

Glencoe McGraw-Hill

Study Notebook

Algebra 1



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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

Expressions, Equations, and Functions

Before You Read

Before you read the chapter, think about what you know about expressions, equations, and functions. List three things you already know about them in the first column. Then list three things you would like to learn about them in the second column.

| K What I know... | W What I want to find out... |
|---------------------|---------------------------------|
| | |


 FOLDABLES® Study Organizer

Construct the Foldable as directed at the beginning of this chapter.



Note Taking Tips

- **When taking notes, write down a question mark to anything you do not understand.**

Before your next quiz, ask your instructor to explain these sections.

- **When you take notes, be sure to listen actively.**

Always think before you write, but don't get behind in your note-taking. Remember to enter your notes legibly.

CHAPTER
1

Expressions, Equations, and Functions

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on properties of numbers, one fact might be that zero has no reciprocal (because any number times 0 is 0). After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|---|------|
| 1-1 Variables and Expressions | |
| 1-2 Order of Operations | |
| 1-3 Properties of Numbers | |
| 1-4 The Distributive Property | |
| 1-5 Equations | |
| 1-6 Relations | |
| 1-7 Functions | |
| 1-8 Logical Reasoning and Counterexamples | |

1-1 Variables and Expressions

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in this lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Match each term with its definition.

algebraic expression

the quantities being multiplied in an expression involving multiplication

term

consists of one or more numbers and variables along with one or more arithmetic operation

power

the result of a multiplication expression

factors

symbols used to represent unspecified numbers or values in algebra

product

indicates the number of times the base is used as a factor

variables

a part of an expression that may be a number, a variable, or a product or quotient of numbers and variables

Vocabulary Link *Vary* is a word used in everyday English that is used to build the word *variable*. Find the definition of *vary* using a dictionary. Explain how its everyday definition can help you understand the meaning of *variable* in mathematics.

Lesson 1-1

Lesson 1-1 *(continued)*

Main Idea

Write Verbal Expressions

p. 5

Details

Write a verbal expression for each algebraic expression.

1. $4x + 10$

2. $p - 17$

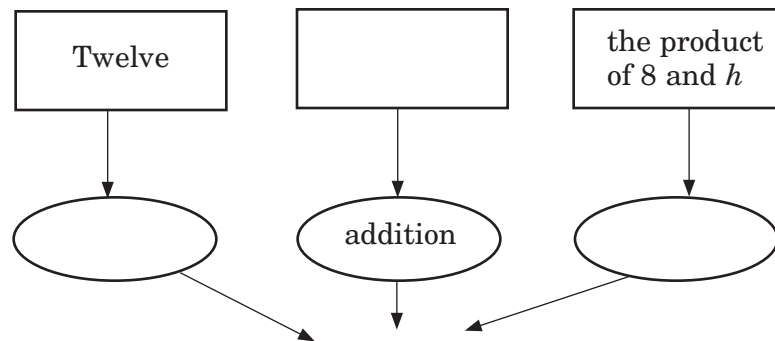
3. $\frac{3y}{8}$

Write Algebraic Expressions

p. 6

A model can be used to aid in translating a verbal expression into an algebraic expression. Write an algebraic expression for the following verbal expression.

Twelve more than the product of 8 and h .



Helping You Remember

A classmate states that 7 less than w translates to $7 - w$. You correct the classmate by saying it translates to $w - 7$. Your classmate responds by saying, "That is the same thing." Is your classmate correct? Support your answer with examples that either disprove or support your classmate.

1-2 Order of Operations

What You'll Learn

Skim Lesson 1-2. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the correct term next to each definition. (*Lesson 1-1*)

- _____ ▶ symbols used to represent unspecified numbers or values
- _____ ▶ the result of a multiplication expression
- _____ ▶ indicates the number of times the base is used as a factor

New Vocabulary Define the following terms in your own words.

evaluate ▶ _____

order of operations ▶ _____

Vocabulary Link *Evaluate* is a word that is used in everyday English. Find the definition of *evaluate* using a dictionary. Explain how its English definition can help you understand its meaning in mathematics.

Lesson 1-2

Lesson 1-2 *(continued)*

Main Idea

Details

Evaluate Numerical Expressions

pp. 10–11

Evaluate each expression.

1. 3^3 _____
2. $4(2 + 3) - 8$ _____
3. $(4 + 2)^2 \div 2$ _____

Evaluate Algebraic Expressions

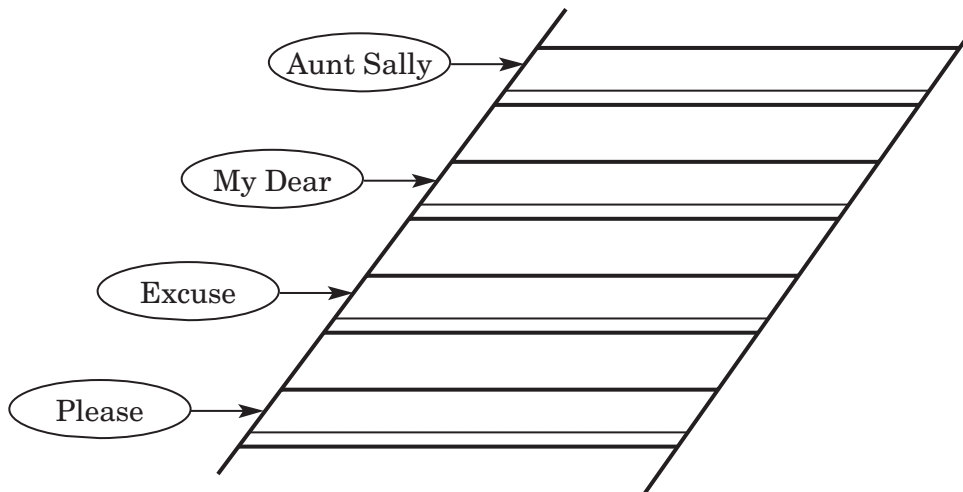
pp. 11–12

Complete the chart that shows the steps in evaluating an algebraic expression.

| | | |
|--|--|--|
| Replace the _____ with their assigned _____. | Apply the _____ _____ to the expression. | _____ _____ and label your answer, if necessary. |
|--|--|--|

Helping You Remember

Complete each rung of the ladder with the correct order of operations. Start at the bottom and work your way to the top.



1-3 Properties of Numbers

What You'll Learn

Scan the text in Lesson 1-3. Write two facts you learned about properties of numbers as you scanned the text.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Define *variables* in your own words. (Lesson 1-1)

New Vocabulary Fill in each blank with the correct term or phrase.

- equivalent expressions* ▶ Two numbers whose product is 1 are called *multiplicative inverses* or _____.
- reciprocals* ▶ Expressions that represent the same number are _____.
- Additive Identity* ▶ The number 1 is known as the _____.
- Multiplicative Identity* ▶ The number 0 is known as the _____.

Vocabulary Link *Identity* is a word that is used in everyday English. Find the definition of *identity* using a dictionary. Explain how its English definition can help you understand its meaning in mathematics, specifically when referring to additive and multiplicative identities.

Lesson 1-3 (continued)

Main Idea

Properties of Equality and Identity

pp. 16–17

Details

Fill in the blanks with the property used in each step.

$$5(9 + 3) \cdot (9 - 8) \cdot \frac{1}{60} + (-5 + 5)$$

$$= 5(12) \cdot (1) \cdot \frac{1}{60} + (-5 + 5)$$

$$9 + 3 = 12$$

$$\text{and } 9 - 8 = 1 \text{ _____}$$

$$= 5(12) \cdot (1) \cdot \frac{1}{60} + 0 \quad -5 + 5 = 0 \text{ _____}$$

$$= 60 \cdot (1) \cdot \frac{1}{60} + 0 \quad 5(12) = 60 \text{ _____}$$

$$= 60 \cdot \frac{1}{60} + 0 \quad 60 \cdot 1 = 60 \text{ _____}$$

$$= 1 + 0 \quad 60 \cdot \frac{1}{60} = 1 \text{ _____}$$

$$= 1 \quad 1 + 0 = 1 \text{ _____}$$

Use Commutative and Associate Properties

pp. 18–19

Use the Associative Property to write two equivalent expressions. Use the numbers 4, 6, and 9.

Use the numbers and a set of parentheses to write an addition expression.

\rightarrow = 19
 \rightarrow = 19

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Helping You Remember

Look up the meaning of the word *commute* in the dictionary. Find an everyday meaning that is close to the mathematical meaning and explain how it can help you remember the mathematical meaning.

1-4 The Distributive Property

What You'll Learn

Scan Lesson 1-4. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the term next to each definition.
(Lesson 1-2)

▶ to find the value of an expression

▶ the rules that let you know which operation to perform

New Vocabulary In the diagram, underline the *coefficient*.

$$10y + 7$$

Define *simplest form* in your own words.

Vocabulary Link *Distribute* is a word that is used in everyday English. Find the definition of *distribute* using a dictionary. Explain how the English definition can help you remember how *distributive* is used in mathematics.

Lesson 1-4 (continued)**Main Idea****Details****Evaluate Expressions**

pp. 23–24

Caitlin works at the Dairy Whiz Monday through Friday. She earns \$8.25 per hour. The hours she worked this week are shown in the table below. Write two equivalent ways of finding her weekly pay.

| Day | Mon | Tue | Wed | Thu | Fri |
|-------|-----|-----|----------------|-----|----------------|
| Hours | 3 | 2 | $1\frac{1}{2}$ | 4 | $1\frac{1}{2}$ |

Method 1: hourly rate of pay times total hours for the week

Method 2: hourly rate of pay times daily hours worked

Simplify Expressions

pp. 24–26

Model the expression $4(x + 3)$ by using or drawing algebra tiles. Then simplify.

Helping You Remember

Write one example of *evaluating an algebraic expression* and explain how you simplified it.

1-5 Equations

What You'll Learn

Skim the Examples in Lesson 1-5. Predict two things you think you will learn about this lesson.

- _____
- _____

Active Vocabulary

New Vocabulary True or False? All open sentences are equations. Explain your answer.

Label the elements of the table with the correct terms.

- equation* ▶
- replacement set* ▶
- solution* ▶

| x | $3x + 1 = 10$ | True or False? |
|-----|-----------------|----------------|
| 2 | $3(2) + 1 = 10$ | False |
| 3 | $3(3) + 1 = 10$ | True |
| 4 | $3(4) + 1 = 10$ | False |
| 5 | $3(5) + 1 = 10$ | False |

Vocabulary Link In mathematics, *sets* are collections of objects or numbers. *Sets* can be illustrated by real-world examples, like a chess *set*. Write another example of a real-world *set*.

Lesson 1-5 (continued)

Main Idea

Details

Solve Equations

pp. 31–33

How to solve multi-step linear equations

| | | | |
|---|---|--|---------------------------------|
| Remove all parentheses using the Distributive Property. | → | $2(x + 5) + 3x = 45$ $2x + 10 + 3x = 45$ | You try: $3(x - 8) + 4x = 4$ |
| Combine like terms on each side of the equation. | → | $2x + 10 + 3x = 45$ $5x + 10 = 45$ | |
| Isolate term(s) with a variable. | → | $5x + 10 = 45$ $\frac{-10}{-10} = \frac{-10}{-10}$ $5x = 35$ | |
| Isolate the variable. | → | $\frac{5x}{5} = \frac{35}{5}$ $x = 7$ | |

Solve Equations with Two Variables

pp. 33–35

Write and solve an equation for the following situation.

Mr. Ludwig wants to rent a post hole digger to build a deck. He pays a rate of \$5 per hour and \$12.50 for gas and insurance to rent the digger. what is the cost for a six-hour rental?

The cost of the _____ is a flat rate. The variable is the number of _____ h for which he rents the digger.

Helping You Remember

Look up the word *solution* in a dictionary. What is one meaning that relates to the way you use the word in algebra?

1-6 Relations

What You'll Learn

Skim the lesson. Write two things you already know about relations.

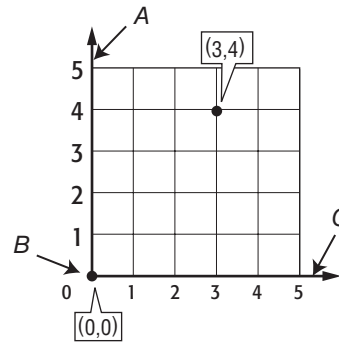
1. _____

2. _____

Active Vocabulary

- x*-coordinate ►
- x*-axis ►
- y*-coordinate ►
- y*-axis ►
- ordered pair ►
- origin ►

New Vocabulary Label the elements of the diagram with the correct terms.



1. The numbers (3, 4) represent a(n) _____.
2. In the ordered pair (3, 4), 3 represents a(n) _____.
3. In the ordered pair (3, 4), 4 represents a(n) _____.
4. Arrow "A" is pointing to the _____.
5. Arrow "B" is pointing to the _____.
6. Arrow "C" is pointing to the _____.

Lesson 1-6 *(continued)*

Main Idea

Details

Represent a Relation

pp. 38–40

Complete the mapping to represent the same relation shown below.

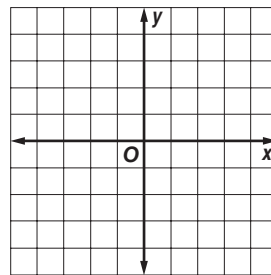
ordered pairs

(0, 1)
(3, 3)
(4, 2)

1. table

| x | y |
|-----|-----|
| 0 | |
| 3 | |
| 4 | |

2. graph



3. mapping

Graphs of a Relation

pp. 40–41

In a relation involving test grades, the more hours spent studying, the higher the grade. Identify the independent and dependent variables.

Helping You Remember

In the alphabet, x comes before y . Use this fact to describe a method for remembering how to write ordered pairs.

1-7 Functions

What You'll Learn

Skim Lesson 1-7. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Define *reciprocals* in your own words. (Lesson 1-3)

New Vocabulary Fill in the blanks with the correct term or phrase.

A graph that consists of points that are not connected is a _____.

A _____ is a function graphed with a line or a smooth curve.

A _____ is a relationship between input and output.

A test used to determine whether or not a graph represents a function is known as the _____.

Vocabulary Link *Function* is a word that is used in everyday English. Find the definition of *function* using a dictionary. Explain how the English definition can help you remember how *function* is used in mathematics.

Lesson 1-7 (continued)

Main Idea

Details

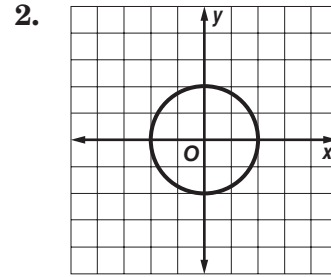
Identify Functions

pp. 45–47

Fill in each blank to tell how to determine if a relation is a function.

1.

| x | y |
|-----|-----|
| 1 | -2 |
| 3 | 4 |
| 4 | 6 |
| 1 | 5 |



Look at a table to see if each member of the _____ corresponds to only _____ member of the _____.

Use the _____ test. If no vertical line can be drawn so that it intersects the graph more than _____, then it is a function.

Find Function Values

p. 48

For $f(x) = 7x - 4$, find each value.

- 1. $f(3)$ _____
- 2. $f(-2)$ _____
- 3. $f(0)$ _____
- 4. $f(-3)$ _____

Helping You Remember

A student who was trying to help a friend remember how functions are different from relations that are not functions gave the following advice: *Just remember that functions are very strict and never give you a choice.* Explain how this might help you remember what a function is.

1-8 Logical Reasoning and Counterexamples

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in this lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the definition next to each term. (*Lesson 1-3*)

- equivalent expressions* ▶ _____
- additive identity* ▶ _____

- multiplicative identity* ▶ _____

- reciprocal* ▶ _____

New Vocabulary Match each term with its definition.

- conditional statement* can be written in the form *If A, then B*
- hypothesis* the process of using facts, rules, definitions, or properties to reach a valid conclusion
- conclusion* the part of the statement immediately following the word *if*
- deductive reasoning* a specific case in which the hypothesis is true and the conclusion is false
- counterexample* the part of the statement that immediately follows the *then*

Vocabulary Link Define the word *reciprocal* in your own words. (*Lesson 1-3*)

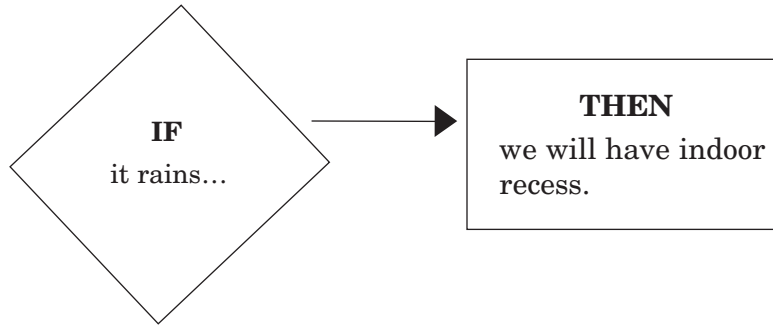
Lesson 1-8 *(continued)*

Main Idea

Details

Conditional Statements
pp. 54–55

Identify the hypothesis and conclusion of the statement.



Identify the if-then statement for the following equation.

$$6x + 5 = 47, x = 7$$

Deductive Reasoning and Counterexamples
pp. 55–56

Find a counterexample for the conditional statement.

If $x^4 = 16$, then $x = 2$.

Helping You Remember

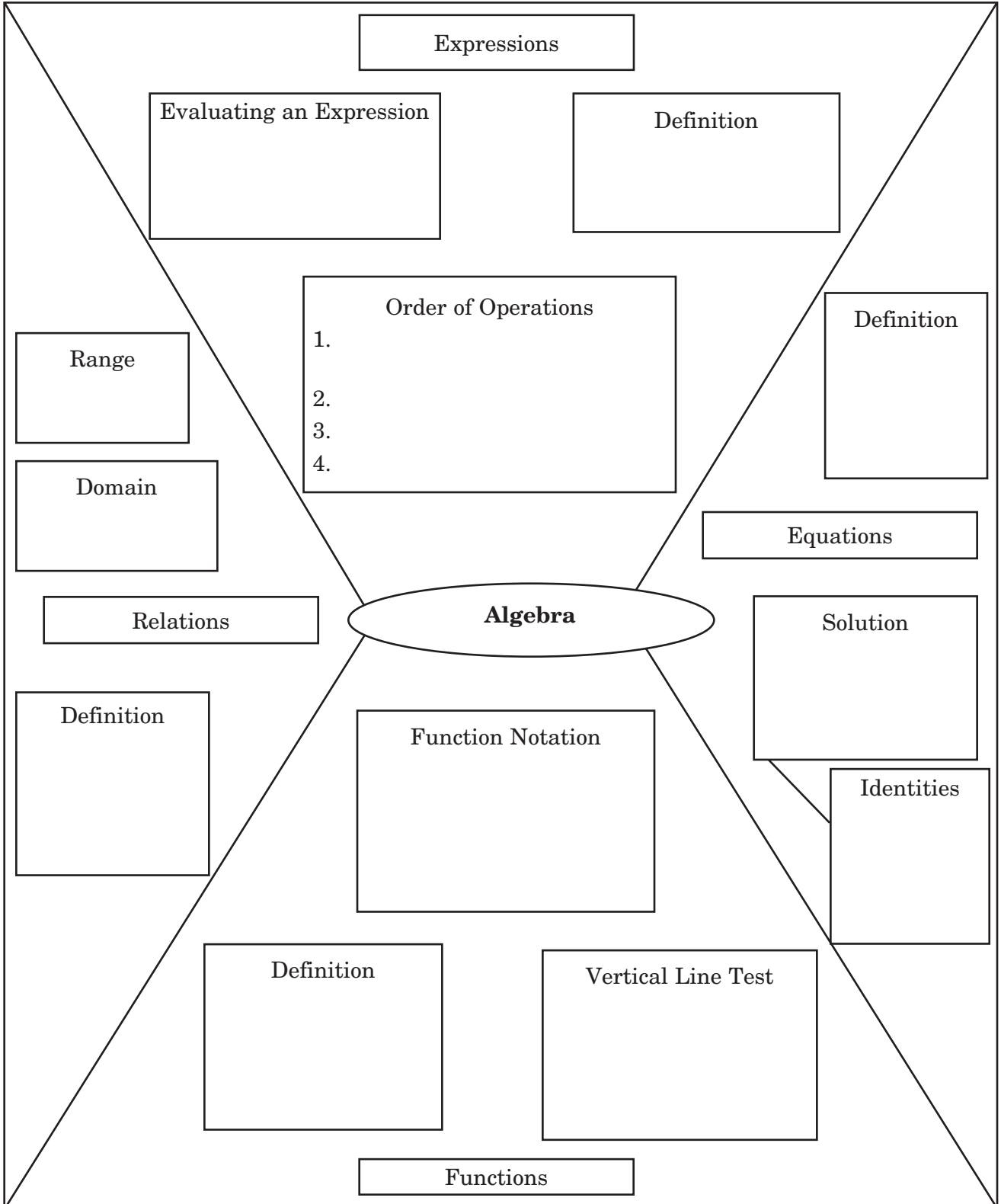
Write an example of a conditional statement you would use to teach someone how to identify a hypothesis and a conclusion.

CHAPTER
1

Expressions, Equations, and Functions

Tie It Together

Add details to each part of the graphic organizer.



CHAPTER
1

Expressions, Equations, and Functions

Before the Test

Review the ideas you listed in the table at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the table by filling in the third column.

| K What I know... | W What I want to find out... | L What I learned... |
|---------------------|---------------------------------|------------------------|
| | | |

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

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 1 Study Guide and Review in the textbook.
- I took the Chapter 1 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.

 **Study Tips**

- Set goals and priorities before studying. Then study the hardest material first, and complete assignments that have due dates before others.


 CHAPTER
2

Linear Equations

Before You Read

Before you read the chapter, think about what you know about linear equations. List three things you already know about them in the first column. Then list three things you would like to learn about them in the second column.

| K What I know... | W What I want to find out... |
|---------------------|---------------------------------|
| | |


 FOLDABLES® Study Organizer

Construct the Foldable as directed at the beginning of this chapter.



Note Taking Tips

- When you take notes, circle, underline, or star anything the teacher emphasizes.**
 When your teacher emphasizes a concept, it will usually appear on a test, so make an effort to include it in your notes.
- Before going to class, look over your notes from the previous class, especially if the day's topic builds from the last one.**

CHAPTER
2

Linear Equations

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on ratios and proportions, one fact might be that the ratio of two measurements having different units of measure is called a rate. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|--|------|
| 2-1 Writing Equations | |
| 2-2 Solving One-Step Equations | |
| 2-3 Solving Multi-Step Equations | |
| 2-4 Solving Equations with the Variable on Each Side | |
| 2-5 Solving Equations Involving Absolute Value | |
| 2-6 Ratios and Proportions | |
| 2-7 Percent of Change | |
| 2-8 Literal Equations and Dimensional Analysis | |
| 2-9 Weighted Averages | |

2-1 Writing Equations

What You'll Learn

Skim Lesson 2-1. Write two things you already know about writing equations.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Define *equation* in your own words.
(Lesson 1-5)

New Vocabulary Define the term *formula* from this lesson.

Vocabulary Link *Formula* is a word that is used in everyday English. Find the definition of *formula* using a dictionary. Explain how its English definition can help you understand the meaning of *formula* in mathematics.

Lesson 2-1 (continued)

Main Idea

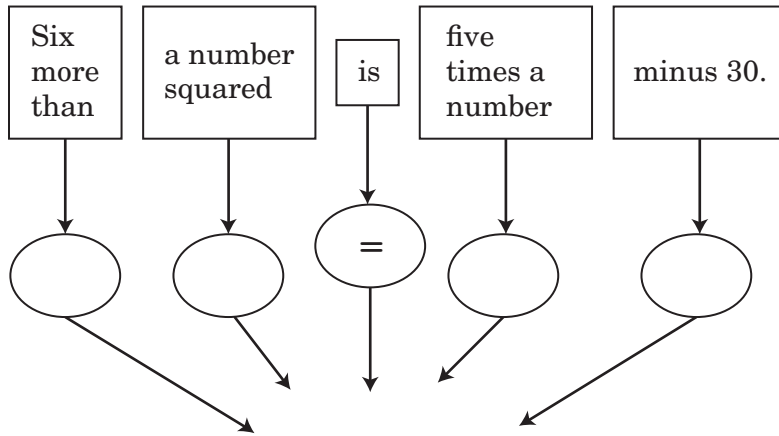
Details

Write Verbal Expressions

pp. 75–76

Use a model to help translate the sentence below into an equation.

Six more than a number squared is 30 less than five times the number.



Write Sentences from Equations

pp. 77–78

Translate each equation into a sentence.

1. $7x + 2 = 30$

2. $p^2 + 18 = 7 - k$

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Helping You Remember

If you cannot remember all the steps of the Four-Step Problem-Solving Plan, try to remember the first letters of the first word in each step. Write those letters with their associated words.

U _____

P _____

S _____

C _____

2-2 Solving Equations

What You'll Learn

Skim Lesson 2-2. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Define *formula* in your own words. (Lesson 2-1)

New Vocabulary Fill in each blank with the correct term or phrase.

equivalent equations ►

To find the value of the variable that makes the equation true is to _____

solve an equation ►

_____ have the same solution.

Vocabulary Link *Solution* is a word that is used in everyday English. Find the definition of *solution* using a dictionary. Explain how its English definition can help you understand its meaning in mathematics.

Lesson 2-2

Lesson 2-2 (continued)

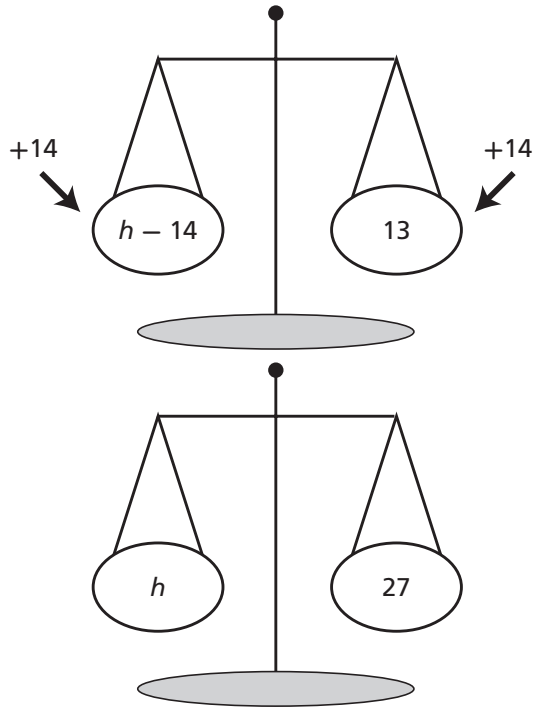
Main Idea

Details

Solving Equations Using Addition or Subtraction

pp. 83–84

Adding the same quantity to two equal or “balanced” amounts, will yield scales that remain balanced.



Solving Equations Using Multiplication or Division

pp. 84–85

Solve by multiplying.

1. $\frac{g}{4} = 7$

2. $\frac{m}{-5} = 3$

Solve by dividing.

3. $9y = 108$

4. $5k = -115$

Helping You Remember

One way to remember something is to explain it to someone else. Write how you would explain to a classmate how to solve the equation $\frac{2}{3}x = 12$.

2-3 Solving Multi-Step Equations

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about solving multi-step equations.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Define *equivalent equations* in your own words. (*Lesson 2-2*)

New Vocabulary Write the correct term next to each definition.

- _____ ▶ integers in counting order
- _____ ▶ the study of numbers and the relationships between them
- _____ ▶ an equation that requires more than one step to solve

Vocabulary Link *Consecutive* is a word that is used in everyday English. Find the definition of *consecutive* using a dictionary. Explain how its English definition can help you understand the meaning of *consecutive* in mathematics.

Lesson 2-3 (continued)

Main Idea

Details

Solve Multi-Step Equations

pp. 91–92

Solve the equation.

$$2x + 3 = 17$$

Original equation



$$2x + 3 - 3 = 17 - 3$$

Subtract from each side.



$$2x = 14$$

Simplify.



$$\frac{2x}{2} = \frac{14}{2}$$

Divide each side.



$$x = 7$$

Simplify.

Solve Consecutive Integer Problems

pp. 92–93

Write an equation for the following problem. Then solve the equation and answer the problem.

Find three consecutive even integers with a sum of 48.

Helping You Remember

Explain why working backward is a useful strategy for solving equations.

Explain why working backward is a useful strategy for solving equations.

2-4 Solving Equations with the Variable on Each Side

What You'll Learn

Skim the Examples for Lesson 2-4. Predict two things you think you will learn about solving equations with the variable on each side.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Match each term with its definition. (Lessons 2-1 through 2-3)

| | |
|-----------------------------|---|
| <i>formula</i> | equations that have the same solution |
| <i>solve an equation</i> | an equation that requires more than one step to solve. |
| <i>number theory</i> | integers in counting order |
| <i>equivalent equations</i> | the study of numbers and the relationships between them |
| <i>multi-step equations</i> | a rule for the relationship between certain quantities |
| <i>consecutive integers</i> | finding the value of the variable that makes an equation true |

New Vocabulary Define *identity* in your own words.

Vocabulary Link *Identity* is a word that is used in everyday English. Find the definition of *identity* using a dictionary. Explain how the English definition can help you remember how it is used in mathematics.

Lesson 2-4 (continued)

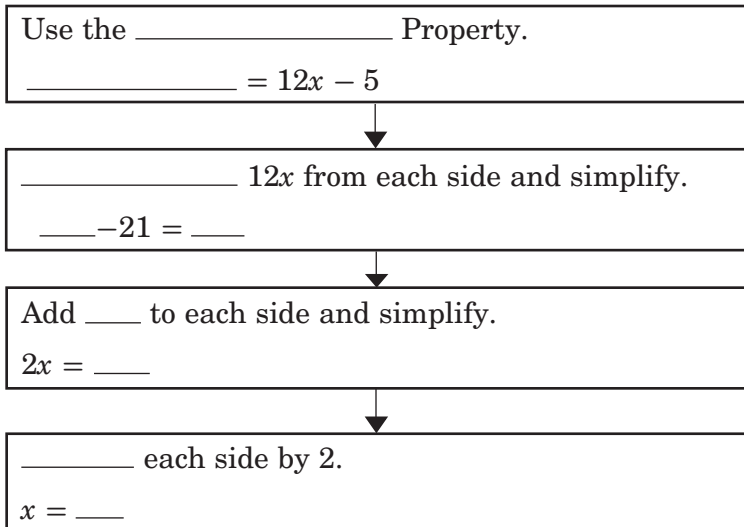
Main Idea

Variables on Each Side
pp. 97–99

Details

Complete the *flow chart* to describe the steps in solving the equation.

$$7(2x - 3) = 12x - 5$$



Solve the equation $6y + 4 = 3(2y - 10)$.

Helping You Remember

In addition to the examples in this section of Chapter 2, there will be other occurrences of *no solutions*, as well as *identities* where there are endless possibilities of solutions. What are the symbols for these?

2-5 Solving Equations Involving Absolute Value

What You'll Learn

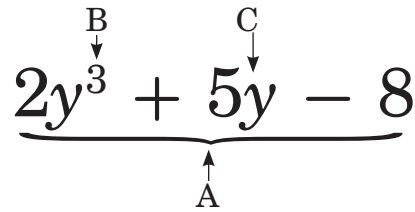
Scan the text in Lesson 2-5. Write two facts you learned about solving equations involving absolute value as you scanned the text.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Label the elements of the diagram with the correct terms. (*Lesson 1-1*)



- algebraic expression* ▶ 1. The term $5y$ represents a(n) _____.
- power* ▶ 2. Arrow "A" is pointing to a(n) _____.
- product* ▶ 3. Arrow "B" is pointing to a(n) _____.
- variable* ▶ 4. Arrow "C" is pointing to a(n) _____.

Define *absolute value* in your own words.

Lesson 2-5 *(continued)*

Main Idea

Details

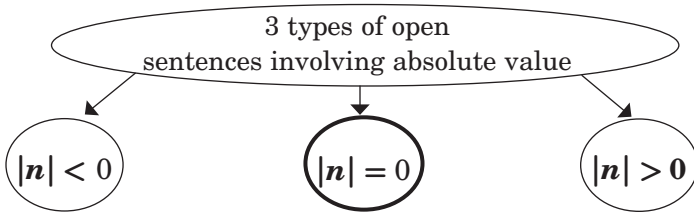
Absolute Value Expressions

p. 103

Evaluate the following absolute value expression in the space provided.

$$|f + 7| - 11 \text{ if } f = -9$$

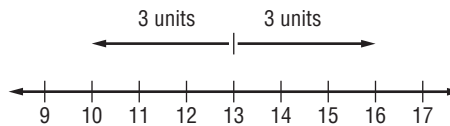
Complete the organizer below.



Absolute Value Equations

pp. 103–105

Write an absolute value equation that fits the solution graphed below. Then, write the solution set.



Sample answer: $|x - 16| = 3$

Solution set: $\{10, 16\}$

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Helping You Remember

What is one way you could check to see that your graph of an absolute value equation is correct?

2-6 Ratios and Proportions

What You'll Learn

Scan Lesson 2-6. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

unit ▶ In the proportion $2:5 = 6:15$, the numbers 5 and 6 are known as the _____.

ratio ▶ A(n) _____ is an equation stating that two ratios are equal.

means ▶ A(n) _____ is a rate used when making a model of something that is too large or too small to be convenient at actual size.

rate ▶ The comparison of two numbers by division is known as a(n) _____.

model ▶ A _____ rate tells how many of one item is being compared to one of another item.

extremes ▶ In the proportion $1:15 = 3:45$, the numbers 1 and 45 are known as the _____.

proportion ▶ The ratio of two measurements having different units of measure is called a(n) _____.

scale ▶ A scale _____ is a three-dimensional reproduction of an item that has been reduced in size proportionally.

Lesson 2-6 (continued)

Main Idea

Details

Ratios and Proportions

pp. 111–112

Use cross products to determine whether the pair of ratios forms a proportion.

$$\frac{3}{4}, \frac{4.2}{6}$$

Solve Proportions

pp. 113–114

Use the graphic organizer below to help solve the rate of growth proportion that follows.

A women’s exercise franchise opened 336 gyms during the past 3 years. If their growth rate remains constant, how many exercise gyms will they have opened after 5 years?

Let g represent the number of gyms.

$$\boxed{\frac{\text{number of gyms}}{\text{number of years}}} \rightarrow \boxed{\frac{\text{gyms}}{3 \text{ years}}} = \boxed{\frac{\text{gyms}}{5 \text{ years}}}$$

Helping You Remember

What is one way you could check to see that your graph of an absolute value equation is correct?

2-7 Percent of Change

What You'll Learn

Scan Lesson 2-7. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Match each term with its definition. (Lesson 2-6)

- | | |
|-------------------|---|
| <i>proportion</i> | a ratio of two measurements having different units of measure |
| <i>ratio</i> | an equation stating that two ratios are equal |
| <i>rate</i> | a comparison of two numbers by division |

New Vocabulary Fill in each blank with the correct term or phrase.

_____ is the ratio of the change in an amount to the original amount expressed as a percent.

When the new number is less than the original number, the percent of change is a percent of _____.

When the new number is greater than the original number, the percent of change is a percent of _____.

Vocabulary Link *Change* is a word that is used in everyday English. Find the definition of *change* using a dictionary. Explain how the English definition can help you remember how *change* is used in mathematics.

Lesson 2-7

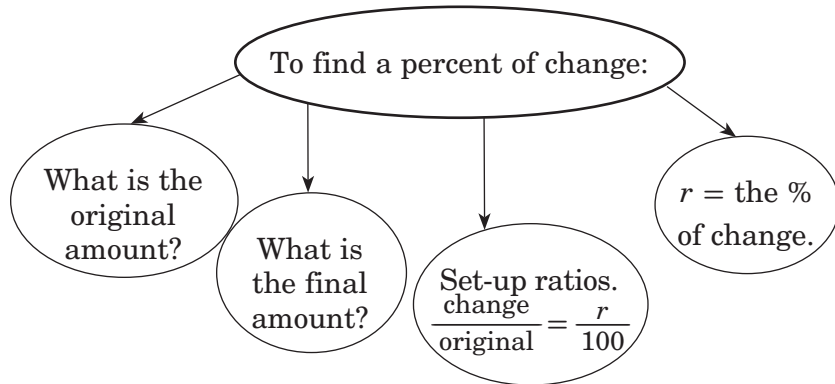
Lesson 2-7 (continued)

Main Idea

Percent of Change
pp. 119–120

Details

Use the graphic organizer to help you find the percent of change given an original amount of 30, and a final amount of 45.



The amount of change = _____ - _____ = _____.

$$\frac{15}{45} = \frac{r}{100} \dots \text{solve for } r \text{ and get } r = \underline{\hspace{2cm}}$$

Therefore, the percent of change is a _____ % _____ (increase or decrease).

Solve Problems
pp. 120–121

Tess purchased a dress that originally cost \$110. The day she made the purchase it was on sale for 20% off. What was the sale price of her dress?

Helping You Remember

If you remember only two things about the ratio used for finding the percent of change, what should they be?

2-8 Literal Equations and Dimensional Analysis

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in this lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Fill in each blank with the correct term or phrase. (*Lessons 2-1, 2-4, and 2-7*)

_____ are equations that are true for all values of the variables.

The ratio of the change in an amount to the original amount expressed as a percent is known as the _____.

A(n) _____ is a rule for the relationship between certain quantities.

New Vocabulary Match each term with its definition.

- dimensional analysis*
- literal equation*
- unit analysis*

- a formula or equation that involves several variables
- the process of carrying units throughout a computation
- another term for dimensional analysis

Vocabulary Link *Literal* is a word that is used in everyday English. Find the definition of *literal* using a dictionary. Explain how the English definition can help you remember how *literal* is used in mathematics.

Lesson 2-8 (continued)

Main Idea

Details

Solve for a Specific Variable

pp. 126–127

Fill in the missing pieces of the graphic organizer below.

| | |
|---|---|
| Solve for p. | |
| Isolate the terms with that variable onto one side of the equation. | $\begin{array}{r} 4p - 3q = pr + 9 \\ + 3q = + 3q \\ \hline 4p = \underline{\hspace{2cm}} \\ -pr = -pr \\ \hline \end{array}$ |
| _____ Property | $p(4 - r) = 3q + 9$ |
| _____ each side by | $\frac{p(4 - r) = 3q + 9}{4 - r = 4 - r}$ |
| Simplify. | $p = \frac{3q + 9}{4 - r} \quad r \neq \underline{\hspace{1cm}}$ |

Use Formulas

pp. 127–128

The formula for the area of a rectangle is $A = lw$, where l is its length, and w is the width. Find the length of a rectangular garden that has an area of 5400 square feet and a width of 90 feet.

Helping You Remember

When you give the dimensions of a rectangle, you have to tell how many units long it is and how many units wide it is. How can this help you remember what dimensional analysis involves?

2-9 Weighted Averages

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Match each term with its definition.

Note: two terms have the same definition.

rate problem

When referring to a set of data, it is the sum of the product of the number of units and the value per unit divided by the sum of the number of units.

uniform motion problem

problems in which two or more parts are combined into a whole

weighted average

problems in which an object moves at a certain speed or rate

mixture problem

a statement that requires a solution, usually by means of a mathematical operation

Vocabulary Link *Problem* is a word that is used in everyday English. Find the definition of *problem* using a dictionary. Explain how the English definition can help you remember how *problem* is used in mathematics.

Lesson 2-9 (continued)

Main Idea

Details

Weighted Averages

p. 132

In addition to the slugging average that was in the textbook, write another example of when it might be necessary to calculate a weighted average.

Uniform Motion Problems

pp. 134–135

Use the table provided to aid in solving the following rate problem.

Two cyclists begin traveling from opposite ends of a 15-kilometer bike path towards each other. One of the cyclists is traveling 20 kilometers per hour, and the other cyclist is traveling 25 kilometers per hour. How much time will it take for them to meet each other?

| | <i>r</i> | <i>t</i> | <i>d = rt</i> |
|----------------|----------|----------|---------------|
| first cyclist | | | |
| second cyclist | | | |

Now write and solve an equation.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = 15$$

$$\underline{\hspace{1cm}} t = 15$$

$$t = \underline{\hspace{1cm}} \text{ or } \underline{\hspace{1cm}} \text{ hour or } \underline{\hspace{1cm}} \text{ minutes}$$

Helping You Remember

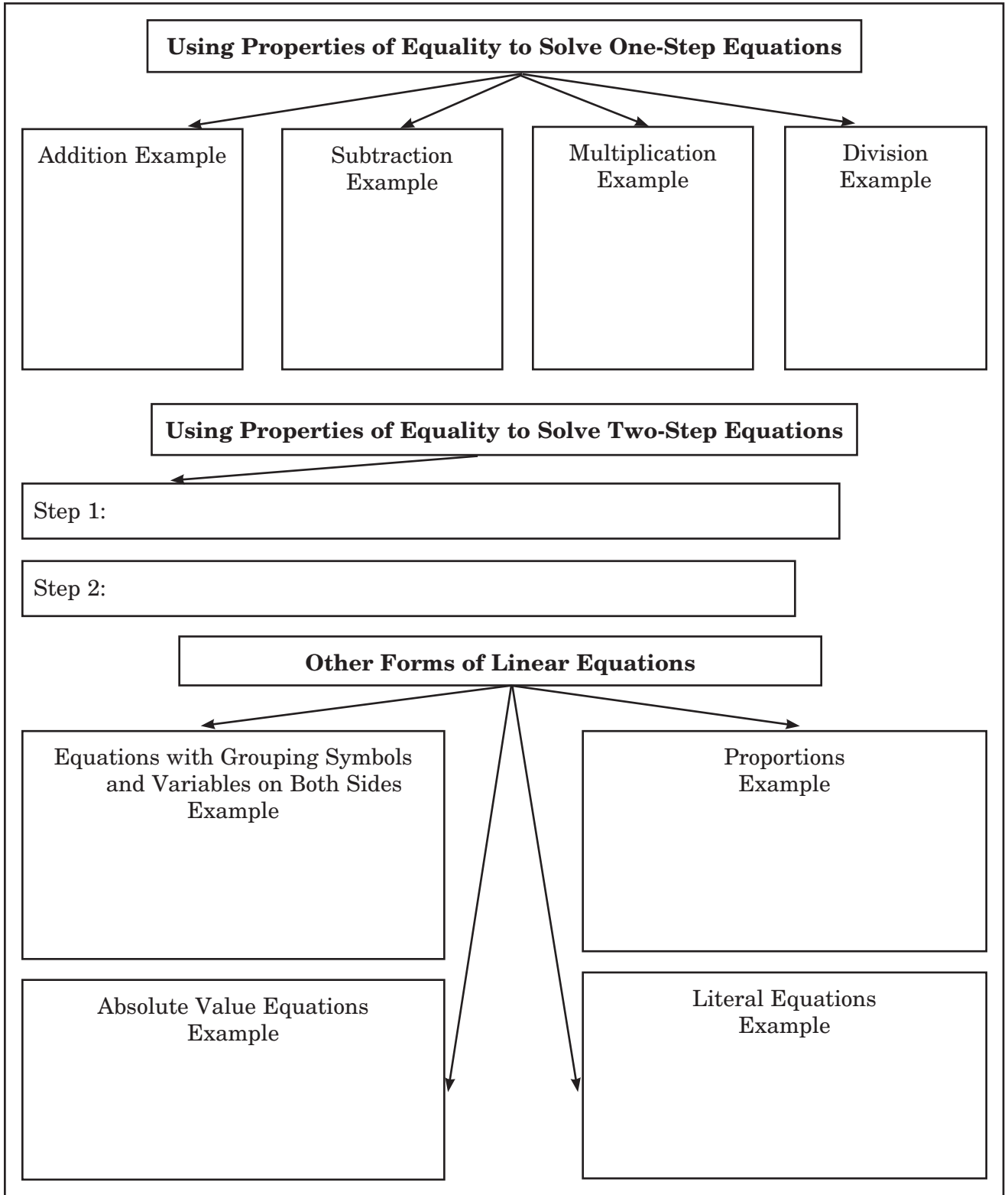
Making a table can be helpful in solving mixture problems. In your own words, explain how you use a table to solve mixture problems.

CHAPTER
2

Linear Equations

Tie It Together

Provide the indicated details in each graphic organizer.



CHAPTER
2

Linear Equations

Before the Test

Review the ideas you listed in the table at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the table by filling in the third column.

| K What I know... | W What I want to find out... | L What I learned... |
|---------------------|---------------------------------|------------------------|
| | | |

Math Online Visit *glencoe.com* to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 2.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 2 Study Guide and Review in the textbook.
- I took the Chapter 2 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.

 **Study Tips**

- Review information daily to keep it fresh and to reduce the amount of last-minute studying before test day. Look over the notes from class, readings, and corrected homework to review. If you have confusion about any concepts get them cleared up before test day.


 CHAPTER
3

Linear Functions

Before You Read

Before you read the chapter, respond to these statements.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Before You Read | Linear Functions |
|-----------------|--|
| | <ul style="list-style-type: none"> • The graph of a linear equation is a straight line. |
| | <ul style="list-style-type: none"> • A family of graphs is different equations that represent the same line. |
| | <ul style="list-style-type: none"> • Slope and rate of change are the same thing. |
| | <ul style="list-style-type: none"> • Slope is the change of x over the change of y. |
| | <ul style="list-style-type: none"> • The graph of a nonproportional relationship will not be a straight line. |


 FOLDABLES[®] Study Organizer

Construct the Foldable as directed at the beginning of this chapter.


 Note Taking Tips

- **When you take notes, write down the math problem and each step in the solution using math symbols.**
Next to each step, write down, in your own words, exactly what you are doing.
- **It is helpful to read through your notes before beginning your homework.**
Look over any page referenced material.

CHAPTER
3

Linear Functions

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on solving linear equations by graphing, one fact might be that the root of an equation is any value that makes the equation true or the solution. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|--|------|
| 3-1 Graphing Linear Equations | |
| 3-2 Solving Linear Equations by Graphing | |
| 3-3 Rate of Change and Slope | |
| 3-4 Direct Variation | |
| 3-5 Arithmetic Sequences as Linear Functions | |
| 3-6 Proportional and Nonproportional Relationships | |

3-1 Graphing Linear Equations

What You'll Learn

Scan Lesson 3-1. List two headings you would use to make an outline of this lesson.

1. _____

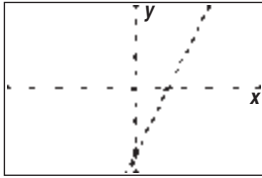
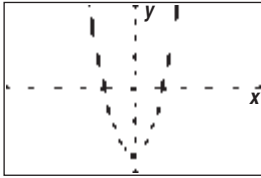
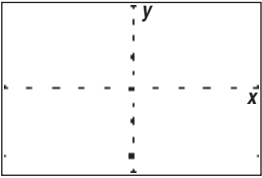
2. _____

Active Vocabulary

New Vocabulary Match the term with its definition by drawing a line to connect the two.

- | | |
|---------------------------------|--|
| <i>linear equation</i> | the x -coordinate of the point at which the graph of an equation crosses the x -axis |
| <i>standard form</i> | a number |
| <i>x-intercept</i> | an equation which forms a line when it is graphed |
| <i>constant</i> | the y -coordinate of the point at which the graph of an equation crosses the y -axis |
| <i>y-intercept</i> | a linear equation written in the form $Ax + By = C$ |

Vocabulary Link Determine whether each of the following is a linear equation. Using a graphing calculator, sketch a graph of each equation.

| | | |
|---|--|---|
| $y = 3x - 4$ | $y = 3x^2 - 4$ | $y = 0x - 4$ |
|  |  |  |
| Linear? Yes No | Linear? Yes No | Linear? Yes No |

Lesson 3-1 *(continued)*

Main Idea

Identify Linear Equations and Intercepts

pp. 153–155

Details

Write a word problem that could be represented by the table of values. Label the independent variable and the dependent variable in the table. Graph the table of values, labeling the axes appropriately.

| | | | | | |
|-----|-----|----|----|----|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | 100 | 75 | 50 | 25 | 0 |

Word Problem

Graph Linear Equations

pp. 155–156

Describe the similarities and differences in finding the x -intercept of a line and finding the y -intercept of a line.

| | |
|----------------------------|---------------------------|
| <p>Similarities</p> | <p>Differences</p> |
|----------------------------|---------------------------|

3-2 Solving Linear Equations by Graphing

What You'll Learn

Scan the text in Lesson 3-2. Write two facts you learned about solving linear equations by graphing as you scanned the text.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Solve each equation for x . Label each as being *consistent*, *inconsistent*, or an *identity*. (Lesson 2-3).

| | | |
|-------------------|-------------------|-----------------------|
| $3x + 6 = 4x - 8$ | $3x + 9 = 3x - 8$ | $3x + 7 = 4x + 7 - x$ |
|-------------------|-------------------|-----------------------|

New Vocabulary Write the definition next to each term.

linear function ▶ _____

parent function ▶ _____

family of graphs ▶ _____

root ▶ _____

zeros ▶ _____

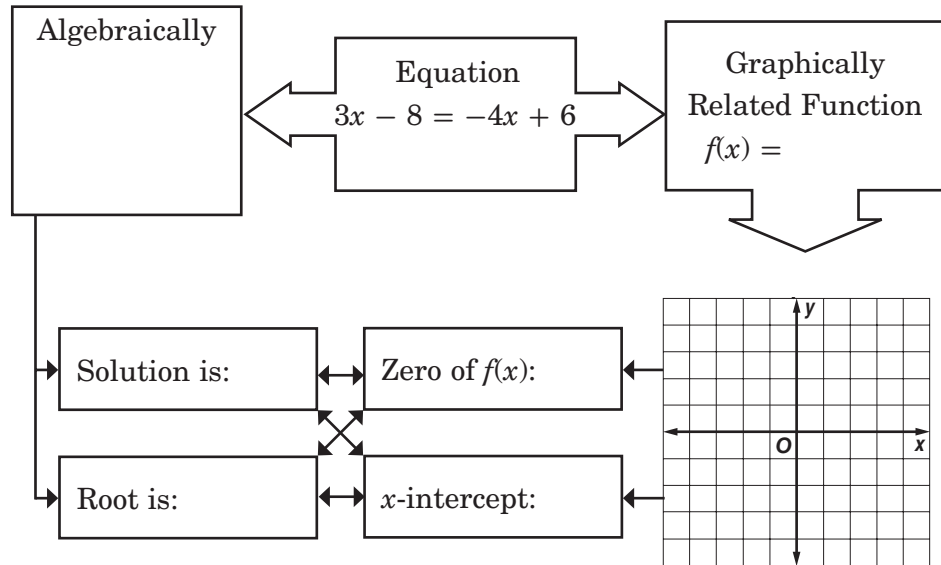
Lesson 3-2 (continued)

Main Idea

Details

Solve by Graphing
pp. 161–163

Complete the diagram to show the relationship between the words *root*, *solution*, *zero*, and *x-intercept*.



Estimate Solutions by Graphing
p. 163

Write a function for the situation described below. Describe how to find the zero of this function. Determine what the zero of this function represents.

The salt reserve for a city’s road crew was at 17 tons prior to the beginning of winter. Each time the roads are treated, the reserves are depleted by 3.25 tons of salt.

$f(x) =$ _____

| Algebraically | Graphically | What does the zero represent? |
|---------------|-------------|-------------------------------|
| | | |

3-3 Rate of Change and Slope

What You'll Learn

Skim the lesson. Write two things you already know about rate of change and slope.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the definition of the word *ratio* and list the three ways that a ratio can be expressed. By scanning ahead, what is a ratio used to represent in this lesson?

New Vocabulary Write the definition next to each term.

rate of change ►

slope ►

Lesson 3-3 (continued)

Main Idea

Details

Rate of Change

pp. 170–172

Complete the table of values so that Table A has a *constant rate of change* of 20 gallons per hour and Table B has a *constant rate of change* of -15.5 inches per minute.

| Table A | |
|------------|---------|
| Hour | Gallons |
| 1:00 P.M. | |
| 4:00 P.M. | |
| 6:00 P.M. | 1250 |
| 10:00 P.M. | |

| Table B | |
|---------|--------|
| Minutes | Inches |
| 6 | 259.25 |
| | 228.25 |
| 12 | |
| | 42.25 |

Find Slope

pp. 172–173

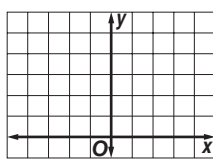
Use each of the indicated methods to calculate the slope of the line described.

a line that passes through the points $(-1, 5)$ and $(-4, 5)$

Use $(-1, 5)$ as (x_1, y_1) and $(-4, 5)$ as (x_2, y_2) .

Use $(-4, 5)$ as (x_1, y_1) and $(-1, 5)$ as (x_2, y_2) .

Plot the points to determine $\frac{\text{rise}}{\text{run}}$.



rise =

run =

$\frac{\text{rise}}{\text{run}} =$

Did you get the same slope all three times?

Helping You Remember

The word *rise* is associated with going up.

Sometimes going from one point to another on a graph does not involve a rise and a run but a fall and a run. Describe how you could select points so that it is always a rise from the first point to a second point.

3-4 Direct Variation

What You'll Learn

Skim the Examples for Lesson 3-4. Predict two things you think you will learn about direct variation.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write another possible point on each of the lines described. Use the slope formula to justify your answer. (*Lesson 3-3*)

1. passes through (5, 8) with negative slope
2. passes through (5, 8) with positive slope
3. passes through (5, 8) with zero slope
4. passes through (5, 8) with no slope
5. passes through (5, 8) with slope of 2

New Vocabulary Label the equation with the correct terms.

direct variation ►

constant of variation ►

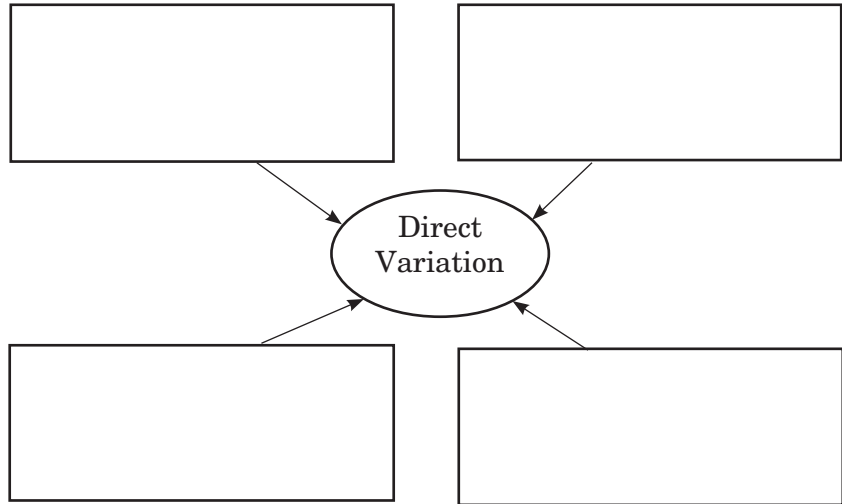
$$y = kx$$

Lesson 3-4 (continued)

Main Idea

Direct Variation Equations
pp. 180–181

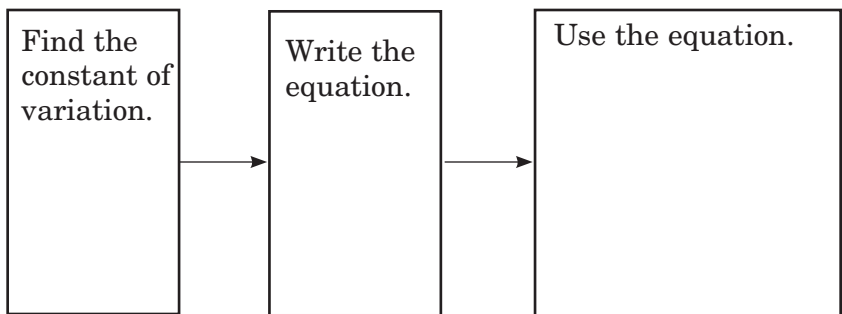
Details
Complete the diagram by writing one characteristic of direct variation in each box.



Direct Variation Problems
p. 182

Write a direct variation equation for the situation described below. Determine Amanda’s pay for 12 hours.

Amanda’s paycheck varies directly as the number of hours that she works. If Amanda works 4 hours, her paycheck is \$35.



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Helping You Remember Look up the word *constant* in a dictionary. How does this definition relate to the term *constant of variation*?

3-5 Arithmetic Sequences as Linear Functions

What You'll Learn

Skim Lesson 3-5. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Evaluate $f(x) = 4x + 2$ and $g(x) = -3x + 7$ for $x = -1, 0, 1, 2, 3$. (*Lesson 3-2*)

| x | -1 | 0 | 1 | 2 | 3 |
|--------|----|---|---|---|---|
| $f(x)$ | | | | | |
| $g(x)$ | | | | | |

Describe the pattern you see in $f(x)$.

Describe the pattern you see in $g(x)$.

Describe the graph of the ordered pairs $(x, f(x))$.

Describe the graph of the ordered pairs $(x, g(x))$.

New Vocabulary Write the correct term beside each definition.

- _____ ▶ the numbers in a sequence
- _____ ▶ a sequence in which the difference in successive terms is constant
- _____ ▶ a set of numbers in a specific order
- _____ ▶ the difference between the terms in an arithmetic sequence

Lesson 3-5 (continued)

Main Idea

Details

Recognize Arithmetic Sequences

pp. 187–189

Complete each question below.

1. Determine whether the sequence 3, -7, -14, -24, -31, -41 is an arithmetic sequence. Justify your answer.

2. Determine the next four terms of the arithmetic sequence -17, -12, -7, -2, 3, ...

3. Write an equation for the n^{th} term of the arithmetic sequence 14, 10, 6, 2, -2, ...

Arithmetic Sequences and Functions

p. 190

Follow the steps below to write a function to represent the arithmetic sequence described.

Anya is collecting cans to turn into the recycling center. The arithmetic sequence \$0.02, \$0.04, \$0.06, \$0.08, ... represents the amount of money she earns for turning in the cans.

Use the function to determine her earnings for turning in 100 cans.

| | | |
|---|---|--|
| Determine the common difference. | → | |
| Substitute into the n^{th} term formula. $a_n = a_1 + (n - 1)d$ | → | |
| Evaluate the function. | → | |

3-6 Proportional and Nonproportional Relationships

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Lesson 3-6

Active Vocabulary

New Vocabulary Fill in the blanks with the correct terms or phrases.

inductive reasoning ► It is the process of using a _____ to make a general _____. When a _____ pattern is found, a linear equation can be written. The relationship is _____ if the linear equation is of the form $y = kx$.

Vocabulary Link Explain how the use of the word *proportional* in geometry can help you remember its use in this lesson.

Lesson 3-6 (continued)

Main Idea

Details

Proportional Relationships

pp. 195–196

Fill in the left boxes with details to describe how to determine whether a given relationship is proportional. Complete the example shown in the right boxes.

| | | | | | |
|-----|-----|-----|-----|-----|-----|
| x | 4 | 5 | 6 | 7 | 8 |
| y | -12 | -15 | -18 | -21 | -24 |

| | |
|-----------------------------|-----------------------------|
| Is the relationship linear? | Is the relationship linear? |
|-----------------------------|-----------------------------|

| | |
|---------------------------------|---------------------------------|
| Does it pass through $(0, 0)$? | Does it pass through $(0, 0)$? |
|---------------------------------|---------------------------------|

| | |
|------------------------------|------------------------------|
| Write an equation and check. | Write an equation and check. |
|------------------------------|------------------------------|

Nonproportional Relationships

p. 197

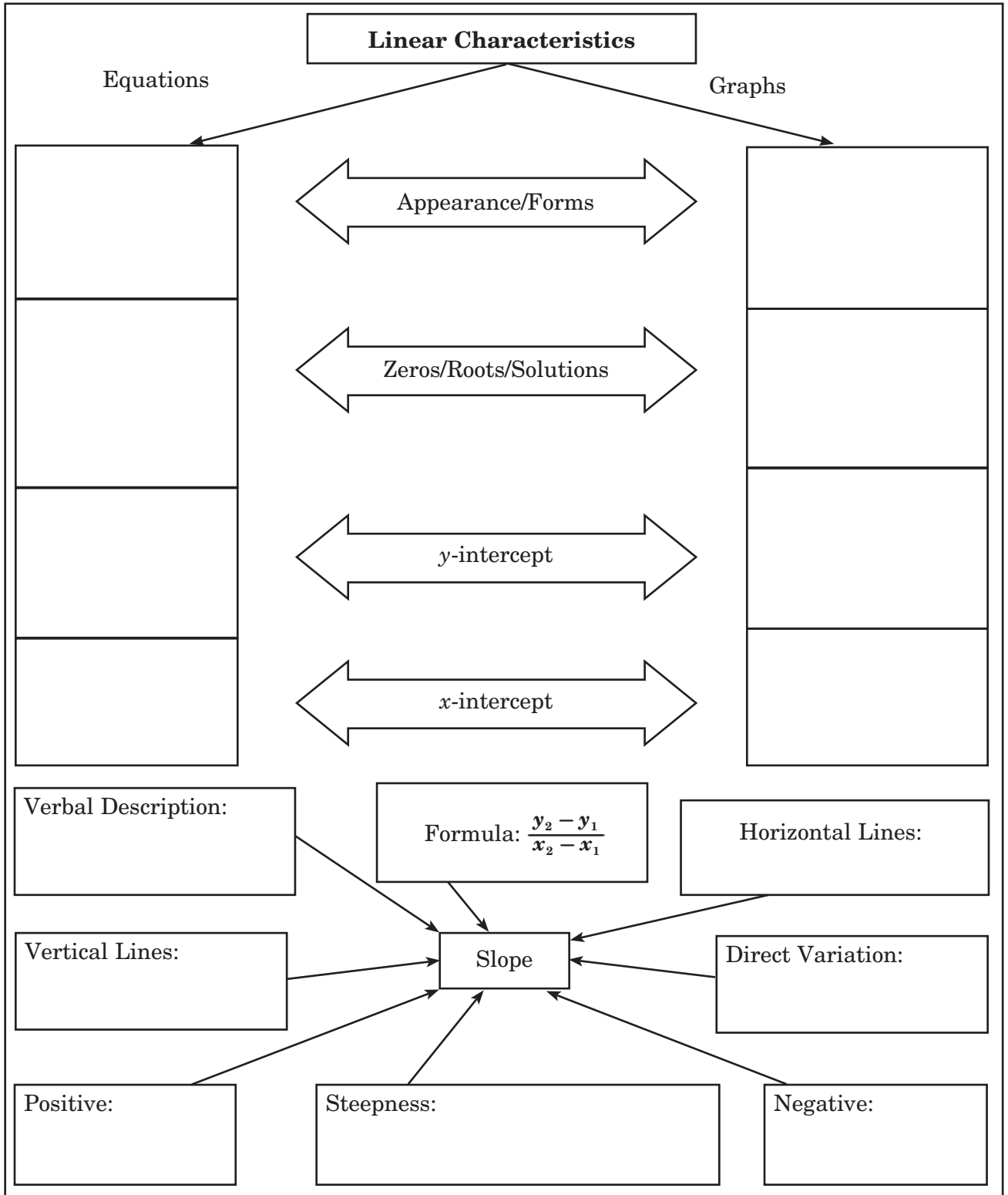
Describe how proportional and nonproportional relationships are similar. Describe how they are different.

CHAPTER 3

Linear Functions

Tie It Together

Provide details in each graphic organizer.



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**CHAPTER
3**

Linear Functions

Before the Test

Now that you have read and worked through the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Linear Functions | After You Read |
|--|----------------|
| • The graph of a linear equation is a straight line. | |
| • A family of graphs is different equations that represent the same line. | |
| • Slope and rate of change are the same thing. | |
| • Slope is the change of x over the change of y . | |
| • The graph of a nonproportional relationship will not be a straight line. | |

Math Online Visit glencoe.com to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 3.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 3 Study Guide and Review in the textbook.
- I took the Chapter 3 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.



Study Tips

- When studying for tests, create and use graphic organizers to show relationships between concepts.


 CHAPTER
4

Linear Functions and Relations

Before You Read

Before you read the chapter, think about what you know about linear functions and relations. List three things you already know about them in the first column. Then list three things you would like to learn about them in the second column.

| K What I know... | W What I want to find out... |
|---------------------|---------------------------------|
| | |


 FOLDABLES[®] Study Organizer

Construct the Foldable as directed at the beginning of this chapter.


 Note Taking Tips

- **As soon as possible, go over your notes.**
Clarify any ideas that were not complete.
- **If you find it difficult to write and pay attention at the same time, write down key words only.**
Then go back and complete your notes.

CHAPTER
4

Linear Functions and Relations

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on scatter plots and lines of fit, one fact might be that scatter plots can show whether there is a trend in a set of data. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|--|------|
| 4-1 Graphing Equations in Slope-Intercept Form | |
| 4-2 Writing Equations in Slope-Intercept Form | |
| 4-3 Writing Equations in Point-Slope Form | |
| 4-4 Parallel and Perpendicular Lines | |
| 4-5 Scatter Plots and Lines of Fit | |
| 4-6 Regression and Median-Fit Lines | |
| 4-7 Special Functions | |

4-1 Graphing Equations in Slope-Intercept Form

What You'll Learn

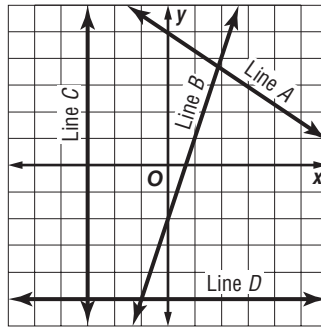
Skim Lesson 4-1. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

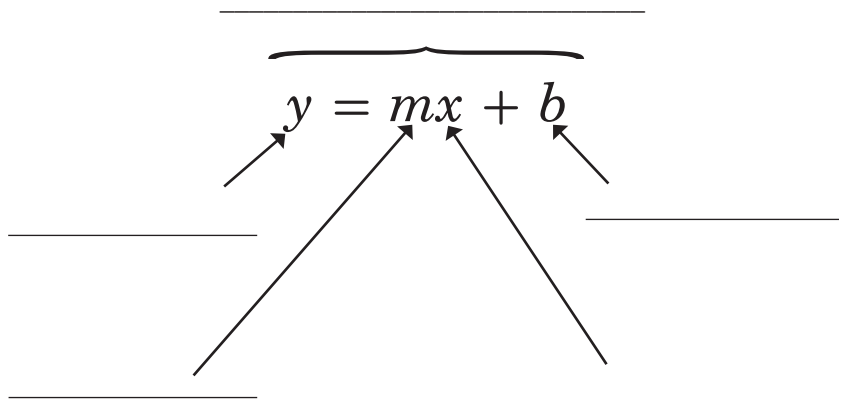
Review Vocabulary Identify the slope and y-intercept of lines A, B, C, and D. (Lessons 3-1 and 3-3)



| Line | Slope | y-intercept |
|------|-------|-------------|
| A | | |
| B | | |
| C | | |
| D | | |

New Vocabulary Label the diagram using the terms at the left.

- slope-intercept form ▶
- y-intercept ▶
- slope ▶
- independent variable ▶
- dependent variable ▶



Lesson 4-1 (continued)

Main Idea

Details

Slope-Intercept Form

pp. 214–216

Complete each step in the chart below. Add details to each step for clarification.

Write the equation in _____ form, if needed.



Identify the _____ and the _____.



Plot the _____ on a coordinate plane.



Plot another _____ using the _____.

Modeling Real-World Data

pp. 216–217

Write a linear equation to determine the price of gas after the year 2008, if the price of gas in 2008 is \$3.16 per gallon and the price increases by \$0.55 per year.

| | | |
|-------------------------|-------------------------------|---------------------------------|
| slope or rate of change | y-intercept or starting value | linear equation $y = mx + b$ |
|-------------------------|-------------------------------|---------------------------------|

4-2 Writing Equations in Slope-Intercept Form

What You'll Learn

Skim the lesson. Write two things you already know about writing equations in slope-intercept form.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Rewrite each equation in *slope-intercept form*. Circle the slope and underline the *y*-intercept. (*Lesson 4-1*)

| | | |
|----------------|--------------------|--------------|
| $2y + 5x = -8$ | $3y + 5x = 5x + 7$ | $y + 5x = 4$ |
|----------------|--------------------|--------------|

New Vocabulary Fill in each blank with the correct terms.
linear extrapolation ► a process in which you use a _____ equation to make _____ about a value that is outside the range of a given set of _____

Vocabulary Link Look up the word *extrapolate* in the dictionary. Write the non-mathematical definition of the word, a synonym for the word, and then use the word *extrapolate* in a non-mathematical sentence.

Lesson 4-2 (continued)

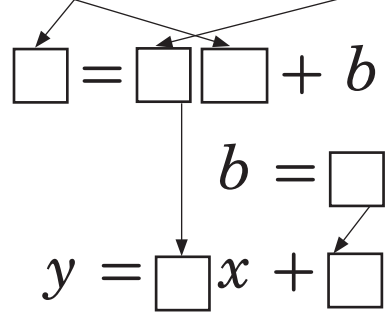
Main Idea

Write an Equation Given the Slope and a Point
p. 224

Details

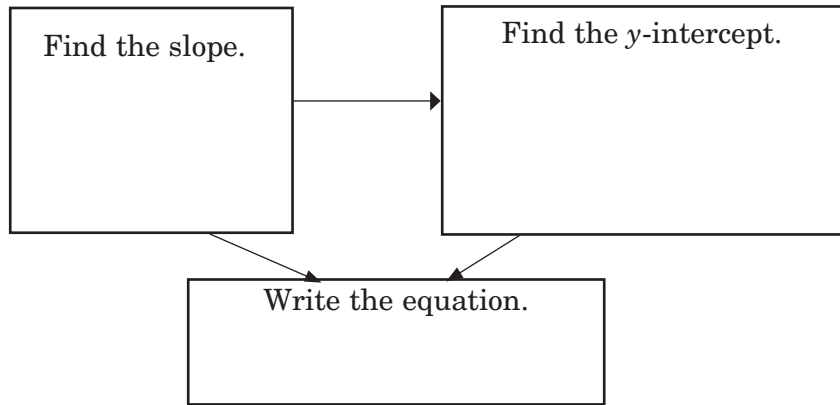
Fill in the diagram to write the equation of the line in slope-intercept form.

Write an equation of the line that passes through $(-2, 4)$ and has a slope of 2.



Write an Equation Given Two Points
pp. 224–226

Write the equation of the line that passes through $(2, 4)$ and $(-7, 5)$.



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Helping You Remember In your own words, explain how you would answer a question that asks you to write the slope-intercept form of an equation.

4-3 Writing Equations in Point-Slope Form

What You'll Learn

Scan the text in Lesson 4-3. Write two facts you learned about equations in point-slope form as you scanned the text.

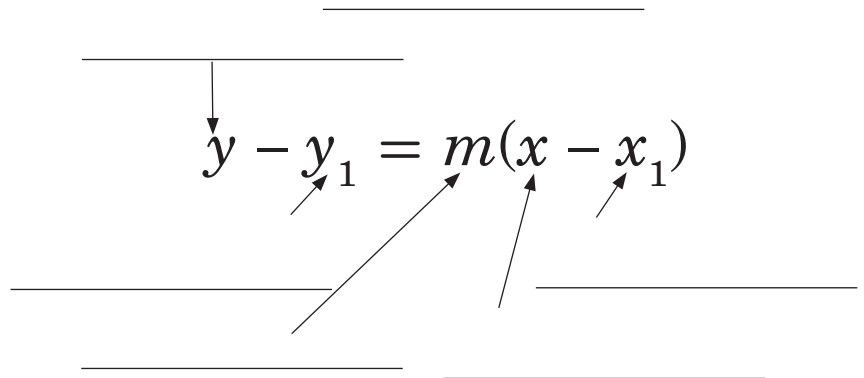
1. _____

2. _____

Active Vocabulary

New Vocabulary Label the diagram using the terms at the left.

- dependent variable* ▶
- slope* ▶
- independent variable* ▶
- x-coordinate of point on the line* ▶
- y-coordinate of point on the line* ▶



Vocabulary Link Write the point-slope formula and the slope formula below. Explain how the two formulas are related.

| | |
|-----------------------|------------------|
| slope formula | point-slope form |
| How are they related? | |

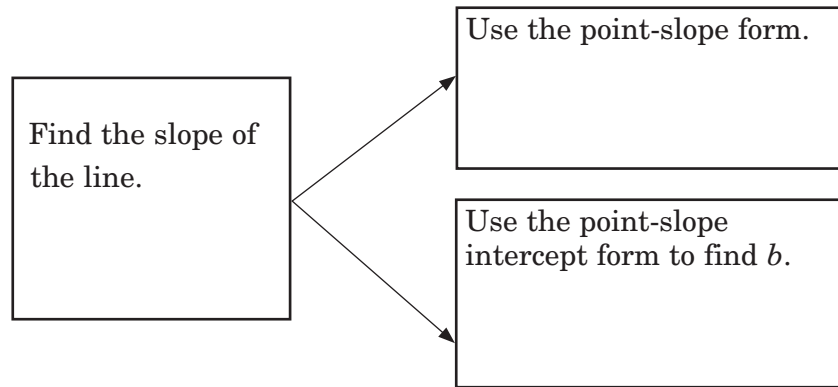
Lesson 4-3 (continued)

Main Idea

Details

Point-Slope Form
p. 231

Write the equation of the line in *slope-intercept form* that passes through $(-4, 5)$ and $(6, -5)$ using the two different methods. Which method do you prefer? Explain.



Forms of Linear Equations
pp. 232–233

Place a check mark in each box in which the specified characteristic applies. Describe the graphing method that you would use for each form identified as being convenient.

| Form | Slope is easily identifiable. | The y-intercept is easily identifiable. | convenient form for graphing |
|----------------------|-------------------------------|---|------------------------------|
| point-slope form | | | |
| slope-intercept form | | | |
| standard form | | | |

4-4 Parallel and Perpendicular Lines

What You'll Learn

Skim the Examples for Lesson 4-4. Predict two things you think you will learn about parallel and perpendicular lines.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the slope formula, and then write a verbal description of how to use the slope formula.
(Lesson 3-3)

New Vocabulary Write the correct term beside each definition.

- _____ ▶ lines in the same plane that never intersect and have the same slope
- _____ ▶ lines that intersect at right angles and have slopes that are opposite reciprocals

Lesson 4-4 (continued)

Main Idea

Details

Parallel Lines
p. 237

Write an equation for each line described in *slope-intercept form*.

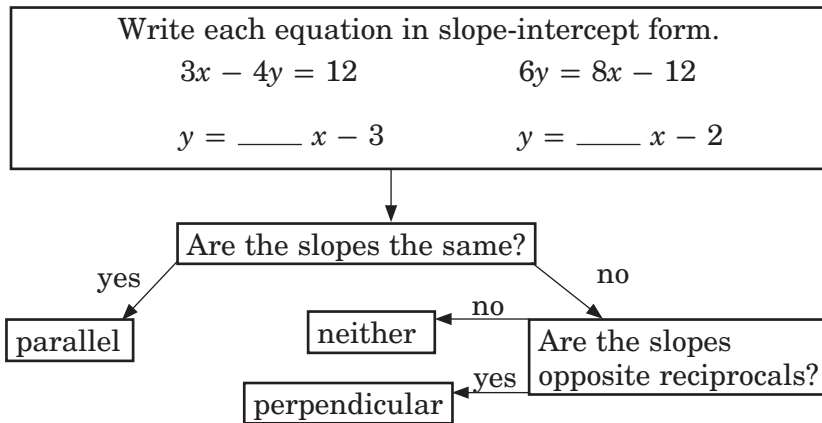
1. x -intercept of 3; y -intercept of -1

2. parallel to the line in Exercise 1

3. intersects the line in Exercise 1 at the y -intercept

Perpendicular Lines
pp. 238–240

Given two equations in standard form, determine whether the lines are parallel, perpendicular, or neither.



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Helping You Remember

Explain to another person how you would use the y -intercept and slope to graph a linear equation.

4-5 Scatter Plots and Lines of Fit

What You'll Learn

Skim Lesson 4-5. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

New Vocabulary Match the term with its definition by drawing a line to connect the two.

| | |
|-----------------------------|--|
| <i>bivariate data</i> | a set of bivariate data graphed as ordered pairs on a coordinate plane |
| <i>line of fit</i> | a set of data which contains two variables |
| <i>scatter plot</i> | the process of using a linear equation to predict values inside the range of a set of data |
| <i>linear interpolation</i> | a line which closely approximates the scatter plot for a set of data |

Vocabulary Link Circle each word which would likely describe the given statistical relationship.

1. the amount of allowance and the number of CDs owned by fifteen students randomly selected from an algebra class

negative correlation positive correlation no correlation weak correlation strong correlation

2. the height in inches and the number of hours spent sleeping each week for ten adults selected at random

negative correlation positive correlation no correlation weak correlation strong correlation

3. the number of hours worked and the number of hours spent watching TV each week by nine teenagers selected at random

negative correlation positive correlation no correlation weak correlation strong correlation

Lesson 4-5 (continued)

Main Idea

Details

Investigate Relationships Using Scatter Plots

p. 245

Describe a real-world situation and a set of corresponding data that would show a strong positive correlation. Describe the meaning of the correlation in terms of the real-world situation.

Situation:

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| | | | | | | | |
| | | | | | | | |

Correlation Meaning:

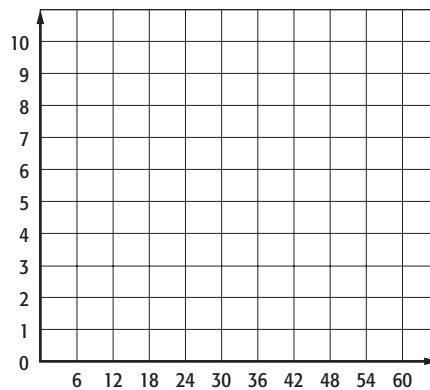
Use Lines of Fit

pp. 246–247

Make a scatter plot and describe the correlation. Determine a line of fit for the data. Use the line of fit to predict the number of hours exercised per week by a 15-year-old.

The table shows the number of hours spent exercising per week and the age of a random sample of seven people.

| | | | | | | |
|--------------|----|----|----|----|-----|----|
| age | 18 | 26 | 32 | 38 | 52 | 59 |
| hours | 10 | 5 | 2 | 3 | 1.5 | 1 |



line of best fit

4-6 Regression and Median-Fit Lines

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____
2. _____

Active Vocabulary

New Vocabulary Write the definition next to each term.

best-fit line ▶

linear regression ▶

correlation coefficient ▶

median-fit line ▶

Vocabulary Link Consider the statement “There is a strong correlation between smoking cigarettes and developing lung cancer.” Explain this statement mathematically and indicate a probable value for the correlation coefficient.

Lesson 4-6

Lesson 4-6 (continued)

Main Idea

Details

Equations of Best-Fit Lines

pp. 253–255

Record the keystrokes required to perform linear regression on your calculator. Provide details as necessary.

| | | |
|-------------------|-----------------------|---|
| entering the data | performing regression | graphing the scatter plot and regression line |
|-------------------|-----------------------|---|

Equations of Median-Fit Lines

p. 255

Use your graphing calculator to determine the median-fit line for the following set of data. Use this equation to perform both a *linear interpolation* and a *linear extrapolation*.

| | | | | | | |
|-----------------------------|---|---|---|---|----|----|
| number of ads | 2 | 5 | 8 | 8 | 10 | 12 |
| sales (\$ thousands) | 2 | 4 | 7 | 6 | 9 | 10 |

| | |
|----------------------|---------------|
| median-fit equation: | |
| interpolation | extrapolation |

Helping You Remember

Explain how each of the following terms are related: *scatter plot*, *line of fit*, *best-fit line*, *regression line*, and *median-fit line*

4-7 Special Functions

What You'll Learn

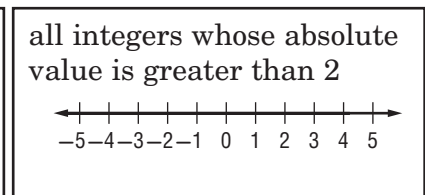
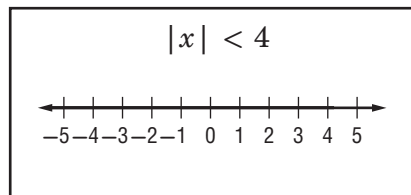
Scan Lesson 4-7. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Graph each on a number line.
(Lesson 2-5)



Lesson 4-7

New Vocabulary Match the term with its definition by drawing a line to connect the two.

- | | |
|-----------------------------------|--|
| <i>piecewise-defined function</i> | a function whose graph consists of disjointed line segments |
| <i>step function</i> | a function when given x , returns the greatest integer less than or equal to x |
| <i>piecewise linear function</i> | a function written using two or more expressions |
| <i>absolute value function</i> | a function which contains an algebraic expression within absolute value symbols |
| <i>greatest integer function</i> | a function written using one expression which results in a graph that consists of multiple lines |

Lesson 4-7 (continued)

Main Idea

Details

Step Functions

pp. 261–262

Evaluate each expression.

1. $\lceil 8.7 \rceil$
2. $\lfloor -8.2 \rfloor + \lceil 16.2 \rceil$
3. $\lceil 12.1 \rceil + 8$
4. $\lfloor 18.9 + 12.6 \rfloor$

Provide either the graph or the function notation for each *piecewise-defined function*. Identify the domain and range for each.

Absolute Value Functions

pp. 262–264

| Function | Graph | Domain |
|---|-------|--------------------|
| $f(x) = \begin{cases} 3x - 5 & \text{if } x < 3 \\ -\frac{2}{3}x - 4 & \text{if } x \geq 3 \end{cases}$ | | {all real numbers} |
| | | Range |
| | | Domain |
| | | {all real numbers} |
| | | Range |
| | | {all real numbers} |

Helping You Remember

Explain how you can use a number line to find the value of the greatest integer function for any real number.

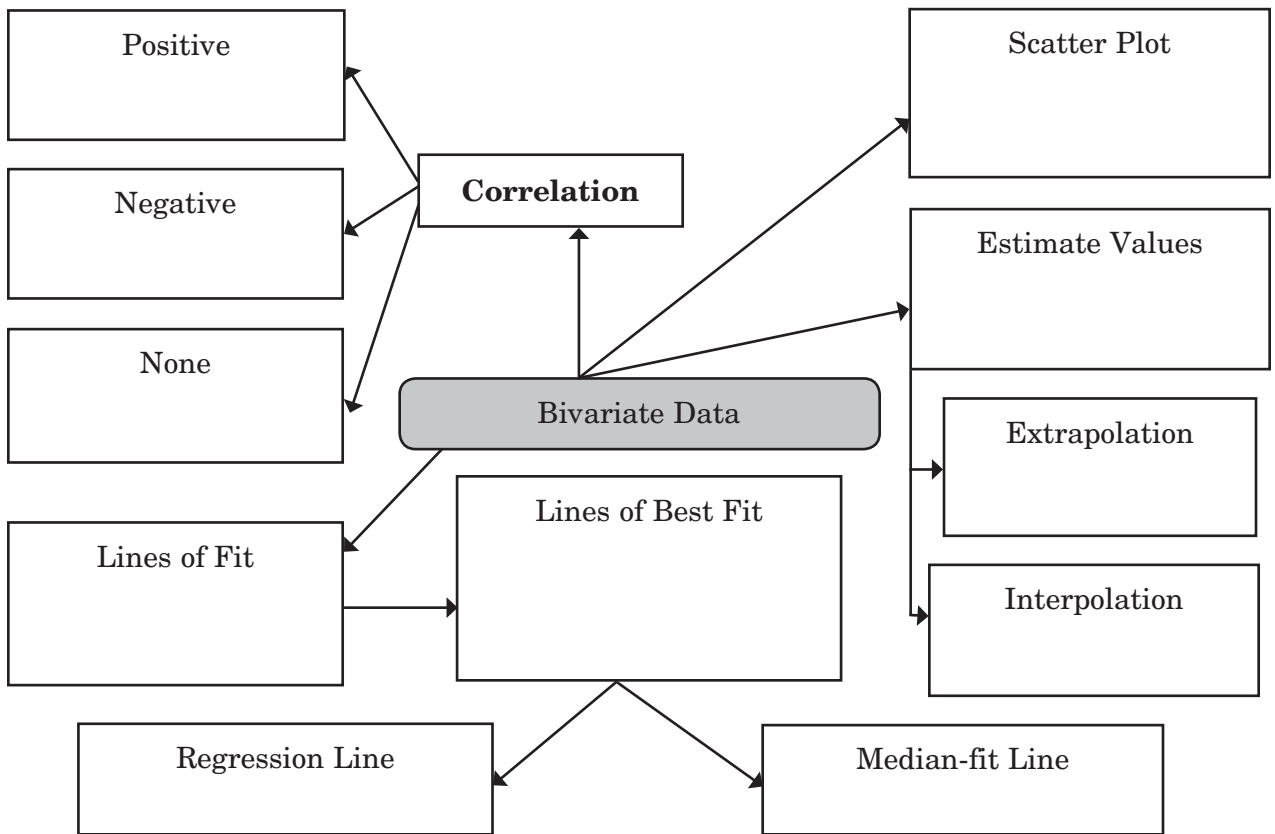
CHAPTER
4

Linear Functions and Relations

Tie It Together

Provide details for each titled graphic organizer. Supply a title and details for graphic organizers that are blank.

| Equation of a Line | | | |
|---------------------------------------|------------------|----------------------|---------------|
| | Point-Slope Form | Slope-Intercept Form | Standard Form |
| General Equation | | | |
| Using to Graph a Line | | | |
| Using to Write the Equation of a Line | | | |



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CHAPTER
4

Linear Functions and Relations

Before the Test

Review the ideas you listed in the table at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the table by filling in the third column.

| K What I know... | W What I want to find out... | L What I learned... |
|---------------------|---------------------------------|------------------------|
| | | |

Math Online Visit *glencoe.com* to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 4.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 4 Study Guide and Review in the textbook.
- I took the Chapter 4 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.

 **Study Tips**

- Make up an invented sentence (acrostic) to remember lists or sequences. **Please Excuse My Dear Aunt Sally** is one acronym for remembering the order of operations (**p**arentheses, **e**xponents, **m**ultiply and divide, **a**dd and **s**ubtract).


 CHAPTER
5

Linear Inequalities

Before You Read

Before you read the chapter, respond to these statements.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Before You Read | Linear Inequalities |
|-----------------|--|
| | <ul style="list-style-type: none"> • Inequalities are solved by isolating the variable. |
| | <ul style="list-style-type: none"> • If both sides of an inequality are multiplied by a negative number, the inequality sign is reversed. |
| | <ul style="list-style-type: none"> • A graph of an inequality has an open circle when the symbol is “greater than or equal to”. |
| | <ul style="list-style-type: none"> • The order of operations does not apply when solving inequalities. |
| | <ul style="list-style-type: none"> • Inequalities with absolute values are undefined. |


FOLDABLES Study Organizer

Construct the Foldable as directed at the beginning of this chapter.


Note Taking Tips

- **Remember to study your notes daily.**
Reviewing small amounts at a time will help you retain the information.
- **When you take notes, it may be helpful to sit as close as possible to the front of the class.**
There are fewer distractions and it is easier to hear.

CHAPTER
5

Linear Inequalities

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on solving inequalities by addition and subtraction, one fact might be that when solving inequalities, the goal is to isolate the variable on one side of the inequality. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|---|------|
| 5-1 Solving Inequalities by Addition and Subtraction | |
| 5-2 Solving Inequalities by Multiplication and Division | |
| 5-3 Solving Multi-Step Inequalities | |
| 5-4 Solving Compound Inequalities | |
| 5-5 Inequalities Involving Absolute Value | |
| 5-6 Graphing Inequalities in Two Variables | |

5-1 Solving Inequalities by Addition and Subtraction

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write a word description for each inequality symbol and write a true mathematical sentence using the symbol. (*Lesson 1-1*)

1. $>$ _____

2. $<$ _____

3. \geq _____

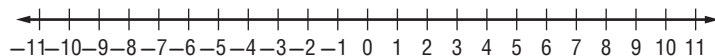
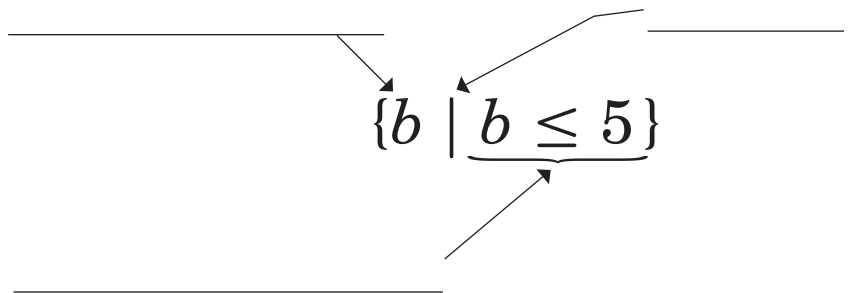
4. \leq _____

New Vocabulary Label the parts of the *set builder notation* below using the phrases given at the left. Show the set builder notation on the number line.

such that ▶

the set of all numbers b ▶

b is less than or equal to 5 ▶



Lesson 5-1 (continued)

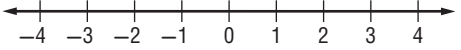

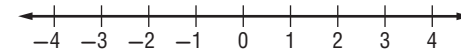
Main Idea

Details

Solve Inequalities by Addition

pp. 283–284

Fill in the chart with the missing solution set representations.

| Verbal Description | Set Builder Notation | Graphical Representation |
|----------------------------|----------------------|--|
| all numbers greater than 3 | |  |
| | |  |
| | $\{x \mid x < -3\}$ |  |

Solve Inequalities by Subtraction

pp. 284–285

Write a linear inequality to represent the following problem. Solve the inequality. Provide a complete sentence to answer the problem.

Raul needs at least \$150 to purchase a digital audio player. Currently, Raul has \$102. How much more money does Raul need before he can purchase a digital audio player?

| | |
|--------------------------|---------------------|
| Inequality: Solution: | Answer the problem: |
|--------------------------|---------------------|

Helping You Remember

Teaching someone else can help you remember something. Explain how you would teach another student to solve the inequality $2x + 4 \leq 3x$.

5-2 Solving Inequalities by Multiplication and Division

What You'll Learn

Scan Lesson 5-2. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

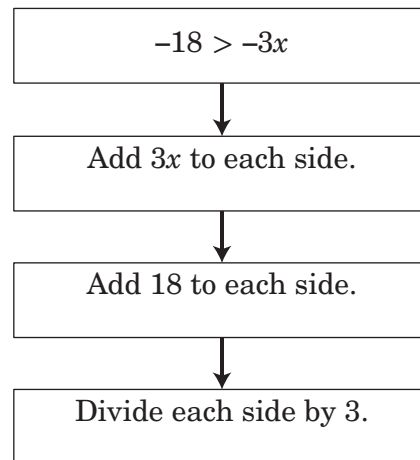
Active Vocabulary

Review Vocabulary Explain how the *Multiplication Property of Equality* and the *Division Property of Equality* can both be used to solve the equation $3x = 24$. (Lesson 2-2)

| | |
|-------------------------------------|-------------------------------|
| Multiplication Property of Equality | Division Property of Equality |
|-------------------------------------|-------------------------------|

Lesson 5-2

Vocabulary Link Solve the inequality below by following the outlined steps.



Lesson 5-2 *(continued)*

Main Idea

Solve Inequalities by Multiplication

pp. 290–291

Details

Compare and contrast the process for solving the inequalities $-\frac{1}{3}x > -12$ and $\frac{1}{3}x > 12$ and for showing the solutions sets on a number line.

Similarities:

Differences:

Solve Inequalities by Division

p. 292

Classify each inequality listed in the chart below.

$3x > -12$, $-4x < 15$, $-\frac{2}{3}x \leq -15$, $x - 5 > -15$, $\frac{1}{4}x \geq -8$,
 $-x > 9$, $x + 14 < -6$, $\frac{3}{2}x > -7$

| The inequality symbol is not reversed when solving. | The inequality symbol is reversed when solving. |
|---|---|
| | |

5-3 Solving Multi-Step Inequalities

What You'll Learn

Skim the Examples for Lesson 5-3. Predict two things you think you will learn about solving multi-step inequalities.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Use the Distributive Property to simplify each expression. (*Lesson 1-3*)

1. $3(2x - 7)$

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

3. $2(x + 5) + 3(2x + 1)$

4. $-4(2x - 6) - (x + 7)$

Vocabulary Link Fill in a missing term in each equation to satisfy the given solution. Justify your answer by solving each equation.

1. $4x - 12 = 6x + \square$

Solution: $x = -2$

2. $2x - 10 = 2x + \square$

Solution: \emptyset

3. $3x + 11 = \square + 11$

Solution: {all real numbers}

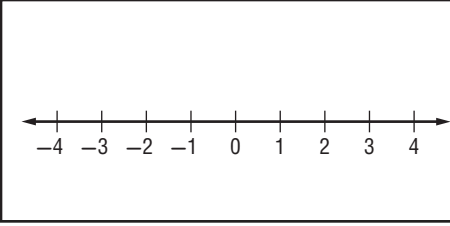
Lesson 5-3 (continued)

Main Idea

Details

Solve Multi-Step Inequalities
pp. 296–297

Solve each inequality using the indicated first step. Show the solution set using set builder notation and on a number line.

| | |
|---|--|
| $5 - 6z \geq 13$ Subtract 5 from each side. |  |
| $5 - 6z \geq 13$ Add 6z to each side. | |

Solve Inequalities Involving the Distributive Property
pp. 297–298

Explain how to identify an inequality that has either “all real numbers” or “∅” as the solution.

All Real numbers: _____

∅: _____

Helping You Remember

Make a checklist of steps for solving inequalities.

5-4 Solving Compound Inequalities

What You'll Learn

Skim the lesson. Write two things you already know about solving compound inequalities.

1. _____

2. _____

Active Vocabulary

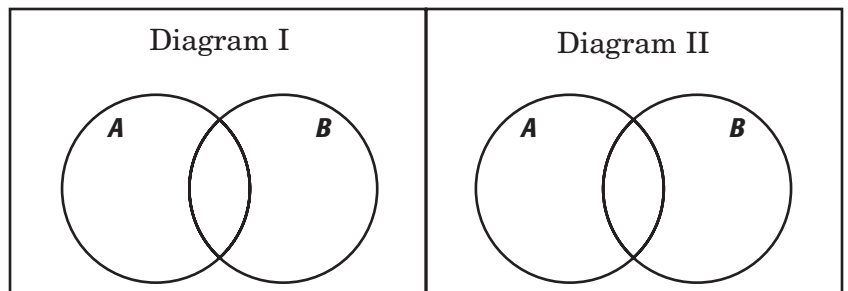
Review Vocabulary Match each verbal description to the correct inequality symbol. (*Lesson 1-1*).

- $x \geq 12$ is no more than 12
- $12 < x$ is less than 12
- $x \leq 12$ is at least 12
- $x < 12$ is more than 12

New Vocabulary Write the correct term beside each definition.

- _____ ▶ Corresponds to the word “and”. Solutions are common to both inequalities in a compound inequality.
- _____ ▶ The name given to two inequalities considered together.
- _____ ▶ Corresponds to the word “or”. Solutions are from one, the other, or both inequalities in a compound inequality.

Vocabulary Link Shade the *intersection* of sets *A* and *B* in Diagram I. Shade the *union* of sets *A* and *B* in Diagram II.



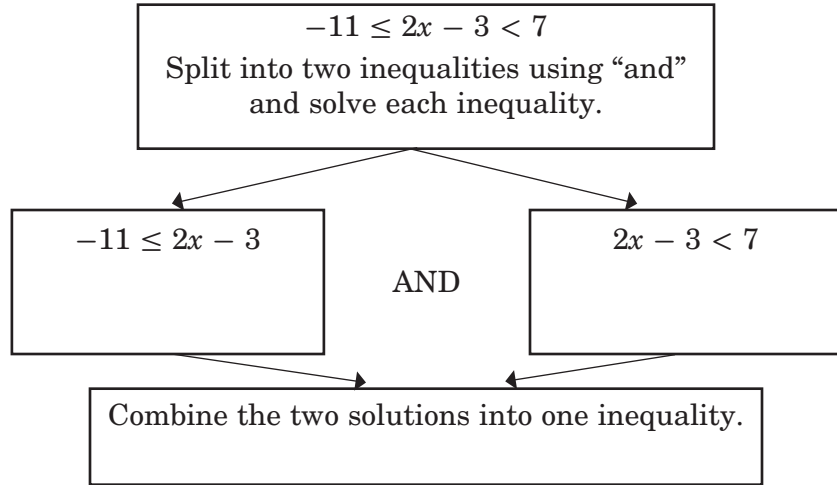
Lesson 5-4 (continued)

Main Idea

Details

Inequalities Containing *and*
p. 304

Complete the diagram to solve the inequality.



Inequalities Containing *or*
pp. 305–306

To be on the **Tiny Tigers Tennis Team**, a child must be at least 6 years old, but less than 9 years old. Write two **compound inequalities**: one representing the ages of children who can be on the team, and the other representing the ages of children who cannot be on the team.

Children on the team: _____

Children not on the team: _____

Helping You Remember

One way to remember something is to connect it to something that is familiar to you. Write two *true* compound statements about yourself, one using the word *and* and other using the word *or*.

5-5 Inequalities Involving Absolute Value

What You'll Learn

Scan the text in Lesson 5-5. Write two facts you learned about inequalities involving absolute value as you scanned the text.

1. _____

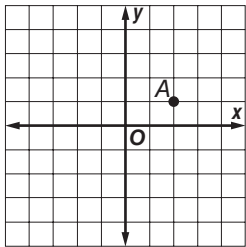
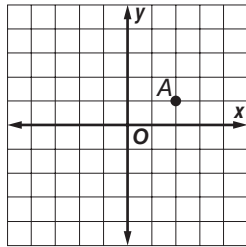
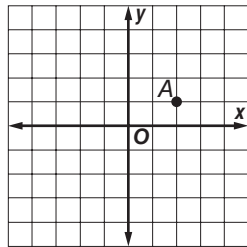
2. _____

Active Vocabulary

Review Vocabulary Solve each *absolute value* equation. (Lesson 2-5)

1. $|x| = 12$
2. $|x| - 5 = -20$
3. $4|x - 6| = 16$
4. $|3x - 1| + 2 = 18$

Vocabulary Link Shade the areas on the coordinate planes which meet the conditions. Describe the shape of the shaded region.

| | | |
|---|--|---|
| <p style="text-align: center;">all points 3 units from A</p>  <p style="text-align: center;">Description</p> | <p style="text-align: center;">all points, at most, 3 units from A</p>  <p style="text-align: center;">Description</p> | <p style="text-align: center;">all points between 2 and 3 units from A</p>  <p style="text-align: center;">Description</p> |
|---|--|---|

Lesson 5-5 (continued)

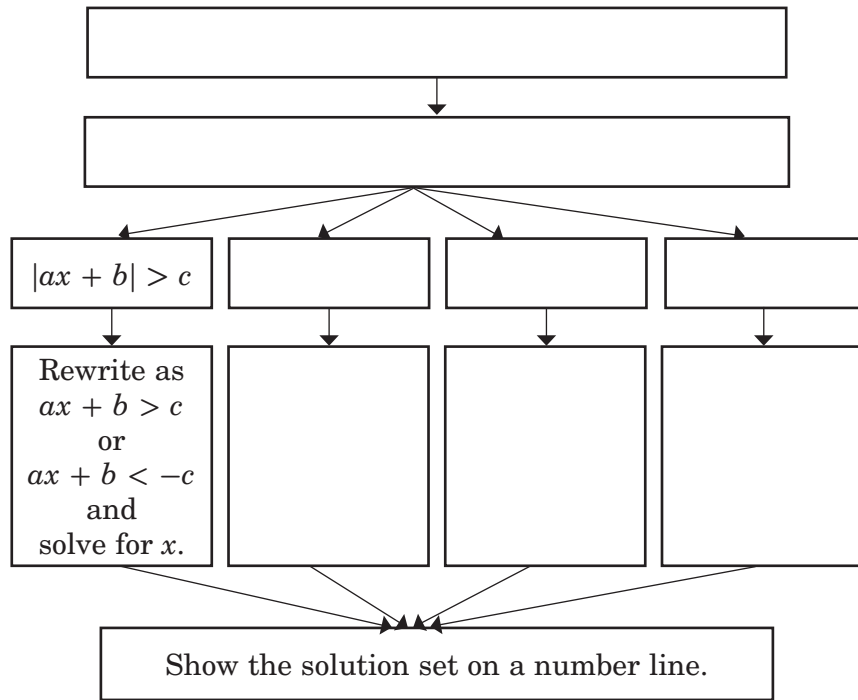
Main Idea

Details

Inequalities Involving Absolute Value

pp. 310–311

Complete the chart below for solving absolute value inequalities.



Solve each inequality.

| | |
|---------------|-------------------|
| $ x + 3 > 5$ | $ 2x - 1 \leq 3$ |
| | |

Helping You Remember

Recall that $|x|$ tells you how many units the number x is from zero on the number line. Explain the meaning of $|x| = n$, $|x| < n$ and $|x| > n$ by using the idea of the distance from x to zero.

5-6 Graphing Inequalities in Two Variables

What You'll Learn

Skim Lesson 5-6. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Lesson 5-6

Active Vocabulary

New Vocabulary Write the definition next to each term.

boundary ▶

half-plane ▶

closed half-plane ▶

open half-plane ▶

Lesson 5-6 (continued)

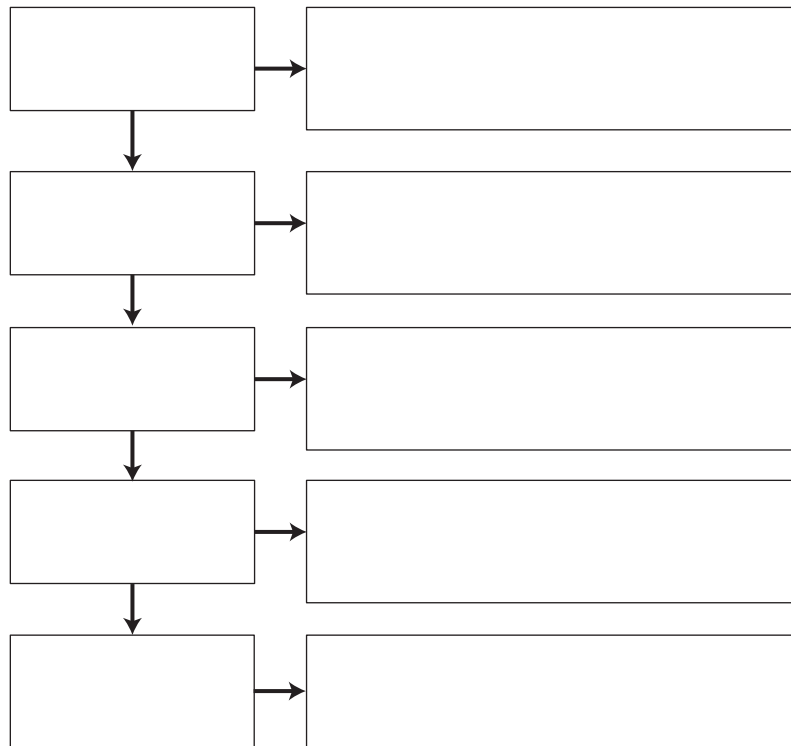
Main Idea

Details

Graph Linear Inequalities
pp. 315–316

Sequence the steps for graphing a linear inequality by placing one step in each box. Add details in the box next to each step.

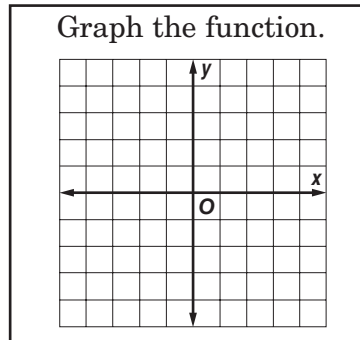
Shade the graph, Graph the boundary line, Determine if the boundary line is solid or shaded, Pick a point not on the line to test, Check a point not in the shaded region



Solve Linear Inequalities
pp. 316–317

Use an inequality in two variables to solve $-2x - 3 \leq -5$.

Write the related function.



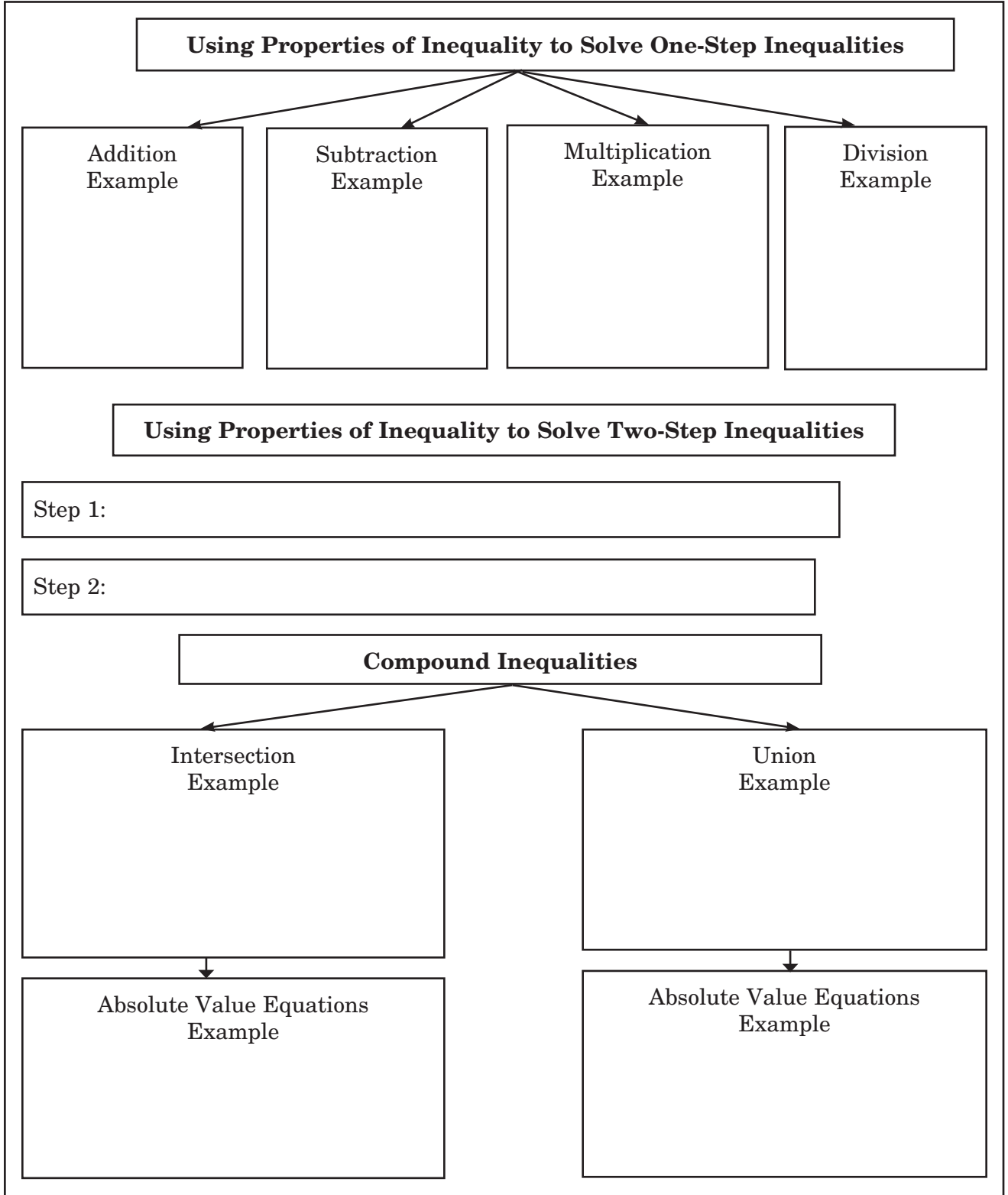
Pick/Test a Point. Shade the graph.

CHAPTER
5

Linear Inequalities

Tie It Together

Provide the indicated details in the graphic organizer.



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**CHAPTER
5**

Linear Inequalities

Before the Test

Now that you have read and worked through the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Linear Inequalities | After You Read |
|--|----------------|
| • Inequalities are solved by isolating the variable. | |
| • If both sides of an inequality are multiplied by a negative number, the inequality sign is reversed. | |
| • A graph of an inequality has an open circle when the symbol is “greater than or equal to”. | |
| • The order of operations does not apply when solving inequalities. | |
| • Inequalities with absolute values are undefined. | |

Math Online Visit glencoe.com to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 5.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 5 Study Guide and Review in the textbook.
- I took the Chapter 5 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.



Study Tips

- On handouts, homework, and workbooks that can be written in, underline and highlight significant information.


 CHAPTER
6

Systems of Linear Equations and Inequalities

Before You Read

Before you read the chapter, think about what you know about systems of linear equations and inequalities. List three things you already know about them in the first column. Then list three things you would like to learn about them in the second column.

| K What I know... | W What I want to find out... |
|---------------------|---------------------------------|
| | |


 FOLDABLES[®] Study Organizer

Construct the Foldable as directed at the beginning of this chapter.



Note Taking Tips

- **If your instructor points out definitions or procedures from your text, write a reference page in your notes.**
 You can then write these referenced items in their proper place in your notes after class.
- **When you take notes, listen or read for main ideas.**
 Then record concepts, define terms, write statements in if-then form, and write paragraph proofs.

CHAPTER
6

Systems of Linear Equations and Inequalities

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on graphing systems of equations, one fact might be that if a consistent system has an infinite number of solutions, it is dependent. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|--|------|
| 6-1 Graphing Systems of Equations | |
| 6-2 Substitution | |
| 6-3 Elimination Using Addition and Subtraction | |
| 6-4 Elimination Using Multiplication | |
| 6-5 Applying Systems of Linear Equations | |
| 6-6 Organizing Data Using Matrices | |
| 6-7 Using Matrices to Solve Systems of Equations | |
| 6-8 Systems of Inequalities | |

6-1 Graphing Systems of Equations

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Make a table of values which satisfy the equation $x + y = 13$. (*Lesson 3-1*)

| | | | | | | | | | |
|-----|----|----|----|----|----|----|----|----|----|
| x | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| y | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 |

Is it possible to make a table that shows all ordered pairs that satisfy this equation? Justify your answer.

How can you show all of the ordered pairs for the equation?

New Vocabulary Match the term with its definition by drawing a line.

- consistent* a set of two or more equations that contain the same variables
- inconsistent* a system of equations that has at least one solution
- system of equations* a system of equations that has an infinite number of solutions
- independent* a system of equations that has exactly one solution
- dependent* a system of equations that has no solutions

Lesson 6-1 (continued)

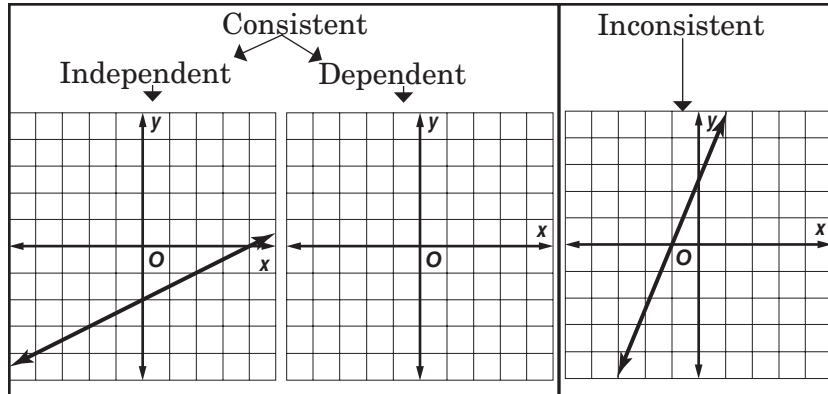
Main Idea

Details

Possible Number of Solutions

pp. 333–334

Add a line to each graph so that the given condition is satisfied.



Solve by Graphing

pp. 334–335

Solve the system of equations by graphing.

Step 1
Solve for y
in each
equation.

$2x + y = 9$

$2x - 5y = 15$

Step 2 Graph each equation.

Step 3 Find the solution.
The lines intersect at point _____.

Helping You Remember

Describe how you can solve a system of equations by graphing.

6-2 Substitution

What You'll Learn

Scan the text in Lesson 6-2. Write two facts you learned about solving systems by substitution as you scanned the text.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Solve the equation after substituting the given value for each variable. (*Lesson 2-3*)

1. $3x + 7y = 8$, given $x = -2$
2. $-2y + 2x = 12$, given $y = 0$
3. $y - \frac{2}{3x} = 9$, given $x = -6$
4. $0.5y + 6x = -5$, given $y = 4$

New Vocabulary Write the definition next to each term.

substitution ►

Vocabulary Link Describe when it would be more convenient to use substitution than graphing for solving a system of equations.

Lesson 6-2 (continued)

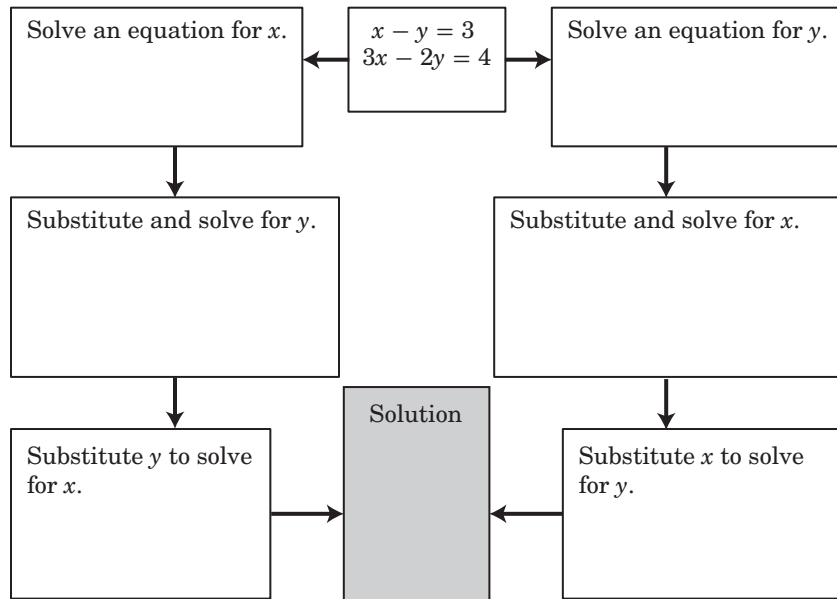
Main Idea

Solve by Substitution

pp. 342–344

Details

Solve the system of equations twice using the *substitution method*. In the first column, solve for x initially. In the second, solve for y initially.



Solve Real-World Problems

p. 344

Write a system of equations to represent the following problem. Identify the variables. Solve the system.

A total of 150 tickets were sold for the annual concert. Student tickets were \$4 and non-student tickets were \$8. If the total revenue was \$840, how many tickets of each type were sold?

| | | |
|-----------|--------|-------------------|
| Let $s =$ | system | Solve and answer. |
| Let $n =$ | | |

Helping You Remember

What is usually the first step in solving a system of equations by substitution?

6-3 Elimination Using Addition and Subtraction

What You'll Learn

Scan Lesson 6-3. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Match each linear equation with the appropriate form. (*Lessons 4-2 and 4-3*)

slope-intercept form $y = -\frac{3}{4}x + 3$

point-slope form $3x + 4y = 12$

standard form $y + 3 = (x - 8)$

Do these equations represent the same line? Justify your answer.

New Vocabulary Fill in the blanks with the correct term or phrase.

elimination ► It is a method to _____ a system in which the equations are written so that like _____ with the same or opposite coefficients are _____. The equations are _____ or subtracted to eliminate one _____. The value for one variable is found and is _____ into one of the equations to solve for the other variable.

Lesson 6-3 (continued)

Main Idea

Details

Elimination Using Addition

pp. 348–349

Solve each system of equations using the addition method. Fill in both the verbal and mathematical missing steps.

| | | |
|---|---|---|
| Given | $\begin{aligned} -5y + 3x &= -9 \\ 4x + 5y &= 23 \end{aligned}$ | $\begin{aligned} 3x &= 4y + 11 \\ 2y &= 3x - 7 \end{aligned}$ |
| | ↓ | ↓ |
| Line up the variables and coefficients. | | |
| | ↓ | ↓ |
| _____ | $7x = 14$ | |
| _____ | ↓ | ↓ |
| Solve the one-variable equation. | | |
| | ↓ | ↓ |
| _____ | $\begin{aligned} 3(2) - 5y &= -9 \\ -5y &= -15 \\ y &= 3 \end{aligned}$ | |
| _____ | ↓ | ↓ |
| _____ | | $(1, -2)$ |

Elimination Using Subtraction

pp. 350–351

Create a system of equations which has a solution of (2, 4) and can be solved using the subtraction method.

Helping You Remember

Tell how you can decide whether to use addition or subtraction to eliminate a variable in a system of equations.

6-4 Elimination Using Multiplication

What You'll Learn

Skim Lesson 6-4. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the property of equality which is represented by each example. (*Lessons 1-3*)

$4x = 9$ is equivalent to $4x - 18 = -9$.

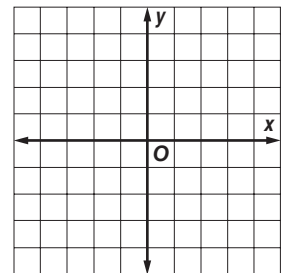
$3x + 2y = 12$ is equivalent to $6x + 4y = 24$.

$3x = 12$ is equivalent to $3x + 8 = 20$.

Vocabulary Link Add the two linear equations to create a third. Graph all three equations on the same plane. What happens?

$$2x - 3y = -8$$

$$-x + 2y = 6$$



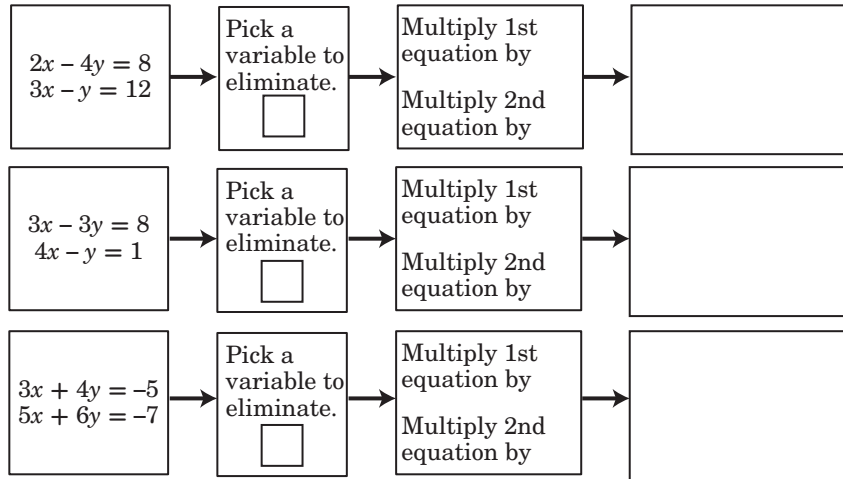
Lesson 6-4 (continued)

Main Idea

Elimination Using Multiplication

pp. 355–356

Details



Solve Real-World Problems

p. 357

Write a system of equations to represent the following problem. Identify the variables. Solve the system using elimination.

On Monday, Arnold paid \$3.40 for three donuts and two coffees. On Tuesday, he paid \$3.60 for two donuts and three coffees. On Wednesday, he bought one donut and one coffee. What was his bill for one donut and one coffee?

| | | |
|-----------|------------------|-------------------|
| Let $d =$ | system | Solve and answer. |
| | $3d + 2c = 3.40$ | |
| Let $c =$ | $2d + 3c = 3.60$ | |

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Helping You Remember

If you are going to solve a system by elimination, how do you decide whether you will need to multiply one or both equations by a number?

6-5 Applying Systems of Linear Equations

What You'll Learn

Skim the Examples for Lesson 6-5. Predict two things you think you will learn about applying systems of equations.

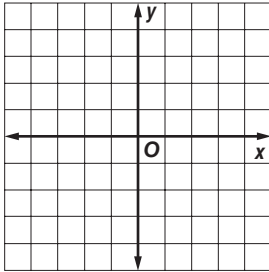
1. _____

2. _____

Active Vocabulary

Review Vocabulary Solve the system of equations using each of the four methods. (*Lessons 6-1 through 6-4*)

$$x - 2y = 4; x - y = 3$$

| | |
|--|---|
| <p>Graphing</p>  <p>Solution:</p> | <p>Substitution</p> <p>Solution:</p> |
| <p>Elimination Using Subtraction</p> <p>Solution:</p> | <p>Elimination Using Multiplication</p> <p>Solution:</p> |

Lesson 6-5 (continued)

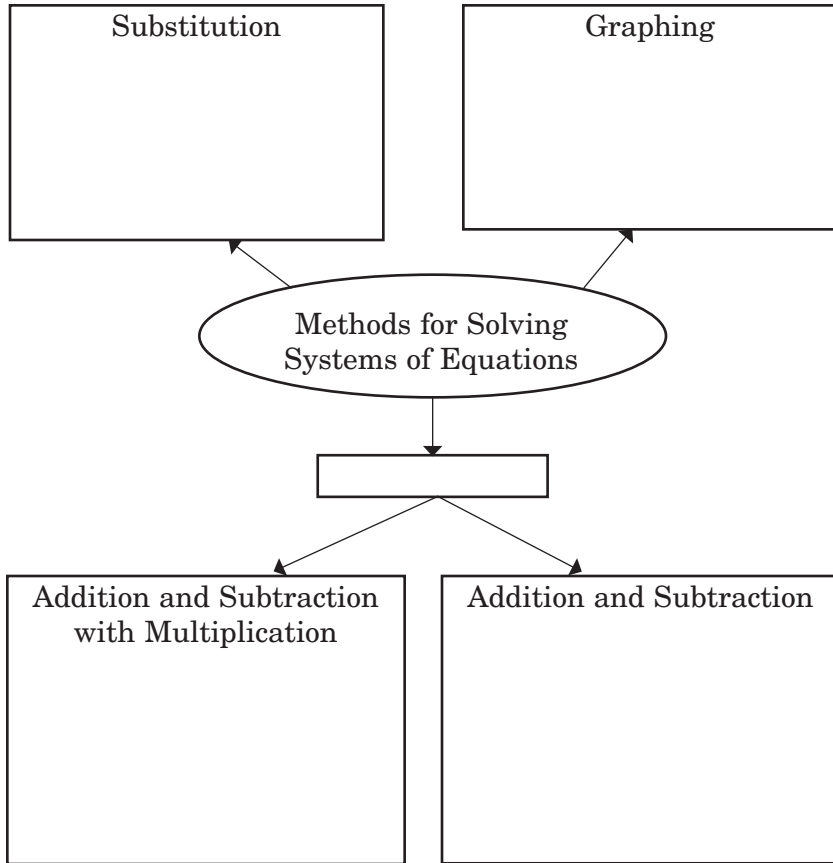
Main Idea

Determine the Best Method

pp. 362–363

Details

Summarize when to use each of the following methods in your own words.



Apply Systems of Linear Equations

p. 364

Write a word problem that could be represented by the following system of equations. Identify each variable.

$$4b + 3m = 1.45; 2b + 5m = 1.25$$

$b =$

$m =$

Word Problem

6-6 Organizing Data Using Matrices

What You'll Learn

Skim the lesson. Write two things you already know about organizing data using matrices.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the correct term beside each definition.

- _____ ▶ the number of rows and columns in a matrix, written as $m \times n$, where m is the number of rows and n is the number of columns
- _____ ▶ a constant that is multiplied by a matrix
- _____ ▶ the name given to each number in a matrix
- _____ ▶ a rectangular array of variables or constants in horizontal rows and columns
- _____ ▶ the operation of multiplying each element of a matrix by the scalar

Vocabulary Link Explain how scalar multiplication is similar to using the Distributive Property in an algebraic expression. Explain how matrix addition/subtraction is similar to combining like terms in an algebraic expression.

| |
|--|
| Scalar multiplication & Distributive Property |
| Matrix addition/subtraction & combining like terms |

Lesson 6-6 (continued)**Main Idea****Organize Data Using Matrices**

pp. 369–370

DetailsUse matrix A to answer the following questions.

$$A = \begin{bmatrix} -2 & 7 & -10 & 1 & 12 \\ 3 & 0.5 & 2 & -1 & -5 \\ 5 & 6 & 0 & 4 & 0.75 \end{bmatrix}$$

What are the dimensions of Matrix A ? _____

What is the element in row 2, column 4? _____

What is the position of the circled element? _____

What is the sum of the elements in column 3? _____

What is the sum of the elements in row 1? _____

Matrix Operations

pp. 370–371

Perform each matrix operation.

$$-3 \begin{bmatrix} -2 & 4 \\ 1 & 7 \end{bmatrix} = \begin{bmatrix} & \\ & \end{bmatrix}$$

$$\begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix} - \begin{bmatrix} 5 & -1 \\ 3 & 8 \end{bmatrix} = \begin{bmatrix} & \\ & \end{bmatrix}$$

6-7 Using Matrices to Solve Systems of Equations

What You'll Learn

Skim the Examples for Lesson 6-7. Predict two things you think you will learn about using matrices to solve systems of equations.

- _____
- _____

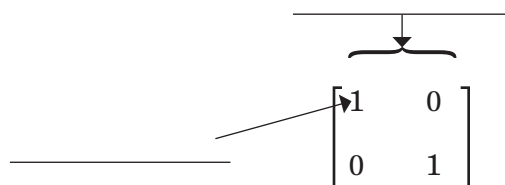
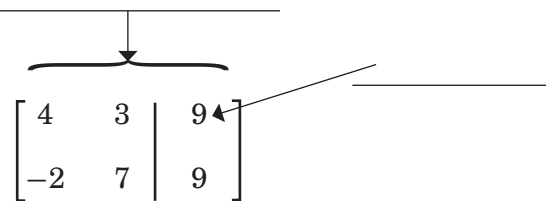
Active Vocabulary

Review Vocabulary Eliminate the indicated variable for each system. Do not solve the system. (*Lesson 6-4*)

| | |
|---|--|
| $2x - 3y = -13$ $5x - 12y = -46$ <p>Eliminate x.</p> <p>Multiply 1st equation by ____.</p> <p>Multiply 2nd equation by ____.</p> | $4x + 3y = 48$ $3x + 2y = 34$ <p>Eliminate y.</p> <p>Multiply 1st equation by ____.</p> <p>Multiply 2nd equation by ____.</p> |
|---|--|

New Vocabulary Fill in each box with the correct term.

- constant* ▶
- coefficient* ▶
- identity matrix* ▶
- augmented matrix* ▶



Lesson 6-7 (continued)

Main Idea

Details

Augmented Matrices

p. 376

Write a system of equations from the augmented matrices. Use x and y as the variables.

| | | |
|--|---|--|
| $\left[\begin{array}{cc c} 4 & 8 & 1 \\ 3 & -1 & 5 \end{array} \right]$ | → | |
|--|---|--|

Solve Systems of Equations

pp. 376–378

Use an augmented matrix to solve the system of equations $x - y = 12$ and $2x + y = 3$. Fill in the missing steps.

| | | |
|---|---|---|
| $\left[\begin{array}{cc c} 1 & -1 & 12 \\ 2 & 1 & 3 \end{array} \right]$ | → | |
| $\left[\begin{array}{cc c} & & \\ & & \end{array} \right]$ | → | Make the 2nd element in the 1st row a 0 by adding the 2nd row to the 1st. |
| $\left[\begin{array}{cc c} 1 & 0 & 5 \\ 2 & 1 & 3 \end{array} \right]$ | → | |
| $\left[\begin{array}{cc c} & & \\ & & \end{array} \right]$ | → | Make the 1st element in the 2nd row a 0 by multiplying the 1st row by -2 and adding to the 2nd. |
| $(5, -7)$ | → | Write the solution. |

Helping You Remember

A student in your class is having difficulty understanding why the goal of row reduction is to achieve an identity matrix. How can you explain this to the student?

6-8 Systems of Inequalities

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

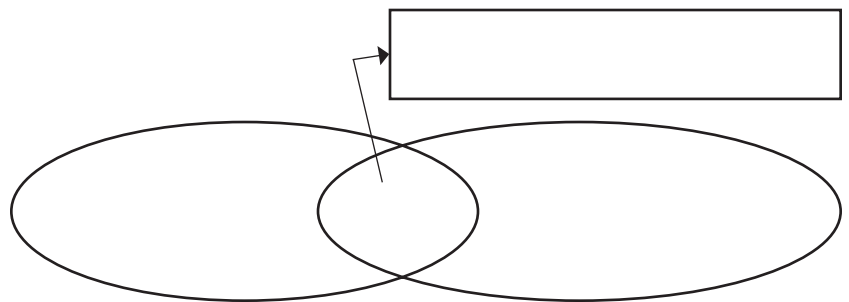
Active Vocabulary

system of inequalities ►

New Vocabulary Fill in the blank with the correct term or phrase.

It is a set of _____ or more inequalities with the same _____. The solution of the system is the set of _____ that satisfy all of the inequalities in the system. These ordered pairs are the _____ of the graphs of each individual inequality.

Vocabulary Link Intersecting regions can be represented using a Venn diagram. Place the terms “solutions of $y > 2x - 4$ ”, “solutions of $y \leq -0.5x + 3$ ”, and “solutions of $y > 2x - 4$ and $y \leq -0.5x + 3$ ” in the Venn diagram below.



How could you use the Venn diagram to represent “solutions of $y > 2x - 4$ or $y \leq -0.5x + 3$ ”?

Lesson 6-8 (continued)

Main Idea

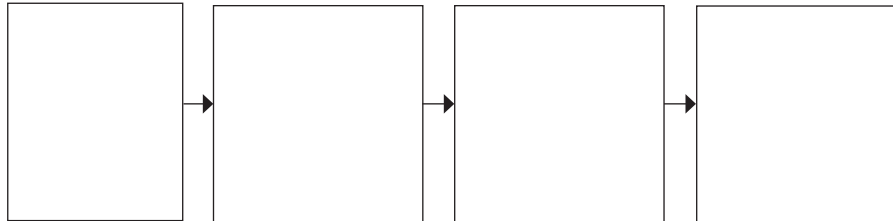
Details

Systems of Inequalities

pp. 382–383

Sequence the steps for solving a system of inequalities. Solve the two systems of inequalities.

Graph the first inequality and shade appropriately, Write both lines in slope-intercept form, Determine the intersections of the shaded regions, Graph the second inequality and shade appropriately.



| | |
|--|--|
| <p>Example 1</p> $y > x - 1$ $y < x + 3$ | |
| <p>Example 2</p> $4x - 3y \leq 3$ $2x + y \geq 2$ | |

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Helping You Remember

Describe how you would explain the process of using a graph to solve a system of inequalities to a friend.

CHAPTER
6

Systems of Linear Equations and Inequalities

Tie It Together

Fill in each graphic organizer. Add details if space permits.

| Solving Systems of Equations | | |
|---|------------|-------------|
| Method | How to Use | When to Use |
| Graphing | | |
| Substitution | | |
| Elimination with Addition/ Subtraction | | |
| Elimination with Multiplication | | |

Possible Solution Sets

```

graph TD
    A[Possible Solution Sets] --> B[ ]
    A --> C[ ]
    A --> D[ ]
    B --> E[Algebraically Solved]
    C --> F[Algebraically Solved]
    D --> G[Algebraically Solved]
    E --> H[Graphically Solved]
    F --> I[Graphically Solved]
    G --> J[Graphically Solved]
    
```

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CHAPTER
6

Systems of Linear Equations and Inequalities

Before the Test

Review the ideas you listed in the table at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the table by filling in the third column.

| K What I know... | W What I want to find out... | L What I learned... |
|---------------------|---------------------------------|------------------------|
| | | |

Math Online Visit *glencoe.com* to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 6.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 6 Study Guide and Review in the textbook.
- I took the Chapter 6 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.

Study Tips

- Use the SQ3R method of reading: **S**urvey, **Q**uestion, **R**ead, **R**ecite, and **R**evue. Survey the text by previewing the headings, boldface words, and examples. Ask questions about what you survey, read with purpose, recite out loud the main points and concepts without looking at the text, and review your text notes or use the chapter review at the end of the chapter.


 CHAPTER
7

Polynomials

Before You Read

Before you read the chapter, respond to these statements.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Before You Read | Polynomials |
|-----------------|---|
| | <ul style="list-style-type: none"> • To multiply exponents with the same base, find the product of the base and the exponents. |
| | <ul style="list-style-type: none"> • A simplified expression is without fractions, duplicate bases, and powers of powers. |
| | <ul style="list-style-type: none"> • A base with a negative exponent is written with a positive exponent when it is a denominator. |
| | <ul style="list-style-type: none"> • To subtract polynomials, subtract like terms. |
| | <ul style="list-style-type: none"> • To multiply polynomials, use the Commutative Property. |


 FOLDABLES[®] Study Organizer

Construct the Foldable as directed at the beginning of this chapter.


 Note Taking Tips

- **When taking notes, writing a paragraph that describes the concepts, the computational skills, and the graphics will help you to understand the math in the lesson.**
- **Before each lesson, skim through the lesson and write any questions that come to mind in your notes.**

As you work through the lesson, record the answer to your question.


 CHAPTER
7

Polynomials

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on dividing monomials, one fact might be that the order of magnitude of a quantity is the number rounded to the nearest power of 10. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|--|------|
| 7-1 Multiplying Monomials | |
| 7-2 Dividing Monomials | |
| 7-3 Scientific Notation | |
| 7-4 Polynomials | |
| 7-5 Adding and Subtracting Polynomials | |
| 7-6 Multiplying a Polynomial by a Monomial | |
| 7-7 Multiplying Polynomials | |
| 7-8 Special Products | |

7-1 Multiplying Monomials

What You'll Learn

Skim the Examples for Lesson 7-1. Predict two things you think you will learn about multiplying monomials.

1. _____
2. _____

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

constant ► A constant is a monomial that is a _____.

monomial ► A monomial is a number, a _____, or the product of a number and one or more variables with nonnegative integer _____.

Vocabulary Link The word *constant* has a place in a number of real-world applications. Think of a real-world example where you would describe something as constant. Then look up the word and explain how its everyday meaning relates to its mathematical meaning.

Lesson 7-1

Lesson 7-1 (continued)

Main Idea

Details

Monomials
pp. 401–403

Complete the table by circling the property of powers that can be used to simplify each expression. Then simplify the expression.

| Expression | Property | Simplified Expression |
|-----------------|---|-----------------------|
| $(w^3)^5$ | Product of Powers Power of a Power Power of a Product | |
| $c^2 \cdot c^4$ | Product of Powers Power of a Power Power of a Product | |
| $(2mn)^3$ | Product of Powers Power of a Power Power of a Product | |

Simplify Expressions
p. 404

Simplify each expression.

1. $(2mn^2)^2(3m^2n^4)^3$

2. $(4c^2d^3)^2[(-3c^2d^4)^3]^2$

Helping You Remember

Write an example of each of the three properties of powers discussed in this lesson. Then, using the examples, explain how the property is used to simplify them.

7-2 Dividing Monomials

What You'll Learn

Skim the lesson. Write two things you already know about dividing monomials.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the correct term next to each definition or expression.

_____ ▶ $\left(\frac{c}{5}\right)^0 = 1$

_____ ▶ for a given quantity, the number rounded to the nearest power of 10

_____ ▶ $a^{-2} = \frac{1}{a^2}$

Vocabulary Link Look up the definition of magnitude. Tell how the meaning compares to the order of magnitude of a quantity.

Lesson 7-2 (continued)

Main Idea

Details

Quotients of Monomials
pp. 408–410

Complete the table by circling the property of powers that can be used to simplify each expression. Then simplify the expression.

| Expression | Property | Simplified Expression |
|---------------------------------|---|-----------------------|
| $\frac{a^2b^4}{ab^2}$ | Quotient of Powers Power of a Quotient | |
| $\left(\frac{4z^3}{5}\right)^2$ | Quotient of Powers Power of a Quotient | |

Simplify Expressions
pp. 411–412

Simplify each expression. Assume that no denominator is equal to zero.

1. $\left(\frac{7c^2d^5}{21c^3d^2}\right)^0$

2. $\frac{(m^{-1}n^3)^{-4}}{m^3n^3}$

Helping You Remember

Describe how you would help a friend who needs to simplify the expression $\frac{4x^2}{2x^5}$.

Describe how you would help a friend who needs

7-3 Scientific Notation

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the definition next to each term.
(Lesson 7-1)

constant ▶

monomial ▶

New Vocabulary Write the definition of the term.

scientific notation ▶

Lesson 7-3 (continued)

Main Idea

Details

Scientific Notation

pp. 416–417

Follow the steps below to write 5.18×10^7 in standard form.

Step 1: Identify the exponent.

$n =$ _____

Step 2: Move the decimal point n places to the right.

$5.18 \times 10^7 \rightarrow$ _____

Step 3: Rewrite using commas.

$5.18 \times 10^7 =$ _____

Products and Quotients in Scientific Notation

pp. 417–418

Evaluate each expression. Express the results in both scientific notation and standard form.

1. $(1.3 \times 10^{-6})(5.2 \times 10^8)$

2. $\frac{2.04 \times 10^9}{1.2 \times 10^{13}}$

Helping You Remember

A good way to remember a mathematical concept is to explain it to someone else. How would you tell a friend to write the decimal 0.00000012 using scientific notation?

7-4 Polynomials

What You'll Learn

Skim Lesson 7-4. Predict two things that you expect to learn based on the headings and figures in the lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the correct term next to each definition.

- _____ ▶ a monomial or the sum or difference of monomials, each called a *term*
- _____ ▶ the coefficient of the first term of a polynomial when written in standard form
- _____ ▶ the sum of the exponents of all the variables of a monomial
- _____ ▶ the sum or difference of three monomials
- _____ ▶ the form of a polynomial that is written with the terms in order from greatest degree to least degree
- _____ ▶ the sum or difference of two monomials
- _____ ▶ the greatest degree of any term in a polynomial

Lesson 7-4 (continued)

Main Idea

Details

Degree of a Polynomial
pp. 424–425

Complete the table below for each monomial, binomial, or trinomial.

| Expression | Number of Terms | Monomial, Binomial, or Trinomial? |
|----------------|-----------------|-----------------------------------|
| $32x^2y$ | | |
| $4x + 2y - 6$ | | |
| $9x^2 - 81y^2$ | | |
| -7 | | |
| $8y + 3$ | | |

Polynomials in Standard Form
pp. 425–426

Write each polynomial in standard form. Identify the leading coefficient.

1. $y^2 + 32 - y + 4y^3$ _____
2. $32 - x^4 + 10x^2$ _____
3. $5z + 7z^2 + 6$ _____
4. $12a^2 - 15 - 8a + 9a^6$ _____

Helping You Remember

Use a dictionary to find the meaning of the terms *ascending* and *descending*. Write their meanings and then describe a situation in your everyday life that relates to them.

7-5 Adding and Subtracting Polynomials

What You'll Learn

Scan the text in Lesson 7-5. Write two facts you learned about adding and subtracting polynomials as you scanned the text.

- _____
- _____

Active Vocabulary

Review Vocabulary Fill in each blank with the correct term or phrase. (*Lessons 7-1 and 7-4*)

- polynomial* ▶ A polynomial is a monomial or the sum or difference of monomials, each called a _____ of the polynomial.
- constant* ▶ A constant is a _____ that is a real number.
- binomial* ▶ A binomial is the sum or _____ of two monomials.
- leading coefficient* ▶ The leading coefficient of a polynomial is the coefficient of the first term when written in _____.
- monomial* ▶ A monomial is a _____, a variable, or the _____ of a number and one or more variables with nonnegative integer exponents.

Lesson 7-5 *(continued)*

Main Idea

Details

Add Polynomials

p. 433

Find each sum.

1. $(3x^2 + 8) + (4x^2 - 6x)$ _____

2. $(-x^3 + 5x) + (2x^3 + 10x)$ _____

3. $(4x^2 - x + 2) + (x^2 - 3x - 8)$ _____

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

Subtract Polynomials

pp. 434–435

Compare and contrast the processes of adding and subtracting polynomials by listing any similarities and differences.

Adding and Subtracting Polynomials

Similarities

Differences

Helping You Remember

A good way to gain a greater understanding of a mathematical process is to relate it to previously learned processes. Describe how adding and subtracting polynomials vertically is like adding and subtracting decimals vertically.

7-6 Multiplying a Polynomial by a Monomial

What You'll Learn

Scan Lesson 7-6. List two headings you would use to make an outline of the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Label the diagram with the correct terms. (Lesson 7-4)

leading coefficient

degree

The diagram shows the polynomial $12x^4 - x^3 + 2x + 5$ written on a horizontal line. Two arrows point to specific parts of the polynomial: one arrow points to the coefficient 12, and another arrow points to the exponent 4.

Review Vocabulary Match the term with its definition by drawing a line to connect the two. (Lessons 7-2 and 7-4)

order of magnitude

the sum or difference of two monomials

trinomial

for a given quantity, the number rounded to the nearest power of 10

degree of a monomial

the sum of the exponents of all the variables of a monomial

binomial

the sum or difference of three monomials

Lesson 7-6 (continued)

Main Idea

Details

Polynomial Multiplied by Monomial

pp. 439–440

Follow the steps below to find $-2x^2(5x^2 - 3x + 1)$.

Step 1: Write the original expression.



Step 2: Use the Distributive Property.



Step 3: Multiply the terms.



Step 4: Simplify the expression.

Solve Equations with Polynomial Expressions

p. 441

Solve the equation below for m . Show your work.

$$m(m - 4) - m(m + 2) = -4m - 10$$

$m =$ _____

Helping You Remember

Use the equation $2x(x - 5) + 3x(x + 3) = 5x(x + 7) - 9$ to show how you would explain the process of solving equations with polynomial expressions to another algebra student.

7-7 Multiplying Polynomials

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the definition next to each term. (*Lessons 7-1 and 7-2*)

order of magnitude ▶

constant ▶

New Vocabulary Fill in each blank with the correct term or phrase.

FOIL method ▶

To multiply two binomials using the FOIL method, find the sum of the products of **F** the _____, **O** the outer terms, **I** the inner terms, and **L** the _____.

quadratic expression ▶

A quadratic expression is an expression in one _____ with a degree of 2.

Lesson 7-7 (continued)

Main Idea

Details

Multiply Binomials

pp. 447–449

Use the FOIL method to find the product

$(x + 8)(x - 5)$.

| | |
|--------------|--|
| First terms: | |
| ↓ | |
| Outer terms: | |
| ↓ | |
| Inner terms: | |
| ↓ | |
| Last terms: | |

The product is _____.

Multiply Polynomials

p. 449

Use the Distributive Property to find the product

$(x + 1)(x^2 + x - 1)$. Show your work.

Helping You Remember

Think of a method for remembering all the product combinations used in the FOIL method for multiplying two binomials. Describe your method using words or a diagram.

7-8 Special Products

What You'll Learn

Scan the text in Lesson 7-8. Write two facts you learned about special products as you scanned the text.

1. _____

2. _____

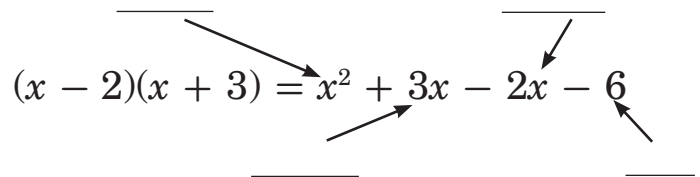
Active Vocabulary

Review Vocabulary Match the term with its definition by drawing a line to connect the two. (*Lessons 7-1, 7-3, 7-4, and 7-7*)

- | | |
|-----------------------------|---|
| <i>monomial</i> | an expression in one variable with a degree of 2 |
| <i>quadratic expression</i> | a monomial or the sum or difference of monomials, each called a <i>term</i> |
| <i>polynomial</i> | a form of a number that is written as $a \times 10^n$, where $1 \leq a < 10$ and n is an integer |
| <i>scientific notation</i> | a number, a variable, or the product of a number and one or more variables with nonnegative integer exponents |

Review Vocabulary Label the diagram with the correct terms. (*Lesson 7-7*)

- first* ▶
- outer* ▶
- inner* ▶
- last* ▶



Lesson 7-8 (continued)

Main Idea

Squares of Sums and Differences
pp. 453–454

Details

Complete the tables to illustrate two special products.

| Square of a Sum | |
|------------------------|--|
| Words | The square of $a + b$ is _____ _____ _____ |
| Symbols | $(a + b)^2 = a^2 + 2ab + b^2$ |
| Example | $(n + 5)^2 = n^2 + 10n + 25$ |

| Square of a Difference | |
|-------------------------------|--|
| Words | The square of $a - b$ is _____ _____ _____ |
| Symbols | $(a - b)^2 = a^2 - 2ab + b^2$ |
| Example | $(h - 7)^2 = h^2 - 14n + 49$ |

Product of a Sum and a Difference
p. 455

Find the product $(p - 2)(p + 2)$. Show your work.

Helping You Remember

Explain how the FOIL method can help you remember how many terms are in the special products studied in this lesson.


 CHAPTER
7

Polynomials

Tie It Together

Fill in the graphic organizer with details from the chapter.

Laws of Exponents/Powers

| Law | Notation | Verbal Description | Example |
|----------------------------|----------|--------------------|---------|
| Product of Powers | | | |
| Power of Powers | | | |
| Power of a Product | | | |
| Quotient of Powers | | | |
| Power of a Quotient | | | |
| Zero Exponent Property | | | |
| Negative Exponent Property | | | |


**CHAPTER
7**

Polynomials

Before the Test

Now that you have read and worked through the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Systems of Linear Equations and Inequalities | After You Read |
|---|----------------|
| <ul style="list-style-type: none"> • To multiply exponents with the same base, find the product of the base and the exponents. | |
| <ul style="list-style-type: none"> • A simplified expression is without fractions, duplicate bases, and powers of powers. | |
| <ul style="list-style-type: none"> • A base with a negative exponent is written with a positive exponent when it is a denominator. | |
| <ul style="list-style-type: none"> • To subtract polynomials, subtract like terms. | |
| <ul style="list-style-type: none"> • To multiply polynomials, use the Commutative Property. | |

Math Online Visit glencoe.com to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 7.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 7 Study Guide and Review in the textbook.
- I took the Chapter 7 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.



Study Tips

- Use flash cards to study for tests by writing the concept on one side of the card and its definition on the other.


 CHAPTER
8

Factoring and Quadratic Equations

Before You Read

Before you read the chapter, think about what you know about factoring and quadratic equations. List three things you already know about them in the first column. Then list three things you would like to learn about them in the second column.

| K What I know... | W What I want to find out... |
|---------------------|---------------------------------|
| | |


FOLDABLES[®] Study Organizer

Construct the Foldable as directed at the beginning of this chapter.



Note Taking Tips

- When you take notes, always write clear and concise notes so they can be easily read when studying for a quiz or exam.
- A visual study guide like the Foldable shown above helps you organize what you know and remember what you have learned.

You can use them to review main ideas or keywords.


 CHAPTER
8

Factoring and Quadratic Equations

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on monomials and factoring, one fact might be that the product of the common prime factors is called their greatest common factor. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|---|------|
| 8-1 Monomials and Factoring | |
| 8-2 Using the Distributive Property | |
| 8-3 Quadratic Equations: $x^2 + bx + c = 0$ | |
| 8-4 Quadratic Equations: $ax^2 + bx + c = 0$ | |
| 8-5 Quadratic Equations: Differences of Squares | |
| 8-6 Quadratic Equations: Perfect Squares | |

8-1 Monomials and Factoring

What You'll Learn

Skim the lesson. Write two things you already know about monomials and factoring.

1. _____

2. _____

Lesson 8-1

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

factored form ► A monomial is in factored form when it is expressed as the _____ of prime numbers and _____, and no variable has an exponent greater than 1.

greatest common factor (GCF) ► Two or more whole numbers may have some _____ prime factors. The greatest common factor (GCF) is the greatest _____ that is a factor of both original numbers.

Vocabulary Link You have likely learned how to find the greatest common factor of two whole numbers before. Describe how finding the greatest common factor of two monomials is similar.

Lesson 8-1 (continued)

Main Idea

Details

Factor Monomials

p. 471

Factor each monomial completely.

- 1. $-8x^3y$ _____
- 2. $15c^2d^2$ _____
- 3. $36kp^4$ _____
- 4. $-9x^2yz^2$ _____
- 5. $-16a^4b$ _____
- 6. $20r^3s^2$ _____

Greatest Common Factor

p. 471

Write each monomial as a product of its prime factors. Circle any common factors to find the GCF.

- $14m^3n^2q =$ _____
- $21m^2nq^3 =$ _____
- GCF: _____

Helping You Remember

How can the two words that make up the term *prime factorization* help you remember what the term means?

8-2 Using the Distributive Property

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the definition next to each term.

factoring ▶

factoring by grouping ▶

Zero Product Property ▶

Lesson 8-2 (continued)

Main Idea

Use the Distributive Property to Factor
pp. 476–477

Details

Complete the following table illustrating when a polynomial can be factored by grouping.

| Factoring by Grouping | |
|-----------------------|---|
| Words | <p>A polynomial can be factored by grouping only if all of the following conditions exist.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> |
| Symbols | |

Solve Equations by Factoring
pp. 478–479

Solve the following equation by factoring.

$$4x^2 + 20x = 0$$

$$(\quad)(\quad) = 0$$

$$\underline{\hspace{2cm}} = 0 \text{ or } \underline{\hspace{2cm}} = 0$$

$$x = \underline{\hspace{2cm}} \text{ or } x = \underline{\hspace{2cm}}$$

Helping You Remember

A good way to remember a mathematical concept is to explain it to somebody else. How would you help a classmate understand when it is possible to use the Zero Product Property to solve an equation? Give an example of an equation that can be solved using the Zero Product Property.

8-3 Quadratic Equations: $x^2 + bx + c = 0$

What You'll Learn

Skim Lesson 8-3. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Match the term with its definition by drawing a line to connect the two. (*Lessons 8-1 and 8-2*)

factored form

a process that involves finding the completely factored form of a polynomial

factoring

the largest number that is a factor of two numbers

greatest common factor (GCF)

a monomial that is expressed as the product of prime numbers and variables, where no variable has an exponent greater than 1

New Vocabulary Write the correct term next to the definition.

_____ ►

a type of equation that can be written in the standard form

$ax^2 + bx + c = 0$, where $a \neq 0$

Lesson 8-3 (continued)

Main Idea

Details

Factor $x^2 + bx + c$
pp. 485–487

Factor $x^2 + 10x + 16$ by making an organized list of the factors of 16.

| Factors of 16 | Sum of factors |
|---------------|----------------|
| | |
| | |
| | |
| | |
| | |

$x^2 + 10x + 16 = (\text{_____})(\text{_____})$

Solve Equations by Factoring
p. 488

Solve the quadratic equation $x^2 - 6x - 40 = 0$ by factoring.

$(\text{_____})(\text{_____}) = 0$

$\text{_____} = 0$ or $\text{_____} = 0$

$x = \text{_____}$ or $x = \text{_____}$

Helping You Remember

If you are using the pattern $(x + m)(x + n)$ to factor a trinomial of the form $x^2 + bx + c$, how can you use your knowledge of multiplying integers to help you remember whether m and n are positive or negative?

8-4 Quadratic Equations: $ax^2 + bx + c = 0$

What You'll Learn

Scan the text in Lesson 8-4. Write two facts you learned about quadratic equations of the form $ax^2 + bx + c = 0$ as you scanned the text.

1. _____

2. _____

Active Vocabulary

prime polynomial ►

New Vocabulary Write the definition next to the term.

Vocabulary Link Recall the definition of a prime number. Describe how this definition relates to the definition of a prime polynomial.

Lesson 8-4 (continued)

Main Idea

Factor

$ax^2 + bx + c = 0$

pp. 493–495

Details

Follow the steps below to factor the polynomial $2x^2 + 9x + 10$.

Step 1 Apply the pattern of factoring by grouping to write the desired form.

$2x^2 + 9x + 10 = 2x^2 + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + 10$

Step 2 Find two numbers that have a product of 2×10 or 20 and a sum of 9.

| | |
|--------------------------|-----------------------|
| Factors of twenty | Sum of factors |
| | |
| | |
| | |

Step 3 Use grouping to find the factors. Check your answer.

$2x^2 + 9x + 10 = (\underline{\hspace{2cm}}) + (\underline{\hspace{2cm}})$

Solve Equations by Factoring

pp. 495–496

Solve each equation. Check your solutions.

1. $2x^2 + 5x - 3 = 0$

2. $3x^2 - 10x - 8 = 0$

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

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

Helping You Remember

A good way to remember a mathematical procedure is to recite the steps of the procedure. What are the steps you would use to find the factors of a trinomial written in the form $ax^2 + bx + c = 0$?

8-5 Quadratic Equations: Differences of Squares

What You'll Learn

Skim the Examples for Lesson 8-5. Predict two things you think you will learn about polynomials and quadratic equations that are differences of squares.

1. _____

2. _____

Active Vocabulary

New Vocabulary Circle each polynomial below that represents a difference of squares.

difference of squares ►

$x^2 - 15$

$4b^2 - 49$

$3x^2 - 81$

$100n^2 - 1$

$16p^2 - 25$

$8r^2 - 12$

$256t^2 - 16$

$25h^2 - 4$

Vocabulary Link Describe how you can use the term *difference of squares* to recognize when a polynomial is of this form.

Lesson 8-5 (continued)

Main Idea

Factor Differences of Squares
pp. 499–500

Details

Model the process of factoring a polynomial that is a difference of squares by completing the following table.

| Difference of Squares | |
|-----------------------|---|
| Symbols | $a^2 - b^2 = (\text{_____}) (\text{_____})$ |
| Examples | $x^2 - 16 = (\text{_____}) (\text{_____})$ |
| | $4y^2 - 1 = (\text{_____}) (\text{_____})$ |
| | $25 - 9g^2 = (\text{_____}) (\text{_____})$ |

Solve Equations by Factoring
p. 501

Solve $4n^2 - 25 = 0$ for n . Show your work.

Helping You Remember

A good way to remember a new mathematical concept is to explain it to a friend. Suppose a classmate is having difficulty remembering how to factor a difference of squares. How would you explain this concept to her?

8-6 Quadratic Equations: Perfect Squares

What You'll Learn

Scan Lesson 8-6. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Lesson 8-6

Active Vocabulary

Review Vocabulary Write the correct term next to each definition. (*Lessons 8-1, 8-2, 8-3, and 8-4*)

- _____ ▶ a monomial that is expressed as the product of prime numbers and variables, and no variable has an exponent greater than 1
- _____ ▶ a process that involves writing a polynomial as the product of its factors
- _____ ▶ a type of equation that can be written in the standard form $ax^2 + bx + c = 0$, where $a \neq 0$
- _____ ▶ a polynomial that cannot be written as a product of two polynomials with integral coefficients

New Vocabulary Fill in the blank with the correct term or phrase.

perfect square trinomials ▶ Perfect square trinomials are trinomials that are the squares of _____.

Lesson 8-6 *(continued)*

Main Idea

Factor Perfect Square Trinomials

pp. 505–507

Details

Model the process of factoring a polynomial that is a perfect square trinomial by completing the table.

| Factoring Perfect Square Trinomials | |
|-------------------------------------|--|
| Symbols | $a^2 + 2ab + b^2 = (\text{_____})^2$ $a^2 - 2ab + b^2 = (\text{_____})^2$ |
| Examples | $x^2 + 8x + 16 = (\text{_____})^2$ $b^2 - 10b + 25 = (\text{_____})^2$ |

Solve Equations with Perfect Squares

pp. 507–509

Use the Square Root Property to solve the equation $(x + 3)^2 = 100$. Check your solutions.

Helping You Remember

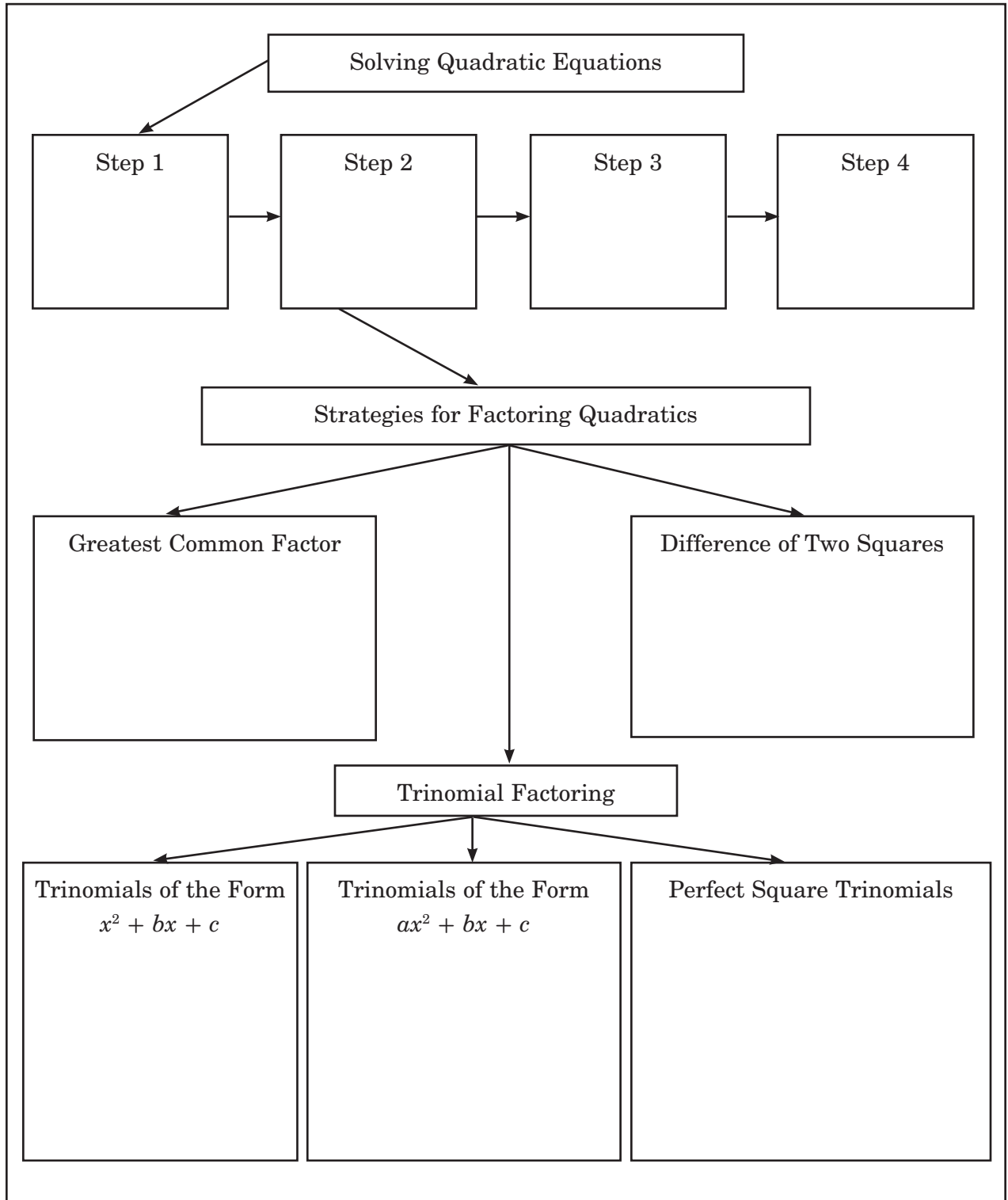
Sometimes it is easier to remember a set of instructions if you can state them in a short sentence or phrase. Summarize the conditions that must be met in order for a trinomial to be factored as a perfect square trinomial.

CHAPTER
8

Factoring and Quadratic Equations

Tie It Together

Fill in the graphic organizer. Use examples from the chapter to add details if space permits.



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 CHAPTER
8

Factoring and Quadratic Equations

Before the Test

Review the ideas you listed in the table at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the table by filling in the third column.

| K What I know... | W What I want to find out... | L What I learned... |
|---------------------|---------------------------------|------------------------|
| | | |

Math Online Visit *glencoe.com* to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 8.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 8 Study Guide and Review in the textbook.
- I took the Chapter 8 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.



Study Tips

- To answer a multiple-choice question, read all of the answer choices first. Cross out any choices that you know are not correct, and look for hints in other parts of the test for clues to the answer. Don't change the answer you decide upon unless you know it is not correct.


 CHAPTER
9

Quadratic and Exponential Functions

Before You Read

Before you read the chapter, respond to these statements.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Before You Read | Quadratic and Exponential Functions |
|-----------------|--|
| | <ul style="list-style-type: none"> • The graph of a quadratic function is a parabola. |
| | <ul style="list-style-type: none"> • When $a < 0$ in a quadratic function, the parabola opens up and has a minimum value. |
| | <ul style="list-style-type: none"> • The graph of $f(-x)$ flips the graph $f(x) = x^2$ across the x-axis. |
| | <ul style="list-style-type: none"> • Factoring, using square roots, graphing, and the quadratic formula are methods to solve quadratic functions. |
| | <ul style="list-style-type: none"> • In an exponential function, the base is a variable and the exponent is a constant. |


FOLDABLES Study Organizer

Construct the Foldable as directed at the beginning of this chapter.


Note Taking Tips

- When you take notes, draw a visual (graph, diagram, picture, chart) that presents the information introduced in the lesson in a concise, easy-to-study format.
- In addition to writing important definitions in your notes, be sure to include your own examples of the concepts presented.

CHAPTER
9

Quadratic and Exponential Functions

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on transformations of quadratic functions, one fact might be that a transformation changes the position or size of a figure. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|--|------|
| 9-1 Graphing Quadratic Functions | |
| 9-2 Solving Quadratic Equations by Graphing | |
| 9-3 Transformations of Quadratic Functions | |
| 9-4 Solving Quadratic Equations by Completing the Square | |
| 9-5 Solving Quadratic Equations by Using the Quadratic Formula | |
| 9-6 Exponential Functions | |
| 9-7 Growth and Decay | |
| 9-8 Geometric Sequences as Exponential Functions | |
| 9-9 Analyzing Functions with Successive Differences and Ratios | |

9-1 Graphing Quadratic Functions

What You'll Learn

Skim Lesson 9-1. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the correct term next to each definition.

- _____ ▶ a function with a graph that is not a straight line
- _____ ▶ a nonlinear function that can be written in the form $f(x) = ax^2 + bx + c$, where $a \neq 0$
- _____ ▶ the form of a quadratic function when it is written as $f(x) = ax^2 + bx + c$
- _____ ▶ the shape of the graph of a quadratic function
- _____ ▶ the central line about which a parabola is symmetric
- _____ ▶ the point of intersection between a parabola and its axis of symmetry
- _____ ▶ the lowest point on a parabola
- _____ ▶ the highest point on a parabola

Lesson 9-1 (continued)

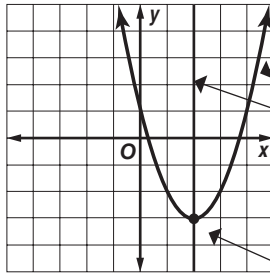
Main Idea

Characteristics of Quadratic Functions

pp. 525–528

Details

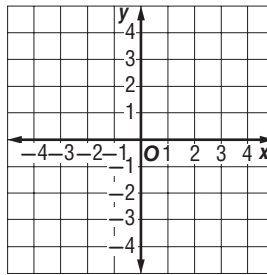
Fill in the boxes with the correct terms.



Graph Quadratic Functions

pp. 528–530

Graph the quadratic function $f(x) = x^2 + 3x + 2$ on the coordinate grid below.



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Helping You Remember

Look up the word *vertex* in a dictionary. You will find that it comes from the Latin word *vertere*, which means to turn. How can you use the idea of “to turn” to remember the vertex of a parabola?

9-2 Solving Quadratic Equations by Graphing

What You'll Learn

Scan Lesson 9-2. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Match each term with its definition by drawing a line to connect the two. (*Lesson 9-1*)

- | | |
|---------------------------|---|
| <i>nonlinear function</i> | the shape of the graph of a quadratic function |
| <i>minimum</i> | the central line about which a parabola is symmetric |
| <i>parabola</i> | a function with a graph that is not a straight line |
| <i>axis of symmetry</i> | the point of intersection between a parabola and its axis of symmetry |
| <i>vertex</i> | the lowest point on a parabola |

New Vocabulary Write the definition next to the term.

- double root* ► _____

Lesson 9-2 (continued)

Main Idea

Details

Solve by Graphing
pp. 537–538

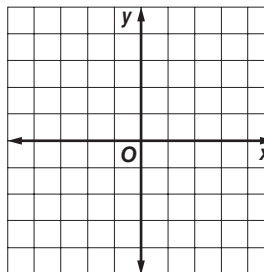
Complete the following table illustrating the number and nature of the solutions of a quadratic equation.

| Solutions of Quadratic Equations | |
|----------------------------------|---------------------------------|
| Number of real solutions | Relationship with the x -axis |
| 0 | |
| 1 | |
| 2 | |

Estimate Solutions
p. 539

Solve the quadratic equation below by graphing. If integral roots cannot be found, estimate the roots to the nearest tenth.

$$x^2 + 3x - 2 = 0$$



$x =$ _____

Helping You Remember

Describe how you can remember that the word *zero* is used when you are talking about functions, but the word *root* is used when you are talking about equations.

9-3 Transformations of Quadratic Functions

What You'll Learn

Skim the lesson. Write two things you already know about transformations of quadratic functions.

1. _____

2. _____

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

dilation ► A dilation makes the graph narrower or wider than the _____.

reflection ► A reflection flips a figure over a _____.

transformation ► A transformation changes the _____ or _____ of a figure.

translation ► A translation moves a figure _____, down, or _____.

Lesson 9-3 (continued)

Main Idea

Details

Translations

p. 544

Describe how the graph of each function is related to the graph of $f(x) = x^2$.

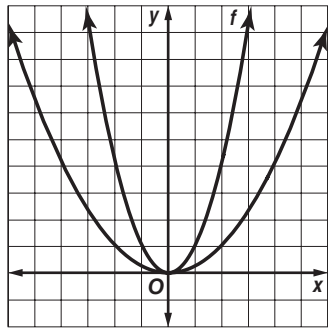
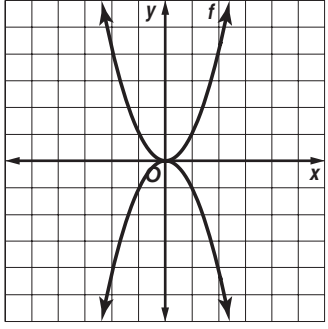
1. $f(x) = x^2 - 6$

2. $f(x) = x^2 + \frac{1}{2}$

Dilations and Reflections

pp. 545–546

Complete the table below by naming and describing each transformation of $f(x)$.

| Dilations and Reflections | |
|--|--|
|  |  |
| Transformation: _____ _____ | Transformation: _____ _____ |

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Helping You Remember

A good way to remember mathematical terms is to relate them to a term you already know. Translations are often called *slides*, and reflections are often called *flips*. Explain how these terms accurately describe the corresponding transformations of parabolas.

9-4 Solving Quadratic Equations by Completing the Square

What You'll Learn

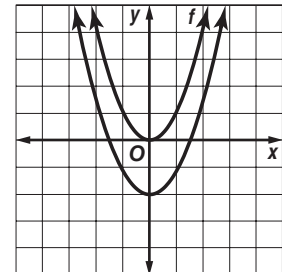
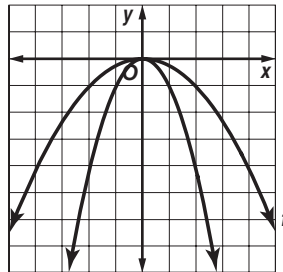
Scan the text in Lesson 9-4. Write two facts you learned about solving quadratic equations by completing the square as you scanned the text.

- _____
- _____

Active Vocabulary

Review Vocabulary Label each diagram with the correct term to describe the transformation. (*Lesson 9-3*)

- dilation* ▶
- translation* ▶



New Vocabulary Fill in the blank with the correct term or phrase.

- completing the square* ▶ Any quadratic expression in the form $x^2 + bx$ can be made into a _____ trinomial by using a method called completing the square.

Lesson 9-4 (continued)

Main Idea

Complete the Square
pp. 552–553

Details

Complete the following table to show the steps that you must follow to complete the square.

| Completing the Square | |
|-----------------------|---|
| Words | To complete the square for any quadratic expression of the form $x^2 + bx$, follow the steps below. Step 1 _____ _____ Step 2 _____ _____ Step 3 _____ |
| Symbols | $x^2 + bx +$ |

Solve Equations by Completing the Square
pp. 553–554

Solve $x^2 + 6x = 27$ by completing the square. Show your work.

Helping You Remember

How is completing the square related to the method you use to determine whether a trinomial is a perfect square trinomial?

9-5 Solving Quadratic Equations by Using the Quadratic Formula

What You'll Learn

Skim the Examples for Lesson 9-5. Predict two things you think you will learn about solving quadratic equations by using the quadratic formula.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the correct term next to each definition. (*Lesson 9-1*)

- _____ ▶ the shape of the graph of a quadratic function
- _____ ▶ the central line about which a parabola is symmetric
- _____ ▶ the highest point on a parabola

New Vocabulary Write the correct term next to each definition.

- _____ ▶ the formula that gives the solutions to the general quadratic equation, $ax^2 + bx + c = 0$, as $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- _____ ▶ the expression under the radical sign in the quadratic formula, $b^2 - 4ac$

Lesson 9-5 (continued)

Main Idea

Details

Quadratic Formula

pp. 558–561

Solve the equation $x^2 + 5x + 3 = 0$ by using the Quadratic Formula. Determine the exact solutions. Show your work.

The Discriminant

p. 561

Complete the following table to show the relationship between the discriminant of a quadratic equation and its solutions and graph.

| The Discriminant | | |
|------------------|--------------------------|--|
| Value | Number of real solutions | Relationship between graph and the x -axis |
| $b^2 - 4ac > 0$ | | |
| $b^2 - 4ac = 0$ | | |
| $b^2 - 4ac < 0$ | | |

Helping You Remember

To help remember the methods for solving a quadratic equation, explain how you would choose the best method for solving a form of the quadratic equation $ax^2 + bx + c = 0$.

9-6 Exponential Functions

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Lesson 9-6

Active Vocabulary

Review Vocabulary Match the term with its definition by drawing a line to connect the two. (*Lessons 9-1, 9-2, and 9-3*)

- | | |
|--------------------|---|
| <i>reflection</i> | the point of intersection between a parabola and its axis of symmetry |
| <i>double root</i> | a transformation that moves a figure up, down, or diagonally |
| <i>translation</i> | two zeroes of a quadratic equation that are the same number |
| <i>vertex</i> | a transformation that flips a figure over a line |

New Vocabulary Write the definition next to the term.

exponential function ► _____

Lesson 9-6 (continued)

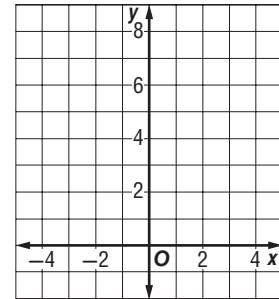
Main Idea

Graph Exponential Functions
pp. 567–569

Details

Complete the following table of function values and use it to help you graph the exponential function $y = 2^x$.

| x | 2^x | y |
|-----|-------|-----|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |



Identify Exponential Behavior
p. 569

Determine whether the set of data shown below displays exponential behavior. Write *yes* or *no*. Explain why or why not.

| | | | | | | |
|-----|-----|----|----|----|---|----|
| x | 0 | 2 | 4 | 6 | 8 | 10 |
| y | 128 | 64 | 32 | 16 | 8 | 4 |

9-7 Growth and Decay

What You'll Learn

Skim the Examples for Lesson 9-7. Predict two things you think you will learn about growth and decay.

1. _____

2. _____

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

compound interest ▶ Compound interest is interest _____ or _____ on both the initial investment and previously _____ interest.

exponential decay ▶ In exponential decay, the original _____ decreases by the same _____ over a period of time.

exponential growth ▶ In exponential growth, the original amount _____ by the same percent over a period of time.

Vocabulary Link Think of some real-world examples that involve exponential growth and decay.

Lesson 9-7 (continued)

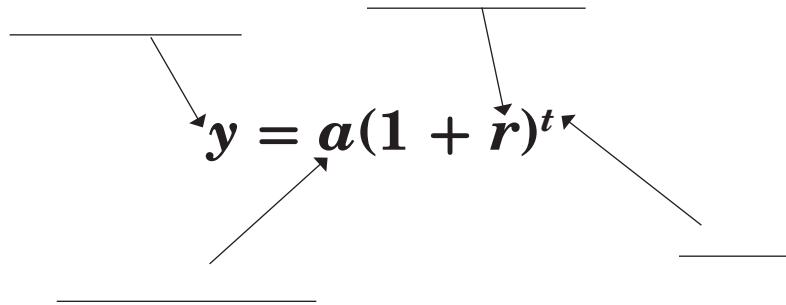
Main Idea

Details

Exponential Growth

pp. 573–574

Label each of the parts of the general equation for exponential growth shown below. Use the terms *initial amount*, *final amount*, *time*, and *growth rate*.



Exponential Decay

p. 574

Suppose a particular species of bird on an island is decreasing at an annual rate of 5.4%. The species originally had a population of 12,600.

- a. Write an equation to represent the decrease in population.

- b. Estimate the number of birds on the island after 4 years.

Helping You Remember

A good way to help you remember a new concept is to explain it in your own words. The general equations for exponential growth and exponential decay are very similar. Explain how you can determine if an equation represents exponential growth or exponential decay.

9-8 Geometric Sequences as Exponential Functions

What You'll Learn

Skim the lesson. Write two things you already know about geometric sequences as exponential functions.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the definition next to each term.

common ratio ▶

geometric sequence ▶

Lesson 9-8 (continued)

Main Idea

Details

Recognize Geometric Sequences

pp. 580–581

Determine whether each sequence is *arithmetic*, *geometric*, or *neither*. Explain.

1. 12, 9, 6, 3, 0, ...

2. 3, -6, 12, -24, 48, ...

Geometric Sequences and Functions

pp. 581–582

What is the 12th term of the geometric sequence 6, 12, 24, 48, ...?

Step 1: Compare consecutive terms to find the common ratio.

$r =$ _____

Step 2: Write an equation to model the sequence.

$a_n =$ _____

Step 3: Evaluate the formula for $n = 12$.

$a_{12} =$ _____

9-9 Analyzing Functions with Successive Differences and Ratios

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the correct term next to each definition. (*Lessons 9-1, 9-3, 9-4, 9-5, 9-6, and 9-8*)

- _____ ▶ a function with a graph that is not a straight line
- _____ ▶ the form of a quadratic function when it is written as $f(x) = ax^2 + bx + c$
- _____ ▶ a transformation that makes a function wider or narrower than the parent function
- _____ ▶ the expression under the radical sign in the quadratic formula, $b^2 - 4ac$
- _____ ▶ a function of the form $y = ab^x$, where $a \neq 0$, $b > 0$, and $b \neq 1$
- _____ ▶ the ratio of two consecutive terms in a geometric sequence

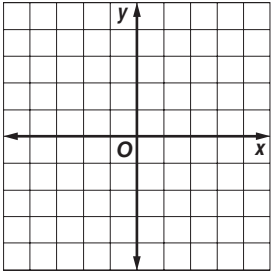
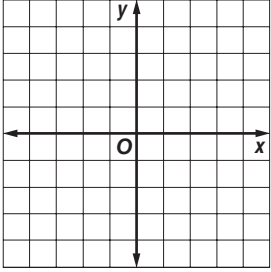
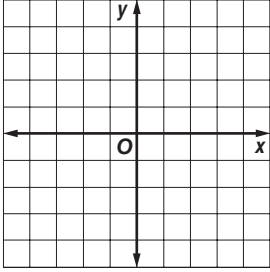
Lesson 9-9 (continued)

Main Idea

Identify Functions
pp. 586–587

Details

Complete the table below by writing the general form of each function and sketching a sample graph.

| Linear, Quadratic, and Exponential Functions | | |
|---|--|---|
| Linear Function | Quadratic Function | Exponential Function |
| $y = mx + b$ | $y = ax^2 + bx + c$ | $y = ab^x$ |
|  |  |  |

Write Equations
pp. 587–588

Determine which model best describes the data in the table. Then write an equation for the function that models the data.

| | | | | | |
|-----|-----|----|----|----|----|
| x | -5 | -4 | -3 | -2 | -1 |
| y | 160 | 80 | 40 | 20 | 10 |

Helping You Remember

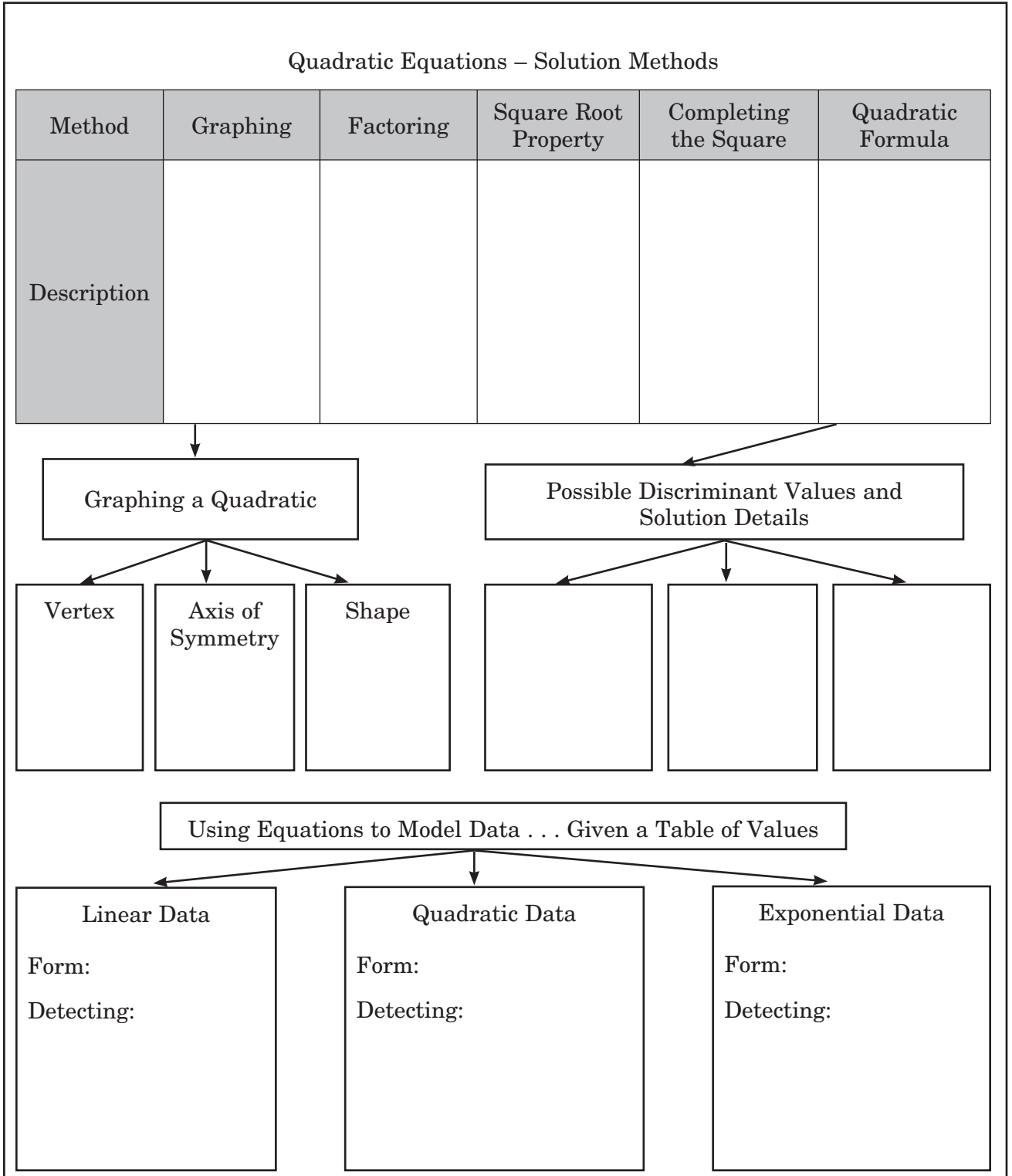
A good way to remember a mathematical concept is to explain it in your own words. Explain how you can determine the type of a function simply by looking at its graph.

CHAPTER
9

Quadratic and Exponential Functions

Tie It Together

Fill in each graphic organizer paying attention to the depicted relationships between the organizers. Add details for each organizer.



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**CHAPTER
9**

Quadratic and Exponential Functions

Before the Test

Now that you have read and worked through the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Quadratic and Exponential Functions | After You Read |
|--|----------------|
| <ul style="list-style-type: none"> • The graph of a quadratic function is a parabola. | |
| <ul style="list-style-type: none"> • When $a < 0$ in a quadratic function, the parabola opens up and has a minimum value. | |
| <ul style="list-style-type: none"> • The graph of $f(-x)$ flips the graph $f(x) = x^2$ across the x-axis. | |
| <ul style="list-style-type: none"> • Factoring, using square roots, graphing, and the quadratic formula are methods to solve quadratic functions. | |
| <ul style="list-style-type: none"> • In an exponential function, the base is a variable and the exponent is a constant. | |

Math Online Visit glencoe.com to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 9.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 9 Study Guide and Review in the textbook.
- I took the Chapter 9 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.



Study Tips

- If possible, rewrite your notes. Not only can you make them clearer and neater, rewriting them will help you remember the information.


**CHAPTER
10**

Radical Functions and Geometry

Before You Read

Before you read the chapter, respond to these statements.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Before You Read | Radical Functions and Geometry |
|-----------------|---|
| | <ul style="list-style-type: none"> • The graph of a square root function includes both positive and negative values. |
| | <ul style="list-style-type: none"> • $\tan A = \frac{\textit{opposite}}{\textit{adjacent}}$ |
| | <ul style="list-style-type: none"> • The product of two conjugates is a rational number. |
| | <ul style="list-style-type: none"> • In a Pythagorean triplet, two or three numbers can be equal. |
| | <ul style="list-style-type: none"> • The midpoint formula is derived from the Pythagorean Theorem. |


FOLDABLES® Study Organizer

Construct the Foldable as directed at the beginning of this chapter.



Note Taking Tips

- **Take notes in such a manner that someone who did not understand the topic will understand after reading what you have written.**
- **When you take notes, write a summary of the lesson, or write in your own words what the lesson was about.**

CHAPTER
10

Radical Functions and Geometry

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on the Pythagorean Theorem, one fact might be that in a right triangle, the side opposite the right angle is the hypotenuse. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|--|------|
| 10-1 Square Root Functions | |
| 10-2 Simplifying Radical Expressions | |
| 10-3 Operations with Radical Expressions | |
| 10-4 Radical Equations | |
| 10-5 The Pythagorean Theorem | |
| 10-6 The Distance and Midpoint Formulas | |
| 10-7 Similar Triangles | |
| 10-8 Trigonometric Ratios | |

10-1 Square Root Functions

What You'll Learn

Skim the lesson. Write two things you already know about square root functions.

1. _____

2. _____

Lesson 10-1

Active Vocabulary

New Vocabulary Match the term with its definition by drawing a line to connect the two.

- | | |
|-----------------------------|--|
| <i>radicand</i> | a function that contains a variable under a radical sign |
| <i>radical function</i> | a function that contains the square root of a variable |
| <i>square root function</i> | the expression under the radical sign |

Vocabulary Link Recall that the square root of a negative number is not defined to be a real number. Explain what effect this has on the domain of a square root function.

Lesson 10-1 (continued)

Main Idea

Details

Dilations of Radical Functions

p. 605

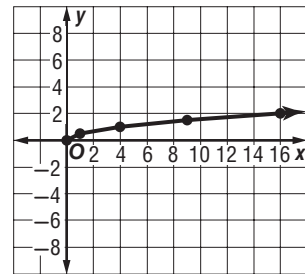
Graph $f(x) = \frac{1}{2} \sqrt{x}$. State the domain and range.

Step 1: Make a table of function values.

Step 2: Plot the points on a coordinate grid.

Step 3: Connect the points with a smooth curve.

| | | | | | |
|--------|---|---|---|---|----|
| x | 0 | 1 | 4 | 9 | 16 |
| $f(x)$ | | | | | |



Reflections and Translations of Radical Functions

pp. 606–607

The velocity of an object dropped from a height of h meters is given by the function $v = \sqrt{2gh}$, where g is the constant, 9.8 meters per second squared. What is the velocity of an object when it hits the ground if it is dropped from a height of 100 meters? Show your work and round your answer to the nearest tenth.

$v \approx$ _____ m/s

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Helping You Remember

Suppose a classmate is having difficulty remembering how to graph a square root function. What advice would you give him about how to select suitable domain values?

10-2 Simplifying Radical Expressions

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the definition next to the term.
(Lesson 10-1)

radicand ► _____

New Vocabulary Fill in each blank with the correct term or phrase.

conjugate ► Binomials of the form $a\sqrt{b} + c\sqrt{d}$ and _____ are called conjugates.

radical expression ► A radical expression contains a _____, such as a square root.

rationalizing the denominator ► Rationalizing the denominator of a fraction with a radical eliminates all _____ from the _____.

Lesson 10-2 (continued)

Main Idea

Product Property of Square Roots

pp. 612–613

Details

Complete the following table to illustrate the Product Property of Square Roots.

| Product Property of Square Roots | |
|----------------------------------|--|
| Words | For any nonnegative real numbers a and b , the square roots of ab is equal _____ _____ _____ |
| Symbols | $\sqrt{ab} =$ _____ |
| Symbols | $\sqrt{16 \cdot 25} =$ _____ |

Quotient Property of Square Roots

pp. 613–614

Simplify the expression $\frac{2}{4 + \sqrt{5}}$. Show your work.

Helping You Remember

What should you remember to check for when you want to determine if a radical expression is in simplest form?

10-3 Operations with Radical Expressions

What You'll Learn

Skim the Examples for Lesson 10-3. Predict two things you think you will learn about operations with radical expressions.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the correct term next to each definition. (*Lessons 10-1 and 10-2*)

- _____ ▶ a function that contains the square root of a variable
- _____ ▶ an expression that contains a radical, such as a square root
- _____ ▶ the expression under the radical sign
- _____ ▶ binomials of the form $a\sqrt{b} + c\sqrt{d}$ and $a\sqrt{b} - c\sqrt{d}$
- _____ ▶ a function that contains a variable under a radical sign
- _____ ▶ a process that eliminates all radicals from the denominator of a fraction

Lesson 10-3 (continued)

Main Idea

Details

Add or Subtract Radical Expressions

pp. 619–620

Simplify each expression in the table illustrating how adding and subtracting radical expressions is similar to adding and subtracting monomials.

| Monomials | Radical Expressions |
|---------------------------------|---|
| $6b + 3b =$ _____ $=$ _____ | $6\sqrt{2} + 3\sqrt{2} =$ _____ $=$ _____ |
| $12m - 5m =$ _____ $=$ _____ | $12\sqrt{3} - 5\sqrt{3} =$ _____ $=$ _____ |

Multiply Radical Expressions

pp. 620–621

Simplify each expression. Show your work.

1. $6\sqrt{5} (2\sqrt{5})$

2. $2\sqrt{3} (6\sqrt{7} - \sqrt{7})$

Helping You Remember

How can you use what you know about adding and subtracting monomials to help you remember how to add and subtract radical expressions?

10-4 Radical Equations

What You'll Learn

Scan Lesson 10-4. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

radical equations ▶ Equations that contain variables in the _____, like $h = 1.34\sqrt{\ell}$, are called radical equations.

extraneous solutions ▶ Squaring each side of an equation sometimes produces a _____ that is not a solution of the original _____. These are called extraneous solutions.

Vocabulary Link Look up the definition of *extraneous* in a dictionary. Describe how this definition applies to the concept of extraneous solutions.

Lesson 10-4 (continued)

Main Idea

Details

Radical Equations

pp. 624–625

Solve the equation $\sqrt{n + 4} + 2 = 5$. Show your work.

Extraneous Solutions

p. 625

Follow the steps below to solve the equation $x = \sqrt{x + 3} - 1$. Check your solutions.

Step 1: Isolate the radical on one side.

Step 2: Square each side to eliminate the radical.

Step 3: Solve. Check for extraneous solutions.

solution(s): _____ extraneous solution(s): _____

Helping You Remember

Acronyms can be a useful tool for remembering the steps in a mathematical process. For example, the acronym FOIL reminds you to multiply the First, Outer, Inner, and Last terms when multiplying two binomials. How can you use the letters ISC to remember the three steps in solving a radical equation?

10-5 The Pythagorean Theorem

What You'll Learn

Skim Lesson 10-5. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the definition next to each term. (Lessons 10-1 and 10-4)

radical function ▶

radical equation ▶

New Vocabulary Match the term with its definition by drawing a line to connect the two.

converse the two shorter sides of a right triangle

hypotenuse the result when the hypothesis and conclusion of an if-then statement are exchanged

legs a group of three whole numbers that satisfy the equation $c^2 = a^2 + b^2$, where c is the greatest number

Pythagorean Triple the side opposite the right angle in a right triangle

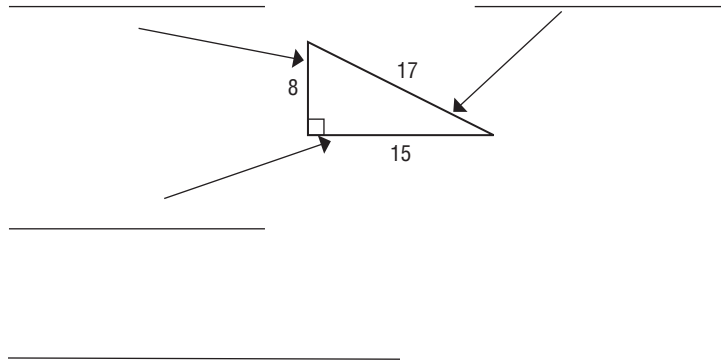
Lesson 10-5 (continued)

Main Idea

Details

The Pythagorean Theorem
pp. 630–631

Label the sides of the right triangle shown using the terms *leg* and *hypotenuse*. Then write an equation to demonstrate the Pythagorean Theorem.



Right Triangles
p. 631

Circle the sets of numbers below that represent Pythagorean triples.

- | | |
|---------------|---------------|
| 1. 5, 12, 13 | 2. 18, 24, 30 |
| 3. 16, 32, 34 | 4. 30, 40, 50 |
| 5. 9, 40, 41 | 6. 8, 12, 20 |

Helping You Remember

Think of a word or phrase that you can associate with the Pythagorean Theorem to help you remember the equation $c^2 = a^2 + b^2$.

10-6 The Distance and Midpoint Formulas

What You'll Learn

Scan the text in Lesson 10-6. Write two facts you learned about the distance and midpoint formulas as you scanned the text.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the definition next to each term.

Distance Formula ▶

midpoint ▶

Midpoint Formula ▶

Vocabulary Link Think of how the word *distance* is used in everyday life. How does this compare to the concept of distance on the coordinate plane?

Lesson 10-6

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Lesson 10-6 (continued)

Main Idea

Details

Distance Formula

pp. 636–637

Complete the following steps to find the distance between points $A(2, 9)$ and $B(-4, 6)$.

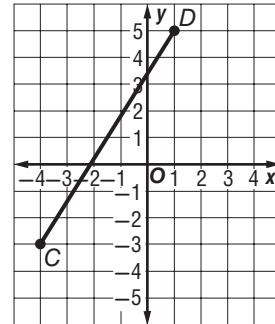
- $d =$ _____ Distance Formula
- $d =$ _____ Substitute $A(2, 9)$, $B(-4, 6)$.
- $d =$ _____ Simplify.
- $d =$ _____ Evaluate squares.
- $d =$ _____ or about _____ Simplify.

Midpoint Formula

p. 638

Find the coordinates of the midpoint of segment CD .

M (_____, _____)



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Helping You Remember

Sometimes it is easier to remember a formula if you can state it in words. How can you state the Distance Formula in easy-to-remember words?

10-7 Similar Triangles

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the correct term next to each definition. (*Lessons 10-2, 10-5, and 10-6*)

- _____ ► a formula that is used to find the distance between two points on the coordinate plane
- _____ ► an expression that contains a radical sign, such as a square root
- _____ ► the side opposite the right angle in a right triangle
- _____ ► the point is equidistant from both endpoints of a line segment

New Vocabulary Fill in each blank with the correct term or phrase.

- similar triangles* ► Similar triangles have the same _____, but not necessarily the same _____.

Lesson 10-7 (continued)

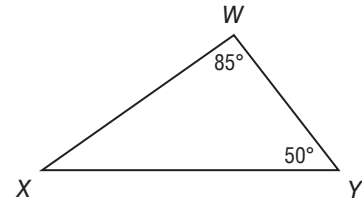
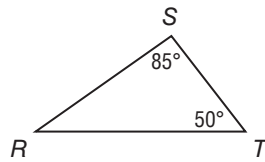
Main Idea

Details

Similar Triangles

pp. 642–643

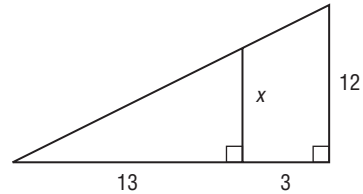
The triangles below are similar. Write a similarity statement and a proportion showing the relationships between the sides.



Find Unknown Measures

pp. 643–644

Solve for x in the figure below.



$x =$ _____

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Helping You Remember

A good way to remember a mathematical procedure is to relate it to another concept. How can you use the idea that the corresponding sides of similar triangles are proportional to help you remember how to find the unknown lengths of the sides of similar triangles?

10-8 Trigonometric Ratios

What You'll Learn

Scan Lesson 10-8. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the correct term next to each definition.

_____ ▶ the ratio of the opposite leg to the hypotenuse of a right triangle

_____ ▶ a function that has a rule given by a trigonometric ratio

_____ ▶ the measure of $\angle A$ if $\sin A$ is known

_____ ▶ the study of triangle measurement

_____ ▶ the measure of $\angle A$ if $\tan A$ is known

_____ ▶ finding all unknown sides and angles of a right triangle

_____ ▶ the ratio of the adjacent leg to the hypotenuse of a right triangle

_____ ▶ the measure of $\angle A$ if $\cos A$ is known

_____ ▶ a ratio of the lengths of two sides of a right triangle

_____ ▶ the ratio of the opposite leg to the adjacent leg of a right triangle

Lesson 10-8 (continued)

Main Idea

Details

Trigonometric Ratios

pp. 649–650

Complete the chart to show the trigonometric ratios for angles R and S .

$\sin R =$ _____

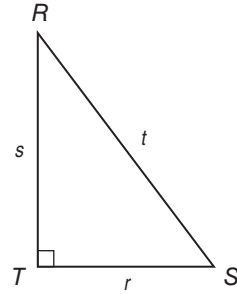
$\sin S =$ _____

$\cos R =$ _____

$\cos S =$ _____

$\tan R =$ _____

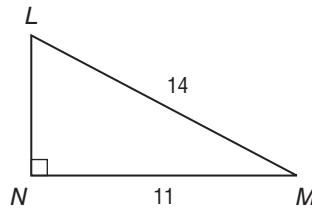
$\tan S =$ _____



Use Trigonometric Ratios

pp. 650–651

Use a calculator to find the measure of $\angle M$ to the nearest tenth.



$m\angle M \approx$ _____

Helping You Remember

How can the *co* in *cosine* help you to remember the relationship between the sines and the cosines of the two acute angles of a right triangle?


**CHAPTER
10**

Radical Functions and Geometry

Before the Test

Now that you have read and worked through the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Radical Functions and Geometry | After You Read |
|---|----------------|
| <ul style="list-style-type: none"> The graph of a square root function includes both positive and negative values. | |
| <ul style="list-style-type: none"> $\tan A = \frac{\text{opposite}}{\text{adjacent}}$ | |
| <ul style="list-style-type: none"> The product of two conjugates is a rational number. | |
| <ul style="list-style-type: none"> In a Pythagorean triplet, two or three numbers can be equal. | |
| <ul style="list-style-type: none"> The midpoint formula is derived from the Pythagorean Theorem. | |

Math Online Visit glencoe.com to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 10.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 10 Study Guide and Review in the textbook.
- I took the Chapter 10 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.



Study Tips

- To prepare to take lecture notes, make a column to the left about 2 inches wide. Use this column to write additional information from your text, place question marks, and to summarize information.


 CHAPTER
11

Rational Functions and Equations

Before You Read

Before you read the chapter, think about what you know about rational functions and equations. List three things you already know about them in the first column. Then list three things you would like to learn about them in the second column.

| K What I know... | W What I want to find out... |
|---------------------|---------------------------------|
| | |


 FOLDABLES® Study Organizer

Construct the Foldable as directed at the beginning of this chapter.


 Note Taking Tips

- **When taking notes, place a question mark next to anything you do not understand.**

Then be sure to ask questions before any quizzes or tests.

- **When you take notes in geometry, be sure to make comparisons among the different formulas and concepts.**

For example, how are pyramids and cones similar? Different? This will help you learn the material.


 CHAPTER
11

Rational Functions and Equations

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on rational functions, one fact might be that a line that the graph of a function approaches is called an asymptote. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|--|------|
| 11-1 Inverse Variation | |
| 11-2 Rational Functions | |
| 11-3 Simplifying Rational Expressions | |
| 11-4 Multiplying and Dividing Rational Expressions | |
| 11-5 Dividing Polynomials | |
| 11-6 Adding and Subtracting Rational Expressions | |
| 11-7 Mixed Expressions and Complex Fractions | |
| 11-8 Rational Equations and Functions | |

11-1 Inverse Variation

What You'll Learn

Skim the Examples for Lesson 11-1. Predict two things you think you will learn about inverse variation.

1. _____

2. _____

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

inverse variation ► A relationship between x and y that can be represented by the equation _____ or _____ is an inverse variation.

product rule ► The equation _____ is called the product rule for inverse variations.

Vocabulary Link Look up the word *inverse* in a dictionary. Explain how the definition applies to an inverse variation equation.

Lesson 11-1 (continued)

Main Idea

Details

Identify and Use Inverse Variations

pp. 670–672

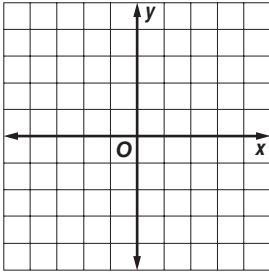
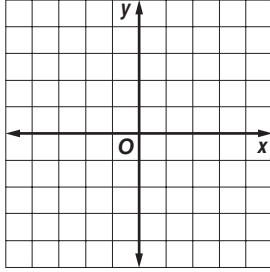
Determine whether the data in the table represent an *inverse* or a *direct* variation. Explain.

| | | | | |
|----------|----|----|----|----|
| <i>x</i> | 4 | 8 | 12 | 16 |
| <i>y</i> | 36 | 18 | 12 | 9 |

Graph Inverse Variations

pp. 672–673

Sketch a sample direct and inverse variation on the coordinate grids below, and complete the table.

| Direct Variation | Inverse Variation |
|--|--|
|  |  |
| $y =$ _____ | $y =$ _____ |
| y varies _____ as x . | y varies _____ as x . |
| The ratio _____ is constant. | The product _____ is constant. |

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Helping You Remember

A good way to help you remember mathematical concepts is to state them in your own words. To remember how to set up a proportion to solve a problem involving inverse variation, write a sentence describing the form the proportion should have.

11-2 Rational Functions

What You'll Learn

Skim the lesson. Write two things you already know about rational functions.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the definition next to each term.

asymptote ▶

excluded value ▶

rational function ▶

Vocabulary Link Explain why the term *rational* is used to describe a rational function.

Lesson 11-2 *(continued)*

Main Idea

Identify Excluded Values

pp. 678–679

State the excluded value for each function.

1. $y = \frac{7}{x + 6}$

2. $y = \frac{-5}{4x - 20}$

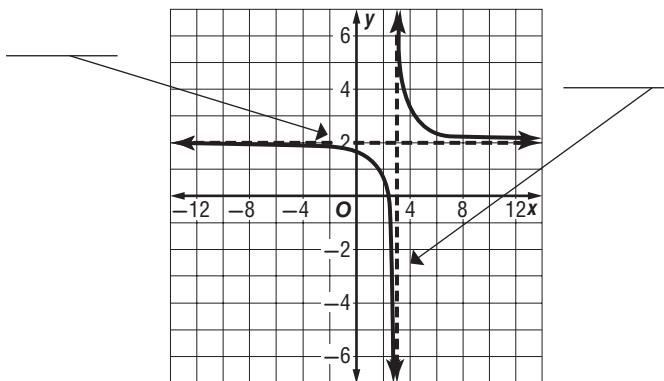
3. $y = \frac{4}{3x + 21}$

4. $y = \frac{-1}{-2x - 8}$

Identify and Use Asymptotes

pp. 679–680

The rational function $y = \frac{1}{x - 3} + 2$ is graphed below. Identify the asymptotes.



Helping You Remember

A good way to remember a mathematical concept is to explain it to someone else. Suppose a classmate is having difficulty finding the excluded values of a rational function. How would you explain the process?

11-3 Simplifying Rational Expressions

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Match the term with its definition by drawing a line to connect the two. (*Lessons 11-1 and 11-2*)

- | | |
|--------------------------|---|
| <i>rational function</i> | a line that the graph of a rational function approaches, but never crosses or touches |
| <i>asymptote</i> | a relationship between x and y that can be represented by the equation $y = \frac{k}{x}$ or $xy = k$ |
| <i>inverse variation</i> | a value that results in zero in the denominator of a rational function |
| <i>excluded value</i> | a function that can be described by the equation $y = \frac{p}{q}$, where p and q are polynomials and $q \neq 0$ |

New Vocabulary Write the correct term next to the definition.

- _____ ► an algebraic fraction whose numerator and denominator are polynomials, such as $\frac{2x - 1}{x^2 + 5x + 9}$

Lesson 11-3 (continued)

| Main Idea | Details |
|-----------|---------|
|-----------|---------|

Identify Excluded Values

pp. 684–685

Follow the steps below to find the excluded values for the rational expression $\frac{-12}{b^2 - 49}$.

Step 1: Set the denominator equal to zero.

Step 2: Factor the expression.

Step 3: Solve for the excluded values.

Simplify Expressions

pp. 685–687

Simplify the expression $\frac{x^2 + 3x - 18}{x - 3}$. State the excluded value(s).

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Helping You Remember

Mathematical concepts are often built on ideas that you learned in previous classes. Explain how you can use what you know about simplifying fractions for rational numbers to remember how to simplify rational expressions.

11-4 Multiplying and Dividing Rational Expressions

What You'll Learn

Scan the text in Lesson 11-4. Write two facts you learned about multiplying and dividing rational expressions as you scanned the text.

1. _____

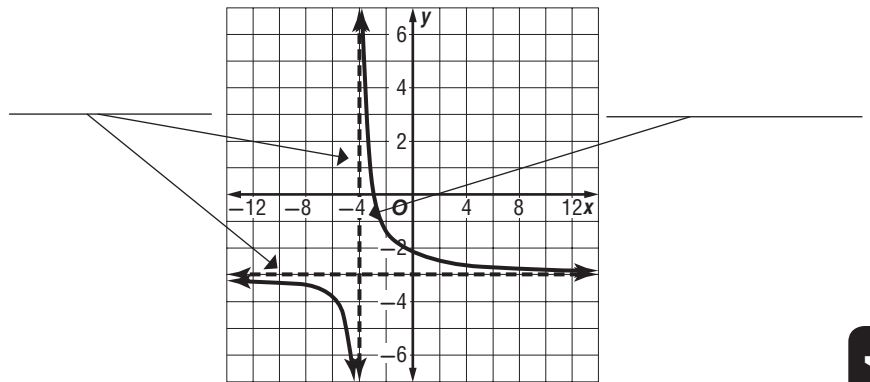
2. _____

Active Vocabulary

Review Vocabulary Label the diagram with the correct terms. (Lesson 11-2)

asymptotes ▶

rational function ▶



Review Vocabulary Write the definition next to the term. (Lesson 11-1)

product rule (for inverse variations) ▶

Lesson 11-4 (continued)

Main Idea

Details

Multiply Rational Expressions

pp. 692–693

Follow the steps below to simplify $\frac{1}{n^2 - 25} \cdot \frac{n^2 + 7n + 10}{n + 2}$.

Step 1: Factor the numerators and denominators.



Step 2: Cross out common factors.



Step 3: Simplify the expression.

Divide Rational Expressions

pp. 693–694

Find the quotient $\frac{6x - 12}{x^2} \div (x - 2)$.

Helping You Remember

Suppose a friend was absent when the class was studying how to multiply rational expressions. Tell how you can explain to your friend the procedure for multiply rational expressions.

11-5 Dividing Polynomials

What You'll Learn

Skim Lesson 11-5. Predict two things that you expect to learn based on the headings and figures in the lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the definition next to each term.
(Lessons 11-1, 11-2, and 11-3)

asymptote ▶

excluded value ▶

rational expression ▶

inverse variation ▶

Lesson 11-5 *(continued)*

Main Idea

Divide Polynomials by Monomials
p. 700

Details

Find each quotient. Show your work.

1. $(5x^2 - 10x) \div 5x$

2. $(2n^2 - 9n + 4) \div 2n$

3. $(12m^2 + 9m) \div -3m$

4. $(4y^2 + 18y - 6) \div 6y$

Divide Polynomials by Binomials
pp. 701–702

Find $(h^2 + 6h - 40) \div (h - 4)$ by using long division. Show your work.

Helping You Remember

There are several methods you can use to divide polynomials by binomials. If you want to remember one method that you can always use to divide a polynomial by a binomial, which method should you select? Explain.

11-6 Adding and Subtracting Rational Expressions

What You'll Learn

Scan Lesson 11-6. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

Review Vocabulary Write the correct term next to each definition. (*Lessons 1-1, 11-2, and 11-3*)

_____ ▶ an algebraic fraction whose numerator and denominator are polynomials

_____ ▶ a value that results in zero and the denominator of a rational

_____ ▶ the quantities being multiplied in an expression involving multiplication

_____ ▶ the result of a multiplication expression

New Vocabulary Fill in each blank with the correct term or phrase.

least common denominator (LCD) ▶ To add or subtract fractions with unlike _____, you need to rename _____ using the least common multiple of the denominators, called the least common denominator (LCD).

least common multiple (LCM) ▶ The least common multiple (LCM) is the least _____ that is a _____ of two or more numbers or polynomials.

Lesson 11-6 (continued)

Main Idea

Add and Subtract Rational Expressions with Like Denominators

pp. 706–707

Details

Find each sum.

1. $\frac{3k}{k-2} + \frac{4}{k-2}$

2. $\frac{4n}{2n+5} + \frac{3n}{2n+5}$

Add and Subtract Rational Expressions with Unlike Denominators

pp. 707–710

Complete the table below to illustrate the steps involved in subtracting rational expressions with unlike denominators.

| Add or Subtract Rational Expressions with Unlike Denominators | |
|---|--|
| Step 1 | |
| Step 2 | |
| Step 3 | |
| Step 4 | |

Helping You Remember

How can you use what you know about addition and subtraction of rational numbers that have like denominators to remember how to add and subtract rational expressions that have like denominators?

11-7 Mixed Expressions and Complex Fractions

What You'll Learn

Scan the text in Lesson 11-7. Write two facts you learned about mixed expressions and complex fractions as you scanned the text.

1. _____

2. _____

Active Vocabulary

New Vocabulary Label the expressions with the correct terms. Write *mixed expression* or *complex fraction* in each blank.

complex fraction ▶

$$5 - \frac{2}{x-1}$$

mixed expression ▶

$$2 + \frac{3}{x} - \frac{2}{x^2}$$

$$\frac{x-1}{2 - \frac{5}{x+2}}$$

$$\frac{\frac{2x^2y}{5xy^3}}{\frac{3x^5y^3}{4xy}}$$

Lesson 11-7 (continued)

Main Idea

Details

Simplify Mixed Expressions

p. 714

Write $4 + \frac{5}{x + 3}$ as a rational expression. Show your work.

Simplify Complex Fractions

pp. 714–716

Follow the steps below to simplify $\frac{\frac{c^2d^3}{b^4}}{\frac{c^4d^2}{b^3}}$.

Step 1: Write the complex fraction as a division expression.

Step 2: Multiply by the reciprocal.

Step 3: Divide out common factors and simplify.

Helping You Remember

Describe an easy way to recognize a mixed expression.

11-8 Rational Equations

What You'll Learn

Skim the Examples for Lesson 11-8. Predict two things you think you will learn about rational equations.

1. _____

2. _____

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

extraneous solution ▶ When a solution of a rational equation results in _____ in the _____, that solution must be excluded. Such solutions are called extraneous solutions.

rational equation ▶ A rational equation contains one or more rational _____.

rate problem ▶ Rational equations can be used to solve rate problems, such as problems involving _____.

work problem ▶ You can use _____ to solve work problems, or problems involving work rates.

Lesson 11-8 (continued)

Main Idea

Details

Solve Rational Equations

pp. 720–722

Solve the rational equation $\frac{4}{x-3} = \frac{6}{x-2}$. Check the solution.

Use Rational Equations to Solve Problems

pp. 722–723

Raymond can mow a lawn in 45 minutes using a push mower. Alex can mow the same lawn in 20 minutes using a riding mower. How long would it take them to mow the lawn working together?

Step 1: Find the portion of the job each person does in 1 minute.

Raymond:

Alex:

Step 2: Write a rational equation.

Step 3: Solve for t . Round to the nearest tenth of a minute.

Helping You Remember

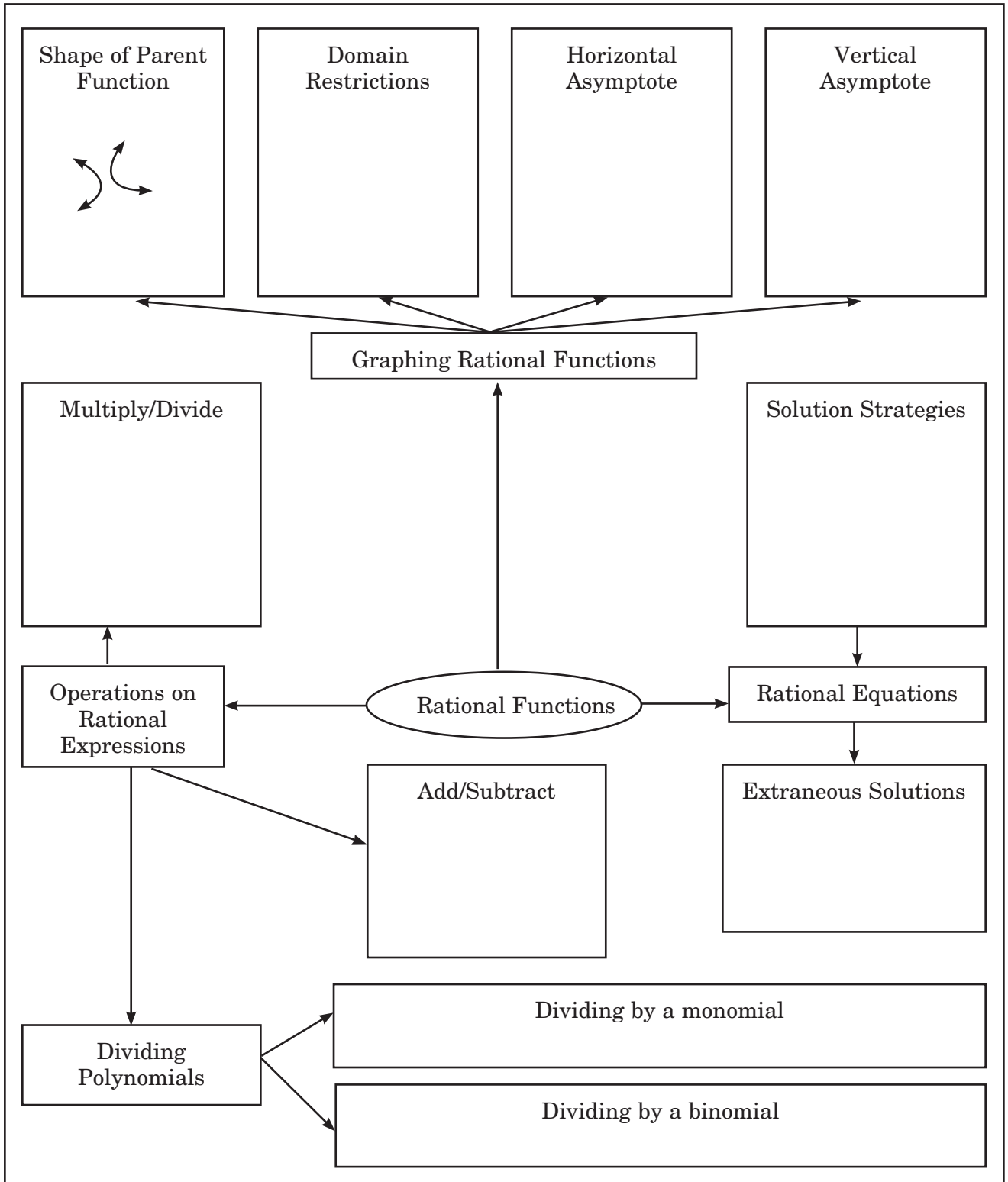
A good way to remember an approach to a mathematical concept is to associate a word with it. Think of a word that can help you remember that multiplying by the LCD is one method you can use to solve a rational equation.

CHAPTER
11

Rational Functions and Equations

Tie It Together

Fill in the graphic organizer. Add details if space permits.



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CHAPTER
11

Rational Functions and Equations

Before the Test

Review the ideas you listed in the table at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the table by filling in the third column.

| K What I know... | W What I want to find out... | L What I learned... |
|---------------------|---------------------------------|------------------------|
| | | |

Math Online Visit *glencoe.com* to access your textbook, more examples, self-check quizzes, personal tutors, and practice tests to help you study for concepts in Chapter 11.

Are You Ready for the Chapter Test?

Use this checklist to help you study.

- I used my Foldable to complete the review of all or most lessons.
- I completed the Chapter 11 Study Guide and Review in the textbook.
- I took the Chapter 11 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.

 **Study Tips**

- Complete reading assignments before class. Write down or circle any questions you may have about what was in the text.


 CHAPTER
12

Statistics and Probability

Before You Read

Before you read the chapter, respond to these statements.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Before You Read | Statistics and Probability |
|-----------------|---|
| | <ul style="list-style-type: none"> • Unbiased surveys are random. |
| | <ul style="list-style-type: none"> • The sum of the probabilities for all values of x is 1. |
| | <ul style="list-style-type: none"> • A graph that shows a cluster of data about the mean is an average distribution. |
| | <ul style="list-style-type: none"> • Theoretical probability is the frequency of an outcome to the total number of events or trials. |
| | <ul style="list-style-type: none"> • In a permutation, order matters; but in a combination, order does not matter. |


 FOLDABLES® Study Organizer

Construct the Foldable as directed at the beginning of this chapter.


 Note Taking Tips

- **When you take notes, it is often a good idea to use symbols to emphasize important concepts.**
- **When taking notes, make annotations.**

Annotations are usually notes taken in the margins of books you own to organize the text for review or study.

CHAPTER
12

Statistics and Probability

Key Points

Scan the pages in the chapter and write at least one specific fact concerning each lesson. For example, in the lesson on statistics and parameters, one fact might be that a parameter is a measure that describes a characteristic of a population. After completing the chapter, you can use this table to review for your chapter test.

| Lesson | Fact |
|-------------------------------------|------|
| 12-1 Designing a Survey | |
| 12-2 Analyzing Survey Results | |
| 12-3 Statistics and Parameters | |
| 12-4 Permutations and Combinations | |
| 12-5 Probability of Compound Events | |
| 12-6 Probability Distributions | |
| 12-7 Probability Simulations | |

12-1 Designing a Survey

What You'll Learn

Scan Lesson 12-1. List two headings you would use to make an outline of this lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the correct term next to each definition.

- _____ ▶ a sample that favors one group over another
- _____ ▶ a method of data collection in which a process is implemented and responses are studied
- _____ ▶ a method of data collection in which a sample is observed for certain patterns or behaviors
- _____ ▶ the entire group about which conclusions are to be drawn
- _____ ▶ a portion of a larger group
- _____ ▶ a sample that is equally likely to be chosen as any other sample from the population
- _____ ▶ a method of data collection in which responses are gathered from a sample of the population

Vocabulary Link *Bias* is a word that is used in everyday English. Find the definition of *bias* using a dictionary. Write how the definition of *bias* can help you remember the mathematical definition of *biased sample*.

Lesson 12-1

Lesson 12-1 *(continued)*

Main Idea

Details

Design a Survey

pp. 740–741

A supermarket manager is interested in finding out whether or not shoppers would like an exotic foods section. He distributes 500 questionnaires to people shopping in the store.

- a. Identify the sample, and determine the population from which it was selected.

- b. Classify the type of data collection used by the store manager.

Sampling Techniques

p. 742

Describe each random sampling technique shown in the table using your own words.

| Random Samples | |
|--------------------------|------------|
| Type | Definition |
| simple random sample | |
| stratified random sample | |
| systematic random sample | |

Helping You Remember

To remember what a stratified random sample is, look up the word *stratified* in a dictionary. What everyday meaning do you find that seems closest to the mathematical meaning presented in this lesson?

12-2 Analyzing Survey Results

What You'll Learn

Scan the text in Lesson 12-2. Write two facts you learned about analyzing survey results as you scanned the text.

1. _____

2. _____

Active Vocabulary

measure of central tendency ►

New Vocabulary Fill in each blank with the correct term or phrase.

Data from a survey can be summarized according to three measures of central tendency: the _____, the _____, and the _____.

Vocabulary Link Explain the meaning of central tendency in your own words. Describe how the mean, median, and mode can each be used to describe the central tendency of a data set.

Lesson 12-2 (continued)

Main Idea

Details

Summarize Survey Results

p. 746

Find each measure of central tendency for the data set below. Show your work.

{8, 12, 9, 17, 13, 11, 12, 10, 7}

| Measures of Central Tendency | |
|------------------------------|--|
| mean | |
| median | |
| mode | |

Evaluate Survey Results

pp. 747–749

A recreation commission wants to determine the most popular weekend activities. One Saturday, every 10th person at a local park is surveyed about their favorite weekend activities, and a conclusion is drawn. Evaluate the validity of the survey and conclusion.

Question: What is your favorite weekend activity?

Conclusion: Spending time at the park is the most popular weekend activity.

Helping You Remember

A good way to remember new mathematical concepts is to be able to describe them and their applications in your own words. Describe when the mean, median, or mode might be the best choice for a measure of central tendency.

12-3 Statistics and Parameters

What You'll Learn

Scan the text under the *Now* heading. List two things you will learn about in the lesson.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the correct term next to each definition.

- _____ ▶ the average of the absolute values of the differences between the mean and each value in the data set
- _____ ▶ the range, quartiles, and interquartile range
- _____ ▶ a measure that describes a characteristic of the population
- _____ ▶ data that can be given as a numerical value
- _____ ▶ data that cannot be given as a numerical value
- _____ ▶ a measure that describes a characteristic of the sample
- _____ ▶ using the statistics of a sample to draw conclusions about the entire population
- _____ ▶ a value that shows how the data deviates from the mean of the set of data
- _____ ▶ the square of the standard deviation

Lesson 12-3 *(continued)*

Main Idea

Details

Statistics and Parameters

p. 756

A random sample of 500 pet owners in the United States is surveyed about the number of times they visit the veterinarian each year. The mean number of visits is calculated. Identify the sample and the population. Then describe the sample statistic and the population parameter.

Sample: _____

Population: _____

Statistic: _____

Parameter: _____

Statistical Analysis

pp. 757–758

Follow the steps below to find the standard deviation of the data set {5, 7, 8, 10, 5}.

Step 1: Find the mean of the data set.



Step 2: Find the variance of the data.



Step 3: Take the square root of the variance.

Helping You Remember

A good way to remember a mathematical concept is to explain it to somebody else. Suppose a classmate is having difficulty distinguishing between quantitative and qualitative data. Explain the difference to him and give an example of each.

12-4 Permutations and Combinations

What You'll Learn

Scan Lesson 12-4. Predict two things that you expect to learn based on the headings and the Key Concept box.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the definition next to each term.

combination ▶

factorial ▶

permutation ▶

sample space ▶

Vocabulary Link *Permutation* is a word that is used in everyday English. Find the definition of *permutation* using a dictionary. Write how the definition of *permutation* can help you remember the mathematical definition of a *permutation*.

Lesson 12-4 (continued)

Main Idea

Details

Permutations

pp. 764–765

Tina has 4 chores to do today. Complete the following table to determine the number of different ways Tina can do her chores if she does one at a time.

| Number of Permutations | Choices for 1st chore | Choices for 2nd chore | Choices for 3rd chore | Choices for 4th chore |
|---------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <i>P</i> | | | | |
| Fundamental Counting Principle | | | | |
| <i>P</i> = | | | | |

There are _____ different ways Tina can do her chores if she does one at a time.

Combinations

pp. 765–767

There are 10 players on a basketball team. How many different 5-player starting lineups are possible? Show your work.

Helping You Remember

To help you remember how the terms *permutation* and *combination* are different, think of everyday words that start with the letters P and C that illustrate the meaning of each term. Explain how the words illustrate the two terms.

12-5 Probability of Compound Events

What You'll Learn

Skim the lesson. Write two things you already know about probability of compound events.

1. _____

2. _____

Active Vocabulary

New Vocabulary Match the term with its definition by drawing a line to connect the two.

- | | |
|----------------------------------|---|
| <i>compound event</i> | events in which the outcome of one event does not affect the outcome of the other event |
| <i>conditional probability</i> | an event that is made up of two or more simple events |
| <i>dependent events</i> | events that cannot occur at the same time |
| <i>independent events</i> | events in which the outcome of one event affects the outcome of the other event |
| <i>mutually exclusive events</i> | the probability that an event will occur, given that another event has already occurred |

Vocabulary Link Think of the meaning of the word *dependent*. Explain how this makes sense in the context of dependent events.

Lesson 12-5 *(continued)*

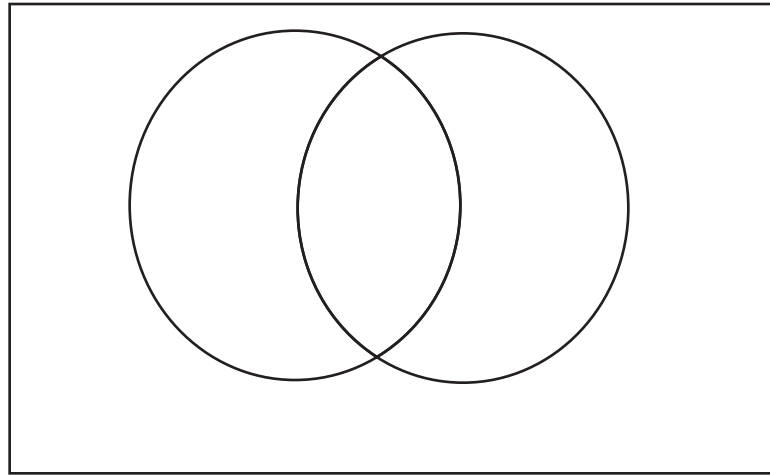
Main Idea

Independent and Dependent Events

pp. 771–772

Details

Model the probability of two independent events by sketching a Venn diagram in the box below.



Mutually Exclusive Events

pp. 773–774

A number cube labeled 1 through 6 is rolled. Find each probability.

1. $P(1 \text{ or } 4)$

2. $P(\text{even number})$

Helping You Remember

Look up the following terms in a dictionary.

Write the definitions that best relate to the way these terms are used in probability.

Independent

Dependent

Exclusive

Inclusive

12-6 Probability Distributions

What You'll Learn

Skim the Examples for Lesson 12-6. Predict two things you think you will learn about probability distributions.

1. _____

2. _____

Active Vocabulary

New Vocabulary Fill in each blank with the correct term or phrase.

discrete random variable ► A discrete random variable is a random variable with a _____ number of possibilities.

expected value ► Expected value is the sum of all possible values for a random variable, each value multiplied by its _____.

probability distribution ► A probability distribution is the probability of every possible value of the _____.

probability histogram ► A probability histogram is a histogram that displays a probability _____.

random variable ► A random variable is a variable with a value that is the _____ of a random event.

Lesson 12-6 (continued)

Main Idea

Details

Random Variables and Probability

p. 779

The table shows the grade distribution on a final exam. Find the probability that a randomly chosen student earned a B.

| Grade | Number of students |
|-------|--------------------|
| A | 6 |
| B | 12 |
| C | 9 |
| D | 1 |

Probability Distributions

p. 780

Complete the following table to show the probability distribution for the number of heads when three coins are tossed.

| Probability Distribution | |
|--------------------------|-------------|
| Number of Heads | Probability |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

Helping You Remember

Sometimes remembering a simple example is a good way for you to remember a more complicated mathematical concept. Show how you can use the outcomes of tossing a coin to describe how the probabilities of the possible outcomes add up to 1.

12-7 Probability Simulations

What You'll Learn

Scan the text in Lesson 12-7. Write two facts you learned about probability simulations as you scanned the text.

1. _____

2. _____

Active Vocabulary

New Vocabulary Write the definition next to each term.

experimental probability ▶

relative frequency ▶

simulation ▶

theoretical probability ▶

Lesson 12-7 *(continued)*

Main Idea

Details

Theoretical and Experimental Probability
p. 787

Claire correctly answered 17 questions out of 20 on a multiple choice test. What is the experimental probability that she answers a question correctly? Express your answer as a percent.

Performing Simulations
pp. 788–789

A field goal kicker on a football team typically makes 2 out of 3 field goal attempts. Describe how to simulate a field goal attempt. Perform the simulation and predict the number of field goals the kicker will make in his next 20 attempts.

| Roll | Number |
|------|--------|
| | |
| | |

Helping You Remember

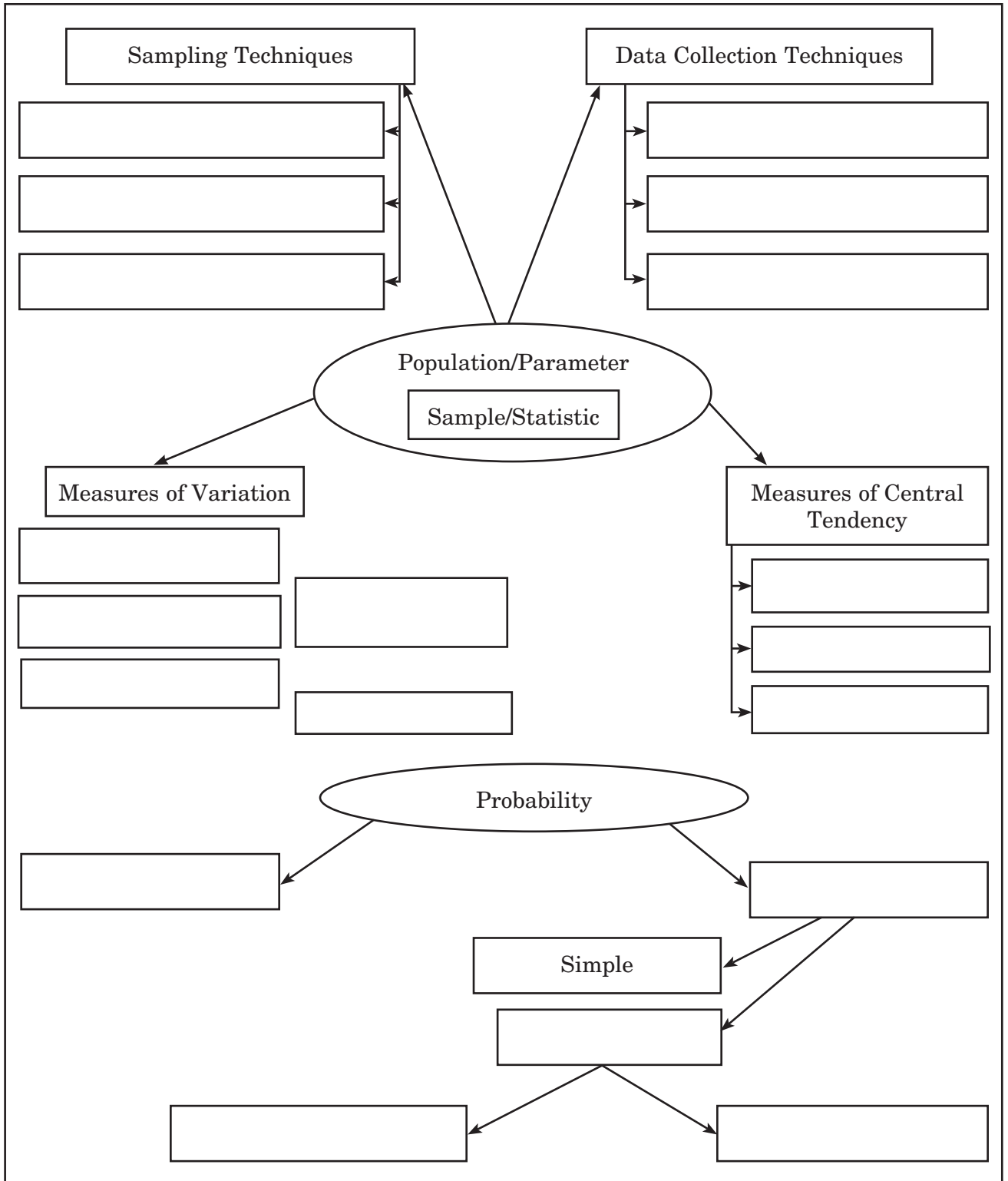
Mathematical concepts are easier to remember if you can explain them in your own words. How would you describe the difference between theoretical probability and experimental probability?

CHAPTER
12

Probability and Statistics

Tie It Together

Fill in each graphic organizer with a term from the chapter.



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**CHAPTER
12**

Probability and Statistics

Before the Test

Now that you have read and worked through the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

| Statistics and Probability | After You Read |
|---|----------------|
| <ul style="list-style-type: none"> • Unbiased surveys are random. | |
| <ul style="list-style-type: none"> • The sum of the probabilities for all values of x is 1. | |
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- I took the Chapter 12 Practice Test in the textbook.
- I used the online resources for additional review options.
- I reviewed my homework assignments and made corrections to incorrect problems.
- I reviewed all vocabulary from the chapter and their definitions.



Study Tips

- Be an active listener in class. Take notes, circle or highlight information that your teacher stresses, and ask questions when ideas are unclear to you.

