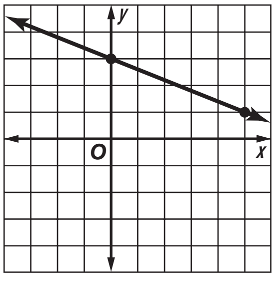
$y =$ ______ Simplify.

Check Your Progress

a. Write an equation in slope-intercept form for the line having slope of -3 and a y-intercept of -5.

______

b. Write an equation in slope-intercept form for the line graphed.



______

EXAMPLE Write an Equation to Make a Prediction

3 BUSINESS The owners of the Good Times eatery surveyed their customers to find out where they lived. They learned that for each 5-mile radius from their restaurant, 30 fewer people visited them. They had 150 patrons in the area immediately surrounding the diner. Predict the number of customers who lived 20 miles away.

Make a table of ordered pairs.

Distance x	Patrons y
0	150
5	120
10	90

Step 1 Find the slope m.

$m = \frac{\text{change in } y}{\text{change in } x}$ ______

$=$ ______ ______

$=$ ______

Step 2 Find the y-intercept b.

$(x, y) = (\text{distance, patrons})$

$= (0,$ ______ $)$

When the distance is within ______,

there are ______.

Step 3 Write the equation.

$y = mx + b$ Slope-intercept form

$y =$ ______ $x + 150$ Replace m with ______ and b with ______.

Step 4 Substitute the distance of ______ miles.

$y = -6x + 150$ Write the equation.

$= -6($ ______ $) + 150$ Replace x with ______.

$=$ ______ Simplify.

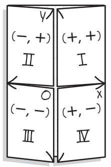
So, the diner had 30 patrons that lived ______ miles away.

Check Your Progress **WEATHER** Attendance at an outdoor sporting event is affected by the temperature outside. When the outside temperature is 0°F, the attendance is 12 people. For every increase in temperature of 20 degrees, the attendance increases by 100 people. Predict the attendance if the temperature is 60°F.

FOLDABLES™

ORGANIZE IT

In your notes, write two points, find the equation of the line that passes through them, and graph the line.



EXAMPLE Write an Equation Given Two Points

4 **Write an equation for the line that passes through (7, 0) and (6, 3).**

Step 1 Find the slope m.

$m = \frac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \frac{\quad}{\quad}$ or ___ $(x_1, y_1) = (7, 0)$

$(x_2, y_2) = (6, 3)$

Step 2 Find the y-intercept b. Use the slope and the coordinates of either point.

$y = mx + b$ Slope-intercept form

___ = ___ Replace m with ___, x with ___, and y with ___.

___ $= b$ Simplify.

Step 3 Substitute the slope and y-intercept.

$y = mx + b$ Slope-intercept form

$y =$ ___ Replace m with ___ and b with ___.

Check Your Progress Write an equation for the line that passes through (4, −2) and (−2, −14).

EXAMPLE Write an Equation From a Table

5 **Use the table of values to write an equation in slope-intercept form.**

x	y
–2	16
–1	10
0	4
1	–2

Step 1 Find the slope m. Use the coordinates of any two points.

$m = \frac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \frac{\boxed{}}{\boxed{}}$ or $\boxed{}$ $(x_1, y_1) = (–2, 16)$

$(x_2, y_2) = (–1, 10)$

Step 2 Find the y-intercept b. Use the slope and the coordinates of either point.

$y = mx + b$ Slope-intercept form

$\boxed{} = \boxed{} + b$ Replace m with $\boxed{}$, y with $\boxed{}$, and x with $\boxed{}$.

$\boxed{} = b$ Simplify.

Step 3 Substitute the slope and y-intercept.

$y = mx + b$ Slope-intercept form

$y = \boxed{} + \boxed{}$ Replace m with $\boxed{}$, and b with $\boxed{}$.

Check Your Progress

Use the table of values to write an equation in slope-intercept form.

x	y
–6	4
–3	2
3	–2
6	–4

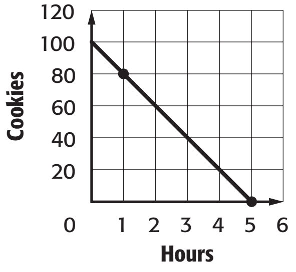
HOMEWORK ASSIGNMENT

Page(s):

Exercises:

EXAMPLE Negative Rate of Change

3 **COOKIES** **Natalie sold 100 cookies in 5 hours. The graph below shows the relationship between the hours spent selling and the number of cookies that remained. Find the rate of change.**



rate of change = $\frac{\boxed{}}{\boxed{}}$

= $\frac{\boxed{}}{\boxed{}}$

= $\frac{\boxed{}}{\boxed{}}$

= $\boxed{}$

So, the rate of change is $\boxed{}$,

or a decrease of $\boxed{}$ for every $\boxed{}$.

Check Your Progress

SPENDING The table shows the amount of money in Garrett's savings during several weeks. Find the rate of change.

Weeks, x	Amount ($), y
1	450
2	225
3	180
4	105

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

EXAMPLE Use Graphs to Identify Proportional Linear Relationships

2 **JOGGING The distance that a jogger runs is recorded in the table. Determine if there is a proportional linear relationship between the time and distance.**

Time (min)	Distance (mi)
x	y
15	12
30	22
45	30
60	34

To determine if the quantities are proportional, find $\frac{\text{distance } y}{\text{time } x}$ for points on the graph.

$\frac{12}{15} = \boxed{}$ $\frac{22}{30} = \boxed{}$ $\frac{30}{45} = \boxed{}$ $\frac{34}{60} = \boxed{}$

Since the ratio $\frac{\text{distance}}{\text{time}}$ is not the same for every pair of values, the distance run is ____________ to the time.

Check Your Progress

WORK The table shows the amount Sam was paid for doing various jobs for his neighbors. Determine if there is a proportional linear relationship between the time and amount paid.

Time (hr)	Amount ($)
x	y
1	8
2	14
3	18
4	20

BUILD YOUR VOCABULARY (pages 166–167)

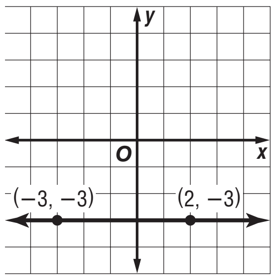
A special type of linear equation that describes constant rate of change is a ____________.

The **constant of variation**, represented by k, is the ____________, or ____________, in the equation $y = kx$.

EXAMPLE Zero and Undef ned Slopes

3 **Find the slope of each line.**

a.

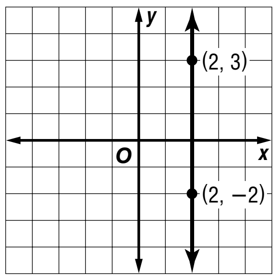


$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \dfrac{\square}{\square}$ $(x_1, y_1) = (-3, -3)$ $(x_2, y_2) = (2, -3)$

$m = \square$ or $\square$

b.



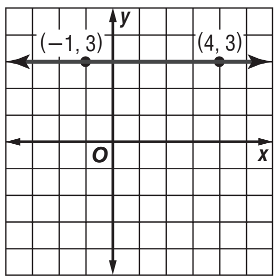
$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \dfrac{\square}{\square}$ $(x_1, y_1) = (2, 3)$ $(x_2, y_2) = (2, -2)$

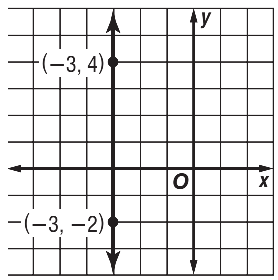
$m = \square$ The slope is $\square$.

Check Your Progress **Find the slope of each line.**

a.



b.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

7–6 Slope-Intercept Form

MAIN IDEAS

- Determine slopes and y-intercepts of lines.
- Graph linear equations using the slope and y-intercept.

BUILD YOUR VOCABULARY (page 167)

An equation written in the form $y = mx + b$, where m is the slope and b is the y-intercept, is in **slope-intercept form**.

EXAMPLE Find the Slope and y-Intercept

1 **State the slope and the y-intercept of the graph of $y = \frac{1}{2}x + 3$.**

$y = \frac{1}{2}x + 3$ — Write the equation in the form $y = mx + b$.

$y = mx + b$ — The slope is ______. The y-intercept is ______.

EXAMPLE Write the Equation in Slope-Intercept Form

2 **State the slope and the y-intercept of the graph of $-4x + 5y = -10$.**

$-4x + 5y = -10$ — Write the equation.

$-4x + 5y + 4x = -10 + 4x$ — Add $4x$ to each side.

______ = ______ — Simplify.

$y =$ ______ — Divide each side by ______.

$y =$ ______ — Slope-intercept form

The slope is ______, and the y-intercept is ______.

Check Your Progress **State the slope and the y-intercept of the graph of each line.**

a. $y = 2x - 7$

b. $-5x + y = 1$

7–8 Prediction Equations

MAIN IDEAS

- Draw lines of fit for sets of data.
- Use lines of fit to make predictions about data.

BUILD YOUR VOCABULARY (page 166)

A **line of fit** is a line that is very to most of the data points.

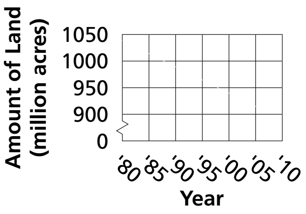
EXAMPLE Make Predictions from a Line of Fit

1 AGRICULTURE **The table shows the amount of land in the U.S. farms from 1980 to 2000.**

Year	Land (million acres)
1980	1039
1985	1012
1990	986
1995	963
2000	943

a. Make a scatter plot and draw the line of fit for the data.

Draw a line that best fits the data.



REMEMBER IT

A line of fit is only an estimation. Different lines with different slopes can be drawn to approximate the data.

b. Use the line of fit to predict the amount of land in the year 2010.

Extend the line so that you can find the y value for an x value of . The y value for is about .

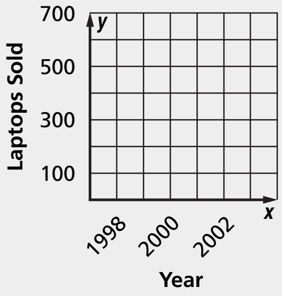
So, a prediction for the amount of farm land in 2010 is approximately million acres.

Check Your Progress

RETAIL The table shows the number of laptop computers sold at a local computer store from 1998 to 2001.

Year	Number of Laptops Sold
1998	215
1999	298
2000	395
2001	430

a. Make a scatter plot and draw a line of fit for the data.



b. Use the line of fit to predict the number of laptops sold in the year 2003.

WRITE IT

Does a line of fit always give a good prediction? Explain.

____

____

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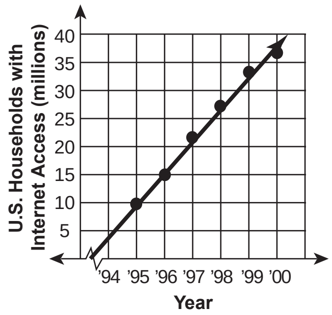
EXAMPLE Make Predictions from an Equation

2 INTERNET The scatter plot shows the number of U.S. households (millions) with Internet access.



a. Write an equation in slope-intercept form for the line of fit.

Step 1

Select two points on the line and find the slope. The two points on the line of fit may not be original data points.

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \dfrac{\square}{\square}$ $(x_1, y_1) = (1995, 10)$

$(x_2, y_2) = (2000, 37)$

$m = \square$

Step 2 Next, find the y-intercept.

$y = mx + b$	Slope-intercept form
$\boxed{} = \boxed{} + b$	$(x, y) = (2000, 37)$, and $m = \boxed{}$.
$\boxed{} = b$	Simplify.

Step 3 Write the equation.

$y = mx + b$	Slope-intercept form
$y = \boxed{}$	$m = \boxed{}$, $b = \boxed{}$

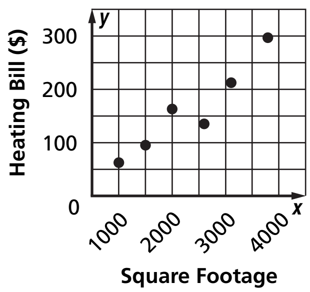
b. Predict the number of U.S. households that will have Internet in the year 2010.

$y = \boxed{}$	Write the equation for the line of fit.
$y = \boxed{}$	Replace x with $\boxed{}$.
$y = \boxed{}$	Simplify.

A prediction for the number of U.S. households that will have Internet in the year 2010 is about $\boxed{}$.

Check Your Progress

TEMPERATURE The scatter plot shows the heating bill for the month of January for different size houses.



a. Write an equation in slope-intercept form for the line of fit.

b. Predict the heating bill for a house that is 4100 square feet in size.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 7

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 7 Foldable** 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: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 166–167*) to help you solve the puzzle.

7-1 Functions

Determine whether each relation is a function.

1. $\{(2, 5), (3, 7), (-2, 5), (1, 8)\}$

2. $\{(-1, 1), (3, 4), (2, 2), (-1, 5)\}$

3. The table shows how age affects the value of one type of computer. Is the relation a function? Describe how age is related to value.

Age (years)	Value
0	\$1500
1	\$1200
2	\$800
3	\$300

7-2 Representing Linear Functions

Find four solutions of each equation. Show each solution as ordered pairs.

4. $y = x + 1$

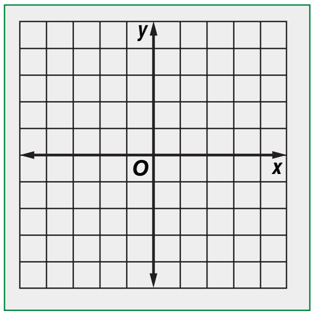
5. $y = 5x - 4$

The equation $y = 3.28x$ describes the approximate number of feet y in x meters.

6. Describe what the solution (5, 16.4) means.

7. About how many feet is a 200 meter dash?

8. Graph the equation $y = 4x - 3$ by plotting ordered pairs.



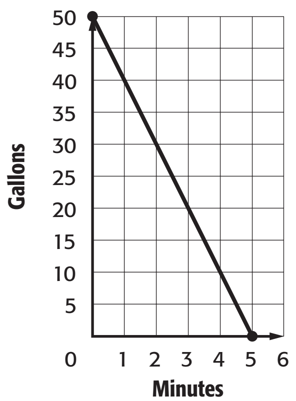
7-3

Rate of Change

9. SCHOOL The table shows the growth in student enrollment of the freshman classes at Washington High School. Find the rate of change from 2003 to 2005.

Year	Enrollment
2003	202
2004	219
2005	243
2006	260

10. POOLS The graph shows the relationship between the amount of time it takes to drain a child's pool and the amount of water that is remaining. Find the rate of change.



7-4

Constant Rate of Change and Direct Variation

11. WALNUTS The cost of walnuts varies directly with the number of pounds bought. Three pounds cost \$9.75. Write an equation that relates the weight and the cost of walnuts. Then predict the cost of 8.5 pounds of walnuts.

7-5

Slope

Find the slope of the line that passes through each pair of points.

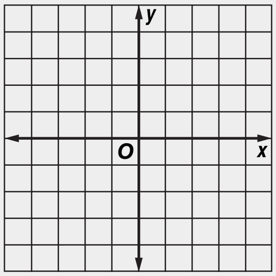
12. $A(2, 3)$ and $B(1, 1)$

13. $S(6, -5)$ and $T(4, 1)$

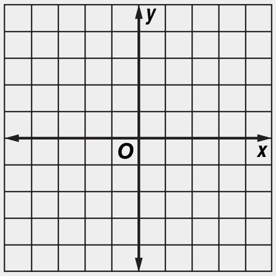
7-6 Slope-Intercept Form

State the slope and y-intercept, then graph each equation.

14. $y = 2x - 1$



15. $4x + 2y = 5$



7-7 Writing Linear Equations

Write an equation in slope-intercept form for each line.

16. slope $= -3$, y-intercept $= 7$

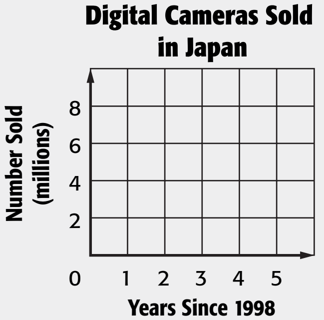
17. slope $= \frac{5}{8}$, y-intercept $= 0$

18. Write an equation in slope-intercept form for the line passing through $(-3, 4)$ and $(1, 2)$.

7-8 Prediction Equations

The table shows the number of digital cameras sold in Japan.

19. Make a scatter plot and draw a line of fit. Then predict how many digital cameras will be sold in Japan in 2008.



Year	Sales (millions)
1999	1.8
2000	3.6
2001	5.9
2002	6.7
2003	9.2*

*Projected in Nov. 2003 Digital Photography Review

ARE YOU READY FOR THE CHAPTER TEST?

Visit **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 413 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 7 Study Guide and Review on pages 408–412 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 7 Practice Test on page 413.

☐ **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 408–412 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 413.

Student Signature

Parent/Guardian Signature

Teacher Signature

CHAPTER 8

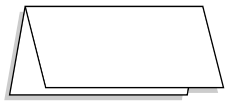
Equations and Inequalities

FOLDABLES™

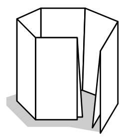
Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with a sheet of $8\frac{1}{2}$" × 11" of notebook paper.

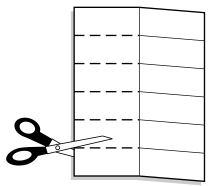
STEP 1 **Fold** in half lengthwise.



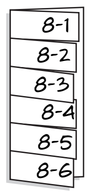
STEP 2 **Fold** in thirds and then fold each third in half.



STEP 3 **Open**. Cut one side along the folds to make tabs.



STEP 4 **Label** each tab with the lesson number as shown.



NOTE-TAKING TIP: Write down questions that you have about what you are reading in the lesson. Then record the answer to each question as you study the lesson.

CHAPTER 8

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
identity			
inequality [IHN-ih-KWAHL-uht-ee]			
null or empty set [NUHL]			

8–1 Solving Equations with Variables on Each Side

MAIN IDEA

- Solve equations with variables on each side.

EXAMPLE Equations with Variables on Each Side

1 **Solve $5x + 12 = 2x$.**

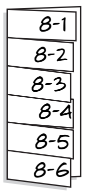
$5x + 12 = 2x$	Write the equation.
$5x - \square + 12 = 2x - \square$	Subtract $\square$ from each side.
$\square = \square$	Simplify.
$\square = x$	Mentally divide each side by $\square$.

Check Your Progress Solve $7x = 5x + 6$.

FOLDABLES™

ORGANIZE IT

As you read through Lesson 8-1, write down one or more questions you have behind the 8-1 tab of your Foldable. As you study the lesson, take notes, and record information that answers your questions.



EXAMPLE Equations with Variables on Each Side

2 **Solve $7x + 3 = 2x + 23$.**

$7x + 3 = 2x + 23$	Write the equation.
$7x - \square + 3 = 2x - \square + 23$	Subtract $\square$ from each side.
$\square = 23$	Simplify.
$\square - \square = 23 - \square$	Subtract $\square$ from each side.
$\square = \square$	Simplify.
$x = \square$	Mentally divide.

Check Your Progress **Solve each equation.**

a. $4x + 15 = 2x - 7$

b. $2.4 - 3m = 6.4m - 8.88$

EXAMPLE

3 **CAR RENTAL** **A car rental agency has two plans. Under Plan A, a car rents for $80 plus $20 each day. Under Plan B, a car rents for $120 plus $15 a day. What number of days results in the same cost?**

Let d represent the number of days.

____ plus ____ per day equals ____ + ____ per day

____ = ____

____ = ____	Write the equation.
$80 + 20d -$ ____ $= 120 + 15d -$ ____	Subtract ____ from each side.
$80 + 5d = 120$	Simplify.
$80 + 5d -$ ____ $= 120 -$ ____	Subtract ____ from each side.
$5d = 40$	Simplify.
____ = ____	Divide each side by ____.
____ = ____	Simplify.

If you rent the car for ____ days, the cost is the same for both plans.

Check Your Progress **CELL PHONES** A cell phone provider offers two plans. Under Plan A, the monthly cost is $20 with a cost of $0.35 per minute. Under Plan B, the monthly cost is $35 with a cost of $0.15 per minute. What number of minutes results in the same cost?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

8–2 Solving Equations with Grouping Symbols

MAIN IDEAS

- Solve equations that involve grouping symbols.
- Identify equations that have no solution or an infinite number of solutions.

EXAMPLE Solve Equations with Parentheses

1 **Solve $3h = 5(h - 2)$.**

$3h = 5(h - 2)$	Write the equation.
$3h =$ ____ $-$ ____	____ Property
$3h =$ ____	Simplify.
$3h -$ ____ $=$ ____	Subtract ____ from each side.
____ $=$ ____	Simplify.
$h =$ ____	Simplify.

Ths solution is ____.

EXAMPLE No Solution

2 **Solve $4x - 0.3 = 4x + 0.9$.**

$4x - 0.3 = 4x + 0.9$	Write the equation.
$4x -$ ____ $- 0.3 = 4x -$ ____ $+ 0.9$	Subtract ____ from each side.
____ $=$ ____	Simplify.

The sentence is ____ true. So, the solution set is ____.

Check Your Progress **Solve each equation.**

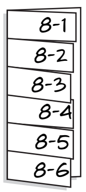
a. $4t = 7(t - 3)$

b. $16 + 1.3m = -12 + 1.3m$

FOLDABLES™

ORGANIZE IT

As you read through Lesson 8-2, write down one or more questions you have behind the 8-2 tab of your Foldable. As you study the lesson, take notes, and record information that answers your questions.



BUILD YOUR VOCABULARY (page 196)

An equation that is ______ for every value of the ______ is called an **identity**.

EXAMPLES All Numbers as Solutions

3 **Solve $3(4x - 2) + 15 = 12x + 9$.**

$3(4x - 2) + 15 = 12x + 9$	Write the equation.
______ $+ 15 = 12x + 9$	Distributive Property
______ $= 12x + 9$	Simplify.
______ = ______	Subtract ______ from each side.
______ = ______	Mentally divide each side by ______.

The sentence is ______ true. The solution set is ______.

Check Your Progress Solve $10a - 9 = 5(2a - 3) + 6$.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

8–3 Inequalities

Main Ideas

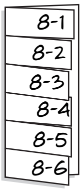
- Write inequalities.
- Graph inequalities.

Build Your Vocabulary (page 196)

A mathematical sentence that contains ______ or ______ is called an **inequality**.

Foldables™ Organize It

As you read through Lesson 8-3, write down one or more questions you have behind the 8-3 tab of your Foldable. As you study the lesson, take notes, and record information that answers your questions.



EXAMPLE Write Inequalities

1 Write an inequality for each sentence.

a. Your height is greater than 52 inches.

Variable: Let h represent ______.

Inequality: ______

b. Your speed is less than or equal to 62 miles per hour.

Variable: Let s represent ______.

Inequality: ______

Check Your Progress **Write an inequality for each sentence.**

a. Your height is less than 48 inches.

b. Your age is greater than 12 years.

c. Your weight is less than or equal to 120 pounds.

d. Your speed is greater than or equal to 35.

WRITE IT

Describe one way to remember the difference between the > symbol and the ≥ symbol.

____

____

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EXAMPLE Determine Truth of an Inequality

2 For the given value, state whether the inequality is *true* or *false*.

a. $s - 9 < 4, s = 6$

$\boxed{} - 9 \overset{?}{<} 4$ — Replace s with $\boxed{}$.

$\boxed{} < 4$ — Simplify.

The sentence is $\boxed{}$.

b. $14 \leq \frac{a}{3} + 1, a = 36$

$14 \leq \frac{\boxed{}}{3} + 1$ — Replace a with $\boxed{}$.

$14 \overset{?}{\leq} \boxed{} + 1$ — Simplify.

$14 \not\leq \boxed{}$ — Simplify.

The sentence is $\boxed{}$.

Check Your Progress **For the given value, state whether each inequality is *true* or *false*.**

a. $12 - m > 7, m = 5$

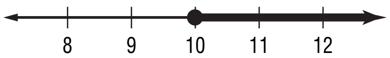
b. $\frac{20}{x} + 3 \leq 6, x = 10$

EXAMPLE Graph Inequalities

3 **a. Graph $x > 10$.**

The open circle means the number 10 is ______.

b. Graph $x \geq 10$.



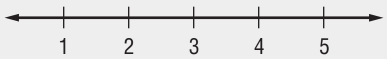
The closed circle means the number 10 is ______.

c. Graph $x < 10$.

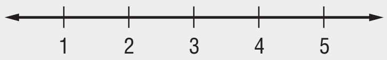
The open circle means the number 10 is ______.

Check Your Progress **Graph each inequality.**

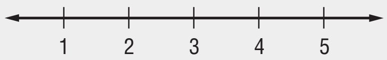
a. $x < 3$



b. $x > 3$

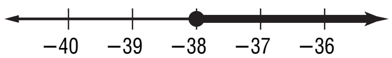


c. $x \geq 3$



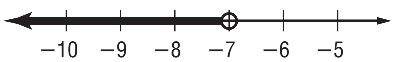
EXAMPLE Write an Inequality

4 **Write the inequality for the graph.**



A closed circle is on −38, so the point −38 is ______ in the graph. The arrow points to the ______, so the graph includes all numbers ______ than or ______ −38. That is, ______.

Check Your Progress Write the inequality for the graph.



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HOMEWORK ASSIGNMENT

Page(s):

Exercises:

8–4 Solving Inequalities by Adding or Subtracting

MAIN IDEA

- Solve inequalities by using the Addition and Subtraction Properties of Inequality.

KEY CONCEPT

Addition and Subtraction Properties When you add or subtract the same number from each side of an inequality, the inequality remains true.

EXAMPLE Solve an Inequality Using Subtraction

1 Solve $y + 5 > 11$.

$y + 5 > 11$	Write the inequality.
$y + 5 - \square > 11 - \square$	Subtract 5 from each side.
$\square > \square$	Simplify.

EXAMPLE Solve an Inequality Using Addition

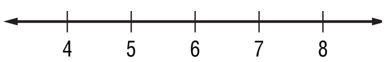
2 Solve $-21 \geq d - 8$.

$-21 \geq d - 8$	Write the inequality.
$-21 + \square \geq d - 8 + \square$	Add $\square$ to each side.
$\square \geq \square$	Simplify.

EXAMPLE Graph Solutions of Inequalities

3 Solve $h - 1\frac{1}{2} < 5$. Graph the solution on a number line.

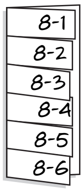
$h - 1\frac{1}{2} < 5$	Write the inequality.
$h - 1\frac{1}{2} + \square < 5 + \square$	Add $\square$ to each side.
$\square < \square$	Simplify.



Place $\square$ at $\square$. Draw a line and arrow to the $\square$.

FOLDABLES™ ORGANIZE IT

As you read through Lesson 8-4, write down questions you have behind the 8-4 tab of your Foldable. As you study the lesson, take notes, and record information that answers your questions.

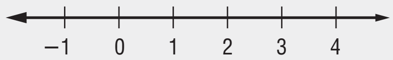


Check Your Progress **Solve each equation.**

a. $x + 9 < 13$

b. $m + 8 < -2$

c. Solve $x - \frac{3}{4} \geq \frac{1}{2}$. Graph the solution on a number line.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

Solving Inequalities by Multiplying or Dividing

MAIN IDEAS

- Solve inequalities by multiplying or dividing by a positive number.
- Solve inequalities by multiplying or dividing by a negative number.

EXAMPLE Multiply or Divide by a Positive Number

1 **a. Solve $9x \le 54$.**

$9x \le 54$ — Write the inequality.

$\dfrac{9x}{\boxed{}} \le \dfrac{54}{\boxed{}}$ — Divide each side by $\boxed{}$.

$\boxed{} \le \boxed{}$ — Simplify.

b. Solve $\dfrac{d}{9} > 4$.

$\dfrac{d}{9} > 4$ — Write the inequality.

$9\left(\dfrac{d}{9}\right) > \boxed{}(4)$ — Multiply each side by $\boxed{}$.

$\boxed{} > \boxed{}$ Simplify.

KEY CONCEPT

Multiplication and Division Properties
When you multiply or divide each side of an inequality by the same or positive number, the inequality remains true.

Check Your Progress **Solve each inequality.**

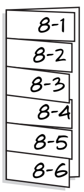
a. $3x > 21$

b. $6 \le \dfrac{p}{3}$

FOLDABLES™

ORGANIZE IT

As you study the lesson, take notes, and record information about solving inequalities.



EXAMPLE

2 **TEST EXAMPLE** **Martha earns \$9 per hour working for a fast-food restaurant. Which inequality can be used to find how many hours she must work in a week to earn at least \$117?**

A $9x < 117$ **C** $9x > 117$

B $9x \ge 117$ **D** $9x \le 117$

Let x represent the number of hours worked.

Amount earned per hour	times	number of hours	is at least	amount earned each week
$\boxed{}$	$\boxed{}$	$\boxed{}$	$\boxed{}$	$\boxed{}$

The inequality is $\boxed{}$. So, the answer is $\boxed{}$.

Check Your Progress **TEST EXAMPLE** Ed earns \$6 per hour working at the library. Write an inequality that can be used to find how many hours he must work in a week to earn more than \$100?

A $6x < 100$ **C** $6x \leq 100$

B $6x \geq 100$ **D** $6x > 100$

KEY CONCEPT

Multiplication and Division Properties When you multiply or divide each side of an inequality by the same negative number, the inequality symbol must be reversed for the inequality to remain true.

EXAMPLE Multiply or Divide by a Negative Number

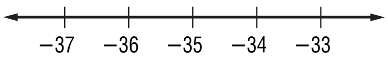
3 **Solve each inequality and check your solution. Then graph the solution on a number line.**

a. $\frac{x}{-5} \geq 7$

$\frac{x}{-5} \geq 7$ Write the inequality.

$\boxed{}\left(\frac{x}{-5}\right) \leq \boxed{}(7)$ Multiply each side by $\boxed{}$ and reverse the symbol.

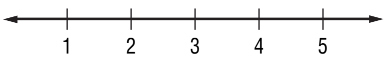
$x \leq \boxed{}$



b. $-9x < -27$ Write the inequality.

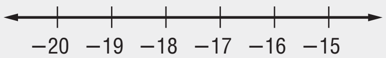
$\frac{-9x}{\boxed{}} > \frac{-27}{\boxed{}}$ Divide each side by $\boxed{}$ and reverse the symbol.

$x > \boxed{}$

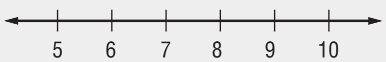


Check Your Progress **Solve each inequality and check your solution. Then graph the solution on a number line.**

a. $\frac{x}{-3} > 6$



b. $-5x \leq -40$



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

8–6 Solving Multi-Step Inequalities

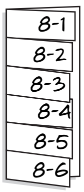
MAIN IDEA

- Solve inequalities that involve more than one operation.

FOLDABLES™

ORGANIZE IT

As you read through Lesson 8-6, write down questions you have behind the 8-6 tab of your Foldable. As you study the lesson, take notes, and record information that answers your questions.

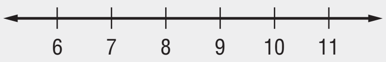


EXAMPLE Solve a Two-Step Inequality

1 **Solve $5x + 13 > 83$. Graph the solution on a number line.**

$5x + 13 > 83$	Write the inequality.
$5x + 13 -$ ____ $> 83 -$ ____	Subtract ____ from each side.
____ $>$ ____	Simplify.
____ $>$ ____	Divide each side by ____.
____ $>$ ____	

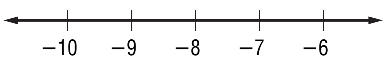
Check Your Progress Solve $3x - 9 < 18$. Graph the solution on a number line.



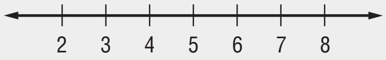
EXAMPLE Reverse the Inequality Symbol

2 **Solve $7 - 4a \leq 23 - 2a$. Graph the solution on a number line.**

$7 - 4a \leq 23 - 2a$	Write the inequality.
$7 - 4a +$ ____ $\leq 23 - 2a +$ ____	Add ____ to each side.
____ $\leq$ ____	Simplify.
____ $\leq$ ____	Subtract ____ from each side.
____ $\leq$ ____	Simplify.
____ $\geq$ ____	Divide each side by ____ and change $\leq$ to $\geq$.
$a \geq$ ____	



Check Your Progress Solve $8 + 2x < 5x - 7$. Graph the solution on a number line.



EXAMPLE

3 RUNNING José wants to run a 10K marathon. Refer to *Get Ready for the Lesson* in the text. If the length of his current daily runs is 2 kilometers, by how many kilometers should he increase his daily run to have enough endurance for the race?

Let d represent the increase in the number of miles José should run.

Words 3 times 2 kilometers plus amount of increase is greater than or equal to desired distance.

Inequality ____ ____ ____ ____ ____

____ $\geq$ ____ Write the equation

____ $\geq$ ____ Distributive Property

____ $\geq$ ____ Subtract ____ from each side.

____ $\geq$ ____ Simplify.

____ $\geq$ ____ Divide each side by ____.

____ $\geq$ ____ Simplify.

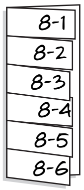
Jose should increase his daily run by at least ____ kilometers each day.

Check Your Progress A person weighing 168 pounds has a 7-pound backpack. If three times the weight of your backpack and its contents should be less than your body weight, what is the maximum weight for the contents of the pack?

FOLDABLES™

ORGANIZE IT

Under the tab for Lesson 8-6, write an example of an inequality that requires two steps to solve. Label each step with the operation being undone.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 8

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 8 Foldable** to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 8, go to: glencoe.com	You can use your completed **Vocabulary Builder** *(page 196)* to help you solve the puzzle.

8-1 Solving Equations with Variables on Each Side

Number the steps in the correct order for solving the equation $2x + 4 = 4x - 8$. Some steps may be used more than once.

1. ______ Simplify.

2. ______ Subtract $2x$ from each side.

3. ______ Write the equation.

4. ______ Add 8 to each side.

5. ______ Divide each side by 2.

8-2 Solving Equations with Grouping Symbols

6. The perimeter of a rectangle is 74 inches. Find the dimensions and the area if the length is 5 inches shorter than twice the width.

______

8-3 Inequalities

For each of the following phrases, write the corresponding inequality symbol in the blank. Use <, >, ≤, or ≥.

7. is greater than ______

8. is less than or equal to ______

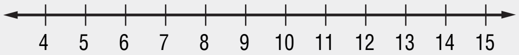
9. Write an inequality for the sentence: *Seven less than a number is at least 15.* ______

8-4 Solving Inequalities by Adding or Subtracting

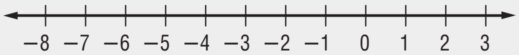
10. Is 6 a solution for the inequality $17 + x > 23$? Explain.

Solve each inequality. Then graph the solution on a number line.

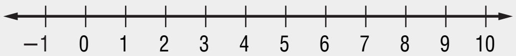
11. $b + 6 < 19$



12. $21 > n + 27$



13. $-8 \leq -15 + x$



8-5 Solving Inequalities by Multiplying or Dividing

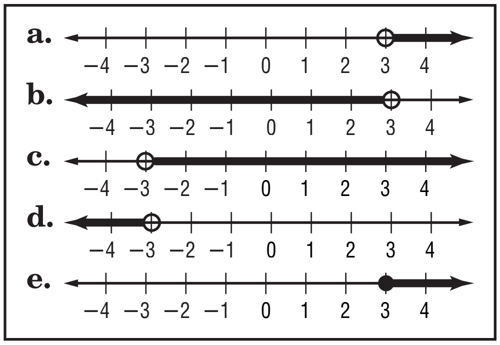
Match each inequality with its graph.

14. $2x \geq 6$

15. $\frac{x}{-3} > -1$

16. $12x < -36$

17. $-3x < -9$



8-6 Solving Multi-Step Inequalities

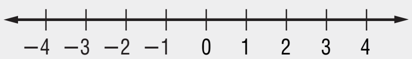
Underline the correct term or phrase to complete each statement.

18. Remember to (reverse, delete) the inequality symbol when multiplying or dividing both sides of the inequality by a negative number.

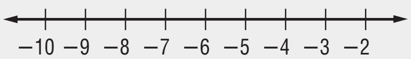
19. To check the solution $x > 14$, you should try a number (smaller, greater) than 14 in the original inequality.

Solve each inequality. Graph the solution on a number line.

20. $\frac{x}{2} + 7 < 6$



21. $3(p + 2) \leq 2(2p + 7.5)$



CHAPTER 8

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **glencoe.com** to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 8.

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 451–454 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.

☐ **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 451–454 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.

Student Signature

Parent/Guardian Signature

Teacher Signature

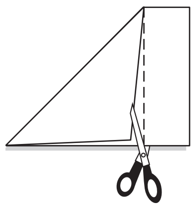
CHAPTER 9

Real Numbers and Right Triangles

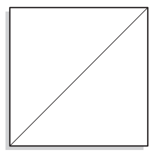
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with three plain sheets of $8\frac{1}{2}$" × 11" paper.

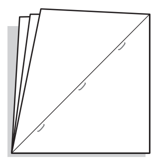
STEP 1 **Fold** to make a triangle. Cut off extra paper.



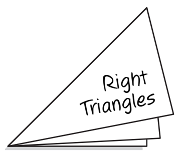
STEP 2 **Repeat** Step 1 twice. You now have three squares.



STEP 3 **Stack** the three squares and staple along the fold.



STEP 4 **Label** each section with a topic.



NOTE-TAKING TIP: A visual (graph, diagram, picture, chart) can present information in a concise, easy-to-study format. Clearly label your visuals and write captions when needed.

CHAPTER 9

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 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 angle			
acute triangle			
congruent [kuhn-GROO-uhnt]			
Distance Formula			
equilateral triangle [EE-kwuh-LAT-uh-ruhl]			
hypotenuse [hy-PAHT-uhn-noos]			
indirect measurement			
irrational numbers			
isosceles triangle [eye-SAHS-uh-LEEZ]			
line segment			

Vocabulary Term	Found on Page	Definition	Description or Example
obtuse angle [ahb-TOOS]			
obtuse triangle			
perfect square			
Pythagorean Theorem [puh-THAG-uh-REE-uhn]			
radical sign			
real numbers			
right angle			
right triangle			
scalene triangle [SKAY-LEEN]			
similar figures			
square root			
straight angle			
triangle			
vertex			

9–1 Squares and Square Roots

MAIN IDEAS

- Find squares and square roots.
- Estimate square roots.

BUILD YOUR VOCABULARY (page 215)

A **radical sign**, $\sqrt{}$, is used to ______ the square root.

KEY CONCEPT

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

EXAMPLE Find Square Roots

1 Find each square root.

a. $\sqrt{\mathbf{64}}$ indicates the ______ square root of 64.

Since ______ $= 64$, $\sqrt{64} =$ ______.

b. $-\sqrt{\mathbf{121}}$ indicates the ______ square root of 121.

Since ______ $= 121$, $-\sqrt{121} =$ ______.

c. $\pm\sqrt{\mathbf{256}}$ indicates both square roots of 256. Since $16^2 =$ ______,

$\sqrt{256} =$ ______ and $-\sqrt{256} =$ ______.

d. $\sqrt{\boldsymbol{z}^{\mathbf{2}}}$ indicates the positive square root of z^2.

$\sqrt{z^2} =$ ______

EXAMPLE Find Square Roots with a Calculator

2 Use a calculator to find each square root to the nearest tenth.

a. $\sqrt{\mathbf{22}}$

2nd [$\sqrt{}$] 22 ENTER ______ Use a calculator.

$\sqrt{22} \approx$ ______ Round to the nearest tenth.

b. $-\sqrt{\mathbf{319}}$

(–) 2nd [$\sqrt{}$] 319 ENTER ______ Use a calculator.

$-\sqrt{319} \approx$ ______ Round to the nearest tenth.

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

a. $\sqrt{25}$ **b.** $-\sqrt{144}$

c. $\pm\sqrt{16}$ **d.** $\sqrt{t^2}$

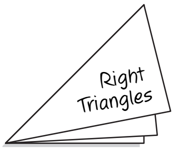
Use a calculator to find each square root to the nearest tenth.

d. $\sqrt{71}$ **e.** $-\sqrt{38}$

FOLDABLES™

ORGANIZE IT

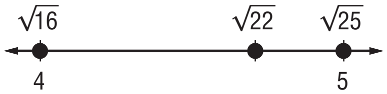
Under the tab for Lesson 9-1, list and then estimate three square roots to the nearest whole number.



EXAMPLE Estimate Square Roots

3 **Estimate $\sqrt{22}$ to the nearest integer.**

- The first perfect square less than 22 is 16.
- The first perfect square greater than 22 is 25.
- Plot each square root on a number line.



The square root of $\sqrt{22}$ is between the integers ____ and ____. Since 22 is closer to ____ than ____, you can expect that $\sqrt{22}$ is closer to ____ than ____.

Check Your Progress **Estimate each square root to the nearest integer.**

a. $\sqrt{54}$ **b.** $-\sqrt{152}$

EXAMPLE

4 **SKYSCRAPER The tallest building in Houston, Texas is the JP Morgan Chase Tower, standing at 1002 feet tall. Use the Real-World Link in the text to determine about how far a person can see from the top floor on a clear day.**

$D = 1.22 \times$ ______	Write the formula.
$= 1.22 \times$ ______	Replace A with ______.
$=$ ______	Evaluate the square root first. Then multiply.

On a clear day, the light will be visible from about ______.

Check Your Progress **SKYSCRAPER** A skyscraper stands 378 feet high. On a clear day, about how far could an individual standing on the roof of the skyscraper see? Round to the nearest tenth.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

9–2 The Real Number System

MAIN IDEAS

- Identify and compare numbers in the real number system.
- Solve equations by finding square roots.

BUILD YOUR VOCABULARY (pages 214–215)

The set of ________ numbers and the set of ________ numbers together make up the set of **real numbers**.

KEY CONCEPT

Irrational Number An irrational number is a number that cannot be expressed as $\frac{a}{b}$, where a and b are integers and b does not equal 0.

EXAMPLE Classify Real Numbers

1 Name all of the sets of numbers to which each real number belongs.

a. $0.2\overline{46}$ This repeating decimal is a ________ number because it is equivalent to ________.

b. $\sqrt{225}$ Since $\sqrt{225} =$ ________, this number is a ________

c. $-\frac{72}{6}$ Since $-\frac{72}{6} =$ ________, this number is an ________ and a ________.

d. $\frac{14}{4}$ Since $\frac{14}{4} =$ ________, this number is a ________.

Check Your Progress **Name all of the sets of numbers to which each real number belongs.**

a. $0.\overline{380}$ ________

b. $-\sqrt{81}$ ________

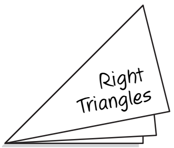
c. $\frac{45}{9}$ ________

d. $\frac{19}{4}$ ________

FOLDABLES™

ORGANIZE IT

Under the tab for Lesson 9-2, explain how to compare real numbers on a number line. Be sure to include an example.



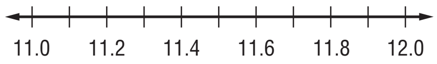
EXAMPLE Compare Real Numbers on a Number Line

2 **Replace ● with <, >, or = to make $\sqrt{125}$ ● $11\frac{7}{8}$ a true statement.**

Express each number as a ______. Then ______ the numbers.

$\sqrt{125} =$ ______

$11\frac{7}{8} =$ ______



Since $\sqrt{125}$ is to the ______ of $11\frac{7}{8}$, $\sqrt{125}$ ______ $11\frac{7}{8}$.

Check Your Progress Replace ● with <, >, or = to make $\sqrt{61}$ ● $7\frac{3}{4}$ a true statement.

EXAMPLE Solve Equations

3 **Solve $w^2 = 169$. Round to the nearest tenth, if necessary.**

$w^2 = 169$	Write the equation.
______ = ______	Take the square root of each side.
$w =$ ______ or $w =$ ______	Find the positive and negative square root.
$w =$ ______ or $w =$ ______	

Check Your Progress Solve $m^2 = 81$. Round to the nearest tenth, if necessary.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

9–3 Triangles

MAIN IDEAS

- Find the missing angle measure of a triangle.
- Classify triangles by properties and attributes.

KEY CONCEPT

Angles of a Triangle The sum of the measures of the angles of a triangle is 180°.

EXAMPLE Use Ratios to Find Angle Measures

1 ALGEBRA **The measures of the angles of a certain triangle are the ratio 2:3:5. What are the measures of the angles?**

Let ______ represent the measure of one angle, ______ the measure of a second angle, and ______ the measure of the third angle.

______ = 180 The sum of the measures is 180.

______ = 180 Combine like terms.

______ = ______ Divide each side by ______.

x = ______ Simplify.

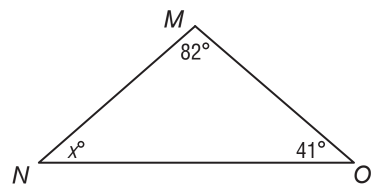
$2x = 2($ ______ $)$ or ______, $3x = 3($ ______ $)$ or ______, and

$5x = 5($ ______ $)$ or ______.

The measures of the angles are ______, ______, and ______.

Check Your Progress

a. Find the value of x in $\triangle MNO$.

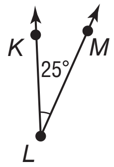


b. The measures of the angles of a certain triangle are in the ratio 3:5:7. What are the measures of the angles?

EXAMPLE Classify Angles

2 **Classify each angle as *acute, obtuse, right,* or *straight*.**

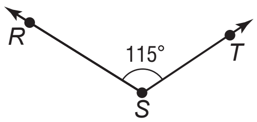
a.



$m\angle KLM$ ______.

So, $\angle KLM$ is ______.

b.

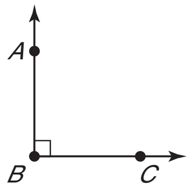


$m\angle RST$ ______.

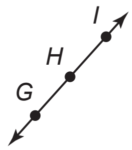
So, $\angle RST$ is ______.

Check Your Progress **Classify each angle as *acute, obtuse, right,* or *straight*.**

a.



b.



KEY CONCEPT

Classify Triangles by their Angles and by their Sides

Acute Triangle A triangle with all acute angles.

Obtuse Triangle A triangle with one obtuse angle.

Right Triangle A triangle with one right angle.

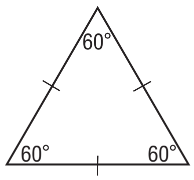
Scalene Triangle A triangle with no congruent sides.

Isosceles Triangle A triangle with at least two sides congruent.

Equilateral Triangle A triangle with all sides congruent.

EXAMPLE Classify Triangles

3 **Classify the triangle by its angles and by its sides.**



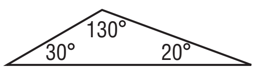
Angles All angles are ______.

Sides All sides are ______.

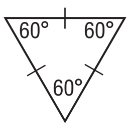
The triangle is an ______ triangle.

Check Your Progress **Classify each triangle by its angles and by its sides.**

a.



b.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

9–4 The Pythagorean Theorem

MAIN IDEAS

- Use the Pythagorean Theorem to find the length of a side of a right triangle.
- Use the converse of the Pythagorean Theorem to determine whether a triangle is a right triangle.

BUILD YOUR VOCABULARY (pages 214–215)

In a right triangle, the side opposite the ______ angle is the **hypotenuse**.

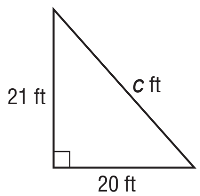
If you know the lengths of two ______ of a right triangle, you can use the **Pythagorean Theorem** to find the length of the ______ side. This is called **solving a right triangle.**

KEY CONCEPT

Pythagorean Theorem
If a triangle is a right triangle, then the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs.

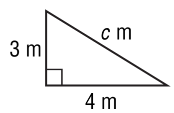
EXAMPLE Find the Length of the Hypotenuse

1 **Find the length of the hypotenuse of the right triangle.**



$c^2 = a^2 + b^2$	Pythagorean Theorem
$c^2 = \_\_\_^2 + \_\_\_^2$	Replace *a* with ______ and *b* with ______.
$c^2 = \_\_\_ + \_\_\_$	Evaluate ______ and ______.
$c^2 = \_\_\_$	Add ______ and ______.
$c^2 = \_\_\_$	Take the ______ of each side.
$c = \_\_\_$	The length is ______.

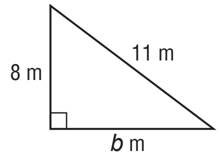
Check Your Progress Find the length of the hypotenuse of the right triangle.



______

EXAMPLE Solve a Right Triangle

2 **Find the length of the leg of the right triangle to the nearest tenth.**



$c^2 = a^2 + b^2$	Pythagorean Theorem
$\_\_\_\_^2 = \_\_\_\_^2 + b^2$	Replace c with ____ and a with ____.
____ $=$ ____ $+ b^2$	Evaluate ____ and ____.
____ $= b^2$	Subtract 64 from each side.
____ $= \sqrt{b^2}$	Take the ____ of each side.

2nd [√‾] ____ ENTER ____

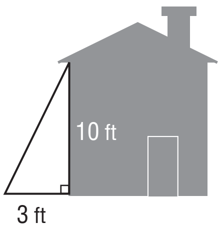
The length of the leg is about ____.

EXAMPLE Use the Pythagorean Theorem

3 **TEST EXAMPLE** **A building is 10 feet tall. A ladder is positioned against the building so that the base of the ladder is 3 feet from the building. About how many feet long is the ladder?**

A 10.0 ft **C** 12.4 ft

B 10.4 ft **D** 14.9 ft



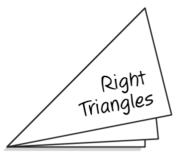
$c^2 = a^2 + b^2$	Pythagorean Theorem
$c^2 = \_\_\_\_^2 + \_\_\_\_^2$	Replace a with ____ and b with ____.
$c^2 =$ ____ $+$ ____	Evaluate ____ and ____.
$c^2 =$ ____	Simplify.
$\sqrt{c^2} = \sqrt{109}$	Take the ____ of each side.
$c \approx$ ____	Round to the nearest tenth.

The ladder is about ____ tall. The answer is ____.

FOLDABLES™

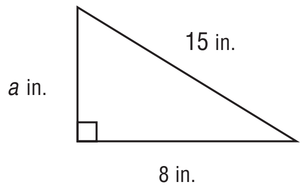
ORGANIZE IT

Under the tab for the Pythagorean Theorem, write the Pythagorean Theorem. Then draw a right triangle and label the sides *a, b,* and *c* as used in the theorem.



Check Your Progress

a. Find the length of the leg of the right triangle.



b. **TEST EXAMPLE** An 18-foot ladder is placed against a building which is 14 feet tall. About how far is the base of the ladder from the building?

A 11.3 ft **B** 11.0 ft **C** 10.5 ft **D** 10.2 ft

EXAMPLE Identify a Right Triangle

4 **The measures of three sides of a triangle are 48 feet, 60 feet, and 78 feet. Determine whether the triangle is a right triangle.**

$c^2 = a^2 + b^2$	Pythagorean Theorem
$\square^2 \stackrel{?}{=} \square^2 + \square^2$	Replace *a* with ____, *b* with ____, and *c* with ____.
$\square \stackrel{?}{=} \square + \square$	Evaluate.
____	Simplify.

The triangle ____ a right triangle.

Check Your Progress The measures of three sides of a triangle are 42 inches, 61 inches, 84 inches. Determine whether the triangle is a right triangle.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

9–5 The Distance Formula

EXAMPLE Use the Distance Formula

Main Idea

- Use the Distance Formula to determine lengths on a coordinate plane.

1 **Find the distance between $M(8, 4)$ and $N(-6, -2)$. Round to the nearest tenth, if necessary.**

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Distance Formula

$MN =$ ______ $(x_1, y_1) = (8, 4)$, $(x_2, y_2) = (-6, -2)$

$MN =$ ______ Simplify.

$MN =$ ______ Evaluate ______ and ______.

$MN =$ ______ Add ______ and ______.

$MN \approx$ ______

The distance between points M and N is about ______.

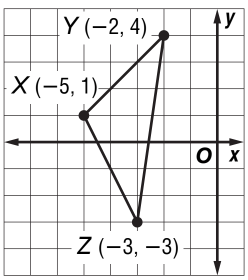
Key Concept

Distance Formula The distance d between two points with coordinates (x_1, y_1) and (x_2, y_2), is given by $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Check Your Progress Find the distance between $A(-4, 5)$ and $B(3, -9)$. Round to the nearest tenth, if necessary.

EXAMPLE Use the Distance Formula to Solve a Problem

2 GEOMETRY **Find the perimeter of $\triangle XYZ$ to the nearest tenth.**



First, use the Distance Formula to find the length of each side of the triangle.

Distance Formula:

WRITE IT

Which point should be used for $(y_2 - y_1)$ in the distance formula? Explain.

____

____

____

____

Side $\overline{XY}$: $X(-5, 1)$, $Y(-2, 4)$

$XY =$ ______ $(x_1, y_1) = (-5, 1)$, $(x_2, y_2) = (-2, 4)$

$XY =$ ______ Simplify.

$XY =$ ______ Simplify.

Side $\overline{YZ}$: $Y(-2, 4)$, $Z(-3, -3)$

$YZ =$ ______ $(x_1, y_1) = (-2, 4)$, $(x_2, y_2) = (-3, -3)$

$YZ =$ ______ Simplify.

$YZ =$ ______ Simplify.

Side $\overline{ZX}$: $Z(-3, -3)$, $X(-5, 1)$

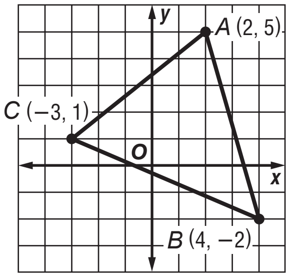
$ZX =$ ______ $(x_1, y_1) = (-3, -3)$, $(x_2, y_2) = (-5, 1)$

$ZX =$ ______ Simplify.

$ZX =$ ______ Simplify.

The perimeter is ______ + ______ + ______ or about ______.

Check Your Progress Find the perimeter of $\triangle ABC$ to the nearest tenth.



EXAMPLE

3 SOCCER Nikki kicks a ball from a position that is 2 yards behind the goal line and 4 yards from the sideline (–2, 4). The ball lands 8 yards past the goal line and 2 yards from the same sideline (8, 2). What distance, to the nearest tenth, was the ball kicked?

Let d = the distance the ball was kicked. Use the distance formula.

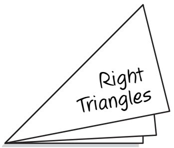
$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	Distance Formula
$d =$	$(x_1, y_1) = (-2, 4)$, $(x_2, y_2) = (8, 2)$
$d =$	Add.
$d =$	Simplify.
$d = \quad \approx$	

The ball was kicked a distance of about ______ yards.

FOLDABLES™

ORGANIZE IT

Write the Distance Formula under the tab for this topic. Illustrate the formula.



Check Your Progress **LANDSCAPING** Geneva set up a coordinate system with units of feet to plan the position of two trees she wants to plant. She plans to put one tree at (–3, –4) and one at (5, 2). How far apart will the trees be? Round to the nearest tenth.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

9–6 Similar Figures and Indirect Measurement

Main Ideas

- Identify corresponding parts and find missing measures of similar figures.
- Solve problems involving indirect measurement using similar triangles.

Key Concept

Corresponding Parts of Similar Figures If two figures are similar, then the corresponding angles have the same measure and the corresponding sides are proportional.

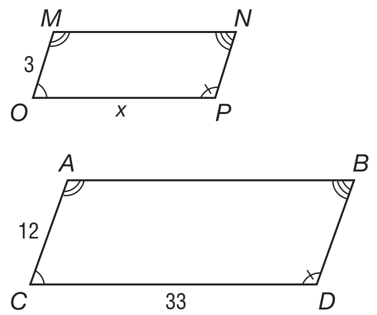
Foldables™ Draw an example of similar figures in your notes. Label the corresponding sides and angles.

Build Your Vocabulary (page 215)

Figures that have the same ___ but not necessarily the same size are called **similar figures**.

Example: Find Measures of Similar Figures

1 The figures are similar. Find the missing measures.



The corresponding sides are ___.

$\dfrac{MO}{AC} = \dfrac{OP}{CD}$ Write a proposition.

___ = ___ $MO =$ ___, $AC =$ ___, $OP =$ ___, $CD =$ ___

___ = ___ Find the cross products.

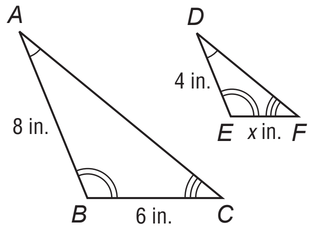
___ = ___ Simplify.

___ $= x$ Divide each side by ___.

The value of x is ___.

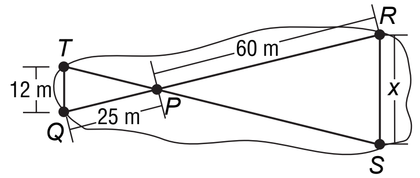
Check Your Progress

The figures are similar. Find the missing measure.



EXAMPLE Use Indirect Measurement

2 MAPS A surveyor wants to find the distance RS across the lake. He constructs $\triangle PQT$ similar to $\triangle PRS$ and measures the distances as shown. What is the distance across the lake?



☐ = ☐ Write a ☐.

☐ = ☐ Substitution

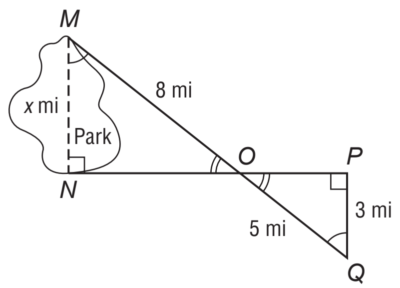
☐ = ☐ Find the ☐.

☐ = ☐ Simplify.

☐ $= x$ Divide each side by ☐.

The distance across the lake is ☐.

Check Your Progress In the figure, $\triangle MNO$ is similar to $\triangle QPO$. Find the distance across the park.



☐

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 9

Bringing It All Together

Study Guide

FOLDABLES	Vocabulary PuzzleMaker	Build Your Vocabulary
Use your **Chapter 9 Foldable** 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: glencoe.com	You can use your completed **Vocabulary Builder** *(pages 214–215)* to help you solve the puzzle.

9-1 Squares and Square Roots

Find each square root, if possible.

1. $\sqrt{361}$ **2.** $\sqrt{-196}$ **3.** $-\sqrt{441}$

Estimate each square root to the nearest integer. Do not use a calculator.

4. $\sqrt{120}$ **5.** $\sqrt{150}$ **6.** $-\sqrt{70}$

9-2 The Real Number System

Underline the correct term to complete each sentence.

7. Numbers with decimals that (are, are not) repeating or terminating are irrational numbers.

8. All square roots (are, are not) irrational numbers.

9. Irrational numbers (are, are not) real numbers.

Name all of the sets of numbers to which each real number belongs. Let N = natural numbers, W = whole numbers, Z = integers, Q = rational numbers, and I = irrational numbers.

10. -49 **11.** $\sqrt{48}$ **12.** 11

Solve each equation. Round to the nearest tenth, if necessary.

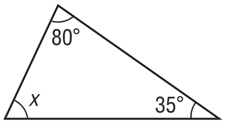
13. $b^2 = 225$ **14.** $2z^2 = 88$

9-3

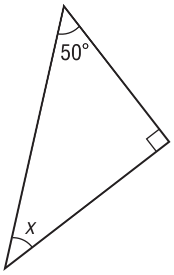
Triangles

Find the value of x in the triangle. Then classify the triangle as *acute, right,* or *obtuse.*

15.



16.



17. The measures of the angles of a triangle are in the ratio 3:4:5. What is the measure of each angle?

9-4

The Pythagorean Theorem

If c is the measure of the hypotenuse, find each missing measure. Round to the nearest tenth, if necessary.

18. $a = 12, b = ?, c = 37$

19. $a = ?, b = 6, c = 16$

20. The length of the sides of a triangle are 10, 24, and 26. Determine whether the triangle is a right triangle.

9-5

The Distance Formula

Find the distance between each pair of points. Round to the nearest tenth, if necessary.

21. $J(8, -3)$, $K(5, 1)$

22. $P(-3, 7)$, $Q(4, 2)$

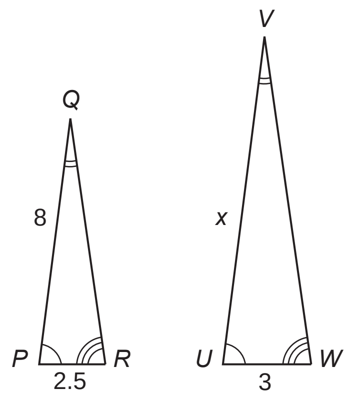
23. $S(2, 4)$, $T(0, -2)$

24. $C(-5, -1)$, $D(3, -4)$

9-6

Similar Figures and Indirect Measurement

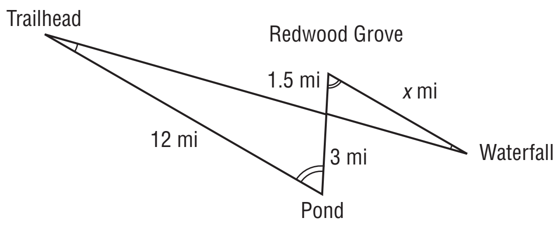
For Questions 25 and 26, use the triangles at the right. $\triangle PQR \sim \triangle UVW$.



25. Name an angle with the same measure as $\angle W$.

26. Find the value of x.

27. In the figure at the right, the triangles are similar. How far is the waterfall from the grove of redwood trees?



CHAPTER 9

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **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 507 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 9 Study Guide and Review on pages 503–506 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 507.

☐ **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 503–506 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 507.

Student Signature

Parent/Guardian Signature

Teacher Signature

CHAPTER 10

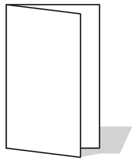
Two-Dimensional Figures

FOLDABLES™

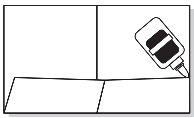
Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with four plain sheets of 11" × 17" paper, eight index cards, and glue.

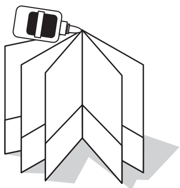
STEP 1 **Fold** in half widthwise.



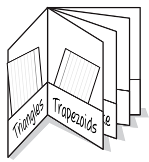
STEP 2 **Fold** the bottom to form a pocket. Glue the edges.



STEP 3 **Repeat** three times. Then glue all four pieces together to form a booklet.



STEP 4 **Label** each pocket. Place an index card in each pocket.



NOTE-TAKING TIP: To help you organize data, create study cards when taking notes, recording and defining vocabulary words, and explaining concepts.

Chapter 10

CHAPTER 10

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
adjacent angles [uh-JAY-suhnt]			
circle			
circumference [suhr-KUHMP-fuhrnts]			
complementary angles [kahm-pluh-MEHN-tuh-ree]			
congruent [kuhn-GROO-uhnt]			
corresponding parts			
diagonal			
diameter			
dilation			
parallel lines			

Vocabulary Term	Found on Page	Definition	Description or Example
perpendicular lines			
π (pi)			
polygon			
quadrilateral [KWAH-druh-LA-tuh-ruhl]			
radius			
reflection			
supplementary angles [SUH-pluh-MEHN-tuh-ree]			
transformation			
translation			
transversal			
vertical angles			

10–1 Line and Angle Relationships

MAIN IDEAS

- Identify the relationships of angles formed by two parallel lines and a transversal.
- Identify the relationships of vertical, adjacent, complementary, and supplementary angles.

BUILD YOUR VOCABULARY (pages 236–237)

Two lines in a plane that never intersect are **parallel lines**.

A line that ____ two parallel lines is called a **transversal**.

When two lines intersect, they form two pairs of ____ angles called **vertical angles**.

When two angles have the same ____, share a common side, and do not overlap, they are **adjacent angles**.

If the sum of the measures of two angles is ____, the angles are **complementary**.

If the sum of the measures of two angles is ____, the angles are **supplementary**.

Lines that ____ to form a ____ are **perpendicular lines**.

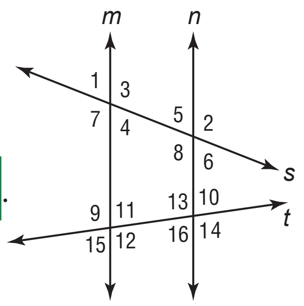
KEY CONCEPT

Parallel Lines Cut by a Transversal If two parallel lines are cut by a transversal, then the following pairs of angles are congruent.

- Corresponding angles are congruent.
- Alternate interior angles are congruent.
- Alternate exterior angles are congruent.

EXAMPLE Find Measures of Angles

1 In the figure, $m \parallel n$ and s and t are transversals. If $m\angle 7 = 123°$, find $m\angle 2$ and $m\angle 8$.



Since $\angle 7$ and $\angle 2$ are alternate ____ angles, they are ____.

So, $m\angle 2 =$ ____.

Since $\angle 7$ and $\angle 8$ are ____ angles, they are ____. So, $m\angle 8 =$ ____.

KEY CONCEPT

Names of Special Angles The eight angles formed by parallel lines and a transversal have special names.

- **Interior angles**
- **Exterior angles**
- **Alternate interior angles**
- **Alternate exterior angles**
- **Corresponding angles**

Check Your Progress In the figure in Example 1, $m \parallel n$ and s and t are transversals. If $m\angle 4 = 57°$, find $m\angle 5$ and $m\angle 1$.

EXAMPLE

2 **LEG LIFTS** **Kian does leg lifts each morning. For each repetition he lifts his legs 35 degrees off the ground. What is the measure of the angle formed by his body and legs in this position?**

The angles are ______.

______ = ______ Write the equation.

$m\angle x + 35$ ______ $= 180$ ______ Subtract ______ from each side.

$m\angle x =$ ______ Simplify.

The angle formed by his body and legs is ______.

Check Your Progress **SEWING** Linda cuts a piece of material from the corner at a 35° angle. What is the measure of the other angle formed by the cut?

EXAMPLE Find Measures of Angles

3 **Angles PQR and STU are supplementary. If $m\angle PQR = x - 15$ and $m\angle STU = x - 65$, find the measure of each angle.**

Step 1 Find the value of x.

$m\angle PQR + m\angle STU =$ ______ Supplementary angles

$(x - 15) + (x - 65) =$ ______ Substitution

______ − ______ = ______ Combine like terms.

______ = ______ Add ______ to each side.

$x =$ ______ Divide each side by ______.

WRITE IT

What is the difference between complementary angles and supplementary angles?

____

____

____

____

____

Step 2 Replace x with ☐ to find the measure of each angle.

$m\angle PQR = x - 15$

$= \square - 15$ or $\square$

$m\angle STU = x - 65$

$= \square - 65$ or $\square$

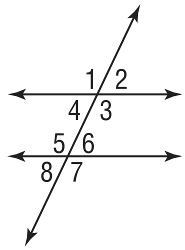
Check Your Progress Angles ABC and DEF are complementary. If $m\angle ABC = x + 12$ and $m\angle DEF = 2x - 9$, find the measure of each angle.

☐

EXAMPLE

4 TRANSPORTATION A road crosses railroad tracks at an angle as shown. If $m\angle 1 = 131°$, find $m\angle 6$ and $m\angle 5$.

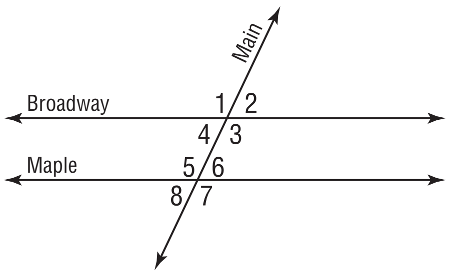
Since ☐ and $\angle 5$ are corresponding angles, they are congruent. So, $m\angle 5 = \square$.



Since ☐ and $\angle 6$ are supplementary angles, the sum of their measures is 180°;

$180 - \square = \square$. So, $m\angle 6 = \square$.

Check Your Progress **TRANSPORTATION** Main Street crosses Broadway Boulevard and Maple Avenue at an angle as shown. If $m\angle 1 = 148°$, find $m\angle 3$ and $m\angle 4$.



☐

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

10–2 Congruent Triangles

MAIN IDEA

- Identify congruent triangles and corresponding parts of congruent triangles.

KEY CONCEPT

Corresponding Parts of Congruent Triangles If two triangles are congruent, their corresponding sides are congruent and their corresponding angles are congruent.

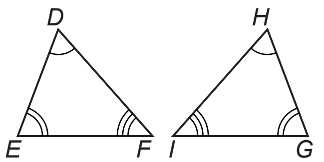
BUILD YOUR VOCABULARY (page 236)

Figures that have the same ______ and ______ are **congruent**.

The parts of congruent triangles that ______ are **corresponding parts**.

EXAMPLE Name Corresponding Parts

1 **Name the corresponding parts in the congruent triangles shown. Then complete the congruence statement.**



$\triangle DEF \cong ?$

Corresponding Angles

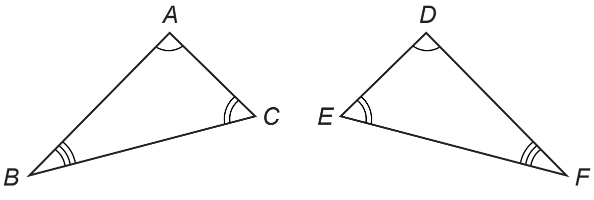
$\angle D \cong$ ______, $\angle E \cong$ ______, $\angle F \cong$ ______

Corresponding Sides

$\overline{DE} \cong$ ______, $\overline{DF} \cong$ ______, $\overline{EF} \cong$ ______

One congruence statement is ______ $\cong$ ______.

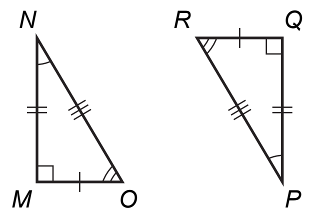
Check Your Progress Name the corresponding parts in the congruent triangles shown. Then complete the congruence statement.

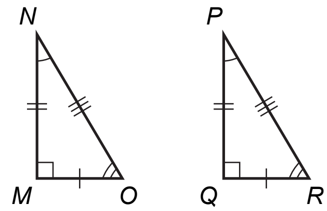


$\triangle ABC \cong ?$

EXAMPLE Identify Congruent Triangles

2 Determine whether the triangles shown are congruent. If so, name the corresponding parts and write a congruence statement.





EXPLORE The drawing shows which angles are congruent and the lengths of all sides.

PLAN Note which segments have the same length and which angles are congruent. Write corresponding vertices in the same order.

SOLVE **Angles:** The arcs indicate that $\angle M \cong$ ____, $\angle N \cong$ ____, and $\angle O \cong$ ____.

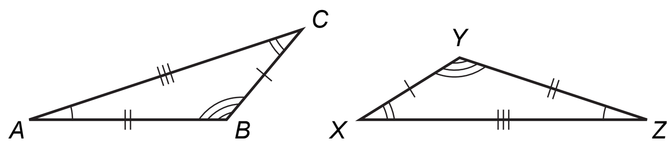
Sides: The slash marks indicate that $\overline{MN} \cong$ ____, $\overline{NO} \cong$ ____, and $\overline{MO} \cong$ ____.

Since all pairs of corresponding angles and sides are ____, the two triangles are ____.

One congruence statement is ____.

CHECK Draw $\triangle MNO$ and $\triangle QPR$ so that they are ____ in the same ____. Then compare the angles and sides.

Check Your Progress Determine whether the triangles shown are congruent. If so, name the corresponding parts and write a congruence statement.



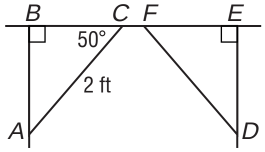
____

REVIEW IT

What do we call a triangle with at least two congruent sides? Three congruent sides? *(Lesson 9-3)*

EXAMPLE Find Missing Measures

3 CONSTRUCTION A brace is used to support a tabletop. In the figure, $\triangle ABC \cong \triangle DEF$.



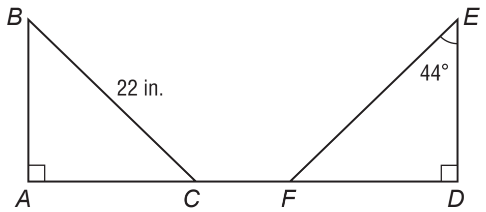
a. What is the measure of $\angle F$?

$\angle F$ and $\angle C$ are ___ angles. So, they are ___. Since $m\angle C =$ ___, $m\angle F =$ ___.

b. What is the length of $\overline{DF}$?

$\overline{DF}$ corresponds to ___. So, $\overline{DF}$ and ___ are ___. Since $AC =$ ___, $DF =$ ___.

Check Your Progress **In the figure, $\triangle ABC \cong \triangle DEF$.**



a. What is the measure of $\angle B$?

b. What the length of EF?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

10–3 Transformations on the Coordinate Plane

MAIN IDEA

- Draw translations, reflections, and dilations on a coordinate plane.

BUILD YOUR VOCABULARY (pages 236–237)

A movement of a geometric figure is a **transformation**.

In a **translation**, you ______ a figure from one position to another without turning it.

In a **reflection**, you ______ a figure over a line.

In a **dilation**, you enlarge or reduce a figure by a scale factor.

KEY CONCEPT

Translation

Step 1 Describe the translation using an ordered pair.

Step 2 Add the coordinates of the ordered pair to the coordinates of the original point.

EXAMPLE Translation in a Coordinate Plane

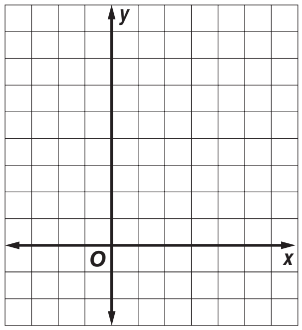
1 **Triangle ABC is shown on the coordinate plane. Find the coordinates of the vertices of the image of $\triangle ABC$ translated 4 units right and 5 units down.**

A $A'(-7, 2), B'(-5, -5), C'(1, 0)$

B $A'(1, 12), B'(3, 5), C'(9, 10)$

C $A'(-7, 12), B'(-5, 5), C'(1, 10)$

D $A'(1, 2), B'(3, -5), C'(9, 0)$



This translation can be written as the ordered pair ______.

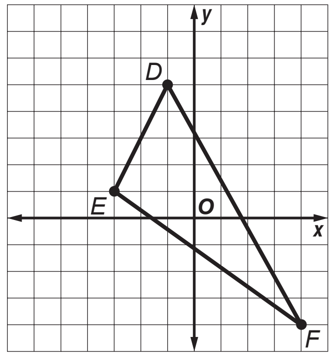
To find the coordinates of the translated image, add ______ to each x-coordinate and add ______ to each y-coordinate.

vertex		4 right, 5 down		translation
$A(-3, 7)$	+		→	A'
$B(-1, 0)$	+		→	B'
$C(5, 5)$	+		→	C'

The coordinates of the vertices of $\triangle A'B'C'$ are A' ______, B' ______, and C' ______. So, the answer is ______.

Check Your Progress

TEST EXAMPLE Triangle *DEF* is shown on the coordinate plane. Find the coordinates of the vertices of the image of $\triangle DEF$ translated 3 units left and 2 units up.



A $D'(-4, 3)$, $E'(-6, -1)$, $F'(1, -6)$

B $D'(2, 3)$, $E'(0, -1)$, $F'(7, -6)$

C $D'(-4, 7)$, $E'(-6, 3)$, $F'(1, -2)$

D $D'(2, 7)$, $E'(0, 3)$, $F'(7, -2)$

EXAMPLE Ref ection in a Coordinate Plane

KEY CONCEPT

Reflection

- To reflect a point over the *x*-axis, use the same *x*-coordinate and multiply the *y*-coordinate by –1.
- To reflect a point over the *y*-axis, use the same *y*-coordinate and multiply the *x*-coordinate by –1.

2 **The vertices of a figure are $M(-8, 6)$, $N(5, 9)$, $O(2, 1)$, and $P(-10, 3)$. Graph the figure and the image of the figure after a reflection over the *y*-axis.**

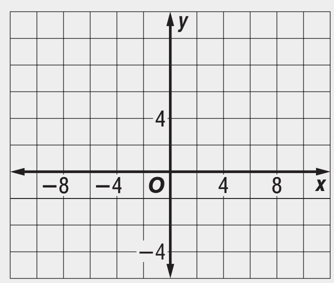
To find the coordinates of the vertices of the image after a reflection over the *y*-axis, multiply the *x*-coordinate by ______ and use the same *y*-coordinate.

vertex				reflection
$M(-8, 6)$	→		→	M'
$N(5, 9)$	→		→	N'
$O(2, 1)$	→		→	O'
$P(-10, 3)$	→		→	P'

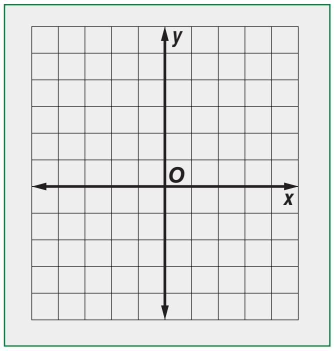
The coordinates of the vertices of the reflected figure are

M' ______, N' ______,

O' ______, and P' ______.



Check Your Progress The vertices of a figure are $Q(-2, 4)$, $R(-3, 1)$, $S(3, -2)$, and $T(4, 3)$. Graph the figure and the image of the figure after a reflection over the y-axis.



EXAMPLE Dilations in a Coordinate Plane

KEY CONCEPT

Dilation
Suppose k is the scale factor of a dilation.

- If $k > 1$, the dilation is an enlargement.
- If $0 < k < 1$, the dilation is a reduction.
- If $k = 1$, the dilation is congruent to the original figure.

3 **A polygon has vertices $A(-1, 1)$, $B(1, 1)$, and $C(1, 2)$. Graph the polygon and the image of the polygon after a dilation centered on the origin with a scale factor of 3.**

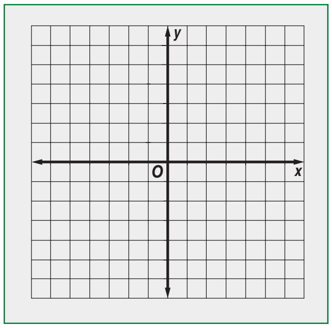
To dilate the polygon, ________

the coordinates of each vertex by ____.

$A(-1, 1) \rightarrow$ ________

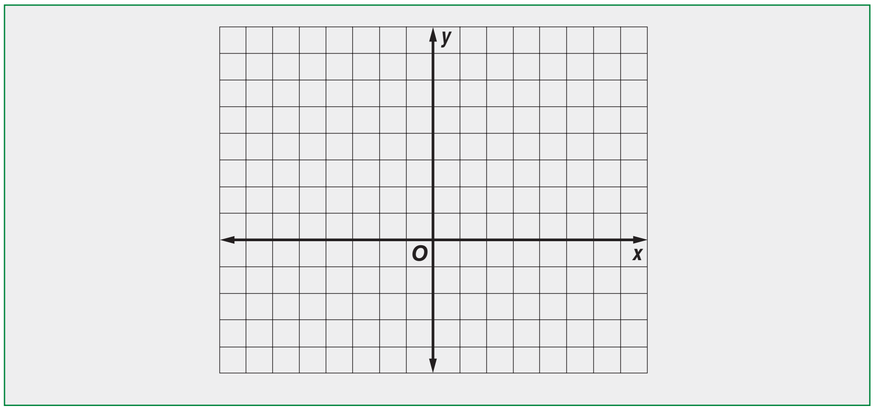
$B(1, 1) \rightarrow$ ________

$C(1, 2) \rightarrow$ ________



The coordinates of the dilated image are ________, ________, and ________.

Check Your Progress A figure has vertices $A(2, -2)$, $B(4, 6)$, $C(-4, 4)$, and $D(-6, -2)$. Graph the figure and the image of the figure after a dilation centered at the origin with a scale factor of $\frac{1}{2}$.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

10–4 Quadrilaterals

MAIN IDEAS

- Find the missing angle measures of a quadrilateral.
- Classify quadrilaterals.

BUILD YOUR VOCABULARY (page 237)

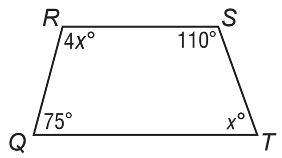
A **quadrilateral** is a closed figure with ______ sides and ______ vertices.

KEY CONCEPT

Angles of a Quadrilateral The sum of the measures of the angles of a quadrilateral is 360°.

EXAMPLE Find Angle Measures

1 **Find the value of x. Then find each missing angle measure.**



Words The sum of the measures of the angles is 360°.

Variable Let $m\angle Q$, $m\angle R$, $m\angle S$, and $m\angle T$ represent the measures of the angles.

Equation $m\angle Q + m\angle R + m\angle S + m\angle T =$ ______

$m\angle Q + m\angle R + m\angle S + m\angle T =$ ______	Angles of a quadrilateral
$75 + 4x + 110 + x =$ ______	Substitution
______ $+$ ______ $=$ ______	Combine like terms.
______ $+$ ______ $-$ ______ $=$ ______ $-$ ______	Subtract.
______ $= 175$	Simplify.
$x =$ ______	Divide.

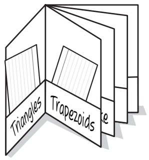
The value of x is ______.

So, $m\angle T =$ ______ and $m\angle R =$ ______ or ______.

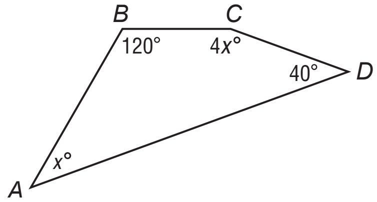
FOLDABLES™

ORGANIZE IT

On your *Quadrilaterals* index card, draw three examples of quadrilaterals, and describe how to find the sum of the measures of the angles in a quadrilateral.



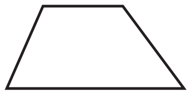
Check Your Progress Find the value of x. Then find each missing angle measure.



EXAMPLE Classify Quadrilaterals

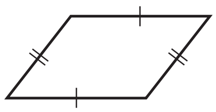
2 **Classify each quadrilateral using the name that best describes it.**

a.



The quadrilateral has ______ of ______ ______. It is a trapezoid.

b.

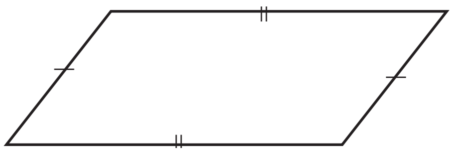


The quadrilateral has ______ of ______ ______ and ______. It is a ______.

Check Your Progress **Classify each quadrilateral using the name that best describes it.**

a.

b.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

10–5 Polygons

MAIN IDEAS

- Classify polygons.
- Determine the sum of the measures of the interior and exterior angles of a polygon.

BUILD YOUR VOCABULARY (pages 236–237)

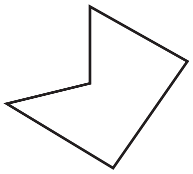
A **polygon** is a simple, closed figure formed by consecutive ______.

A **diagonal** is a line segment in a polygon that ______ two nonconsecutive ______.

EXAMPLE Classify Polygons

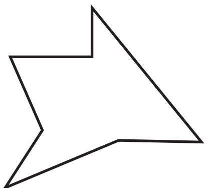
1 **Classify each polygon.**

a.



This polygon has ______ sides. It is a ______.

b.



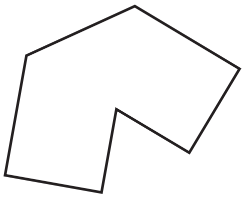
This polygon has ______ sides. It is a ______.

Check Your Progress **Classify each polygon.**

a.

______

b.

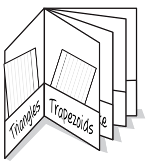


______

FOLDABLES™

ORGANIZE IT

On your index card for polygons, draw several polygons and label them with their name and number of sides.



EXAMPLE Measures of Interior Angles

KEY CONCEPT

Interior Angles of a Polygon If a polygon has n sides, then $n - 2$ triangles are formed. The sum of the degree measures of the interior angles of the polygon is $(n - 2)180$.

2 Find the sum of the measures of the interior angles of a quadrilateral.

A quadrilateral has ____ sides. Therefore, $n =$ ____.

$(n - 2)180 =$ ____ Replace n with ____.

$=$ ____ or ____ Simplify.

The sum of the measures of the interior angles of a quadrilateral is ____.

Check Your Progress Find the sum of the measures of the interior angles of a pentagon.

EXAMPLE Find Angle Measures of a Regular Polygon

3 TRAFFIC SIGNS A stop sign is a regular octagon. What is the measure of one interior angle in a stop sign?

Step 1 Find the sum of the measures of the angles.

An octagon has 8 sides. Therefore, $n =$ ____.

$(n - 2)180 =$ ____ Replace n with ____.

$=$ ____ or ____ Simplify.

The sum of the measures of the interior angles is ____.

Step 2 Divide the sum by 8 to find the measure of one angle.

____ $\div 8 =$ ____

So, the measure of one interior angle in a stop sign is ____.

Check Your Progress A picnic table in the park is a regular hexagon. What is the measure of one interior angle in the picnic table?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

10–6 Area: Parallelograms, Triangles, and Trapezoids

MAIN IDEAS

- Find area of parallelograms.
- Find the areas of triangles and trapezoids.

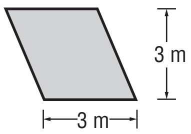
KEY CONCEPT

Area of a Parallelogram
If a parallelogram has a base of b units and a height of h units, then the area A is bh square units.

EXAMPLE Find Areas of Parallelograms

1 **Find the area of each parallelogram.**

a.



The base is _____.

The height is _____.

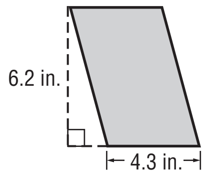
$A = bh$ Area of a parallelogram

$=$ _____ $b =$ _____, $h =$ _____

$=$ _____ Multiply.

The area is _____.

b.



The base is _____.

The height is _____.

$A = bh$ Area of a parallelogram

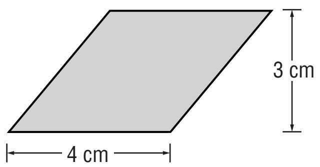
$=$ _____ $b =$ _____, $h =$ _____

$=$ _____ Multiply.

The area is _____.

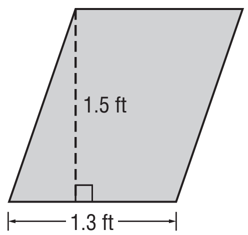
Check Your Progress **Find the area of each parallelogram.**

a.



_____

b.



_____

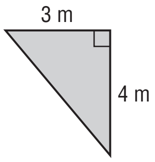
KEY CONCEPT

Area of a Triangle If a triangle has a base of b units and a height of h units, then the area A is $\frac{1}{2}bh$ square units.

EXAMPLE Find Areas of Triangles

2 Find the area of each triangle.

a.



The base is ___.

The height is ___.

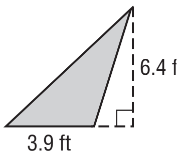
$A = \frac{1}{2}bh$ Area of a triangle

$=$ ___ $b =$ ___, $h =$ ___

$=$ ___ Multiply.

The area of the triangle is ___.

b.



The base is ___.

The height is ___.

$A = \frac{1}{2}bh$ Area of a triangle

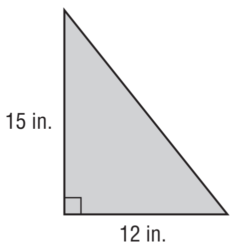
$=$ ___ $b =$ ___, $h =$ ___

$=$ ___ Multiply.

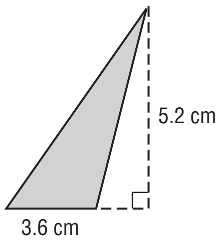
The area of the triangle is ___.

Check Your Progress **Find the area of each triangle.**

a.



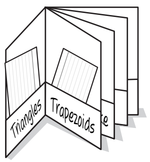
b.



FOLDABLES™

ORGANIZE IT

Add diagrams, labels, and area formulas to the index cards for parallelograms, triangles, and trapezoids in your Foldable.

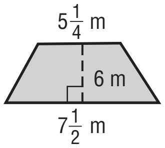


EXAMPLE Find Area of a Trapezoid

KEY CONCEPT

Area of a Trapezoid If a trapezoid has bases of a units and b units and a height of h units, then the area A of the trapezoid is $\frac{1}{2}h(a + b)$ square units.

3 **Find the area of the trapezoid.**



The height is ______.

The bases are ______ and ______.

$A =$ ______ Area of a ______

$A =$ ______ $h =$ ______, $a =$ ______, and $b =$ ______

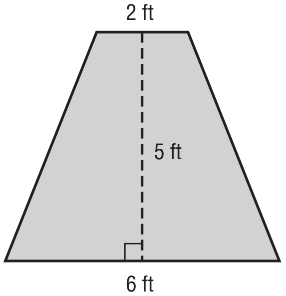
$A =$ ______ Add.

$A =$ ______ Divide out the common factors.

$A =$ ______ or ______ Simplify.

The area of the trapezoid is ______.

Check Your Progress Find the area of the trapezoid.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

10–7 Circles: Circumference and Area

MAIN IDEAS

- Find circumference of circles.
- Find area of circles.

BUILD YOUR VOCABULARY (pages 236–237)

The distance across the circle through its ______ is its **diameter**.

The distance from the ______ to any point on the circle is its **radius**.

The ______ of the **circumference** of a circle to the ______ of the circle is always equal to 3.1415926 . . . , represented by the Greek letter π **(pi)**.

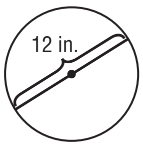
KEY CONCEPT

Circumference of a Circle The circumference of a circle is equal to its diameter times π, or 2 times its radius times π.

EXAMPLE Find the Circumference of a Circle

1 **Find the circumference of each circle to the nearest tenth.**

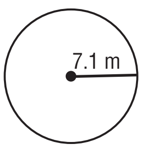
a.



$C = \pi d$	Circumference of a circle
$C =$ ______	Replace *d* with ______.
$C =$ ______	Simplify. This is the *exact* circumference.

Using a calculator, you find that the circumference is about ______.

b.

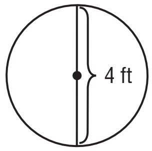


$C = 2\pi d$	Circumference of a circle
$C =$ ______	Replace *r* with ______.
$C =$ ______	Simplify. Use a calculator.

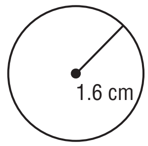
The circumference is about ______.

Check Your Progress **Find the circumference of each circle to the nearest tenth.**

a.



b.



EXAMPLE

2 LANDSCAPING A landscaper has a tree whose roots form a ball-shaped bulb with a circumference of 110 inches. What is the minimum diameter of the hole that the landscaper will have to dig in order to plant the tree?

Use the formula for the circumference of a circle to find the diameter.

$C = \pi d$	Circumference of a circle
$\boxed{} = \pi \cdot d$	Replace C with $\boxed{}$.
$\boxed{} = d$	Divide each side by $\boxed{}$.
$\boxed{} \approx \boxed{}$	Simplify. Use a calculator.

The diameter of the hole should be at least $\boxed{}$.

Check Your Progress **SWIMMING POOL** A circular swimming pool has a circumference of 24 feet. Matt must swim across the diameter of the pool. How far will Matt swim?

EXAMPLE Find Areas of Circles

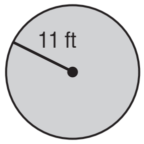
KEY CONCEPT

Area of a Circle The area of a circle is equal to π times the square of its radius.

FOLDABLES Add a diagram of a circle to your *Circles* index card. Label the center, diameter, radius and circumference. Then write the formulas for the circumference and area of a circle.

3 **Find the area of each circle. Round to the nearest tenth.**

a.



$A = \pi r^2$ Area of a circle

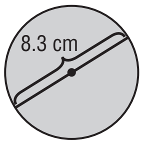
$A =$ ______ Replace r with ______.

$A =$ ______ Evaluate ______.

$A \approx$ ______ Use a calculator.

The area is about ______.

b.



$A = \pi r^2$ Area of a circle

$A =$ ______ Replace r with ______.

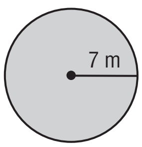
$A =$ ______ Evaluate ______.

$A \approx$ ______ Use a calculator.

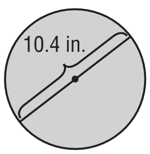
The area is about ______.

Check Your Progress **Find the area of each circle. Round to the nearest tenth.**

a.



b.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

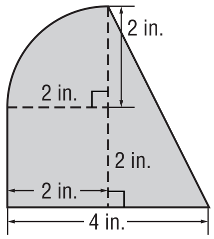
10–8 Area: Composite Figures

MAIN IDEA

- Find the area of composite figures.

EXAMPLE Find Area of Composite Figures

1 **Find the area of the figure to the nearest tenth.**



Separate the figure into a triangle, square, and a quarter-circle. Then find the sum of the areas of the figures.

Area of Square

$A = bh$ — Area of a square

$A =$ ______ or ______ — $b = h =$ ______

Area of Triangle

$A = \frac{1}{2}bh$ — Area of a triangle

$A =$ ______ or ______ — $b =$ ______, $h =$ ______

Area of Quarter-circle

$A = \frac{1}{4}\pi r^2$ — Area of a quarter-circle

$A =$ ______ or ______ — $r =$ ______

The area of the figure is ______ + ______ + ______ or about ______ square inches.

REVIEW IT

What is the difference between πr^2 and $(\pi r)^2$? *(Lesson 4-2)*

______

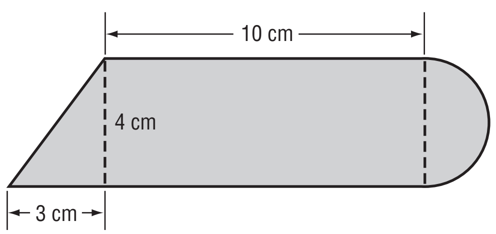
______

______

______

______

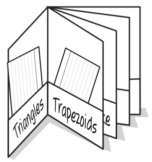
Check Your Progress Find the area of the figure to the nearest tenth.



FOLDABLES™

ORGANIZE IT

On your *Composite Figures* index card, describe how to find the area of a composite figure.



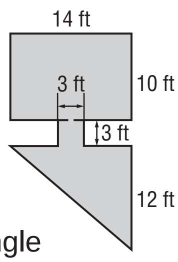
HOMEWORK ASSIGNMENT

Page(s):

Exercises:

EXAMPLE

2 **CARPETING** **Carpeting costs $2 per square foot. How much will it cost to carpet the area shown?**



Step 1 Find the area to be carpeted.

Area of Rectangle

$A = bh$ Area of a rectangle

$A =$ or $b =$, $h =$

Area of Square

$A = bh$ Area of a square

$A =$ or $b = h =$

Area of Triangle

$A = \frac{1}{2}bh$ Area of a triangle

$A =$ or $b =$, $h =$

The area to be carpeted is + + or square feet.

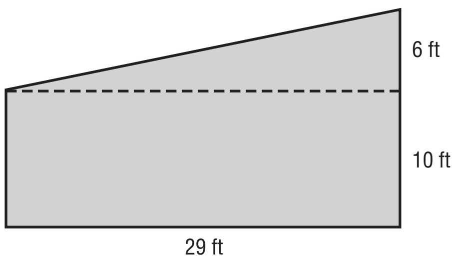
Step 2 Find the cost of the carpeting.

$\times$ $=$

So, it will cost to carpet the area.

Check Your Progress

PAINTING One gallon of paint is advertised to cover 100 square feet of wall surface. About how many gallons will be needed to paint the wall shown at the right?



CHAPTER 10

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 10 Foldable** 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: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 236–237*) to help you solve the puzzle.

10-1 Line and Angle Relationships

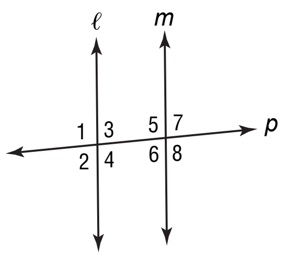
Complete.

1. Two angles are ______ if the sum of their measures is 90°.

2. When two lines intersect, they form two pairs of opposite angles called ______.

In the figure at the right, $\ell \parallel m$ and p is a transversal. If $m\angle 5 = 96°$, find the measure of each angle.

3. $\angle 2$ ______ **4.** $\angle 3$ ______ **5.** $\angle 8$ ______



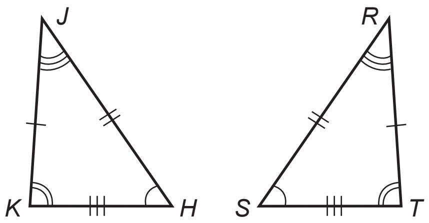
10-2 Congruent Triangles

In the figure shown, the triangles are congruent. Complete each congruence statement.

6. $\angle J \cong$ ______ **7.** $\overline{JH} \cong$ ______

8. $\overline{HK} \cong$ ______ **9.** $\angle K \cong$ ______

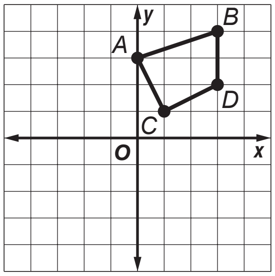
10. $\angle H \cong$ ______ **11.** $\overline{KJ} \cong$ ______



10-3

Transformations on the Coordinate Plane

12. Suppose the figure graphed is reflected over the y-axis. Find the coordinates of the vertices after the reflection.



13. A figure has the vertices $P(4, -2)$, $Q(3, -4)$, $R(1, -4)$, $S(2, -1)$. Find the coordinates of the vertices of the figure after a dilation centered on the origin with a scale factor of 3.

10-4

Quadrilaterals

Match each description with a quadrilateral.

a. square

b. trapezoid

c. rectangle

d. rhombus

14. a parallelogram with four congruent sides and four right angles

15. one pair of opposite sides is parallel

16. a parallelogram with four congruent sides

17. In quadrilateral $EFGH$, $m\angle E = 90°$, $m\angle F = 120°$, and $m\angle G = 70°$. Find $m\angle H$.

10-5

Polygons

Find the sum of the measures of the interior angles of each polygon.

18. decagon **19.** heptagon **20.** 15-gon

Find the measure of an interior angle of each polygon.

21. regular octagon **22.** regular nonagon

10-6 Area: Parallelograms, Triangles, and Trapezoids

Find the area of each figure described.

23. triangle: base, 6 ft; height, 4 ft

24. parallelogram: base, 13 m; height, 7 m

25. trapezoid: height, 4 cm; bases, 3 cm and 9 cm

10-7 Circles: Circumference and Area

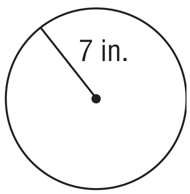
Complete.

26. The distance around a circle is called the ______.

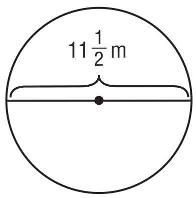
27. The ______ is the distance across a circle through its center.

Find the circumference and area of each circle. Round to the nearest tenth.

28.



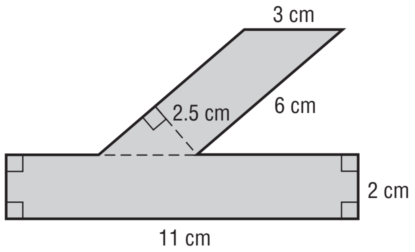
29.



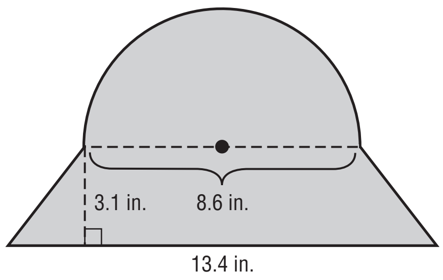
10-8 Area: Composite Figures

Find the area of each figure. Round to the nearest tenth, if necessary.

30.



31.



CHAPTER 10

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **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 569 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 564–568 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 10 Practice Test on page 569.

☐ **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 564–568 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 10 Practice Test on page 569.

Student Signature

Parent/Guardian Signature

Teacher Signature

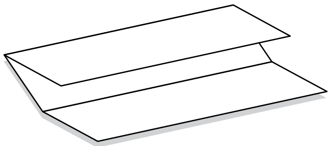
CHAPTER 11

Three-Dimensional Figures

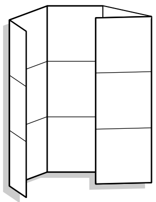
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with a plain piece of 11" x 17" paper.

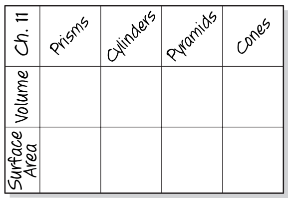
STEP 1 **Fold** the paper in thirds lengthwise.



STEP 2 **Fold** a 2" tab along the short side. Then fold the rest in fourths.



STEP 3 **Draw** lines along folds and label as shown.



NOTE-TAKING TIP: When taking notes, use a table to make comparisons about the new material. Determine what will be compared, decide what standards will be used, and then use what is known to find similarities and differences.

CHAPTER 11

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			
cone			
cylinder [SIH-luhn-duhr]			
edge			
face			
lateral [LA-tuh-ruhl] area			
lateral face			
net			
plane			
polyhedron [pah-lee-HEE-druhn]			

Vocabulary Term	Found on Page	Definition	Description or Example
prism			
pyramid			
similar solids			
slant height			
solid			
sphere			
surface area			
vertex			
volume			

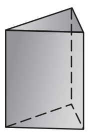
11–1 Three-Dimensional Figures

MAIN IDEAS

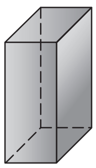
- Identify three-dimensional figures.
- Draw various views of three-dimensional figures.

KEY CONCEPT

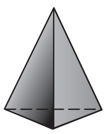
Polyhedrons



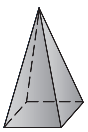
triangular prism



rectangular prism



triangular pyramid



rectangular pyramid

BUILD YOUR VOCABULARY (pages 264–265)

A **plane** is a two-dimensional ____ surface that extends in all directions.

Intersecting planes can form ____ figures or **solids**. A **polyhedron** is a solid with flat surfaces that are ____.

In a polyhedron, an **edge** is where two planes intersect in a ____. A **face** is a ____ surface. A **vertex** is where ____ or more planes ____ in a point.

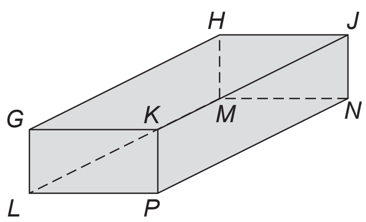
A **prism** is a polyhedron with two ____, congruent faces called **bases**.

A **pyramid** is a polyhedron with one base that is any polygon. Its other faces are ____.

EXAMPLE Identify Solids

1 Identify each solid. Name the bases, faces, edges, and vertices.

a.



This figure has two parallel congruent bases that are ____, $GHJK$ and $LMNP$, so it is a ____.

REMEMBER IT

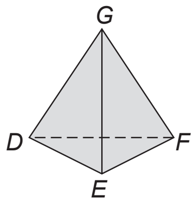
In a rectangular prism, any two parallel rectangles are bases, and any face is a base in a triangular pyramid. Bases do not have to be on the bottom of a figure.

faces:

edges:

vertices:

b.



This figure has one base, *DEF*, so it is a .

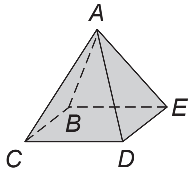
faces:

edges:

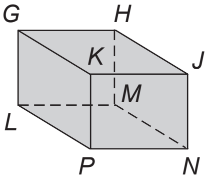
vertices:

Check Your Progress **Identify the solid. Name the bases, faces, edges, and vertices.**

a.

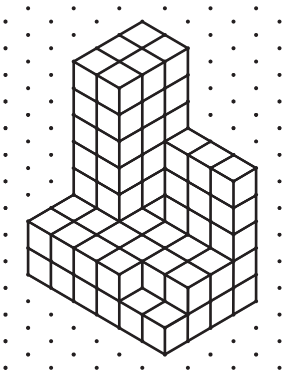


b.



EXAMPLE

2 ARCHITECTURE An architect's sketch shows the plans for a new skyscraper. Each unit on the drawing represents 80 feet.



a. Draw a top view and find the area of the ground floor.

The drawing is two rectangles, a 4 × 6 and a 2 × 1, so the actual dimensions are 4(80) × 6(80) plus or 2(80) × 1(80) or 320 feet × 480 feet plus 160 feet × 80 feet. To find the area add the areas

of the two rectangles. A = ______ + ______

or ______.

The area of the ground

floor is ______.

b. Draw a top-count view of the building.

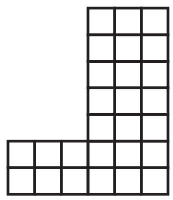
Using the top view from part a, write the number of levels for each unit of the building.

c. How many floors are in the skyscraper if each floor is 16 feet high?

You can see from the side view and top-count view that the height of the building is 7 units.
total height: 7 units × 80 feet per unit = 560 feet number of floors:

______ ÷ ______

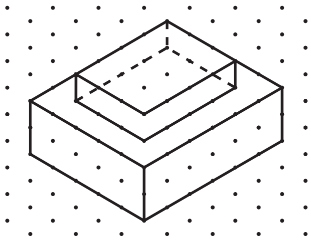
= ______



side view

Check Your Progress

ARCHITECTURE An architect's sketch shows the plans for a new office building. Draw a top view and find the area of the ground floor. Then find the number of floors in the office building if each floor is 15 feet high.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

11–2 Volume: Prisms and Cylinders

MAIN IDEAS

- Find volumes of prisms.
- Find volumes of circular cylinders.

BUILD YOUR VOCABULARY (page 265)

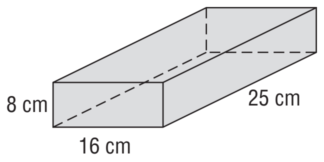
Volume is the ______ of ______ occupied by a solid region.

KEY CONCEPT

Volume of a Prism
The volume V of a prism is the area of the base B times the height h.

EXAMPLE Volume of a Rectangular Prism

1 **Find the volume of the prism.**



$V = Bh$ Formula for volume of a prism

$=$ ______ The base is a ______, so $B =$ ______.

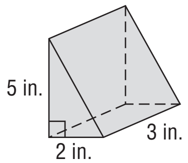
$=$ ______ ______ $= 25$, ______ $= 16$, ______ $= 8$

$=$ ______ Simplify.

The volume is ______ cubic centimeters.

EXAMPLE Volume of a Triangular Prism

2 **Find the volume of the triangular prism.**



$V = Bh$ Formula for volume of a prism

$=$ ______ $B =$ area of base or ______.

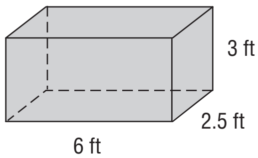
$=$ ______ The ______ of the prism is ______.

$=$ ______ Simplify.

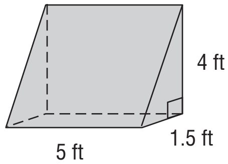
The volume is ______ cubic inches.

Check Your Progress **Find the volume of each prism.**

a.



b.



EXAMPLE Height of a Prism

3 **BAKING Baking Cake batter is poured into a pan that is a rectangular prism whose base is an 8-inch square base. If the cake batter occupies 192 cubic inches, what will be the height of the batter?**

$V = Bh$	Formula for volume of a prism
$V = \ell \cdot w \cdot h$	Formula for volume of a rectangular prism
______ = ______	Replace V with ______, ℓ with ______, and w with ______.
______ = ______	Simplify.
______ $= h$	Divide each side by ______.

The height of the batter is ______.

Check Your Progress

SWIMMING POOLS A swimming pool is filled with 960 cubic feet of water. The pool is a rectangular prism 20 feet long and 12 feet wide and is the same depth throughout. Find the depth of the water.

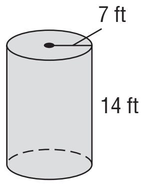
BUILD YOUR VOCABULARY (page 264)

A **cylinder** is a whose bases are congruent, parallel , connected with a side.

EXAMPLE Volume of a Cylinder

4 Find the volume of each cylinder. Round to the nearest tenth.

a.



$V =$ Formula for volume of a

$=$ Replace r with and h with .

$\approx$ Simplify.

The volume is about cubic feet.

b. diameter of base 10 m, height 2 m

Since the diameter is , the radius is .

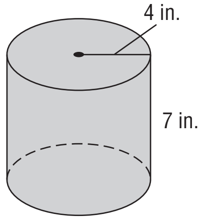
$V = \pi r^2 h$ Formula for volume of a cylinder

$=$ Replace r with and h with .

$\approx$ Simplify.

Check Your Progress **Find the volume of each cylinder. Round to the nearest tenth.**

a.



b. diameter of base 8 cm, height 6 cm

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™ Write the formulas for the volume of a prism and the volume of a cylinder in your table.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

11–3 Volume: Pyramids, Cones, and Spheres

MAIN IDEAS

- Find volumes of pyramids.
- Find volumes of cones and spheres.

KEY CONCEPTS

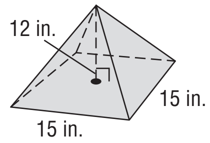
Volume of a Pyramid
The volume V of a pyramid is one-third the area of the base B times the height h.

Volume of a Cone
The volume V of a cone with radius r is one-third the area of the base B times the height h.

FOLDABLES™ Write these formulas in your table.

EXAMPLE Volumes of Pyramids

1 **Find the volume of the pyramid. If necessary, round to the nearest tenth.**



$V = \frac{1}{3}Bh$ Formula for volume of a pyramid

$= \boxed{}$ Replace B with $\boxed{} \cdot \boxed{}$.

$= \boxed{}$ The height is $\boxed{}$ inches.

$= \boxed{}$ Simplify.

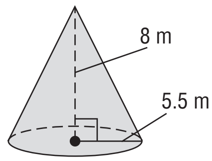
The volume is $\boxed{}$ cubic inches.

BUILD YOUR VOCABULARY (page 264)

A **cone** is a three-dimensional figure with one $\boxed{}$ base. A curved surface connects the base and the vertex.

EXAMPLE Volume of a Cone

2 **Find the volume of the cone. Round to the nearest tenth.**



$V = \frac{1}{3}\pi r^2 h$ Formula for volume of a cone

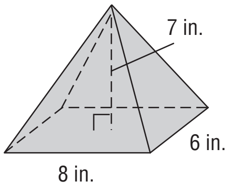
$= \boxed{}$ $r = \boxed{}$ and $h = \boxed{}$.

$\approx \boxed{}$ Simplify.

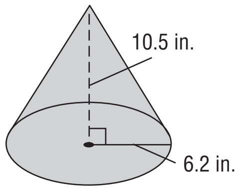
The volume is $\boxed{}$ cubic meters.

Check Your Progress **Find the volume of each solid. Round to the nearest tenth.**

a.



b.

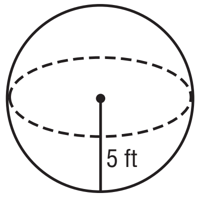


KEY CONCEPT

Volume of a Sphere
The volume V of a sphere is four-thirds times pi times the radius cubed.

EXAMPLE Volume of a Sphere

3 **Find the volume of the sphere. Round to the nearest tenth.**



$V = $ ______ Formula for volume of a sphere.

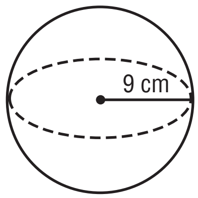
$= $ ______ Replace r with ______.

$\approx $ ______ Simplify.

The volume of the sphere is about ______.

Check Your Progress

Find the volume of the sphere. Round to the nearest tenth.



EXAMPLE

4 LANDSCAPING When mulch was dumped from a truck, it formed a cone-shaped mound with a diameter of 15 feet and a height of 8 feet.

a. What is the volume of the mulch?

$V = \frac{1}{3}\pi r^2 h$ Formula for volume of a cone

$= \boxed{}$ $r = \boxed{}$, $h = \boxed{}$.

$\approx \boxed{}$ cubic feet

b. How many square feet can be covered with this mulch if 1 cubic foot covers 4 square feet of ground?

$\text{ft}^2 \text{ of ground} = \boxed{} \text{ mulch} \times \dfrac{\boxed{} \text{ of ground}}{\boxed{} \text{ mulch}}$

$= \boxed{}$ of ground

Check Your Progress **PLAYGROUND A load of wood chips for a playground was dumped and formed a cone-shaped mound with a diameter of 10 feet and a height of 6 feet.**

a. What is the volume of the wood chips?

b. A person shoveling the wood chips removes them at a rate of 2 ft^3 every minute. How long does it take for the load of wood chips to be completely removed?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

11–4 Surface Area: Prisms and Cylinders

Main Ideas

- Find the lateral area and surface areas of prisms.
- Find the lateral area and surface areas of cylinders.

Build Your Vocabulary (page 265)

The **surface area** of a three-dimensional figure is the ________ of the ________ of all of the ________ of the figure.

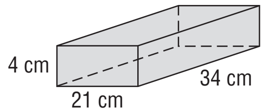
Key Concept

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.

EXAMPLE Surface Area of Prisms

1 **Find the lateral and surface area of the rectangular prism.**

a.



Find the lateral area.

$L = Ph$

$= (2\ell + 2w)(h)$

$= (\boxed{\quad})(\boxed{\quad})$

$= \boxed{\quad}$

Find the surface area.

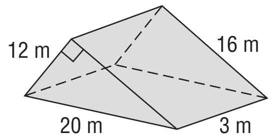
$S = L + 2B$

$= L + 2\ell w$

$= \boxed{\quad} + 2\boxed{\quad}$

$= \boxed{\quad}$

b.



The lateral area is made up of the areas of the lateral faces.

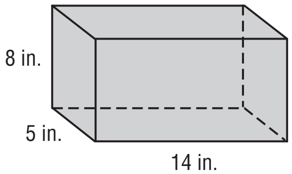
$L = Ph$	Write the formula.
$= \boxed{\quad}$	Substitution.
$= \boxed{\quad}$	Simplify.

Find the surface area.

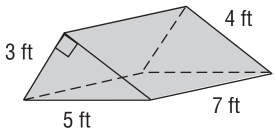
$S = L + 2B$	Write the formula.
$= L + 2\left(\frac{1}{2}bh\right)$	$B = \frac{1}{2}bh$ (area of triangle)
$= \boxed{\quad} + 2\left(\frac{1}{2}\boxed{\quad}\right)$	Substitution
$= \boxed{\quad}$	Simplify.

Check Your Progress **Find the lateral area and surface area of each prism.**

a.



b.



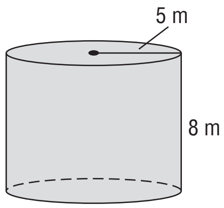
KEY CONCEPT

Surface Area of Cylinders The surface area S of a cylinder with height h and radius r is the area of the two bases plus the area of the curved surface.

FOLDABLES™ Write the formulas for the surface area of a prism and the surface area of a cylinder in your table.

EXAMPLE Surface Area of a Cylinder

2 **Find the lateral area and surface area of the cylinder. Round to the nearest tenth.**



Lateral Area

$L = 2\pi rh$

$=$

$=$

$\approx$

Surface Area

$S = L + 2\pi r^2$

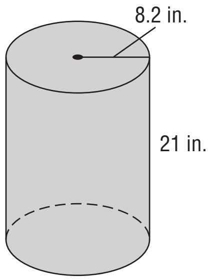
$=$

$=$

$=$

Check Your Progress

Find the lateral area and surface area of the cylinder. Round to the nearest tenth.



EXAMPLE

3 CEREALS **A company packages its cereal in a rectangular prism that is 2.5 inches by 7 inches by 12 inches. It is considering packaging it in a cylinder-shaped container having a 6-inch diameter and a height of 7.5 inches. Which uses the least amount of packaging?**

Surface Area of Rectangular Prism

	Lateral Area		Area of Bases
$S =$		$+$	
$=$		$+$	
$=$		$+$	
$=$			

Surface Area of Cylinder

	Lateral Area		Area of Bases
$S =$		$+$	
$=$		$+$	
$=$		$+$	
$=$			

Since ____________________, the __________ uses less packaging.

Check Your Progress **CANDY** A candy company is deciding between two types of packaging for its gumballs. The first option is a rectangular prism that is 6 inches by 4 inches by 1.5 inches. The second option is a cylinder having a radius of 2 inches and a height of 5 inches. Which option requires less packaging?

Homework Assignment

Page(s):

Exercises:

11–5 Surface Area: Pyramids and Cones

MAIN IDEAS

- Find the surface areas of pyramids.
- Find surface areas of cones.

BUILD YOUR VOCABULARY (pages 264–265)

The ______ or height of each ______ is called the **slant height**.

The ______ of the ______ of the lateral faces is the **lateral area** of a pyramid.

WRITE IT

If the base of a pyramid is a regular polygon, what do you know about its lateral faces?

______

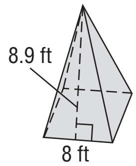
______

______

______

EXAMPLE Surface Area of a Pyramid

1 **Find the surface area of the square pyramid.**



Find the lateral area and the base area.

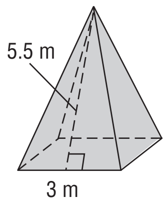
Area of each lateral face

$L = 4(\frac{1}{2})bh$	Area of 4 triangles
$=$ ______	Replace b with ______ and h with ______.
$=$ ______	Simplify.

Then find the surface area. The base of the pyramid is a square.

$S = L + B$	Write the formula.
$= L +$ ______	The area of a square is ______.
$=$ ______	Substitution
$=$ ______	Simplify.

Check Your Progress Find the surface area of the square pyramid.



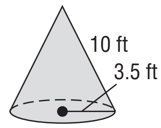
KEY CONCEPT

Surface Area of a Cone The surface area S of a cone with slant height ℓ and radius r is the lateral area plus the area of the base.

FOLDABLES™ Write the formulas for the surface area of a pyramid and the surface area of a cone in your table.

EXAMPLE Surface Area of a Cone

2 **Find the surface area of the cone. Round to the nearest tenth.**



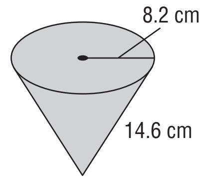
$S = \pi r\ell + \pi r^2$ Formula for surface area of a cone

$S =$ ______ + ______ Replace ______ with ______ and ℓ with ______.

$S \approx$ ______ square feet Simplify.

The surface area is about ______ square feet.

Check Your Progress Find the surface area of the cone. Round to the nearest tenth.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

11–6 Similar Solids

MAIN IDEAS

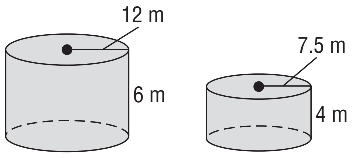
- Identify similar solids.
- Solve problems involving similar solids.

BUILD YOUR VOCABULARY (page 265)

Two solids are **similar solids** if they have the same ______ and their corresponding ______ measures are ______.

EXAMPLE Identify Similar Solids

1 Determine whether the pair of solids is similar.



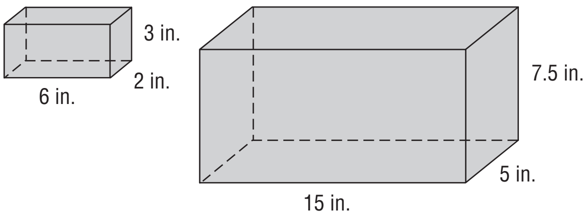
$\square \stackrel{?}{=} \square$ Write a proportion comparing radii and heights.

$\square \stackrel{?}{=} \square$ Find the cross products.

$\square$ Simplify.

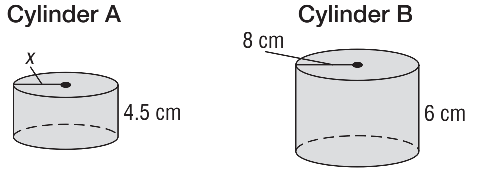
The radii and heights are ______ proportional, so the cylinders are ______ similar.

Check Your Progress Determine whether the pair of solids is similar.



EXAMPLE Find Missing Measures

2 **The cylinders shown are similar. Find the radius of cylinder A.**



$$\frac{\text{radius of cylinder A}}{\text{radius of cylinder B}} = \frac{\boxed{}}{\boxed{}}$$

$\boxed{} = \boxed{}$ Substitute the known values.

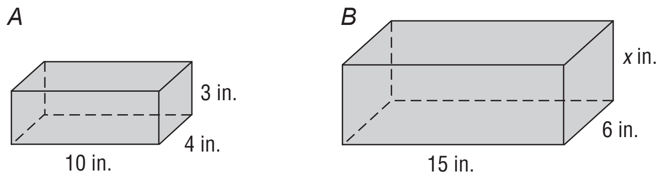
$\boxed{}\,x = 8\left(\boxed{}\right)$ Find the cross products.

$\boxed{} = \boxed{}$ Simplify.

$x = \boxed{}$ Divide each side by $\boxed{}$.

The radius of cylinder A is $\boxed{}$ centimeters.

Check Your Progress The rectangular prisms below are similar. Find the height of prism B.



KEY CONCEPT

Ratios of Similar Solids
If two solids are similar with a scale factor of $\frac{a}{b}$, then the surface areas have a ratio of $\frac{a^2}{b^2}$ and the volumes have a ratio of $\frac{a^3}{b^3}$.

EXAMPLE

3 DOLLHOUSE A small model of a fish tank for Eva's dollhouse is built on a scale of 1 cm to 5 in. and has a volume of 24 cm^3. What is the volume of the actual fish tank?

You know the scale factor $\frac{a}{b}$ is ______ and the volume of the model is ______. Since the volumes have a ratio of $\left(\frac{a}{b}\right)^3$ and $\frac{a}{b}$ = ______, replace a with ______ and b with ______ in $\left(\frac{a}{b}\right)^3$.

$\frac{\text{volume of model}}{\text{volume of fish tank}} = \left(\frac{a}{b}\right)^3$ Write the ratio of volumes.

= ______ Replace a with ______ and b with ______.

= ______ Simplify.

The volume of the fish tank is ______ times the volume of the model.

______ = ______

Check Your Progress **TRAINS** A scale model of a railroad boxcar is built on a scale of 1 inch to 50 inches and has a volume of 72 cubic inches. What is the volume of the actual boxcar?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 11

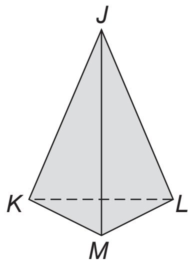
BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 11 Foldable** to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 11, go to: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 264–265*) to help you solve the puzzle.

11-1 Three-Dimensional Figures

1. Identify the solid. Name the faces, edges, and vertices.



State whether each sentence is true or false. If false, replace the underlined word to make a true sentence.

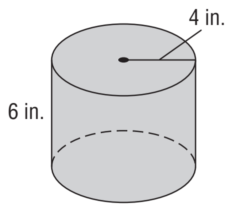
2. A <u>pyramid</u> is a solid with two bases.

3. Intersecting <u>lines</u> form three-dimensional figures called solids.

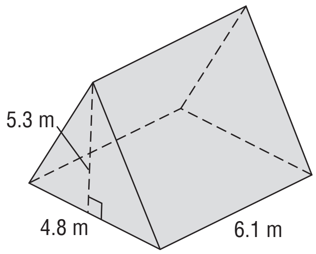
11-2 Volume: Prisms and Cylinders

Find the volume of each prism or cylinder. Round to the nearest tenth if necessary.

4.



5.



11-3 Volume: Pyramids, Cones, and Spheres

Find the volume of each solid. Round to the nearest tenth if necessary.

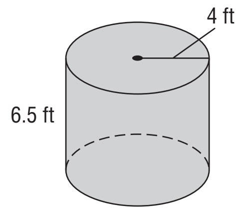
6. cone: diameter 14 ft, height 11 ft

7. square pyramid: length 4.5 m, height 6.8 m

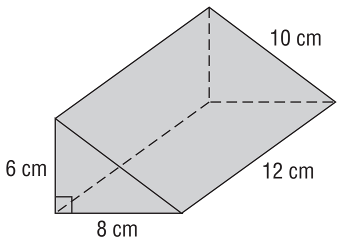
11-4 Surface Area: Prisms and Cylinders

Find the lateral area and surface area of each solid. Round to the nearest tenth if necessary.

8.



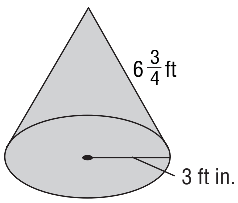
9.



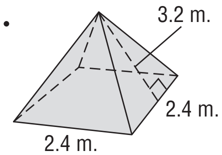
11-5 Surface Area: Pyramids and Cones

Find the surface area of each solid. Round to the nearest tenth if necessary.

10.



11.

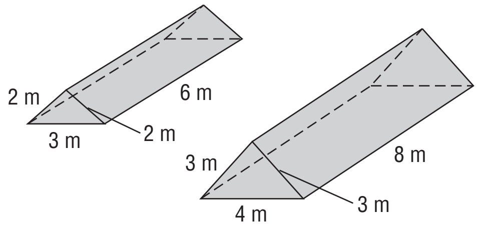


12. square pyramid: base side lengths 5 in., slant height 8 in.

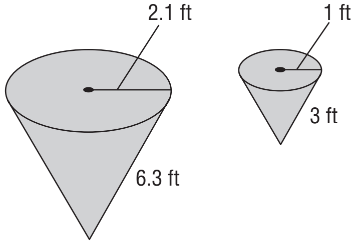
11-6 Similar Solids

Determine whether each pair of solids is similar.

13.

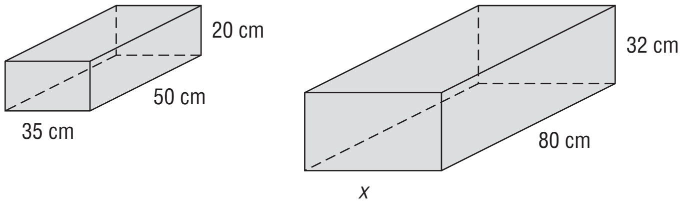


14.



Find the missing measure for the pair of similar solids.

15.



CHAPTER 11

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **glencoe.com** to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 11.

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 619 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 11 Study Guide and Review on pages 615–618 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 619.

☐ **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 Foldables.
- Then complete the Chapter 11 Study Guide and Review on pages 615–618 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 619.

Student Signature

Parent/Guardian Signature

Teacher Signature

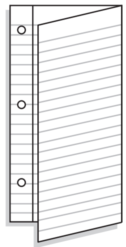
CHAPTER 12

More Statistics and Probability

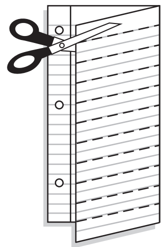
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

Begin with a piece of notebook paper.

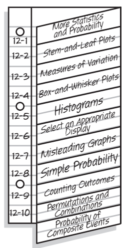
STEP 1 **Fold** lengthwise to the holes.



STEP 2 **Cut** along the top line and then cut 10 tabs.



STEP 3 **Label** the lesson numbers and titles as shown.



NOTE-TAKING TIP: When taking notes on statistics, include your own statistical examples as you write down concepts and definitions. This will help you to better understand statistics.

CHAPTER 12

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
back-to-back stem-and-leaf plot			
box-and-whisker plot			
combination			
composite events			
dependent events			
experimental probability			
Fundamental Counting Principle			
histogram			
independent events			
interquartile range [in-tuhr-kwawr-tyl]			
measures of variation			

Vocabulary Term	Found on Page	Definition	Description or Example
mutually exclusive events			
outcomes			
outliers			
permutation [puhr-myoo-tay-shuhn]			
probability			
quartiles			
range			
sample space			
simple event			
stem-and-leaf plot			
theoretical probability			
tree diagram			
upper and lower quartiles			

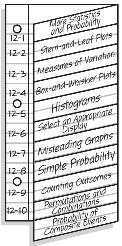
12–1 Stem-and-Leaf Plots

MAIN IDEAS

- Display data in stem-and-leaf plots.
- Interpret data in stem-and-leaf plots.

FOLDABLES™ ORGANIZE IT

Write a description of a stem-and-leaf plot under the tab for this lesson.



BUILD YOUR VOCABULARY (page 289)

In a **stem-and-leaf plot**, numerical data are listed in ascending or descending ______.

Stem	Leaf
5	1 2 3 6
6	0 5
7	1

6|0 = 60

The ______ place value of the data is used for the **stems**. The ______ place value forms the **leaves**.

EXAMPLE Draw a Stem-and-Leaf Plot

1 FOOD **Display the data in a stem-and-leaf plot with or without the use of technology.**

Peanuts Harvest, 2001	
State	**Amount (lb/acre)**
Alabama	2400
Florida	2800
Georgia	2800
New Mexico	2400
North Carolina	2900
Oklahoma	2200
South Carolina	2900
Texas	2600
Virginia	3000

Step 1 Find the least and the greatest number. Then identify the greatest place value digit in each number.

2200

The least number has ______ in the ______ place.

3000

The greatest number has ______ in the ______ place.

REVIEW IT

What are the mean, the median, and the mode of a set data? *(Lesson 5–9)*

____

____

____

____

____

Step 2 Draw a vertical line and write the stems ______ and ______ to the left of the line.

Step 3 Write the leaves to the right of the line, with the corresponding stem.

Step 4 Rearrange the leaves so they are ordered from least to greatest. Then include a key.

Stem	Leaf

$2|4 = 2400$ *lb / acre*

Check Your Progress Display the speeds 65, 72, 59, 68, 75, 70, 68, 64, 67, 69, 72, and 55 given in miles per hour in a stem-and-leaf plot.

EXAMPLE Interpret Data

2 VOTING **The stem-and-leaf plot lists the percent of people in each state in 2004 that were born in Mexico, rounded to the nearest whole number.**

Stem	Leaf
0	0 0 0 1 1 2 2 3 4
0	4 5 5 5 6 6 8 8 8
1	0 1 4 4 7
2	1 2 3 8
3	1 2 3 5 5 9 9
4	0 1 2 3 3 3 4 6 8
5	2 6 6
6	4 6
7	4

$3|1 = 31\%$

a. Which interval contains the most percentages?

Most of the data occurs in the ______ interval.

b. What is the greatest percent of people living in one U.S. state that were born in Mexico?

The greatest percent is ______.

c. What is the median percent of people living in one U.S. state that were born in Mexico?

The median in this case is the mean of the middle two numbers or ______.

Check Your Progress

ALLOWANCES The stem-and-leaf plot lists the amount of allowance students are given each month.

Stem	Leaf
0	0 5
1	0 2 2 5 8 8 8
2	0 0 0 4 4 5 5 5 5
3	0 0 2 2 2 4 4 5 5 6 6
4	0 2 4 4 5 5 5 5 8 8 9 9
5	0 0

2|5 = $25

a. In which interval do most of the monthly allowances occur?

______

b. What is the greatest monthly allowance given?

______

c. What is the median monthly allowance given?

______

BUILD YOUR VOCABULARY (page 288)

Two sets of data can be ______ using a **back-to-back stem-and-leaf plot**. The leaves for one set of data are on one side of the ______ and the leaves for the other set of data are on the other side.

EXAMPLE

3 AGRICULTURE The yearly production of honey in California and Florida is shown for the years 2000 to 2004, in millions of pounds.

Source: USDA

California		Florida
7	1	4
8 4	2	0 0 2 4
2 1	3	

2|3 = 23 million lb *2|0 = 20 million lb*

a. Which state produces more honey?

______; it produces between ______ and ______ million pounds per year.

b. Which state has the most varied production? Explain.

; the data are more spread out.

Check Your Progress **EXAMS The exam score earned on the first test in a particular class is shown for male and female students.**

Male		Female
8 2	6	
9 6 4	7	4 8 8 9
7 4 2 2 0	8	1 3 4 8 9
6 5 3	9	2 5 9

2|8 = 82   *7|4 = 74*

a. Which group of students had the higher test scores?

b. Which group of students had more varied test scores?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

12–2 Measures of Variation

MAIN IDEAS

- Find measures of variation.
- Use measures of variation to interpret and compare data.

BUILD YOUR VOCABULARY (page 289)

Measures of variation are used to describe the ______ of the data.

The **range** of a set of data is the ______ between the greatest and the least values of the set.

The **quartiles** are the values that divide a set of data into ______ equal parts.

The ______ of the lower half of a set of data is the **lower quartile**.

The median of the ______ of a set of data is the **upper quartile**.

WRITE IT

What does the range describe about a set of data?

______

______

______

______

EXAMPLE Rang e

1 **Find the range of each set of data.**

a. **{$79, $42, $38, $51, $63, $91}**

The greatest value is ______, and the least value is ______.

So, the range is ______ – ______ or ______.

b.

Stem	Leaf
3	3 3 5 7 7 8
4	0 3 3 4 9
5	4 9

3|5 = 35

The greatest value is ______ and the least value is ______.

So, the range is ______ – ______ or ______.

Check Your Progress **Find the range of each set of data.**

a. {14, 37, 82, 45, 24, 10, 75}

b.

Stem	Leaf
5	2 3 5 5 9
6	4 8 9
7	0 1 8 9

6|8 = 68

____ ____

KEY CONCEPTS

Interquartile Range The interquartile range is the range of the middle half of a set of data. It is the difference between the upper quartile and the lower quartile.

Outliers Data that are more than 1.5 times the value of the interquartile range beyond the quartiles.

EXAMPLE Interquartile Range and Outliers

2 **Find the interquartile range and any outliers for {2, 49, 17, 14, 14, 22, 15, 32, 24, 25}.**

Step 1 List the data from least to greatest. Then find the median.

Step 2 Find the upper and lower quartiles.

$$\underbrace{2\ \ 14\ \ 14\ \ 15\ \ 17}_{\text{lower half}}\quad \underbrace{22\ \ 24\ \ 25\ \ 32\ \ 49}_{\text{upper half}}$$

____ ____

median = ____ or ____

The interquartile range is ____ – ____ or ____.

Step 3 Find the limits for the outliers.

____ × 1.5 = ____ Multiply the interquartile range, ____, by 1.5.

14 – ____ = ____ Subtract ____ from the lower quartile.

____ + 25 = ____ Add 16.5 to the upper quartile.

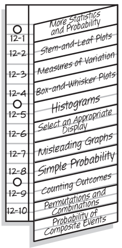
The limits for the outliers are ____ and ____.

There are no values less than ____. One value, ____, is greater than ____. So, ____ is an outlier.

FOLDABLES

ORGANIZE IT

Explain the difference between the range and the interquartile range of a set of data under the tab for Lesson 12–2.



Check Your Progress **Find the interquartile range for each set of data.**

a. {52, 74, 98, 80, 63, 84, 77}

b. {12, 18, 25, 31, 23, 19, 16, 22, 28, 32}

EXAMPLE

3 **LAND USE** **The urban land in certain western and eastern states is listed below as the percent of each state's total land, rounded to the nearest percent.**

Western States		Eastern States
1 1 1 1 1 0 0	0	
3 2 2 2 1 1 1	0	3 3 4 5 6 6 8
5 4 4	0	8 9 9 9 9 9 9
	1	1 3 3 4 4 5
	2	3 6 7
2 |0 = 2%	3	5 2 *|7 = 27%*

Source: U.S. Census Bureau

a. What is the median percent of urban land use for each region?

The median percent of urban land use for the western states is ______. The median percent of urban land use for the eastern states is ______.

b. Compare the range for each set of data.

The range for the west is ______ – ______ or ______, and the range for the east is ______ – ______ or ______.

The percents of urban land used in the ______ vary more.

Check Your Progress **FITNESS The hours per week spent exercising for teenagers and people in their twenties are listed in the stem-and-leaf plot.**

Teens		Twenties
5 4 2 0	0	0 4 6 7 9
7 3	1	0 2 2 5
1	2	0 3 4 5 8

3|1 = 13 hr *1|5 = 15 hr*

a. What is the median time spent exercising for each group?

b. Compare the range for each set of data.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

12–3 Box-and-Whisker Plots

MAIN IDEAS

- Display data in a box-and-whisker plot.
- Interpret data in a box-and-whisker plot.

BUILD YOUR VOCABULARY (page 288)

A **box-and-whisker plot** ______ a set of data into ______ using the median and quartiles. A *box* is drawn around the ______, and *whiskers* extend from each quartile to the ______ data points.

REMEMBER IT

The median does not necessarily divide the box in half. Data clustered toward one quartile will shift the median in its direction.

EXAMPLE Draw a Box-and-Whisker Plot

1 JOBS **The projected number of employees in 2008 in the fastest-growing occupations is shown. Display the data in a box-and-whisker plot.**

Fastest-Growing Jobs			
Occupation	**Jobs (1000s)**	**Occupation**	**Jobs (1000s)**
Computer Engineer	622	Desktop Publishing	44
Computer Support	869	Paralegal/Legal Assistant	220
Systems Analyst	1194	Home Health Aide	1179
Database Administrator	155	Medical Assistant	398

Source: U.S. Census Bureau

Step 1 Find the ______ and ______ number.

Then draw a number line that covers the ______ of the data.

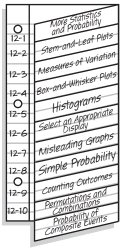
Step 2 Find the ______, the extremes, and the upper and lower ______. Mark these points above the number line.

Step 3 Draw a box and the whiskers.

FOLDABLES™

ORGANIZE IT

Write a description of a box-and-whisker plot under the tab for this lesson.

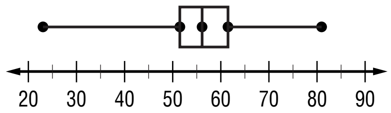


Check Your Progress **TRAVEL** The data listed below represents the time, in minutes, required for students to travel from home to school each day. Display the data in a box-and-whisker plot.

14 32 7 45 18 22 26 9 4 18 15

EXAMPLE

2 **WEATHER** **The box-and-whisker plot below shows the average percent of sunny days per year for selected cities in each state.**



Source: U.S. Census Bureau

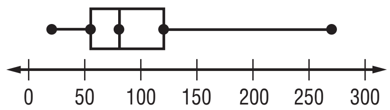
a. Half of the selected cities have an average percent of sunny days under what percent?

Half of the selected cities have an average percent of sunny days under ______.

b. What does the length of the box in the box-and-whisker plot tell about the data?

The length of the box is ______. This tells us that the middle 50% of the data values are ______.

Check Your Progress **CLOTHES** **The box-and-whisker plot below shows the average amount spent per month on clothing.**



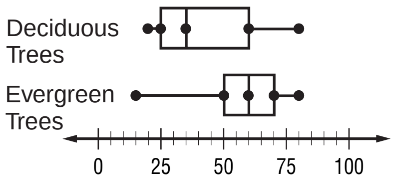
a. What is the smallest amount spent per month on clothing?

b. Half of the monthly expenditures on clothing are under what amount?

c. What does the length of the box-and-whisker plot tell about the data?

EXAMPLE

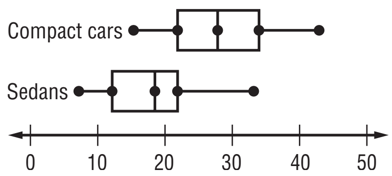
3 TREES The average maximum height, in feet, for selected evergreen trees and deciduous trees is displayed. How do the heights of evergreen trees compare with the heights of deciduous trees?



Source: ohioline.osu.edu

Most deciduous trees range in height between ____ and ____ feet. However, some are as tall as ____ feet. Most evergreen trees range in height between ____ and ____ feet. However, some are as tall as ____ feet. Most evergreen trees are ____ than most deciduous trees.

Check Your Progress **GAS MILEAGE** The average gas mileage, in miles per gallon, for selected compact cars and sedans is displayed. How do the gas mileages of compact cars compare with the gas mileages for sedans?



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

12–4 Histograms

MAIN IDEAS

- Display data in a histogram.
- Interpret data in a histogram.

BUILD YOUR VOCABULARY (page 288)

A **histogram** uses ______ to display numerical data that have been organized into ______ intervals.

WRITE IT

What type of data does a histogram display?

______

______

______

______

______

EXAMPLE Draw a Histogram

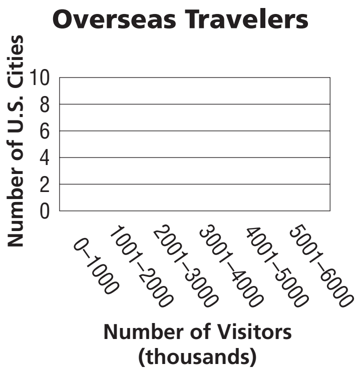
1 TOURISM The frequency table shows the number of overseas visitors to the top 15 U.S. cities in 2004. Display the data in a histogram.

Overseas Travelers		
Number of Vistors (1000s)	Tally	Frequency
0–1000	𝍸 IIII	9
1001–2000	II	2
2001–3000	I	1
3001–4000		
4001–5000	II	2
5001–6000	I	1

Source: U.S. Department of Commerce

Step 1 Draw and label a horizontal and vertical axis. Include a ______.

Step 2 Show the intervals from the frequency table on the ______ axis and an interval of 1 on the ______ axis.

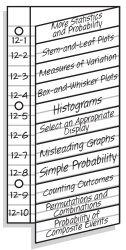


Step 3 For each interval, draw a bar whose height is given by the ______.

FOLDABLES™

ORGANIZE IT

Describe how to display data in a histogram under the tab for this lesson.



Check Your Progress

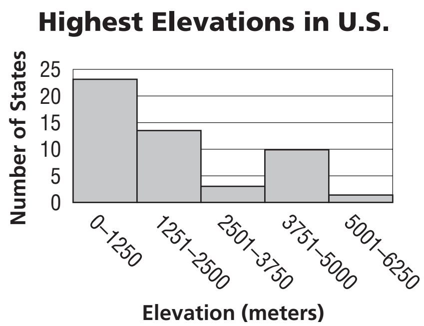
SHOPPING The frequency table shows the number of daily customers a new grocery store has during its first 30 days in business. Display the data in a histogram.

Daily Customers		
Number of Customers	**Tally**	**Frequency**
0–49	卌 I	6
50–99	卌 卌 II	12
100–149	卌 IIII	9
150–199	III	3

EXAMPLE Interpret Data

2 ELEVATIONS **Use the histogram.**

a. How many states have highest points with elevations at least 3751 meters?

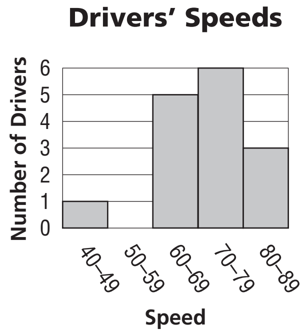


Since ____ states have elevations in the 3751–5000 range and 2 states have elevations in the ____ range, ____ + ____ or ____ states have highest points with elevations at least 3751 meters.

b. Is it possible to tell the height of the tallest point?

No, you can only tell that the highest point is between ____ and ____ meters.

Check Your Progress Use this histogram.

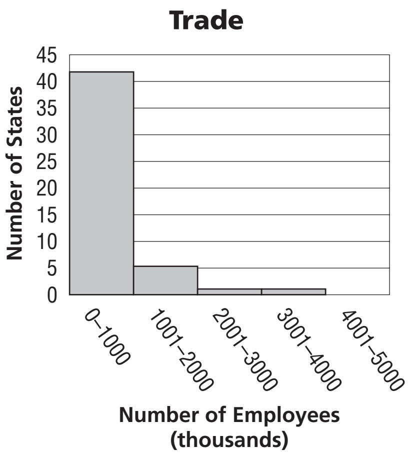


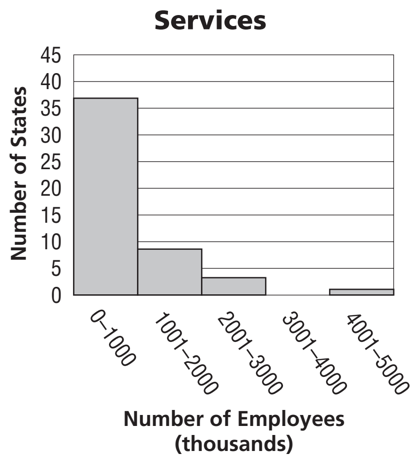
a. How many drivers had a speed of at least 70 miles per hour?

b. Is it possible to tell the lowest speed driven?

EXAMPLE

3 EMPLOYMENT **Use the histograms.**

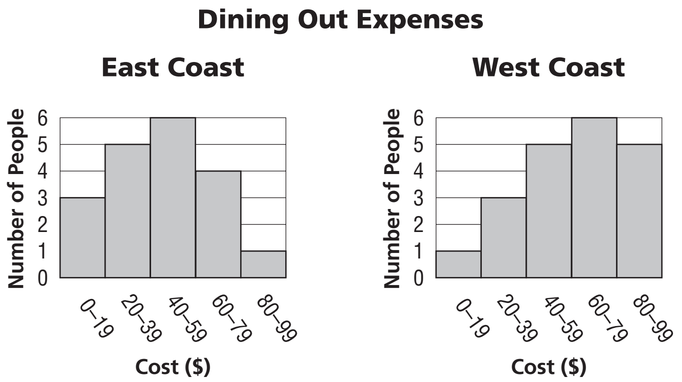




Which business sector has more states with between 1,001,000 and 3,000,000 employees?

By comparing the graphs, you find that ______ has more states with between 1,001,000 and 3,000,000 employees.

Check Your Progress Use the histograms that show weekly dining expenses.



Which coast has more people spending at least $60 weekly?

HOMEWORK ASSIGNMENT

Page(s):

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12–5 Selecting an Appropriate Display

MAIN IDEA

- Select an appropriate display for a set of data.

EXAMPLE Select an Appropriate Display

1 **a.** DESSERT **Danielle took a survey of her classmates' preferences for desserts. Danielle's survey revealed that 46% of her classmates like pie, 32% like ice cream, 9% like cake, 7% like candy, and 6% don't have a preference. How could Danielle best display the results of her survey? Then make the display with or without the use of technology.**

A ______ would compare the parts of the data to the ______.

b. LACROSSE **Juan compares the heights of the players on two lacrosse teams. Juan's team has players with the following heights, in inches: 61, 60, 58, 59, 57, 67, 58, 60, 60, 65, 61, and 61. The rival team has players with the following heights, in inches: 62, 70, 65, 60, 60, 58, 66, 63, 61, 57, 67, and 64. What is an appropriate display for the data? Make the display.**

A ______ would condense and ______ the data.

Check Your Progress

a. SPORTS Out of 40 athletes surveyed, 12 play basketball and 18 play soccer. Of those athletes who play either sport, 5 play both sports. Select an appropriate type of display for this situation. Then make the display with or without the use of technology.

b. TEST SCORES Ms. Slater compares the scores of the students in her two math classes. The morning math class earned the following scores on the last test: 98, 82, 76, 94, 65, 82, 78, 98, 86, 93, 74, 96, 73, 87, and 81. The afternoon math class earned the following scores: 86, 93, 75, 89, 100, 84, 86, 97, 64, 95, 92, 85, 79, 90, and 85. Select an appropriate type of display for this situation. Then make the display with or without the using technology.

EXAMPLE

2 TEST EXAMPLE **Which graph would best represent the data if you want to show relationships among sets of data?**

A line graph
B Venn diagram
C bar graph
D circle graph

You can eliminate choice ______ because ______ compare parts of the data to the whole. Choice ______ displays frequencies of data in categories and choice ______ shows change over time. Even though ______ and ______ show relationships among similar types of data, ______ show relationships among different types of data. So, the answer is ______.

Check Your Progress **TEST EXAMPLE** Which graph would best represent the data if you want to show how many times each number occurs in the data?

A box-and-whisker plot
B line plot
C line graph
D bar graph

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

12–6 Misleading Graphs

MAIN IDEAS

- Recognize when graphs are misleading.
- Evaluate predictions and conclusions based on data analysis.

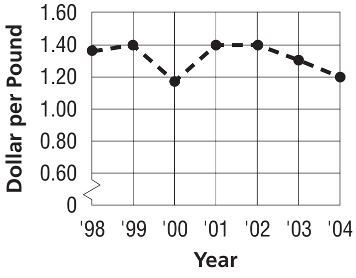
REMEMBER IT

Carefully read the labels and the scales when interpreting a graph.

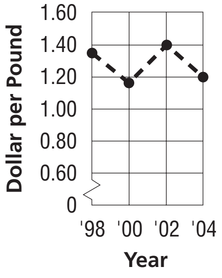
EXAMPLE Misleading Graphs

1 FOOD The graphs show the decrease in the price of lemons.

Price of Lemons Graph A



Price of Lemons Graph B



a. Why do the graphs look different?

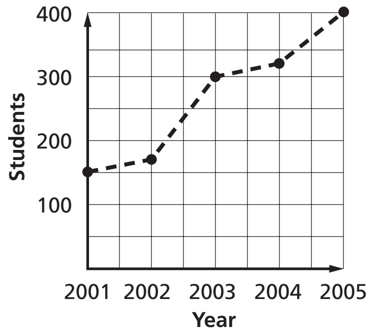
The ________ scales differ.

b. Which graph appears to show a more rapid decrease in the price of lemons after 2002? Explain.

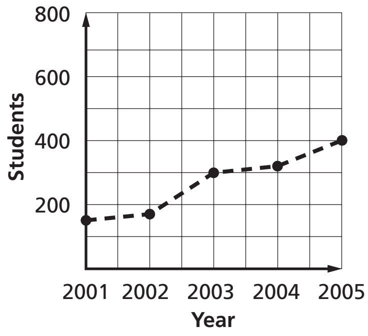
Graph B; the slope of the line from ________ to ________ is steeper in Graph B.

Check Your Progress **The graphs show the increase in attendance at a public elementary school.**

School Attendance Graph A



School Attendance Graph B



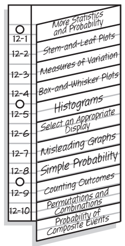
a. Why do the graphs look different?

b. Which graph appears to show a more rapid increase in attendance between 2002 and 2003? Explain.

FOLDABLES™

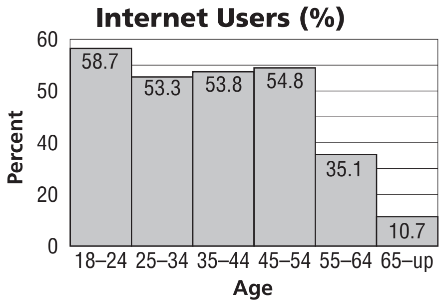
ORGANIZE IT

Under the Lesson 12-6 tab, draw an example of a misleading graph, and explain why it is misleading



EXAMPLE Misleading Bar Graphs

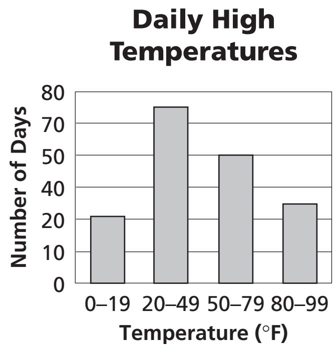
2 **INTERNET** **The graph shows the percent of Internet use in different age groups. According to the graph, more 18- to 24-year-olds are using the Internet than the other age groups. Determine whether this statement is accurate. Justify your reasoning.**



_____, the statement is _____. However, the intervals are not equal.

Check Your Progress

TEMPERATURE The graph shows the daily high temperatures for the previous six months. According to the graph, there were less than twice as many days 50° to 79° than there were days 80° to 99°. Determine whether this statement is accurate. Justify your reasoning.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

12–7 Simple Probability

MAIN IDEAS

- Find the probability of simple events.
- Use a sample to predict the actions of a larger group.

KEY CONCEPT

Probability The probability of an event is a ratio that compares the number of favorable outcomes to the number of possible outcomes.

EXAMPLE Find Probability

1 Suppose a number cube is rolled. What is the probability of rolling a 4 or a 5?

There are ______ numbers that are a 4 or a 5.

There are 6 possible outcomes: 1, 2, 3, 4, 5, and 6.

$P(4 \text{ or } 5) = \dfrac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$

$= \boxed{}$ or $\boxed{}$ or $\boxed{}$

EXAMPLE Find Probability

2 Suppose that two number cubes are rolled. Find the probability of rolling two identical numbers.

Make a table showing the sample space when rolling two number cubes.

	1	2	3	4	5	6
1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

$P(\text{two identical numbers}) = \boxed{}$ or $\boxed{}$ or $\boxed{}$.

Check Your Progress

a. Suppose a number cube is rolled. What is the probability of rolling a number that is divisible by 3?

b. Suppose that two number cubes are rolled. Find the probability of rolling two numbers whose sum is 8.

BUILD YOUR VOCABULARY (pages 288–289)

Experimental probability is what actually occurs when conducting a probability experiment. **Theoretical probability** is what should occur.

EXAMPLE Find Experimental Probability

3 **A coin was tossed 40 times and heads came up 18 times. Find the experimental probability of getting tails for this experiment.**

$$\frac{\text{number of times tails occur}}{\text{number of possible outcomes}} = \boxed{} \text{ or } \boxed{} \text{ or } \boxed{}.$$

Check Your Progress Brian is shooting baskets with a basketball. He makes 13 shots and misses 9 shots. Determine the experimental probability of Brian making a shot.

EXAMPLE Make a Prediction

4 SPORTS **Miss Newman surveyed her class to see which sport they preferred watching. 44% preferred football, 28% basketball, 20% soccer, and 8% tennis. Out of 560 students in the entire school, how many would you expect to say they prefer watching basketball?**

$$\begin{array}{r} \text{part} \longrightarrow \\ \text{whole} \longrightarrow \end{array} \frac{a}{560} = \frac{28}{100} \longleftarrow \text{percent}$$

$$100 \cdot a = 560 \cdot 28$$

$$\boxed{} = \boxed{}$$

$$a = \boxed{}$$

About $\boxed{}$ students say they prefer watching basketball.

Check Your Progress The students in an art class were surveyed about their favorite color. 32% preferred blue, 29% preferred red, 23% preferred yellow, and 16% preferred green. Out of 450 students in the entire school, how many would you expect to say they prefer red?

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

12–8 Counting Outcomes

Main Ideas

- Use tree diagrams or the Fundamental Counting Principle to count outcomes.
- Use the Fundamental Counting Principle to find the probability of an event.

Build Your Vocabulary (page 289)

A **tree diagram** is a diagram used to show the total number of possible outcomes.

Review It

What is the name for the set of all possible outcomes of a probability event? *(Lesson 12-7)*

____

____

____

____

____

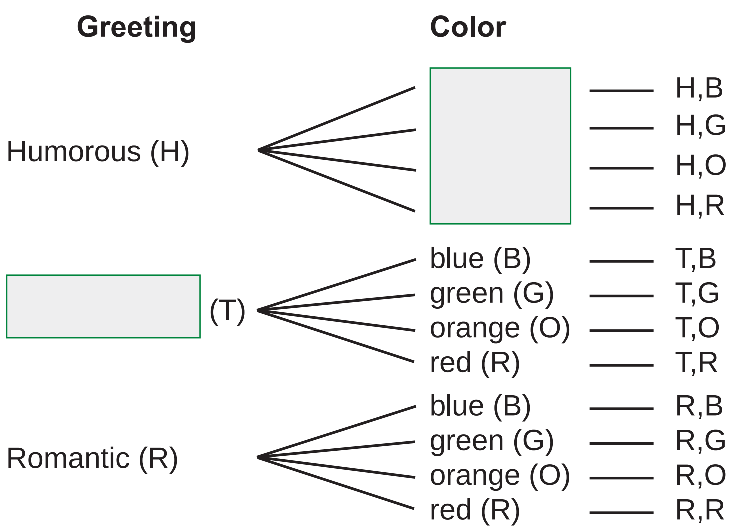
____

EXAMPLE Use a Tree Diagram to Count Outcomes

1 GREETING CARDS **A greeting-card maker offers three birthday greeting in four possible colors as shown in the table below. Draw a tree diagram to find the number of cards that can be made from three greeting choices and four color choices.**

You can draw a diagram to find the number of possible cards.

Greeting	Color
Humorous	Blue
Traditional	Green
Romantic	Orange
	Red



There are ______ possible cards.

Key Concept

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 $m \cdot n$ ways.

FOLDABLES™ Explain how to determine the number of possible outcomes using a tree diagram and the Fundamental Counting Principle.

EXAMPLE Use the Fundamental Counting Principle

2 CELL PHONES **A cell phone company offers 3 payment plans, 4 styles of phones, and 6 decorative phone wraps. How many phone options are available?**

Use the Fundamental Counting Principle.

The number of types of payment plans	times	the number of styles of phones	times	The number of decorative wraps	equals	The number of possible outcomes.
☐	×	☐	×	☐	=	☐

There are ☐ possible phone options.

Check Your Progress

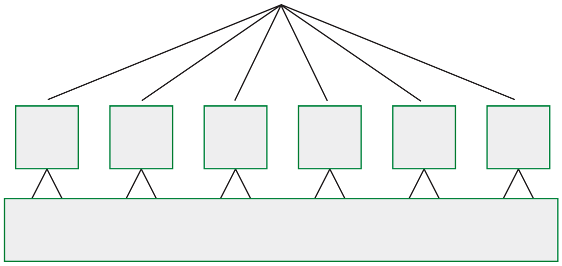
a. An ice cream parlor offers a special on one-scoop sundaes with one topping. The ice cream parlor has 5 different flavors of ice cream and three different choices for toppings. How many different sundaes can be made?

b. A sandwich shop offers 4 choices for bread, 5 choices for meat, and 3 choices for cheese. If a customer can make one choice from each category, how many different sandwiches can be made?

EXAMPLE **Find Probabilities**

3 a. Henry rolls a number cube and tosses a coin. What is the probability that he will roll a 3 and toss heads?

First find the number of outcomes.



There are ____ possible outcomes. There is one outcome that has a 3 and a head.

$P(3 \text{ and head}) = \dfrac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} = $ ____

The probability that Henry will roll a 3 and toss heads is ____.

b. What is the probability of winning a raffle where the winning number is made up of 6 numbers from 1 to 50 chosen at random? Assume all numbers are eligible each draw.

First, find the number of possible outcomes. Use the Fundamental Counting Principle.

The total number of outcomes is ____ × ____ × ____ × ____ × ____ × ____ or 15,625,000,000.

There is 1 winning number. So, the probability of winning with 1 ticket is ____.

Check Your Progress

a. Bob rolls a number cube and tosses a coin. What is the probability that he will roll an odd number and toss tails?

b. What is the probability of winning a lottery where the winning number is made up of 5 numbers from 1 to 20 chosen at random? Assume all numbers are eligible each draw.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

12–9 Permutations and Combinations

MAIN IDEAS

- Use permutations.
- Use combinations.

BUILD YOUR VOCABULARY (page 289)

An ______ or listing in which ______ is important is called a **permutation**.

REMEMBER IT

The first factor in a permutation is the number of things you are choosing from.

EXAMPLE Use a Permutation

1 **TRAVEL** **The Reyes family will visit a complex of theme parks during their summer vacation. They have a four-day pass good at one park per day. They can choose from seven parks.**

a. How many different ways can they arrange their vacation schedule?

The order in which they visit the parks is important. This arrangement is a permutation.

☐ parks Choose ☐.

$P(7, 4) = $ ______

$= $ ______

☐ choices for the 1st day

☐ choices for the 2nd day

☐ choices for the 3rd day

☐ choices for the 4th day

There are ______ possible arrangements.

b. How many five-digit numbers can be made from the digits 2, 4, 5, 8, and 9 if each digit is used only once?

☐ choices for the 1st digit

☐ choices remain for the 2nd digit

☐ choices remain for the 3rd digit

☐ choices remain for the 4th digit

☐ choice remains for the 5th digit

$P(5, 5) = $ ______ $=$ ______

There are ______ numbers that can be made.

Check Your Progress

a. How may ways can five runners be arranged on a three-person relay team?

b. How many six-digit numbers can be made from the digits 1, 2, 3, 4, 5, and 6 if each digit is used only once?

BUILD YOUR VOCABULARY (page 288)

An arrangement or ________ in which ________ is not important is called a **combination**.

EXAMPLE Use a Combination

2 **a.** HATS **How many ways can a window dresser choose two hats out of a fedora, a bowler, and a sombrero?**

Since order is not important, this arrangement is a combination.

First, list all of the permutations of the types of hats taken ________ at a time. Then cross off arrangements that are the same as another one.

There are ________ ways to choose two hats from three possible hats.

b. PENS **How many ways can a customer choose two pens from a purple, orange, green, red, and black pen?**

Since order is not important, this arrangement is a combination.

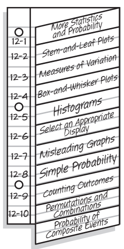
First, list all of the permutations of the types of pens taken ________ at a time. Then cross off arrangements that are the same as another one.

There are ________ ways to choose two pens from five possible pens.

FOLDABLES™

ORGANIZE IT

Explain the difference between a permutation and a combination under the Lesson 12-8 tab.



Check Your Progress How many ways can two shirts be selected from a display having a red shirt, a blue shirt, a green shirt, and a white shirt?

EXAMPLE

3 TENNIS The players listed are playing singles in a tennis tournament. If each player plays every other player once, what is the probability that Kyle plays in the first match?

Thomas	Carl
Ager	Jack
Brian	Seth
Kyle	Pedro

Kyle playing Ager is the same as ______ playing ______, so this is a ______.

Find the combination of ______ people taken ______ at a time. Then find how many matches involve Kyle.

$C(\_\_, \_\_) =$ ______ or ______ There are ______ ways to choose ______ people to play.

Kyle plays each person once during the tournament. If there are ______ other people, Kyle is involved in ______ games.

So the probability that Kyle plays in the first match is $\frac{7}{28}$ or $\frac{1}{4}$.

Check Your Progress

VOLLEYBALL The teams listed are playing in a volleyball tournament. If each team plays every other team once, what is the probability that the Lions play in the first game?

Huskers	Broncos
Gators	Waves
Cougars	Red Storm
Wild Cats	Lions
Badgers	Bearcats

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

12–10 Probability of Composite Events

MAIN IDEAS

- Find the probability of independent and dependent events.
- Find the probability of mutually exclusive events.

BUILD YOUR VOCABULARY (page 288)

A **composite** event consists of ______ simple events.

In **independent events**, the outcome of one event does not ______ the outcome of a second event.

KEY CONCEPT

Probability of Two Independent Events The probability of two independent events is found by multiplying the probability of the first event by the probability of the second event.

EXAMPLE Probability of Independent Events

1 GAMES **In a popular number cube game, the highest possible score in a single turn is a roll of five of a kind. After rolling one five of a kind, every other five of a kind you roll earns 100 points. What is the probability of rolling two five of a kinds in a row?**

The events are ______ since each roll does not affect the outcome of the next roll.

There are ______ ways to roll five of a kind.

There are 6^5 or ______ ways to roll five dice. So, the probability of rolling five of a kind on a toss of the number cubes is ______ or ______.

P(two five of a kind)

$= P$(five of a kind on first roll) • P(five of a kind on second roll)

= ______ • ______

= ______

Check Your Progress Find the probability of rolling doubles four times in a row when rolling a pair of number cubes.

BUILD YOUR VOCABULARY (pages 288–289)

If the ______ of one event ______ the outcome of a second event, the events are called **dependent events**.

If two events ______ happen at the ______, they are said to be **mutually exclusive**.

KEY CONCEPT

Probability of Two Dependent Events
If two events, *A* and *B* are dependent, then the probability of both events occurring is the product of the probability of *A* and the probability of *B* after *A* occurs.

EXAMPLE Probability of Dependent Events

2 CLOTHES **Charlie's clothes closet contains 3 blue shirts, 10 white shirts, and 7 striped shirts. What is the probability that Charlie will reach in and randomly select a white shirt followed by a striped shirt?**

$P(\text{white shirt and striped shirt}) = \square \cdot \square$

$= \square$ or $\square$

10 of 20 shirts are white.

7 of 19 remaining shirts are striped.

The probability Charlie will select a white shirt followed by a striped shirt is $\square$.

Check Your Progress **COOKIES** A plate has 6 chocolate chip cookies, 4 peanut butter cookies, and 5 sugar cookies. What is the probability of randomly selecting a chocolate chip cookie followed by a sugar cookie?

Key Concept

Probability of Two Mutually Exclusive Events
The probability of one or the other of two mutually exclusive events can be found by adding the probability of the first event to the probability of the second event.

Foldables Under the 12–10 tab, explain when you would use each of the three probability formulas defined in this lesson.

EXAMPLE Probability of Mutually Exclusive Events

3 CARDS **You draw a card from a standard deck of playing cards. What is the probability that the card will be a black nine or any heart?**

The events are ______ because the card can not be both a black nine and a heart at the same time.

$P(\text{black nine or heart}) = P(\quad) + P(\quad)$

$= \quad + \quad$

$= \quad$

The probability that the card will be a black nine or any heart is ______.

Check Your Progress **CARDS** You draw a card from a standard deck of playing cards. What is the probability that the card will be a club or a red face card?

Homework Assignment

Page(s):

Exercises:

CHAPTER 12

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 12 Foldable** to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 12, go to: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 288–289*) to help you solve the puzzle.

12-1

Stem-and-Leaf Plots

Use the table at the right.

1. Display the data set in a stem-and-leaf plot.

2. In which interval do most of the players fall?

Home runs hit by American League Leaders in 2002	
Chavez	34
Delgado	33
Giambi	41
Ordóñez	38
Palmeiro	43
Rodríguez	57
Soriano	39
Tejeda	34
Thome	52

Source: mlb.com

12-2

Measures of Variation

Find the range, interquartile range, and any outliers for each set of data.

3. {42, 22, 59, 82, 15, 37, 71, 24}

4.

Stem	Leaf
1	3 7
2	2 3 8
3	1 4 6 7 *1|3 = 13*

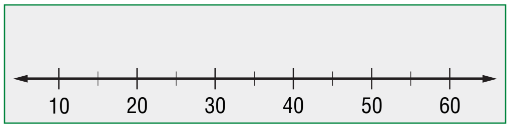
5.

Stem	Leaf
7	0 2 4 7 8
8	0 2 7
9	3 6 *7|0 = 70*

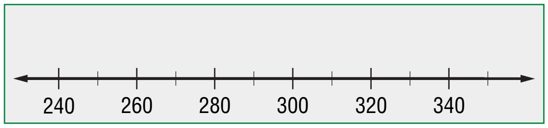
12-3 Box-and-Whisker Plots

Draw a box-and-whisker plot for each set of data.

6. 24, 40, 22, 15, 52, 46, 31, 22, 36



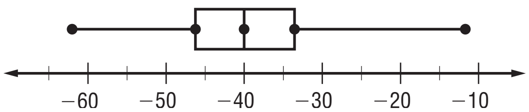
7. 342, 264, 289, 272, 245, 316, 331, 249, 270, 261



For exercises 8 and 9, use the box-and-whisker plot shown.

8. What is the warmest lowest recorded temperature?

Lowest Recorded Temperature (°C) in the US



9. What percent of the temperatures range from 0°C to −40°C?

12-4 Histograms

For Exercises 10–12, use the frequency table shown.

10. Display the data in a histogram.

Movies Seen in the Last 12 Months		
Movies	**Tally**	**Frequency**
1–4	~~||||~~ ||||	9
5–8	~~||||~~ ~~||||~~ ~~||||~~	15
9–12	~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ ||	22
13–16	~~||||~~	5

11. How many people were surveyed?

12. How many people surveyed saw no more than 8 movies?

12-5

Selecting an Appropriate Display

OLYMPICS The table shows the winning times for the Men's Marathon during the Summer Olympic Games from 1928 to 2004

Year	1928	1932	1936	1948	1952	1956	1960	1964	1968
Time (min)	153	152	149	155	143	145	135	132	140
Year	1972	1976	1980	1984	1988	1992	1996	2000	2004
Time (min)	132	130	131	129	131	133	133	130	131

Source: olympic.org

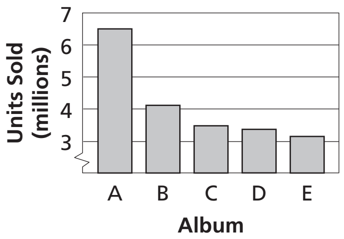
13. Which graph best represents the data if you want to show change over a period of time?

12-6

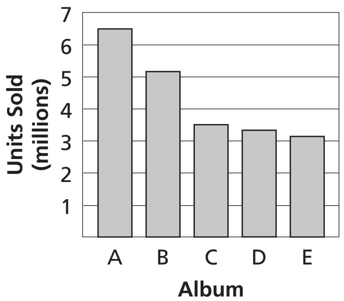
Misleading Statistics

14. Which graph gives the impression that the top-selling 2003 album sold far more units than any other in the top five?

2003 Top Five Selling Albums
Graph A



2003 Top Five Selling Albums
Graph B

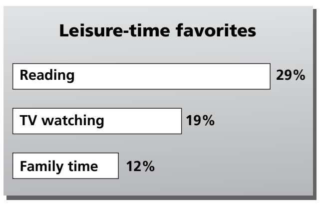


12-7

Simple Probability

15. A box contains 7 black, 10 blue, 5 green, and 8 red pens. One pen is selected at random. Find the probability that it is *not* green.

16. Refer to the graph. Out of a group of 3500 people, how many would you expect to say that family time is their favorite leisure-time activity?



Source: *USA Today*

12-8

Counting Outcomes

Find the number of possible outcomes for each situation.

19. One part of a test has 7 true-false questions.

20. A bicycle is made with a choice of two seats, three frames, and five colors.

21. What is the probability of rolling exactly one 6 when two number cubes are rolled?

12-9

Permutations and Combinations

Tell whether each situation is a *permutation* or *combination*. Then solve.

22. How many ways can you choose 4 books from 15 on a shelf?

23. How many 4-digit numbers can you write using the digits 1, 2, 3, and 4 exactly once in each number?

12-10

Probability of Compound Events

For Exercises 24 and 25, pens are drawn from a bag containing 6 red, 8 black, and 4 blue pens. Label each situation as *independent*, *dependent*, or *mutually exclusive* events. Then find each probability.

24. drawing a red pen, which is replaced, followed by a blue pen

25. drawing a black pen or a blue pen

26. What is $P(A \text{ and } B)$ if $P(A) = \frac{1}{6}$, $P(B) = \frac{2}{3}$, $P(B \text{ following } A) = \frac{4}{5}$, and A and B are dependent?

CHAPTER 12

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **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 695 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 12 Study Guide and Review on pages 690–694 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 695.

☐ **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 Foldables.
- Then complete the Chapter 12 Study Guide and Review on pages 690–694 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 695.

Student Signature

Parent/Guardian Signature

Teacher Signature

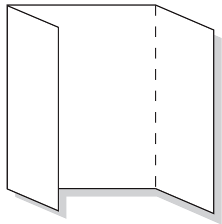
CHAPTER 13

Polynomials and Nonlinear Functions

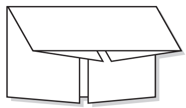
FOLDABLES™ Use the instructions below to make a Foldable to help you organize your notes as you study the chapter. You will see Foldable reminders in the margin of this Interactive Study Notebook to help you in taking notes.

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

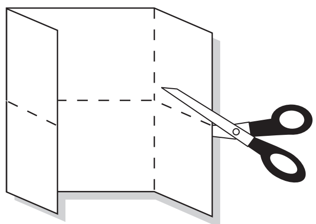
STEP 1 **Fold** the short sides toward the middle.



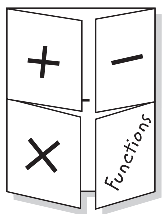
STEP 2 **Fold** the top to the bottom.



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 taking notes, write clean and concise explanations. Someone who is unfamiliar with the math concepts should be able to read your explanations and learn from them.

CHAPTER 13

BUILD YOUR VOCABULARY

This is an alphabetical list of new vocabulary terms you will learn in Chapter 13. 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
binomial [by-NOH-mee-uhl]			
cubic function [KYOO-bihk]			
degree			

Vocabulary Term	Found on Page	Definition	Description or Example
nonlinear function			
polynomial [PAHL-uh-NOH-mee-uhl]			
quadratic function [kwah-DRAT-ink]			
trinomial [try-NOH-mee-uhl]			

13–1 Polynomials

Main Ideas

- Identify and classify polynomials.
- Find the degree of a polynomial.

Build Your Vocabulary (pages 326–327)

An ______ that contains one or more ______ is called a **polynomial**.

A polynomial with ______ is called a **binomial**, and a polynomial with ______ is called a **trinomial**.

The **degree** of a monomial is the ______ of the ______ of its variables.

Remember It

When classifying polynomials, first write all expressions in simplest form.

EXAMPLE Classify Polynomials

1 **Determine whether each expression is a polynomial. If it is, classify it as a *monomial*, *binomial*, or *trinomial*.**

a. $\frac{-2}{x}$

The expression ______ a polynomial because $\frac{-2}{x}$ has a variable in the ______.

b. $x^2 - 12$

This ______ a polynomial because it is the difference of two ______. There are two terms, so it is a ______.

Check Your Progress **Determine whether each expression is a polynomial. If it is, classify it as a *monomial*, *binomial*, or *trinomial*.**

a. $x^3 + 3x^2 + 8$ ______

b. $\sqrt{x} + 5$ ______

EXAMPLE Degree of a Monomial or Polynomial

2 Find the degree of each polynomial.

a. $-10w^4$ The variable w has degree ___, so the degree of $-10w^4$ is ___.

b. $8x^3y^7z$ x^3 has a degree of ___, y^7 has a degree of ___, and z has a degree of ___. The degree of $8x^3y^7z$ is ___ + ___ + ___ or ___.

c. $a^2b^5 - 4$

term	degree
a^2b^5	
4	

The greatest degree is ___. So, the degree of the polynomial is ___.

d. $2x^2y^2 + 7xy^6$

term	degree
$2x^2y^2$	
$7xy^6$	

The greatest degree is ___. So, the degree of the polynomial is ___.

Check Your Progress **Find the degree of each polynomial.**

a. $5m^3$

b. $-3ab^2c^5$

c. $x^3y^3 + 4x^4y$

d. $-3mn^4 - 7$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

13–2 Adding Polynomials

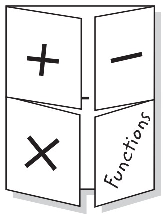
Main Ideas

- Add polynomials.

Foldables™

Organize It

Write an example of adding two polynomials with two or three terms each under the "+" tab.



EXAMPLE Add Polynomials

1 **a. Find $(9w - 4) + (w + 5)$.**

METHOD 1 Add vertically.

$$\begin{array}{rr} & 9w - 4 \\ (+) & w + 5 \\ \hline & \underline{\qquad\qquad} \end{array}$$

Align like terms.

Add.

METHOD 2 Add horizontally.

$(9w - 4) + (w + 5)$

$= \underline{\qquad\qquad} + \underline{\qquad\qquad}$ Associative and Commutative Properties

$= \underline{\qquad\qquad}$

The sum is $\underline{\qquad\qquad}$.

b. Find $(6x^2 - 3x + 1) + (-x^2 + x - 1)$.

METHOD 1 Add vertically.

$$\begin{array}{rr} & 6x^2 - 3x + 1 \\ (+) & -x^2 + x - 1 \\ \hline & \underline{\qquad\qquad} \end{array}$$

Align like terms.

Add.

METHOD 2 Add horizontally.

$(6x^2 - 3x + 1) + (-x^2 + x - 1)$ Write the expression.

$= \underline{\qquad\qquad} + \underline{\qquad\qquad} + \underline{\qquad\qquad}$ Group like terms.

$= \underline{\qquad\qquad}$ Simplify.

The sum is $\underline{\qquad\qquad}$.

REVIEW IT

Identify the like terms in the expression $6x + 5 + 3y - 4 - 2x$. (*Lesson 3–2*)

____

____

____

____

____

Check Your Progress **Find each sum.**

a. $(5b + 2) + (3b - 6)$

b. $(3m^2 - 5m + 9) + (-5m^2 + 3m - 7)$

EXAMPLE

2 **GEOMETRY** **The length of a rectangle is $3x^2 + 2x - 5$ units and the width is $8x - 1$ units.**

a. Find the perimeter.

$P = \boxed{}$	Formula for the perimeter of a rectangle.
$P = 2\boxed{} + 2\boxed{}$	Replace ℓ with $\boxed{}$ and w with $\boxed{}$.
$P = \boxed{}$	Distributive Property
$P = \boxed{}$	Simplify.

The perimeter is $\boxed{}$.

b. Find the perimeter of the rectangle if $x = 3$.

$P = \boxed{}$	Write the equation for the perimeter.
$P = 6\left(\boxed{}\right)^2 + 20\left(\boxed{}\right) - 12$	Replace x with $\boxed{}$.
$P = \boxed{}$	Simplify.

The perimeter of the rectangle is $\boxed{}$ when $x = 3$.

Check Your Progress **GEOMETRY** The width of a rectangle is $2w^2 + 3w + 4$ units and the width is $6w - 3$ units. Find the perimeter. Then find the length when $w = 5$.

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

13–3 Subtracting Polynomials

MAIN IDEAS

- Subtract polynomials.

EXAMPLE Subtract Polynomials

1 **a. Find $(7a + 4) - (9a + 2)$.**

$$\begin{array}{rl} & 7a + 4 \\ (-) & 9a + 2 \\ \hline \end{array}$$

Align like terms.

Subtract.

b. Find $(8b^2 + 6) - (3b^2 + 6b + 1)$.

$$\begin{array}{rl} & 8b^2 \qquad\quad + 6 \\ (-) & 3b^2 + 6b + 1 \\ \hline \end{array}$$

Align like terms.

Subtract.

Check Your Progress **Find each difference.**

a. $(2x + 9) - (5x - 4)$

b. $(5k^2 + 3k - 4) - (2k^2 + 1)$

EXAMPLE Subtract Using the Additive Inverse

2 **a. Find $(4x - 8) - (3x + 9)$.**

The additive inverse of $3x + 9$ is $(-1)(3x - 9)$ or ______.

$(4x - 8) - (3x + 9)$

$= (4x - 8) +$ ______ Add the additive inverse.

$=$ ______ Group like terms.

$=$ ______ Simplify.

b. Find $(7ab + 2b^2) - (3a^2 + ab + b^2)$.

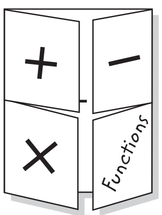
The additive inverse of $3a^2 + ab + b^2$ is

$(-1)(3a^2 + ab + b^2)$ or ______.

FOLDABLES™

ORGANIZE IT

Write an example of subtracting two polynomials with two or three terms each under the "–" tab.



Write It

Explain when you might use a placeholder when subtracting two polynomials.

Align the like terms and add the additive inverse.

$$\begin{array}{rl} & 7ab + 2b^2 \\ (-) & 3a^2 + ab + b^2 \end{array} \longrightarrow \begin{array}{rl} & 7ab + 2b^2 \\ (+) & \square \\ \hline & \square \end{array}$$

Check Your Progress **Find each difference.**

a. $(8c - 3) - (-2c + 4)$

b. $(-3xy - 4y^2) - (2x^2 - 8xy + 2y^2)$

EXAMPLE

3 ALLOWANCE Nguyen receives a monthly allowance from his parents of $2x + 5$. Susan receives an allowance of $x + 6$. For both, x represents the number of chores each completed. When $x \geq 2$, Nguyen earns more than Susan. How much more does he earn?

difference in allowance when $x \geq 2$

= ______ allowance − ______ allowance

= ______ Substitution

= ______ Add the additive inverse.

= ______ Group like terms.

= ______ Simplify.

Nguyen earns ______ in allowance when $x \geq 2$.

Check Your Progress **PROFIT** The ABC Company's costs are given by $3x + 200$ where x = the number of items produced. The revenue is given by $5x$. Find the profit, which is the difference between the revenue and the cost.

Homework Assignment

Page(s):

Exercises:

13–4 Multiplying a Polynomial by a Monomial

MAIN IDEAS

- Multiply a polynomial by a monomial.

EXAMPLE Product of a Monomial and a Polynomial

1 **a. Find $-8(3x + 2)$.**

$-8(3x + 2) =$ ______ $+$ ______ Distributive Property

$=$ ______ Simplify.

b. Find $(6x - 1)(-2x)$.

$(6x - 1)(-2x) = 6x$ ______ $- 1$ ______ Distributive Property

$=$ ______ Simplify.

Check Your Progress **Find each product.**

a. $3(-5m - 2)$

b. $(4p - 8)(-3p)$

EXAMPLE Product of a Monomial and a Polynomial

2 **Find $4b(-a^2 + 5ab + 2b^2)$.**

$4b(-a^2 + 5ab + 2b^2)$

$=$ ______ Distributive Property

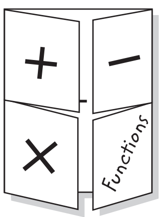
$=$ ______ Simplify.

Check Your Progress Find $-3x(2x^2 - 4xy + 3y^2)$.

FOLDABLES™

ORGANIZE IT

Write an example of multiplying a monomial by a polynomial with two or three terms under the "×" tab



EXAMPLE

Write It

How do you determine the degree of a polynomial?

____

____

____

____

3 TEST EXAMPLE The length of a dog run is 4 feet more than three times its width. The perimeter of the dog run is 56 feet. What are the dimensions of the dog run?

A 8 ft by 20 ft **C** 3 ft by 56 ft

B 10 ft by 12 ft **D** 6 ft by 22 ft

Let w represent the width of the dog run. Then ______ represents the length. Write an equation.

Perimeter	equals	twice	the sum of the length and width.
P	$=$	2	$(\ell + w)$

$P = 2(\ell + w)$ Write the equation.

$56 =$ ______ $P = 56$, $\ell =$ ______

$56 =$ ______ Combine like terms.

$56 =$ ______ Distributive Property

______ $=$ ______ Subtract ______ from each side.

______ $=$ ______ Divide each side by ______.

The width of the dog run is ______ and the length is ______ or ______. The answer is ______.

Check Your Progress **TEST EXAMPLE** The length of a garden is four more than twice its width. The perimeter of the garden is 44 feet. What are the dimensions of the garden?

A 6 ft by 12 ft **C** 12 ft by 16 ft

B 6 ft by 16 ft **D** 8 ft by 12 ft

Homework Assignment

Page(s):

Exercises:

13–5 Linear and Nonlinear Functions

MAIN IDEAS

- Determine whether a function is linear or nonlinear.

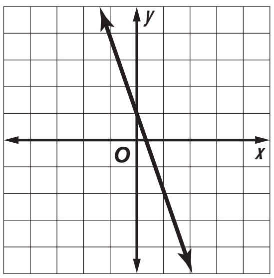
BUILD YOUR VOCABULARY (page 327)

A **nonlinear function** is a function whose graph is ______ a ______ line.

EXAMPLE Identify Functions Using Graphs

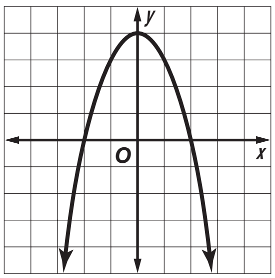
1 Determine whether each graph represents a *linear* or *nonlinear* function.

a.



The graph is a ______ line, so it represents a ______ function.

b.



The graph is a ______, not a ______ line, so it represents a ______ function.

REVIEW IT

Why is the equation $y = 2x^2 + 3$ a function? (Lesson 7–1)

______

______

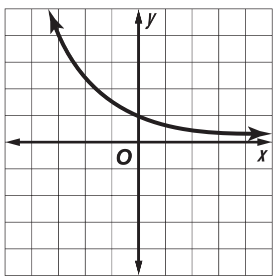
______

______

______

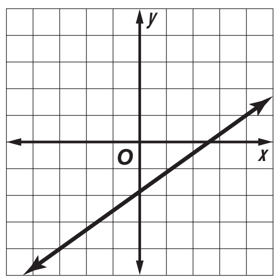
Check Your Progress **Determine whether each graph represents a *linear* or *nonlinear* function.**

a.



______

b.

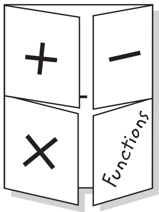


______

FOLDABLES™

ORGANIZE IT

Write an example of a linear function and an example of a nonlinear function under the Functions tab.



EXAMPLE Identify Functions Using Equations

2 **Determine whether each equation represents a *linear* or *nonlinear* function.**

a. $y = -5x - 4$

This equation represents a ______ function because it is written in the form ______.

b. $y = 2x^2 + 3$

This equation is ______ because x is raised to the ______ and the equation cannot be written in the form ______.

Check Your Progress **Determine whether each equation represents a *linear* or *nonlinear* function.**

a. $y = \frac{2}{x} + 6$ ______

b. $2x + y = 4$ ______

EXAMPLE Identify Functions Using Tables

3 **Determine whether each table represents a *linear* or *nonlinear* function.**

a.

	x	y	
	2	25	
+ 2			− 8
	4	17	
+ 2			− 8
	6	9	
+ 2			− 8
	8	1	

As x increases by ______, y decreases by ______. So, this is a ______ function.

b.

	x	y	
	5	2	
+ 3			+ 2
	8	4	
+ 3			+ 4
	11	8	
+ 3			+ 8
	14	16	

As x increases by ______, y increases by a ______ amount each time. So, this is a ______ function.

Check Your Progress **Determine whether each table represents a *linear* or *nonlinear* function.**

a.

x	y
3	10
5	11
7	13
9	16

b.

x	y
10	4
9	7
8	10
7	13

EXAMPLE Describe a Linear Function

4 Which of the following is a linear function?

a. $y = \frac{1}{x} + 3$

The independent variable has an exponent of ____.

b. $y = -9x$

The independent variable has an exponent of ____.

c. $y = x(x - 5)$

The independent variable has an exponent of ____.

d. $32 = 2x^2 + 3y$

The independent variable has an exponent of ____.

The linear function is ____.

Check Your Progress Which of the following is a linear function?

a. $y = x^2 + 3$

b. $xy = -5$

c. $5x - y = 1$

d. $y = \frac{1}{4}x^3$

HOMEWORK ASSIGNMENT

Page(s):

Exercises:

13–6 Graphing Quadratic and Cubic Functions

MAIN IDEAS

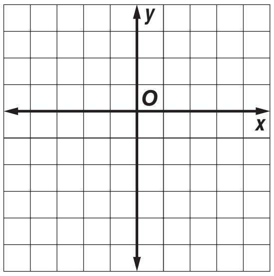
- Graph quadratic functions.
- Graph cubic functions.

EXAMPLE Graph Quadratic Functions

1 **a. Graph $y = -2x^2$.**

Make a table of values, plot the ____________, and connect the points with a ________.

x	$-2x^2$	(x, y)
-1.5	$-2(-1.5)^2 = 4.5$	
-1	$-2(-1)^2 =$ ____	$(-1, -2)$
0.5	$-2(0.5)^2 = (-0.5)$	
-0.5	$-2(-0.5)^2 =$ ____	$(-0.5, -0.5)$
0	$-2(0)^2 =$ ____	
1	$-2(1)^2 =$ ____	$(1, -2)$
1.5	$-2(1.5)^2 = -4.5$	



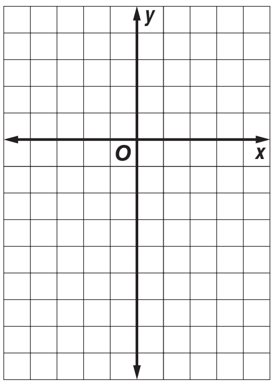
REMEMBER IT

When substituting values for x in a function, consider using decimal values if necessary to find points that are closer together.

b. Graph $y = -x^2 - 3$.

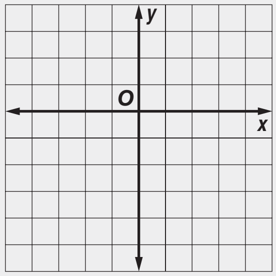
Make a table of values, plot the ordered pairs, and connect the points with a curve.

x	$-x^2 - 3$	(x, y)
-2	$-(-2)^2 - 3 =$ ____	
-1	$-(-1)^2 - 3 =$ ____	$(-1, -4)$
0	$-(0)^2 - 3 = -3$	
1	$-(1)^2 - 3 = -4$	
2	$-(2)^2 - 3 =$ ____	$(2, -7)$

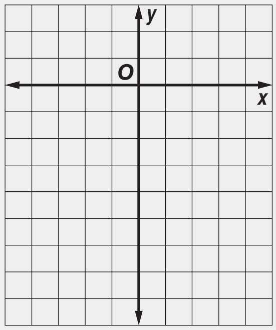


Check Your Progress **Graph each function.**

a. $y = -x^2$



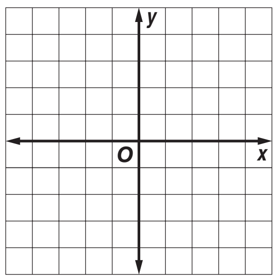
b. $y = 3x^2 - 8$



EXAMPLE **Graph Cubic Functions**

2 **Graph** $y = -\frac{x^3}{2}$.

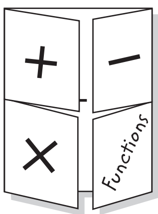
x	$-\frac{x^3}{2}$	(x, y)
-2	$-\frac{(-2)^3}{2} = 4$	$(-2, 4)$
-1	$-\frac{(-1)^3}{2} = 0.5$	
0	$-\frac{(0)^3}{2} =$	
1	$-\frac{(1)^3}{2} = -0.5$	$(1, -0.5)$
2	$-\frac{(2)^3}{2} =$	



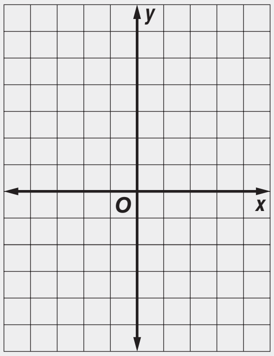
FOLDABLES™

ORGANIZE IT

Under the Functions tab, write an example of a quadratic function and an example of a cubic function. Then graph each function.



Check Your Progress Graph $y = x^3 - 3$.



HOMEWORK ASSIGNMENT

Page(s):

Exercises:

CHAPTER 13

BRINGING IT ALL TOGETHER

STUDY GUIDE

FOLDABLES™	VOCABULARY PUZZLEMAKER	BUILD YOUR VOCABULARY
Use your **Chapter 13 Foldable** to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 13, go to: glencoe.com	You can use your completed **Vocabulary Builder** (*pages 326–327*) to help you solve the puzzle.

13-1

Polynomials

Determine whether each expression is a polynomial. If it is, classify it as a *monomial*, *binomial*, or *trinomial*.

1. $5m - 3$

2. $\frac{5}{c} + c^2$

3. $7 - 3y - 4y^3$

Find the degree of each polynomial.

4. pq

5. 144

6. $x^4 + x - 5$

13-2

Adding Polynomials

Find each sum.

7. $(4y - 17) + (2y + 3)$

8. $(9b^2 + 4b - 15) + (-3b^2 + 8)$

13-3

Subtracting Polynomials

Find each difference.

9. $(6x + 11y) - (10x - 2y)$

10.
$$\begin{array}{lr} & x^2 + 9xy - 12y \\ (-) & 2xy - y \\ \hline \end{array}$$

13-4 Multiplying a Polynomial by a Monomial

Find each product.

11. $4(3q - 2)$

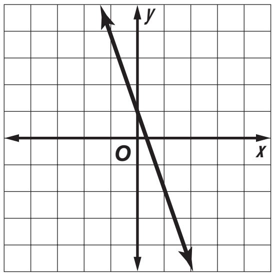
12. $(3y + 8)x$

13. $7a(2a^2 - 3b)$

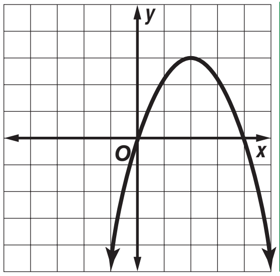
13-5 Linear and Nonlinear Functions

Determine whether each graph, equation, or table represents a *linear* or *nonlinear* function. Explain.

14.



15.



16. $y = \frac{5}{x} + 3$

17.

x	y
−3	9
−1	1
0	0
1	1

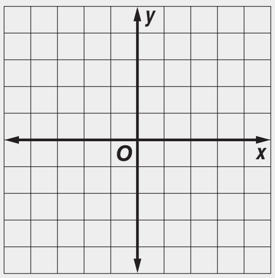
18.

x	y
−12	−3
−10	−2
−8	−1
−6	0

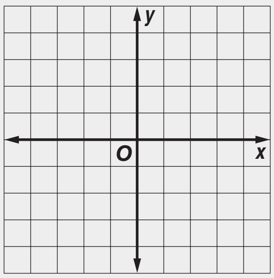
13-6 Graphing Quadratic and Cubic Functions

Graph each function.

19. $y = -2x^2 + 4$



20. $y = 0.5x^3 - 2$



CHAPTER 13

Checklist

ARE YOU READY FOR THE CHAPTER TEST?

Math Online

Visit **glencoe.com** to access your textbook, more examples, self-check quizzes, and practice tests to help you study the concepts in Chapter 13.

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 13 Practice Test on page 735 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 13 Study Guide and Review on pages 732–734 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 13 Practice Test on page 735.

☐ **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 13 Foldable.
- Then complete the Chapter 13 Study Guide and Review on pages 732–734 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 13 Practice Test on page 735.

Student Signature

Parent/Guardian Signature

Teacher Signature