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USING THE KNOW-IT NOTEBOOK™

This Know-It Notebook will help you take notes, organize your thinking, and study for quizzes and tests. There are Know-It Notes™ pages for every lesson in your textbook. These notes will help you identify important mathematical information that you will need later.

Know-It Notes

Vocabulary
One good note-taking practice is to keep a list of the new vocabulary.

- Use the page references or the glossary in your textbook to find each definition and a clarifying example.
- Write each definition and example on the lines provided.

Lesson Objectives
Another good note-taking practice is to know the objective the content covers.

Additional Examples
Your textbook includes examples for each math concept taught. Additional examples in the Know-It Notebook help you take notes to remember how to solve different types of problems.

- Take notes as your teacher discusses each example.
- Write notes in the blank boxes to help you remember key concepts.
- Write final answers in the shaded boxes.

Check It Out
Complete the Check It Out problems that follow each lesson. Use these to make sure you understand the math concepts covered in the lesson.

- Write each answer in the space provided.
- Check your answers with your teacher or another student.
- Ask your teacher to help you understand any problem that you answered incorrectly.
Key Concepts
Key concepts from each lesson are included. These are indicated in your student book with the KIN logo.

- Write each answer in the space provided.
- Check your answers with your book.
- Ask your teacher to help you with any concept that you don’t understand.

Chapter Review
Complete Chapter Review problems that follow each lesson. This is a good review before you take the chapter test.

- Write each answer in the space provided.
- Check your answers with your teacher or another student.
- Ask your teacher to help you understand any problem that you answered incorrectly.

Big Ideas
The Big Ideas have you summarize the important chapter concepts in your own words. Putting ideas in your own words requires that you think about the ideas and understand them. This will also help you remember them.

- Write each answer in the space provided.
- Check your answers with your teacher or another student.
- Ask your teacher to help you understand any question that you answered incorrectly.

1-1 Variables and Expressions
Evaluate each expression for $n = 3$ and $x = 4$.

2. $3n + 2x$ 2 3 2 5

3. $x^2 - y^2$ 4 9 16

4. $\frac{y}{x}$ 2.5 0.5

1-2 Adding and Subtracting Real Numbers
Add or subtract.

5. $5 + 2$ 7

6. $3 - 1$ 2

7. $10 - 3$ 7

8. $-3 + 1$ 2

9. $-5 - (-4)$ 1

10. $-2 + 5$ 3

11. There are 100 peaches in a household garden this month and 80 next month. How many more peaches are in the household garden in the second month than the first month?

12. Chapter Review

1. $a + b$ 5

2. $c + d$ 5

3. $e + f$ 5

4. $g + h$ 5

5. $a - b$ 9

6. $c - d$ 5

7. $e - f$ 5

8. $g - h$ 5

1-3 Multiplying and Dividing Real Numbers
Multiply or divide.

9. $3 \times 2$ 6

10. $4 \div 2$ 2

11. $5 \times 3$ 15

12. $6 \div 3$ 2

13. $7 \times 4$ 28

14. $8 \div 4$ 2

For more review of Chapter 1:
- Complete the Ready to Go On quizzes on pages 3 and 61 of your textbook.
- Complete the Chapter 1 Study Guide and Review on pages 62–65 of your textbook.
NOTE TAKING STRATEGIES

Taking good notes is very important in many of your classes and will be even more important when you take college classes. This Notebook was designed to help you get started. Here are some other steps that can help you take good notes.

**Getting Ready**
1. Use a loose-leaf notebook. You can add pages to this as where and when you want to. It will help keep you organized.

**During the Lecture**
2. If you are taking notes during a lecture, write the big ideas. Use abbreviations to save time. Do not worry about spelling or writing every word. Use headings to show changes in the topics discussed. Use numbering or bullets to organize supporting ideas under each topic heading. Leave space before each new heading so that you can fill in more information later.

**After the Lecture**
3. As soon as possible after the lecture, read through your notes and add any information you can so that when you review your notes later, they make sense. You should also summarize the information into key words or key phrases. This will help your comprehension and will help you process the information. These key words and key phrases will be your memory cues when you are reviewing or taking a test. At this time you may also want to write questions to help clarify the meaning of the ideas and facts.
4. Read your notes out loud. As you do this, state the ideas in your own words and do as much as you can by memory. This will help you remember and will also help with your thinking process. It helps you think about and understand the information.
5. Reflect upon the information you have learned. Ask yourself how new information relates to information you already know. Ask how this relates to your personal experience. Ask how you can apply this information and why it is important.
Before the Test

6. Review your notes. Don’t wait until the night before the test to do this review. Do frequent reviews. Don’t just read through your notes. Put the information in your notes into your own words. If you do this you will be able to connect the new material with material you already know. You will be better prepared for tests. You will have less test anxiety and will have better recall.

7. Summarize your notes. This should be in your own words and should only include the main points that you need to remember. This will help you internalize the information.
This table contains important vocabulary terms from Chapter 1. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>absolute value</td>
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<tr>
<td>additive inverse</td>
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<td>like terms</td>
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<td></td>
</tr>
<tr>
<td>Term</td>
<td>Page</td>
<td>Definition</td>
<td>Clarifying Example</td>
</tr>
<tr>
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<td>reciprocal</td>
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<td>whole numbers</td>
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<tr>
<td>x-coordinate</td>
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</tr>
<tr>
<td>y-coordinate</td>
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</tbody>
</table>
Lesson Objectives
Translate between words and algebra; Evaluate algebraic expressions.

Vocabulary
variable (p. 6)
constant (p. 6)
numerical expression (p. 6)
algebraic expression (p. 6)
evaluate (p. 7)

Key Concepts
Think and Discuss (p. 8)
Get Organized Next to each operation, write a word phrase in the left box and its corresponding algebraic expression in the right box.
Lesson Objectives
Add real numbers; Subtract real numbers

Vocabulary
absolute value (p. 14) ______________________________________________
________________________________________________________________
opposites (p. 15) __________________________________________________
________________________________________________________________
additive inverse (p. 15) _____________________________________________
________________________________________________________________

Key Concepts
Adding Real Numbers (p. 15):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding Numbers with the Same Sign</td>
<td></td>
</tr>
<tr>
<td>Adding Numbers with Different Signs</td>
<td></td>
</tr>
</tbody>
</table>

Subtracting Real Numbers (p. 15):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
</table>
Think and Discuss (p. 17)

Get Organized  For each pair of points, tell whether the sum and the difference of the first point and the second point are positive or negative.

<table>
<thead>
<tr>
<th>POINTS</th>
<th>SUM</th>
<th>DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B, A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C, B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D, A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson Objectives

Multiply real numbers; Divide real numbers

Vocabulary

reciprocal (p. 21) __________________________________________________

multiplicative inverse (p. 21) _________________________________________

Key Concepts

Multiplying and Dividing Signed Numbers (p. 21):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplying and Dividing Numbers with the Same Sign</td>
<td></td>
</tr>
<tr>
<td>Multiplying and Dividing Number with Different Signs</td>
<td></td>
</tr>
</tbody>
</table>

Properties of Zero (p. 21):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplication by Zero</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero Divided by a Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division by Zero</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Think and Discuss (p. 22)

Get Organized  In each blank, write “pos” or “neg” to indicate positive or negative.

Multiplying and Dividing Numbers

<table>
<thead>
<tr>
<th>MULTIPLICATION</th>
<th>DIVISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>pos × = pos</td>
<td>pos ÷  = pos</td>
</tr>
<tr>
<td>pos × = neg</td>
<td>pos ÷  = neg</td>
</tr>
<tr>
<td>neg × = neg</td>
<td>neg ÷  = neg</td>
</tr>
<tr>
<td>neg × = pos</td>
<td>neg ÷  = pos</td>
</tr>
</tbody>
</table>
Lesson Objectives
Evalute expressions containing exponents

Vocabulary
power (p. 26) _____________________________________________________

________________________________________________________________

base (p. 26) ______________________________________________________

________________________________________________________________

exponent (p. 26) __________________________________________________

________________________________________________________________

Key Concepts
Think and Discuss (p. 28)
Get Organized In each box, give an example and tell whether the expression is positive or negative.

<table>
<thead>
<tr>
<th>Positive Base</th>
<th>Odd Exponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Even Exponent</td>
<td></td>
</tr>
<tr>
<td>Negative Base</td>
<td></td>
</tr>
</tbody>
</table>
Lesson Objectives
Evaluate expressions containing square roots; Classify numbers within the real number system

Vocabulary

square root (p. 32)

perfect square (p. 32)

real numbers (p. 34)

natural numbers (p. 34)

whole numbers (p. 34)

integers (p. 34)

rational numbers (p. 34)

terminating decimal (p. 34)

repeating decimal (p. 34)

irrational numbers (p. 34)
Key Concepts

Real Numbers (p. 34):

Think and Discuss (p. 35)

Get Organized Use the flowchart to classify each of the given numbers. Write each number in the box with the most specific classification that applies. $4, \sqrt{25}, 0, \frac{1}{3}, -15, -2.25, \frac{1}{4}, \sqrt{21}, 2^4, (-1)^2$
Lesson Objectives
Use the order of operations to simplify expressions

Vocabulary
order of operations (p. 40)
Key Concepts

Order of Operation (p. 40):

<table>
<thead>
<tr>
<th>Order of Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>First:</td>
</tr>
<tr>
<td>Second:</td>
</tr>
<tr>
<td>Third:</td>
</tr>
<tr>
<td>Fourth:</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 42)

Get Organized  In each box, show how grouping symbols can be placed so that the expression is equal to the number shown.

\[
20 - 3 + 2 \cdot 5
\]

95  27  -5
Lesson Objectives
Use the Commutative, Associative, and Distributive Properties to simplify expressions; Combine like terms

Vocabulary

term (p. 47) ______________________________________________________

like terms (p. 47) ________________________________________________

coefficient (p. 48) ________________________________________________
Key Concepts

Properties of Addition and Multiplication (p. 46):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commutative Property</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associative Property</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Distributive Property (p. 47):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
</table>

Think and Discuss (p. 49)

Get Organized  In each box, give an example to illustrate the given property.
Lesson Objectives
Graph ordered pairs in the coordinate plane; Graph functions from ordered pairs

Vocabulary
coordinate plane (p. 54)
axes (p. 54)
origin (p. 54)
x-axis (p. 54)
y-axis (p. 54)
ordered pair (p. 54)
x-coordinate (p. 54)
y-coordinate (p. 54)
quadrant (p. 54)
input (p. 55)
output (p. 55)
**Key Concepts**

**Think and Discuss (p. 56)**

**Get Organized** In each blank, write “positive” or “negative.”

<table>
<thead>
<tr>
<th>Quadrant II</th>
<th>Quadrant I</th>
</tr>
</thead>
<tbody>
<tr>
<td>x is</td>
<td>x is</td>
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<tr>
<td>y is</td>
<td>y is</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quadrant III</th>
<th>Quadrant IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>x is</td>
<td>x is</td>
</tr>
<tr>
<td>y is</td>
<td>y is</td>
</tr>
</tbody>
</table>

The Coordinate Plane
1-1 Variables and Expressions

Evaluate each expression for $a = 3$, $b = 4$, and $c = 8$.

1. $a + b$
2. $ac$
3. $c - b$
4. $c ÷ b$

5. Amy runs 3 miles each day.
   a. Write an expression for the number of miles Amy runs in $d$ days.
   b. Find the number of miles Amy runs in 5, 10, and 32 days.

1-2 Adding and Subtracting Real Numbers

Add or subtract.

6. $-15.3 - 61.4$
7. $\frac{4}{9} - \frac{1}{3}$
8. $72 + (-38)$
9. $6.4 - 9.8$

10. Sue had $78.25. She spent $25.65. How much does she have left?

1-3 Multiplying and Dividing Real Numbers

Multiply or divide.

11. $-2.3(10)$
12. $2 ÷ \frac{1}{3}$
13. $64 ÷ (-8)$
14. $4(12)$

15. There were 183 people at a basketball game. Each ticket cost $8. How much money was spent on the tickets for the basketball game?
1-4 Powers and Exponents

Write each number as a power of the given base.

16. 16; base \(-2\)  
17. 1024; base 4  
18. 625; base 5  
19. \(-27\); base \(-3\)  
20. A certain species started with two and doubled every day. How many species were there after 8 days?

1-5 Square Roots and Real Numbers

Compare. Write <, >, or =.

21. \(\sqrt{121}\) \(\square\) 10  
22. 11 \(\square\) \(\sqrt{144}\)  
23. 9 \(\square\) \(\sqrt{100}\)  
24. 6 \(\square\) \(\sqrt{36}\)  
25. Brian’s square pool has an area of 124 ft\(^2\). Estimate the side length of his pool.

1-6 Order of Operations

Evaluate each expression for the given value of \(x\).

26. \(-x + 5(4)\) for \(x = 6\)  
27. \(x^2(9 + 2)\) for \(x = 3\)  
28. \(4x \div 2(7) - 1\) for \(x = 14\)  
29. \(5(-x^2 - 8)\) for \(x = 2\)  
30. A basketball player’s total points can be found by using the expression  
\(1f + 2j + 3t\). Diana made 85 foul shots \((f)\), 106 jump shots \((j)\), and 39 three pointers \((t)\) last season. How many points did she score?
1-7 Simplifying Expressions

Simplify each expression by combining like terms.

31. \(8x - 2 + 4x\)  
32. \(-12p + 15p\)  
33. \(6(5 - y) + 5y\)  
34. \(a - 5(2a + a^2)\)

Write each product using the Distributive Property. Then simplify.

35. \(5(47)\)  
36. \(12(104)\)  
37. \(11(97)\)  
38. \(7(83)\)

1-8 Introduction to Functions

Generate ordered pairs for each function using the given values for \(x\).

39. \(y = -3x^2 - 2; x = -1, 0, 2\)  
40. \(y = 8 - 2x; x = -1, 0, 1\)

41. The initial cost of renting a car is $50 plus 0.25 per mile at Rent-A-Car. Write a rule for the cost of renting a car from Rent-A-Car. Write ordered pairs for the cost of renting a car and driving 50, 100, and 150 miles.
Answer these questions to summarize the important concepts from Chapter 1 in your own words.

1. Explain how adding numbers with the same sign is different from adding numbers with different signs.

2. Explain the relationship between square roots and perfect squares.

3. Explain why \( \pi \) is an irrational number.

4. Explain how to graph the point \((-5, 7)\).

5. How are natural numbers and whole numbers alike and different?

For more review of Chapter 1:

- Complete the Chapter 1 Study Guide and Review on pages 62–65 of your textbook.
- Complete the Ready to Go On quizzes on pages 39 and 61 of your textbook.
The table contains important vocabulary terms from Chapter 2. As you work through the chapter, fill in the page number, definition, and a clarifying example.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>commission</td>
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<td>contradiction</td>
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</tr>
<tr>
<td>principle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>proportion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ratio</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sales tax</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>scale drawing (model)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>scale factor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>similar</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson Objectives
Solve one-step equations in one variable by using addition or subtraction

Vocabulary
equation (p. 77) ___________________________________________________

solution of an equation (p. 77) _______________________________________

Key Concepts
Properties of Equality (p. 79):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition Property of Equality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtraction Property of Equality</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 79)

Get Organized In each box, write an example of an equation that can be solved by using the given property, and solve it.
Lesson Objectives
Solve one-step equations in one variable by using multiplication or division

Key Concepts
Property of Equality (p. 86):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition Property of Equality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtraction Property of Equality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiplication Property of Equality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division Property of Equality</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Think and Discuss (p. 87)

Get Organized In each box, write an example of an equation that can be solved by using the given property, and solve it.
Lesson Objectives
Solve equations in one variable that contain more than one operation

Key Concepts

Think and Discuss (p. 95)

Get Organized  In each box, write and solve a multi-step equation. Use addition, subtraction, multiplication, and division at least one time each.

<table>
<thead>
<tr>
<th>Solving Multi-Step Equations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Lesson Objectives
Solve equations in one variable that contain variable terms on both sides.

Vocabulary
identity (p. 101):

contradiction (p. 101):

Key Concepts
Identities and Contradictions (p. 101):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contradiction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 103)

Get Organized In each box, write an equation that has the indicated number of solutions.

An equation with variables on both sides can have...
Lesson Objectives
Solve a formula for a given variable; Solve an equation in two or more variables for one of the variables

Vocabulary
formula (p. 107):

literal equation (p. 108):

Key Concepts
Solving for a Variable (p. 107):

<table>
<thead>
<tr>
<th>Solving for a Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Step 2</td>
</tr>
<tr>
<td>Step 3</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 109)

Get Organized  Write a formula that is used in each subject. Then solve the formula for each of its variables.

<table>
<thead>
<tr>
<th>Common Formulas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject</strong></td>
</tr>
<tr>
<td>Geometry</td>
</tr>
<tr>
<td>Physical science</td>
</tr>
<tr>
<td>Earth science</td>
</tr>
</tbody>
</table>
Lesson Objectives
Write and use ratios, rates, and unit rates; Write and solve proportions

Vocabulary
ratio (p. 114):
rate (p. 114):
scale (p. 116):
unit rate (p. 114):
conversion factor (p. 115):
proportion (p. 114):
cross products (p. 115):
scale drawing (p. 116):
scale model (p. 116):
Key Concepts
Cross Products property (p. 115):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>In a proportion, cross products are equal.</td>
<td>$\frac{2}{3} \times \frac{4}{6}$</td>
<td>$\frac{a}{b} \times \frac{c}{d}$ and $b \neq 0$ and $d \neq 0$, then $ad = bc$.</td>
</tr>
<tr>
<td>$2 \cdot 6 = 3 \cdot 4$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 117)

Get Organized In each box, write an example of each use of ratios.

Proportion: Use of Ratios Scale:

Rate:

Conversion factor:

Unit rate:
Lesson Objectives

Use proportions to solve problems involving geometric figures; Use proportions and similar figures to measure objects indirectly.

Vocabulary

similar (p. 121):

corresponding sides (p. 121):

corresponding angles (p. 121):

indirect measurement (p. 122):

scale factor (p. 123):

Key Concepts

Think and Discuss (p. 123)

Get organized In the top box, sketch and label two similar triangles. Then list the corresponding sides and angles in the bottom boxes.
Lesson Objectives
Solve problems involving percents

Vocabulary
percent (p. 127):
Key Concepts

Some Common Equivalents (p. 127):

<table>
<thead>
<tr>
<th>Percent</th>
<th>10%</th>
<th>20%</th>
<th>25%</th>
<th>33(\frac{1}{3})%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>66(\frac{2}{3})%</th>
<th>75%</th>
<th>80%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraction</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{5})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{3})</td>
<td>(\frac{2}{5})</td>
<td>(\frac{1}{2})</td>
<td>(\frac{3}{5})</td>
<td>(\frac{2}{3})</td>
<td>(\frac{3}{4})</td>
<td>(\frac{4}{5})</td>
<td>1</td>
</tr>
<tr>
<td>Decimal</td>
<td>0.1</td>
<td>0.2</td>
<td>0.25</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
<td>0.75</td>
<td>0.8</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 129)

Get organized In each box, write and solve an example using the given method.

Solving Percent Problems

- **Find the part:**
  - Equation:
  - Proportion:

- **Find the whole:**
  - Equation:
  - Proportion:

- **Find the percent:**
  - Equation:
  - Proportion:
Lesson Objectives
Use common applications of percents; Estimate with percents

Vocabulary
commission (p. 133): _______________________________________________
________________________________________________________________
interest (p. 133): __________________________________________________
________________________________________________________________
sales tax (p. 134): _________________________________________________
________________________________________________________________
principal (p. 133): _________________________________________________
________________________________________________________________
tip (p. 134): _______________________________________________________
________________________________________________________________

Key Concepts

Think and Discuss (p. 135)
Get organized In each box, write an example of each type of application and find the answer.
Lesson Objectives
Find percent increase and decrease

Vocabulary
percent change (p. 138):

percent increase (p. 138):

percent decrease (p. 138):

discount (p. 139):

markup (p. 139):

Key Concepts
Percent Change (p. 138):

<table>
<thead>
<tr>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent change = ( \frac{\text{amount of increase or decrease}}{\text{original amount}} ), expressed as a percent</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 140)
Get Organized In each box, write and solve an example of the given type of problem.

<table>
<thead>
<tr>
<th>Percent Increase</th>
<th>Percent Decrease</th>
<th>Discount</th>
<th>Markup</th>
</tr>
</thead>
</table>
2-1 Solving Equations by Adding or Subtracting

Solve each equation.

1. \( a + 45 = 36 \)  
   \( a = 36 - 45 \)  
   \( a = -9 \)  

2. \( 5 - b = 0.65 \)  
   \( b = 5 - 0.65 \)  
   \( b = 4.35 \)  

3. \( c - \frac{1}{2} = \frac{5}{4} \)  
   \( c = \frac{5}{4} + \frac{1}{2} \)  
   \( c = \frac{5}{4} + \frac{2}{4} \)  
   \( c = \frac{7}{4} \)  

4. \( -4.1 + d = -9.8 \)  
   \( d = -9.8 + 4.1 \)  
   \( d = -5.7 \)  

5. Gary had $231. After he bought a video game, he had $186. Write and solve an equation to find the amount of money Gary spent on the video game.
   \[ \text{Initial amount} - \text{Cost of video game} = \text{Remaining amount} \]
   \[ 231 - \text{Cost} = 186 \]
   \[ \text{Cost} = 231 - 186 \]
   \[ \text{Cost} = 45 \]

2-2 Solving Equations by Multiplying or Dividing

Solve each equation.

6. \( 5a = 25 \)  
   \( a = \frac{25}{5} \)  
   \( a = 5 \)  

7. \( 0.25b = -0.75 \)  
   \( b = \frac{-0.75}{0.25} \)  
   \( b = -3 \)  

8. \( -\frac{1}{3}c = -\frac{2}{3} \)  
   \( c = \frac{-2}{-\frac{1}{3}} \)  
   \( c = 6 \)  

9. \( -16 = 64d \)  
   \( d = \frac{-16}{64} \)  
   \( d = -0.25 \)  

10. Marty earns $13.25 per hour. He earned $530 last week. Write and solve an equation to find the number of hours Marty worked last week.
    \[ \text{Pay per hour} \times \text{Number of hours} = \text{Total pay} \]
    \[ 13.25 \times \text{Number of hours} = 530 \]
    \[ \text{Number of hours} = \frac{530}{13.25} \]
    \[ \text{Number of hours} = 40 \]

2-3 Solving Two-Step and Multi-Step Equations

Solve each equation. Check your answer.

11. \( -2a + 8 = 14 \)  
    \[ -2a = 14 - 8 \]  
    \[ -2a = 6 \]  
    \[ a = \frac{6}{-2} \]  
    \[ a = -3 \]  

12. \( 8.5b - 6 = 53.5 \)  
    \[ 8.5b = 53.5 + 6 \]  
    \[ 8.5b = 60 \]  
    \[ b = \frac{60}{8.5} \]  
    \[ b = 7.0588 \]  

13. \( 9 - \frac{1}{4}c = \frac{3}{8} \)  
    \[ -\frac{1}{4}c = \frac{3}{8} - 9 \]  
    \[ -\frac{1}{4}c = -\frac{69}{8} \]  
    \[ c = \frac{-69}{-\frac{1}{4}} \]  
    \[ c = 276 \]  

14. \( 5d + 24 = -36 \)  
    \[ 5d = -36 - 24 \]  
    \[ 5d = -60 \]  
    \[ d = \frac{-60}{5} \]  
    \[ d = -12 \]  

15. A car can be rented for $45 plus $0.14 per mile. Tammy paid $63.90. Write and solve an equation to show how many miles Tammy drove.
    \[ \text{Base cost} + \text{Cost per mile} \times \text{Number of miles} = \text{Total cost} \]
    \[ 45 + 0.14 \times \text{Number of miles} = 63.90 \]
    \[ 0.14 \times \text{Number of miles} = 18.90 \]
    \[ \text{Number of miles} = \frac{18.90}{0.14} \]
    \[ \text{Number of miles} = 135 \]
2-4 Solving Equations with Variables on Both Sides

Solve each equation. Check your answer.

16. \( a + 15 = -4a \)  
17. \( 0.45b = 2.25b - 9 \)  
18. \( \frac{3}{5}c - \frac{1}{5} = \frac{1}{10}c \)  
19. \( -2d - 14 = -4 + d \)

2-5 Solving for a Variable

20. Solve \( p = 4 - m \) for \( m \).
21. Solve \( ab = 8 - c \) for \( a \).
22. Solve \( mn - 3 = s \) for \( n \).
23. Solve \( \frac{d - 5}{f} = g \) for \( f \).

24. The formula for the perimeter of a rectangle is \( P = 2l + 2w \), where \( l \) is the length and \( w \) is the width. Solve for \( w \).

2-6 Rates, Ratios, and Proportions

Solve each proportion.

25. \( \frac{6}{d} = \frac{2}{16} \)
26. \( \frac{t}{5} = \frac{25}{20} \)
27. \( \frac{0.5}{1.5} = \frac{2.5}{m - 0.5} \)

28. A hummingbird’s heart beats 1263 beats per minute. What is a hummingbird’s rate in beats per second?

2-7 Applications of Proportions

29. Every dimension of a cube with length 4 inches is multiplied by 1.5 to get a similar cube. How is the ratio of the volumes related to the ratio of the corresponding dimensions?
30. A firefighter who is 6.5 feet tall casts a shadow 4 feet long. At the same time, a building cast a shadow 54 feet. Write and solve a proportion to find the height of the building.

2-8 Percents

Evaluate each expression for the given value of \( x \).

31. Find 45% of 360.
32. What percent of 240 is 78?
33. 5 is what percent of 80?
34. 208% of what number is 312?
35. What percent of 72 is 5.4?
36. Find 8.5% of 240.

37. A certain glass of orange juice contains 12% of the recommended daily allowance of vitamin C. The recommended daily allowance is 60 mg. How many milligrams of vitamin C are in the glass of orange juice?

2-9 Applications of Percents

38. A car salesman earns a 3.5% commission on each car he sells. Find the commission earned when a car is sold for $25,500.

39. Find the amount of simple interest earned after 5 years on $1450 invested at a 1.5% annual interest rate.

40. Estimate the tip on a $38.90 check using a tip rate of 15%.

41. Find the total amount owed after 18 months on a loan of $84,500 at an annual interest rate of 6.5%.

42. Estimate the tax on a $108 calculator when the sales tax is 4.35%.

43. Find the number of years it would take for $1500 to earn simple interest of $945 at an annual rate of 2.25%.

44. The simple interest paid on a loan after 9 months was $702. The annual interest rate was 6%. Find the principal.
2-10 Percent Increase and Decrease

Find each percent change. Tell whether it is a percent increase or decrease.

45. from 50 to 86
46. from 125 to 75
47. from 24 to 6
48. from 14 to 70

49. Sallie purchased a travel bag that had a 30% markup. The wholesale cost was $25. What was the selling price?

50. Steve uses a coupon and paid $52.50 for a watch that normally costs $75.00. What is the percent discount?
Answer these questions to summarize the important concepts from Chapter 2 in your own words.

1. Explain how the four properties of equality help you solve equations.

2. Explain the difference between an identity and a contradiction.

3. What are the steps for solving for a variable?

4. Explain how you can solve a proportion for a missing value.

5. Explain how to find a percent change.

For more review of Chapter 2:

• Complete the Chapter 2 Study Guide and Review on pages 152–155 of your textbook.

• Complete the Ready to Go On quizzes on pages 113 and 147 of your textbook.
The table contains important vocabulary terms from Chapter 3. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>compound inequality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inequality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>intersection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Page</td>
<td>Definition</td>
<td>Clarifying Example</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------</td>
<td>------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>solution of an inequality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Union</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson Objectives
Identify solutions of inequalities in one variable; Write and graph inequalities in one variable

Vocabulary

inequality (p. 168)

solution of an inequality (p. 168):

Key Concepts
Graphing Inequalities (p. 169):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>ALGEBRA</th>
<th>GRAPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>All real numbers less than 5</td>
<td></td>
<td><img src="image1" alt="Graph" /></td>
</tr>
<tr>
<td>All real numbers greater than −1</td>
<td></td>
<td><img src="image2" alt="Graph" /></td>
</tr>
<tr>
<td>All real numbers less than or equal to $\frac{1}{2}$</td>
<td></td>
<td><img src="image3" alt="Graph" /></td>
</tr>
<tr>
<td>All real numbers greater than or equal to 0</td>
<td></td>
<td><img src="image4" alt="Graph" /></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 170)

Get Organized  Draw a graph in the first row and write the correct inequality in the second row.

<table>
<thead>
<tr>
<th>Inequality</th>
<th>Graph</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image5" alt="Graph" /></td>
</tr>
</tbody>
</table>
Lesson Objectives
Solve one-step inequalities by using addition; Solve one-step inequalities by using subtraction

Key Concepts
Properties of Inequality (p. 174):

<table>
<thead>
<tr>
<th>Words</th>
<th>Numbers</th>
<th>Algebra</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Addition</strong>&lt;br&gt;You can add the same number to both sides of an inequality, and the statement will still be true.</td>
<td>3 &lt; 8&lt;br&gt;3 + 2 &lt; 8 + 2&lt;br&gt;5 &lt; 10</td>
<td>a &lt; b&lt;br&gt;a + c &lt; b + c</td>
</tr>
<tr>
<td><strong>Subtraction</strong>&lt;br&gt;You can subtract the same number from both sides of an inequality, and the statement will still be true.</td>
<td>9 &lt; 12&lt;br&gt;9 - 5 &lt; 12 - 5&lt;br&gt;4 &lt; 7</td>
<td>a &lt; b&lt;br&gt;a - c &lt; b - c</td>
</tr>
</tbody>
</table>

These properties are also true for inequalities that use the symbols >, ≥, and ≤.

Get Organized  In each box, write an inequality that requires the specified property to be solved. Then solve and graph the inequality.

[Diagram of Properties of Inequality]
Lesson Objectives
Solve one-step inequalities by using multiplication; Solve one-step inequalities by using division

Key Concepts
Properties of inequality (p. 180):

<table>
<thead>
<tr>
<th>Multiplication and Division by Positive Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORDS</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Multiplication</td>
</tr>
<tr>
<td>Division</td>
</tr>
</tbody>
</table>

These properties are also true for inequalities that use the symbols $>$, $\geq$, and $\leq$. 
LESSON 3-3 CONTINUED

Properties of Inequality (p. 181):

<table>
<thead>
<tr>
<th>Multiplication and Division by Negative Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WORDS</strong></td>
</tr>
<tr>
<td><strong>Multiplication</strong></td>
</tr>
<tr>
<td>If you multiply both sides of an inequality by the same <em>negative</em> number, you must reverse the inequality symbol for the statement to still be true.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Division</strong></td>
</tr>
<tr>
<td>If you divide both sides of an inequality by the same <em>negative</em> number, you must reverse the inequality symbol for the statement to still be true.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

These properties are also true for inequalities that use the symbols \( >, \geq, \text{ and } \leq \).

Think and Discuss (p. 182)

Get Organized  In each cell, write and solve an inequality.

<table>
<thead>
<tr>
<th>Solving Inequalities by Using Multiplication and Division</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>By a Positive Number</strong></td>
</tr>
<tr>
<td>Divide</td>
</tr>
<tr>
<td>Multiply</td>
</tr>
</tbody>
</table>
Lesson Objectives
Solve inequalities that contain more than one operation

Key Concepts
Think and Discuss (p. 190)

Get Organized  Complete the graphic organizer.
Lesson Objectives
Solve inequalities that contain variable terms on both sides

Key Concepts
Identities and Contradictions (p. 196):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity</td>
<td></td>
</tr>
<tr>
<td>Contradiction</td>
<td></td>
</tr>
</tbody>
</table>

These properties are also true for inequalities that use the symbols >, ≥, and ≤.

Think and Discuss (p. 197)

Get Organized In each box, give an example of an inequality of the indicated type.

Inequalities with Variables on Both Sides
- Identity
- Contradiction
Lesson Objectives
Solve compound inequalities in one variable; Graph solution sets of compound inequalities in one variable

Vocabulary
compound inequality (p. 202): ________________________________________

intersection (p. 203): _______________________________________________

union (p. 204): ____________________________________________________
**Key Concepts**

Compound Inequalities (p. 202):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>ALGEBRA</th>
<th>GRAPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>All real numbers greater than 2 AND less than 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All real numbers greater than or equal to 2 AND less than or equal to 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All real numbers less than 2 OR greater than 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All real numbers less than or equal to 2 OR greater than or equal to 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Think and Discuss (p. 205)**

**Get Organized** Write three solutions in each of the three sections of the diagram. Then write each of your nine solutions in the appropriate column or columns of the table.
3-1 Graphing and Writing Inequalities

Write the inequality shown by each graph.

1. \[ \leq -4 \leq -2 \leq 0 \leq 2 \leq 4 \]
   \[ \]

2. \[ \leq -4 \leq -2 \leq 0 \leq 2 \leq 4 \]
   \[ \]

3. \[ \leq -4 \leq -2 \leq 0 \leq 2 \leq 4 \]
   \[ \]

Graph each inequality.

4. \( r \geq -1 \)
   \[ \]

5. \( g < 2^2 \)
   \[ \]

3-2 Solving One-Step Inequalities by Adding and Subtracting

Solve each inequality and graph the solutions.

6. \( 4 \geq t - 3 \)
   \[ \]

7. \( r + 7 < 12 \)
   \[ \]

8. Danny must have at least 410 points to receive an A. He has 275 points. Write and solve an inequality to show the least number of points Danny needs to receive an A.
   \[ \]
3-3 Solving One-Step Inequalities by Multiplying and Dividing

Solve each inequality and graph the solutions.

9. \( \frac{k}{3} \leq 2 \)

10. \( 3 > \frac{h}{-2} \)

11. \( -2r < -6 \)

12. Hannah wants to buy 4 presents for at least $60. She wants to spend an equal amount of money on each present. Write and solve an inequality to show the least amount of money Hannah will spend on each present.

3-4 Solving Two-Step and Multi-Step Inequalities

Solve each inequality.

13. \( c + 3c > 2 + 14 \)

14. \( 2^3 + 12 \leq 2r - 12r \)

15. \( 14 < \frac{6 - 2f}{2} \)

16. \( \frac{1}{3}b - \frac{1}{2} \geq \frac{5}{6} \)

Solve each inequality and graph the solutions.

17. \( -5a + 2 \geq 22 \)

18. \( 13 < 2t - 3(t - 3) \)
3-5 Solving Inequalities with Variables on Both Sides

Solve each inequality.

19. \( \frac{1}{2}(3 - 8t) > 20(1 - \frac{1}{5}t) \)  
20. \( 2(4 - a) - 2 \leq -2a + 6 \)

Solve each inequality and graph the solutions.

21. \( 4(3m - 1) \geq 2(m + 3) \)

22. \( 9d - 4 \geq 12 + 5d \)

23. The booster club raised $104 to buy soccer balls for the soccer team. Each soccer ball costs $19. How many soccer balls can the booster club buy?

3-6 Solving Compound Inequalities

Solve each compound inequality and graph the solutions.

24. \( -4 < r - 5 \leq -1 \)

25. \( 4v + 3 < -5 \) or \( -2v + 7 < 1 \)

Write the compound inequality shown by each graph.

26. \[\begin{array}{cccccc}
-4 & -2 & 0 & 2 & 4 \\
\end{array}\]

27. \[\begin{array}{cccccc}
-4 & -2 & 0 & 2 & 4 \\
\end{array}\]
Answer these questions to summarize the important concepts from Chapter 3 in your own words.

1. Explain how to show that an endpoint is a solution. Explain how to show that an endpoint is not a solution.

2. Explain how solving a one-step or multi-step inequality is like solving a one-step or multi-step equation.

3. Explain how solving inequalities by multiplying or dividing by a negative number is different from solving inequalities by multiplying or dividing by a positive number.

4. Explain how to graph a compound inequality involving a union

For more review of Chapter 3:

- Complete the Chapter 3 Study Guide and Review on pages 216–219 of your textbook.
- Complete the Ready to Go On quizzes on pages 187 and 211 of your textbook.
This table contains important vocabulary terms from Chapter 4. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>arithmetic sequence</td>
<td></td>
<td></td>
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<tr>
<td>continuous graph</td>
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<td>correlation</td>
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<tr>
<td>dependent variable</td>
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<td>discrete graph</td>
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<td>domain</td>
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<tr>
<td>independent variable</td>
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<tr>
<td>Term</td>
<td>Page</td>
<td>Definition</td>
<td>Clarifying Example</td>
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<td>--------------------</td>
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<tr>
<td>negative correlation</td>
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<tr>
<td>no correlation</td>
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<td></td>
<td></td>
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<tr>
<td>positive correlation</td>
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<tr>
<td>range</td>
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<tr>
<td>relation</td>
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<tr>
<td>scatter plot</td>
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<td></td>
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<tr>
<td>sequence</td>
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<td></td>
</tr>
</tbody>
</table>
Lesson Objectives
Match simple graphs with situations; Graph a relationship

Vocabulary
continuous graph (p. 231):

discrete graph (p. 231):

Key Concepts

Think and Discuss (p. 232)
Get Organized Write an example of key words that suggest the given segments on a graph. One example of each segment is given for you.

Key Words for Graph Segments

Increases

Decreases

Stays the same
Lesson Objectives
Identify functions; Find the domain and range of relations and functions

Vocabulary
relation (p. 236):

domain (p. 236):

range (p. 236):

function (p. 237):

Key Concepts
Think and Discuss (p. 238)
Get Organized Explain when a relation is a function and when it is not a function.

<table>
<thead>
<tr>
<th>A relation is…</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A function if…</td>
<td>Not a function if…</td>
</tr>
</tbody>
</table>
Lesson Objectives
Identify independent and dependent variables; Write an equation in function notation and evaluate a function for given input values

Vocabulary
independent variable (p. 246):

dependent variable (p. 246):

function rule (p. 246):

function notation (p. 247):

Key Concepts
Think and Discuss (p. 248)
Get Organized  Use the rule \( y = x + 3 \) and the domain \{−2, −2, 0, 1, 2\}.

Ways to Represent Functions

- Equation in function notation
- Table
- Graph
Lesson Objectives
Graph functions given a limited domain; Graph functions given a domain of all real numbers

Key Concepts
Graphing Functions Using a Domain of All Real Numbers (p. 253):

<table>
<thead>
<tr>
<th>Graphing Functions Using a Domain of All Real Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Step 2</td>
</tr>
<tr>
<td>Step 3</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 256)
Get Organized  Explain how to graph a function for each situation.

An equation with variables on both sides can have...

Not a real-world situation:  Real-world situation:
Lesson Objectives
Create and interpret scatter plots; Use trend lines to make predictions

Vocabulary
scatter plot (p. 262): ________________________________________________
________________________________________________________________
correlation (p. 262): _______________________________________________
________________________________________________________________
positive correlation (p. 263): _________________________________________
________________________________________________________________
negative correlation (p. 263): ________________________________________
________________________________________________________________
o no correlation (p. 263): __________________________________________
________________________________________________________________
trend line (p. 265): _________________________________________________
________________________________________________________________
Key Concepts

Correlations (p. 263):

<table>
<thead>
<tr>
<th>Correlations</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Correlation</td>
<td>Negative Correlation</td>
<td>No Correlation</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 265)

Get Organized  Complete the graphic organizer with either a scatter plot, or a real-world example, or both.

<table>
<thead>
<tr>
<th>GRAPH</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Correlation</td>
<td></td>
</tr>
<tr>
<td>Negative Correlation</td>
<td></td>
</tr>
<tr>
<td>No Correlation</td>
<td></td>
</tr>
</tbody>
</table>
Lesson Objectives
Recognize and extend an arithmetic sequence; Find a given term of an arithmetic sequence

Vocabulary
sequence (p. 272):

term (p. 272):

arithmetic sequence (p. 272):

common difference (p. 272):

Key Concepts
Finding the $n^{th}$ Term of an Arithmetic Sequence (p. 273):

Think and Discuss (p. 274)
Get Organized  Complete the graphic organizer with steps for finding the $n^{th}$ term of an arithmetic sequence.

Finding the $n^{th}$ Term of an Arithmetic Sequence

1. 

2. 

4-1 Graphing Relationships

Choose the graph that best represents each situation.

1. A person runs a marathon at a constant rate of speed.

2. A person jogs, slows down when approaching a crosswalk, stops for traffic, and then starts to jog again.

3. A person suddenly gets chased by a dog while jogging.

Write a possible situation for the graph.

4. A person...
4-2 Relations and Functions

Give the domain and range of each relation. Tell whether the relation is a function. Explain.

5. \{(7, 0), (7, 7), (0, 0), (7, 7), (7, 7)\}

6. \{(7, −7), (7, −7), (0, 0), (−7, 7), (−7, 7)\}

4-3 Writing Function Rules

Determine a relationship between the x- and y-values. Write an equation.

7. \[
\begin{array}{c|cccc}
  x & 1 & 2 & 3 & 4 \\
  y & 0 & 2 & 4 & 6 \\
\end{array}
\]

8. \{(2, −2), (4, −1), (6, 0), (8, 1)\}

Identify the dependant and independent variables. Write a rule in function notation for each situation.

9. An Internet music web site charges $10 for a membership fee plus $0.99 for each song download.
4-4 Graphing Functions

Graph each function for the given domain.

11. \( f(x) = 3x - 1; D: \{-3, -1, 1, 3, 5\} \)

12. \( x^2 - y = 4; D: \{-2, -1, 0, 1, 2\} \)

Graph each function.

13. \( y = -\frac{1}{3}x - 1 \)

14. \( y = 4x + 2 \)

4-5 Scatter Plots and Trend Lines

Choose the scatter plot that best represents the described relationship. Explain.

15. mathematics test score and number of hours studying

16. mathematics test score and number of missed test questions
17. mathematics test score and number of hours at volleyball practice

Identify the correlation you would expect to see between each pair of data sets. Explain.

18. The temperature of hot coffee and the amount of time a cup of coffee sits on a desk.

19. The length of your hair and the amount of rain that fell in May.

4-6 Arithmetic Sequences

Determine whether each sequence appears to be an arithmetic sequence. If so, find the common difference and the next three terms.

20. \(-12.5, -10, -7.5, -5, \ldots\)

21. \(20, 10, -20, -10, \ldots\)

22. \(1 \frac{1}{2}, 2 \frac{1}{4}, 3, 3 \frac{3}{4}, \ldots\)

Find the indicated term of the arithmetic sequence.

23. \(-11, -14, -17, -20, \ldots\); 13th term

24. \(-6, -2, 2, 6, \ldots\); 31st term
Answer these questions to summarize the important concepts from Chapter 4 in your own words.

1. Explain the difference between a continuous graph and a discrete graph. Give an example of continuous data and discrete data.

2. Explain when a relation is a function.

3. Explain the difference between an independent variable and a dependent variable.

4. Explain how to graph a function using a domain of all real numbers.

5. Write about a situation where you would expect the correlation to be negative.

6. Explain how to find the $n$th term of an arithmetic sequence.

For more review of Chapter 4:

- Complete the Chapter 4 Study Guide and Review on pages 280–283.
- Compete the Ready to Go On quizzes on pages 261 and 279.
This table contains important vocabulary terms from Chapter 5. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>constant of variation</td>
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<tr>
<td>direct variation</td>
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<td>Term</td>
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<td>transformation</td>
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<tr>
<td>translation</td>
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</tbody>
</table>
Lesson Objectives
Identify linear functions and linear equations; Graph linear functions that represent real-world situations and give their domain and range.

Vocabulary
linear function (p. 296):

linear equation (p. 298):

Key Concepts
Standard Form of a Linear Equation (p. 298):

Think and Discuss (p. 299)

Get Organized In each box, describe how to use the information to identify a linear function. Include an example.
LESSON 5-2 Using Intercepts

Lesson Objectives
Find $x$- and $y$-intercepts and interpret their meanings in real-world situations; Use $x$- and $y$-intercepts to graph lines

Vocabulary

$y$-intercept (p. 303): __________________________________________________________________

$x$-intercept (p. 303): __________________________________________________________________

Key Concepts

Think and Discuss (p. 305)

Get Organized Complete the graphic organizer.

Graphing $Ax + By = C$ Using Intercepts

1. Find the $x$-intercept by

2. Find the $y$-intercept by

3. Graph the line by
Lesson Objectives

Find rates of change and slopes; Relate a constant rate of change to the slope of a line

Vocabulary

rate of change (p. 310)

rise (p. 311):

run (p. 311):

slope (p. 311):
Key Concepts
Slope of a Line (p. 311): 

Positive, Negative, Zero, and Undefined Slope (p. 312): 

Think and Discuss (p. 313)
Get Organized In each box, sketch a line whose slope matches the given description.
Lesson Objectives
Find the slope by using the slope formula

Key Concepts
Slope Formula (p. 320):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>FORMULA</th>
<th>EXAMPLE</th>
</tr>
</thead>
</table>

Get Organized  In each box, describe how to find slope using the given method.

Finding Slope

- From a graph
- From a table
- From an equation
LESSON 5-5 Direct Variation

Lesson Objectives
Identify, write, and graph direct variation

Vocabulary

direct variation (p. 326): ____________________________________________
________________________________________________________________
constant of variation (p. 326): ______________________________________
________________________________________________________________

Key Concepts

Think and Discuss (p. 329)

Get Organized In each box, describe how you can use the given information
to identify a direct variation.

<table>
<thead>
<tr>
<th>Recognizing a Direct Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>From an Equation</td>
</tr>
</tbody>
</table>


Lesson Objectives
Write a linear equation in slope-intercept form; Graph a line using slope-intercept form

Key Concepts
Slope-Intercept Form of a Linear Equation (p. 335):

Think and Discuss (p. 337)
Get Organized  Complete the graphic organizer.

Graphing the Line Described by \( y = mx + b \)

1. Plot the point
2. Find the second point on the line by
3. Draw
Lesson Objectives
Graph a line and write a linear equation using point-slope form; Write a linear equation given two points

Key Concepts
Point-Slope Form of a Linear Equation (p. 342)

Think and Discuss (p. 344)

Get Organized In each box, describe how to find the equation of a line by using the given method.

Writing the Equation of a Line

- If you know two points on the line:
- If you know the slope and y-intercept:
- If you know the slope and a point on the line:
Lesson Objectives
Identify and graph parallel and perpendicular lines; Write equations to describe lines parallel or perpendicular to a given line

Vocabulary
parallel lines (p. 349)
perpendicular lines (p. 351)

Key Concepts
Parallel Lines (p. 349):

Perpendicular Lines (p. 351):
Think and Discuss (p. 352)

Get Organized  In each box, sketch an example and describe the slopes.

Parallel lines

Perpendicular lines
Lesson Objectives
Describe how changing slope and $y$-intercept affect the graph of a linear function

Vocabulary
family of functions (p. 357):

parent function (p. 357):

transformation (p. 357):

translation (p. 357):

rotation (p. 358):

reflection (p. 359):
Key Concepts

Vertical Translation of a Linear Function (p. 357)

Rotation of a Linear Function (p. 358)

Reflection of a Linear Function (p. 359)

Think and Discuss (p. 360)

Get Organized In each box, sketch a graph of the given transformation of $f(x) = x$, and label it with a possible equation.
5-1 Identifying Linear Functions

Tell whether the given ordered pairs satisfy a linear function. Explain.

1. \[ \{(-4, 3), (-2, 2), (0, 1), (2, 0), (4, -1)\} \]

2.

<table>
<thead>
<tr>
<th>(x)</th>
<th>6</th>
<th>3</th>
<th>0</th>
<th>-3</th>
<th>-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>(y)</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

Tell whether each function is linear.

3. \[ x^3 - 2y + 3 = 0 \]

4. \[ 9x - 3y = 6 \]

5-2 Using Intercepts

Use intercepts to graph the line described by each equation.

5. \[ 2x + y = -4 \]

6. \[ 3y - 12 = 1\frac{1}{2}x \]

7. Brad sold tickets to a track meet. It cost $6 for an adult ticket and $3 for a student ticket. Brad sold $90 in tickets. Let \(x\) represent the number of adult tickets sold and let \(y\) represent the number of student tickets sold. Find the intercepts. What does each intercept represent?
5-3 Rate of Change and Slope

Find the slope of each line.

8. \[ y \]

9. \[ y \]

5-4 The Slope Formula

Find the slope of each line. Then tell what the slope represents.

10. \[ y \]

11. \[ y \]

5-5 Direct Variation

Tell whether each relationship is a direct variation. If so, identify the constant of variation.

12. \[
\begin{array}{c|c|c|c|c}
 x & -3 & 0 & 3 & 6 \\
 y & 4 & 8 & 12 & 18 \\
\end{array}
\]

13. \[
\begin{array}{c|c|c|c|c}
 x & -5 & -2.5 & 0 & 2.5 \\
 y & -4 & -2 & 0 & 2 \\
\end{array}
\]

14. The value of \( y \) varies directly with \( x \), and \( y = -6 \) when \( x = 3 \). Find \( y \) when \( x = 12 \).
5-6 Slope-Intercept Form

Write the equation that describes each line in slope-intercept form.

15. slope = −3, y-intercept = 7

16. slope = 0.25, y-intercept = 1.5

17. slope = \( \frac{1}{6} \), (−4, 4) is on the line

18. slope = 0, (4, 0) is on the line

Write each equation in slope-intercept form. Then graph the line described by the equation.

19. \( 6x = 3y + 12 \)

20. \( −2x = 12 + 4y \)

5-7 Point-Slope Form

Write an equation in slope-intercept form for the line through the two points.

21. (−8, 2) and (4, 3)

22. (0, 0) and (6, 10)
Graph the line with the given slope that contains the given point.

23. slope = 2; (4, 2)  
24. slope = \(-\frac{1}{3}\); (1, -3)

5-8 Slopes of Parallel and Perpendicular Lines

Identify which lines are parallel.

25. \(y = 2(2x + 4); y = 2x + 4; y = \frac{1}{2}(4x + 4); y = 2(4x + 8)\)

26. \(y - \frac{1}{3} = 2x; y = \frac{1}{3}x + 2; y - \frac{1}{3} = \frac{2}{3}x + 2; y + \frac{1}{3} = \frac{1}{3}(6x + 2)\)

27. Write an equation in slope-intercept form for the line that passes through -3, 2 and is perpendicular to the line described by \(6x - 2y = 8\).
5-9 Transforming Linear Functions

Graph \( f(x) \) and \( g(x) \). Then describe the transformation(s) from the graph of \( f(x) \) to the graph of \( g(x) \).

28. \( f(x) = 4x + 1, \quad g(x) = x + 1 \)  
29. \( f(x) = x + 4, \quad g(x) = -x \)
Big Ideas

Answer these questions to summarize the important concepts from Chapter 5 in your own words.

1. Explain how to find the \(x\)- and \(y\)-intercepts of a linear equation.

2. Explain how you can tell if the slope of a line is positive, negative, zero, or undefined by looking at a graph.

3. Explain the difference between slopes of parallel lines and slopes of perpendicular lines.

4. Explain how you can tell when a graph is translated, rotated, or reflected by looking at the equation of a linear function.

For more review of Chapter 5:

- Complete the Chapter 5 Study Guide and Review on pages 368–371 of your textbook.
- Complete the Ready to Go On quizzes on pages 333 and 365 of your textbook.
This table contains important vocabulary terms from Chapter 6. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

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<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>consistent system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dependent system</td>
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<td></td>
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<tr>
<td>inconsistent system</td>
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<tr>
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<td></td>
<td></td>
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<tr>
<td>system of linear equations</td>
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<td></td>
</tr>
</tbody>
</table>
### CHAPTER 6 VOCABULARY CONTINUED

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>solution of a linear inequality</td>
<td></td>
<td></td>
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<tr>
<td>solution of a system of linear equations</td>
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<tr>
<td>solution of a system of linear inequalities</td>
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<td></td>
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</tr>
<tr>
<td>system of linear inequalities</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson Objectives
Identify solutions of systems of linear equations in two variables; Solve systems of linear equations in two variables by graphing

Vocabulary
system of linear equations (p. 383)

solution of a system of linear equations (p. 383)

Key Concepts
Think and Discuss (p. 385)
Get Organized In each box, write a step for solving a linear system by graphing. More boxes may be added.

Solving a Linear System by Graphing

1. 2. 3.
Lesson Objectives
Solve systems of linear equations in two variables by substitution

Key Concepts
Solving Systems of Equations by Using Substitution (p. 390):

<table>
<thead>
<tr>
<th>Solving Systems of Equations by Substitution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Step 2</td>
</tr>
<tr>
<td>Step 3</td>
</tr>
<tr>
<td>Step 4</td>
</tr>
<tr>
<td>Step 5</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 393)

Get Organized  In each box, solve the system by substitution using the first step given. Show that each method gives the same solution.

\[
\begin{align*}
\begin{align*}
\text{Solve } x + y &= 8 \\
\text{for } x. & \\
\text{Solve } x - y &= 2 \\
\text{for } x. & \\
\text{Solve } x + y &= 8 \\
\text{for } y. & \\
\text{Solve } x - y &= 2 \\
\text{for } y. & \\
\end{align*}
\end{align*}
\]
Lesson Objectives
Solve systems of linear equations in two variables by elimination; Compare and choose an appropriate method for solving systems of linear equations.

Key Concepts
Solving Systems of Equations by Using Elimination (p. 397):

<table>
<thead>
<tr>
<th>Step</th>
<th>Method</th>
<th>Use When . . .</th>
<th>Example</th>
</tr>
</thead>
</table>
| 1    | Graphing    | • Both equations are solved for y.  
          • You want to estimate a solution. | \[
\begin{align*}
y &= 3x + 2 \\
y &= -2x + 6
\end{align*}
\] |
| 2    | Substitution| • A variable in either equation has a coefficient of 1 or -1.  
          • Both equations are solved for the same variable.  
          • Either equation is solved for a variable. | \[
\begin{align*}
x + 2y &= 7 \\
x &= 10 - 5y\end{align*}
\] or \[
\begin{align*}
x &= 2y + 10 \\
x &= 3y + 5
\end{align*}
\] |
| 3    | Elimination | • Both equations have the same variable with the same or opposite coefficients.  
          • A variable term in one equation is a multiple of the corresponding variable term in the other equation. | \[
\begin{align*}
3x + 2y &= 8 \\
5x + 2y &= 12\end{align*}
\] or \[
\begin{align*}
6x + 5y &= 10 \\
3x + 2y &= 15
\end{align*}
\] |
Solving Systems of Equations by Substitution (p. 401)

Get Organized  In each box, write an example of a system of equations that you could solve using the given method.
Lesson Objectives
Solve special systems of linear equations in two variables; Classify systems of linear equations and determine the number of solutions

Vocabulary
inconsistent system (p. 406)

consistent system (p. 406)

independent system (p. 407)

dependent system (p. 407)
Key Concepts

Classification of Systems of Linear Equations (p. 407):

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>CONSISTENT AND INDEPENDENT</th>
<th>CONSISTENT AND DEPENDENT</th>
<th>INCONSISTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Solutions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graph</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 409)

Get Organized In each box, write the word that describes a system with that number of solutions and sketch a graph.
Solving for a Variable

Lesson Objectives
Graph and solve linear inequalities in two variables

Vocabulary
linear inequality (p. 414)
solution of a linear inequality (p. 414)

Key Concepts
Graphing Inequalities (p. 415):

<table>
<thead>
<tr>
<th>Graphing Linear Inequalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Step 2</td>
</tr>
<tr>
<td>Step 3</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 417)

Get Organized Complete the graphic organizer.

<table>
<thead>
<tr>
<th>Inequality</th>
<th>( y &lt; 5x + 2 )</th>
<th>( y &gt; 7x - 3 )</th>
<th>( y \leq 9x + 1 )</th>
<th>( y \geq -3x - 2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(&lt;)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boundary Line</td>
<td>Dashed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shading</td>
<td>Below</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Lesson Objectives**

Graph and solve systems of linear inequalities in two variables

**Vocabulary**

- system of linear inequalities (p. 421)

- solution of a system of linear inequalities (p. 421)

**Key Concepts**

**Think and Discuss** (p. 423)

**Get Organized** In each box, draw a graph and list one solution.

\[
\begin{align*}
\{ y \geq 2x + 1 \\
y > \frac{1}{2}x - 2 \\
\}
\end{align*}
\]

Graph
Solution

\[
\begin{align*}
\{ y < 2x + 1 \\
y \geq \frac{1}{2}x - 2 \\
\}
\end{align*}
\]

Graph
Solution
### 6-1 Solving Systems by Graphing

Tell whether the ordered pair is a solution of the given system.

1. \((2, -3); \begin{cases} 2x - y = 7 \\ x - 2y = -5 \end{cases}\)  
2. \((-1, -5); \begin{cases} y = 3x - 2 \\ y = -x - 6 \end{cases}\)  
3. \((3, 14); \begin{cases} x = \frac{1}{2}y - 4 \\ y = 4x + 2 \end{cases}\)

Solve each system by graphing.

4. \(\begin{cases} x - 2y = 3 \\ y + x = 0 \end{cases}\)

5. \(\begin{cases} x = 6 - y \\ 2 - x = -y \end{cases}\)

### 6-2 Solving Systems by Substitution

Solve each system by substitution.

6. \(\begin{cases} x + 2y = 16 \\ x - 3y = 1 \end{cases}\)

7. \(\begin{cases} 7x + 5y = 175 \\ x + y = 23 \end{cases}\)

8. \(\begin{cases} 2x + y = -9 \\ 3x + 4y = -11 \end{cases}\)

9. The sum of two numbers is 66. The second number is 22 less than three times the first number. Write and solve a system of equations to find the two numbers.
6-3 Solving Systems by Elimination

Solve each system by elimination.

10. \[
\begin{align*}
4y &= 25 - 3x \\
4x &= 7y - 16
\end{align*}
\]

11. \[
\begin{align*}
3x - y &= -137 \\
y &= 2x + 99
\end{align*}
\]

12. \[
\begin{align*}
2x + y &= -21 \\
12x - 13y &= 387
\end{align*}
\]

13. John needs 23 boards to build rafters for his house. He can use 16-foot or 20-foot length boards. He needs seven fewer 16-foot boards than 20-foot boards. Write and solve a system of equations to determine how many of each size board John needs.

6-4 Solving Special Systems

Solve each system of linear equations.

14. \[
\begin{align*}
4y - 6x &= 10 \\
15 + 9x &= 6y
\end{align*}
\]

15. \[
\begin{align*}
2x - 5y &= 15 \\
10y &= 20 + 4x
\end{align*}
\]

16. \[
\begin{align*}
6x + 14y &= 16 \\
24 - 9x &= 21y
\end{align*}
\]

Classify each system. Give the number of solutions.

17. \[
\begin{align*}
y - 3x &= 3 \\
3(x - 1) &= y
\end{align*}
\]

18. \[
\begin{align*}
y + x &= 3 \\
6 &= 2x - y
\end{align*}
\]

19. \[
\begin{align*}
3x &= -y - 2 \\
2y + 4 &= -6x
\end{align*}
\]
6-5 Solving Linear Inequalities

Tell whether the ordered pair is a solution of the inequality.

20. \((-4, 2); \ y \geq 2x - 4\)
21. \((6, 8); \ y < 2x - 4\)
22. \((1, 2); \ 2y \leq x + 3\)

Graph the solutions of each linear inequality.

23. \(y \geq 2x - 2\)
24. \(y + \frac{1}{2}x \leq 1\)

6-6 Solving Systems of Linear Inequalities

Tell whether the ordered pair is a solution of the given system.

25. \((0, 0); \ \begin{cases} x + 2y < 4 \\ 2y > x - 6 \end{cases}\)
26. \((-2, 2); \ \begin{cases} y \geq x + 3 \\ 2x \geq 3y + 2 \end{cases}\)
27. \((4, -3); \ \begin{cases} 2y - x < -6 \\ 2x \geq -3y \end{cases}\)

Graph each system of linear inequalities.

28. \(\begin{cases} 2x - y > -3 \\ 4x + y < 5 \end{cases}\)
29. \(\begin{cases} x - y < -2 \\ x - y > 2 \end{cases}\)
Big Ideas

Answer these questions to summarize the important concepts from Chapter 6 in your own words.

1. What are the steps for solving systems of equations by using substitution?

2. Explain which method is best for solving systems of linear equations for certain systems.

3. What are the steps for graphing inequalities?

4. Explain what the graph of a dependent, consistent, and inconsistent system looks like.

For more review of Chapter 6:

- Compete the Ready to Go On quizzes on pages 413 and 429.
This table contains important vocabulary terms from Chapter 7. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>binomial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cubic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>degree of a monomial</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>degree of a polynomial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>difference of two squares</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>leading coefficient</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>monomial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>perfect-square trinomial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>polynomial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>quadratic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>scientific notation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Page</td>
<td>Definition</td>
<td>Clarifying Example</td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>standard form of a polynomial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>trinomial</td>
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<td></td>
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</tbody>
</table>
Lesson Objectives
Evaluate expressions containing zero and integer exponents; Simplify expressions containing zero and integer exponents

Key Concepts
Integer Exponents (p. 446):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Think and Discuss (p. 448)

Get Organized In each box, describe how to simplify, and give an example.

Simplifying Expressions with Negative Exponents

For a negative exponent in the numerator . . .

For a negative exponent in the denominator . . .
Lesson Objectives
Evaluate and multiply by powers of 10; Convert between standard notation and scientific notation

Vocabulary
scientific notation (p. 453) ____________________________________________

Key Concepts
Powers of 10 (p. 452):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Integer Exponent</td>
<td></td>
</tr>
<tr>
<td>Negative Integer Exponent</td>
<td></td>
</tr>
</tbody>
</table>

Multiplying by Powers of 10 (p. 453):
Think and Discuss (p. 454)
Get Organized  Complete the graphic organizer.

Powers of 10 and Scientific Notation

A negative exponent corresponds to moving the decimal point .
A positive exponent corresponds to moving the decimal point .
Lesson Objectives
Use multiplication properties of exponents to evaluate and simplify expressions

Key Concepts

Simplifying Exponential Expressions (p. 460):

<table>
<thead>
<tr>
<th>Examples</th>
<th>Nonexamples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Product of Powers Property (p. 460):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

Power of a Power Property (p. 462):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Power of a Product Property (p. 463):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 463)

Get Organized In each box, supply the missing exponents. Then give an example for each property.

<table>
<thead>
<tr>
<th>Multiplication Properties of Exponents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product of Powers Property</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
**Lesson Objectives**

Use division properties of exponents to evaluate and simplify expressions

**Key Concepts**

**Quotient of Powers Property (p. 467):**

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Positive Power of a Quotient Property (p. 469):**

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Negative Power of a Quotient Property (p. 470):**

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Think and Discuss (p. 471)

Get Organized  In each box, write an equation that has the indicated number of solutions.

If $a$ and $b$ are nonzero real numbers and $m$ and $n$ are integers, then...

| $rac{a^m}{a^n} =$ | $(\frac{a}{b})^n =$ | $(\frac{a}{b})^{-n} =$ |
Polynomials

Lesson Objectives
Classify polynomials and write polynomials in standard form; Evaluate polynomial expressions

Vocabulary
monomial (p. 476)

degree of a monomial (p. 476)

polynomial (p. 476)

degree of a polynomial (p. 476)

standard form of a polynomial (p. 477)

leading coefficient (p. 477)

quadratic (p. 476)

Cubic (p. 476)

Binomial (p. 476)

Trinomial (p. 476)
Key Concepts

Think and Discuss (p. 478)

Get Organized  In each circle, write an example of the given type of polynomial.

<table>
<thead>
<tr>
<th>Polynomials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monomials</td>
</tr>
<tr>
<td>Binomials</td>
</tr>
<tr>
<td>Trinomials</td>
</tr>
</tbody>
</table>
Lesson Objectives
Add and subtract polynomials

Key Concepts

Think and Discuss (p. 486)

Get Organized In each box, write an example that shows how to perform the given operation.

- Adding
- Subtracting
Lesson Objectives
Multiply polynomials

Key Concepts

Think and Discuss (p. 496)

Get Organized In the top box, sketch and label two similar triangles. Then list the corresponding sides and angles in the bottom boxes.

- Distributive Property
- FOIL method
- Rectangle model
- Vertical method
Lesson Objectives
Find special products of binomials

Vocabulary
perfect-square trinomial (p. 501): _____________________________________
________________________________________________________________
difference of two squares (p. 503): ____________________________________
________________________________________________________________

Key Concepts
Special Products of Binomials (p. 504):

<table>
<thead>
<tr>
<th>Special Products of Binomials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 505)
Get Organized Complete the special product rules and give an example of each.

<table>
<thead>
<tr>
<th>Special Products of Binomials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect-Square Trinomials</td>
</tr>
<tr>
<td>$(a + b)^2 = $</td>
</tr>
<tr>
<td>$(a - b)^2 = $</td>
</tr>
<tr>
<td>Difference of Two Squares</td>
</tr>
<tr>
<td>$(a + b)(a - b) = $</td>
</tr>
</tbody>
</table>
7-1 Integer Exponents

Simplify.

1. \(25g^0\)
2. \(s^{-2}r^3\)
3. \(\frac{3p^{-2}g^{-3}}{2t^0}\)
4. \(\frac{1}{3}x^{-2}y^4\)

Evaluate each expression for the given value(s) of the variable(s).

5. \((b - 4)^{-3}\) for \(b = 4\)
6. \(x^2y^0\) for \(x = 3\) and \(y = 6\)
7. \((2mn)^{-2}m = 3\) and \(n = -2\)

7-2 Powers of 10 and Scientific Notation

8. Find the value of \(10^{-6}\).
9. Write \(10,000,000\) as a power of 10.

10. Find the value of \(14.2 \times 10^3\)
11. Write \(0.0000001715\) in scientific notation.

12. The average diameter of a human hair is 0.00006 meters. Write this number in scientific notation.
7-3 Multiplication Properties of Exponents

Simplify.

13. \(4^4 \cdot 4^{-5} \cdot 4^3\)  
14. \(x^{-2} \cdot x^3 \cdot y^5\)  
15. \((-2s^2t^3)^2\)  
16. \((m^2n)^4 \cdot (m^4n^3)^2\)

17. \((2xy^2)^4 \cdot (x^2y)^{-3}\)  
18. \(-r^{-2} \cdot (-r^2)^3\)  
19. \((x^by^2n)^3\)  
20. \((x + 2)^{-3} \cdot (x + 2)\)

7-4 Division Properties of Exponents

Simplify.

21. \(\frac{x^6}{x^3}\)  
22. \(\frac{4^3}{5}\)  
23. \(\frac{x^4y^3}{x^2y^4}\)  
24. \(\left(\frac{rs^4}{r^4s^2}\right)^{-2}\)

25. In 1867, the United States purchased Alaska from Russia for $7.2 million. The total area of Alaska is about 3.78 \(\times\) \(10^8\) acres. What was the price per acre? Write your answer in standard form.

7-5 Polynomials

Write each polynomial in standard form and give the leading coefficient.

26. \(-4x^2 - x^3 + 3\)  
27. \(15y - 6 + 10y^3 - 3y^2\)

Classify each polynomial according to its degree and number of terms.

28. \(6x + 3x^2 + 1\)  
29. \(16 - 4x^3 + 3x^2\)
7-6 Adding and Subtracting Polynomials

Add or subtract.

30. \((-3y + 2) + (y^2 + 3y + 2)\) \hspace{1cm} 31. \((2x^2 + 3x - 4) - (x^2 + x - 1)\)

32. \((-2x^3 - x + 8) - (-2x^3 + 3x - 4)\)

33. \((-4x^3 - 2x^2 + x - 5) + (2x^3 + 3x + 4)\)

7-7 Multiplying Polynomials

Multiply.

34. \((3x - 7)(-2x)\) \hspace{1cm} 35. \(3x^2(5x - x^3 + 2)\) \hspace{1cm} 36. \((3x - 2)(5x + 7)\)

37. \((x - 5)(2x + 10)\) \hspace{1cm} 38. \((x^2 + 9)(x^2 - x - 4)\) \hspace{1cm} 39. \((2x^2 - 7x + 1)(4x + 3)\)

7-8 Special Products of Binomials

Multiply.

40. \((2x + 1)^2\) \hspace{1cm} 41. \((2 + 3y)^2\) \hspace{1cm} 42. \((3y - 2)^2\)

43. \((4x + 3y)^2\) \hspace{1cm} 44. \((5x - 6)(5x + 6)\) \hspace{1cm} 45. \((4x - 7y)(4x + 7y)\)

46. The height traveled (in feet) of a bottle rocket is modeled by

\[ h = -16t^2 + 57t \]

where \(t\) is the time in seconds. Find the height of the rocket after 2 seconds.
Answer these questions to summarize the important concepts from Chapter 7 in your own words.

1. Explain why the properties using zero exponents and negative exponents specify that bases must be “nonzero numbers”.

2. Explain the difference between multiplying by powers of 10 when the exponent is a positive number and when the exponent is a negative number.

3. When is an exponential expression completely simplified?

4. Explain how to multiply \((x + 3)(x + 2)\) using the FOIL method.

For more review of Chapter 7:
- Complete the Chapter 7 Study Guide and Review on pages 510–513.
- Compete the Ready to Go On quizzes on pages 475 and 509.
This table contains important vocabulary terms from Chapter 8. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>greatest common factor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Page</td>
<td>Definition</td>
<td>Clarifying Example</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------</td>
<td>------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>prime factorization</td>
<td></td>
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</tr>
</tbody>
</table>
Factors and Greatest Common Factors

Lesson Objectives
Write the prime factorization of numbers, find the GCF of monomials

Vocabulary
prime factorization (p. 524):

greatest common factor (p. 525):

Key Concepts
Think and Discuss (p. 526)

Get Organized  In each box, write an example of an equation that can be solved by using the given property, and solve it.

100x²  Coefficient  Prime factorization of coefficient  Prime Factorization of 100x²
Variable  Variable term as a product
Lesson Objectives
Factor polynomials by using the greatest common factor

Key Concepts
Think and Discuss (p. 534)
Get Organized Complete the graphic organizer.

Factoring by GCF

1. Find the common factor.
2. Write each term as a ______ using the GCF.
3. Use the ______ to factor out the GCF.
4. Check by ______.
Lesson Objectives
Factor quadratic trinomials of the form \( x^2 + bx + c \)

Key Concepts
Factoring \( x^2 + bx + c \) (p. 541):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 543)
Get Organized In each box, write an example of a trinomial with the given properties and factor it.

Factoring \( x^2 + bx + c \)

- \( c \) is positive, and \( b \) is positive.
- \( c \) is negative, and \( b \) is positive.
- \( c \) is positive, and \( b \) is negative.
- \( c \) is negative, and \( b \) is negative.
Lesson Objectives
Factor quadratic trinomials of the form \( ax^2 + bx + c \)

Key Concepts

Think and Discuss (p. 551)

Get Organized  In each box, write an equation that has the indicated number of solutions.

<table>
<thead>
<tr>
<th>Factoring ( ax^2 + bx + c )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( c &gt; 0 )</td>
<td></td>
</tr>
<tr>
<td>( b &gt; 0 )</td>
<td>( b &lt; 0 )</td>
</tr>
<tr>
<td>( c &lt; 0 )</td>
<td></td>
</tr>
<tr>
<td>( b &lt; 0 )</td>
<td>( b &gt; 0 )</td>
</tr>
</tbody>
</table>
Lesson Objectives
Factor perfect-square trinomials; Factor the difference of two squares

Key Concepts
Perfect-Square Trinomials (p. 558):

<table>
<thead>
<tr>
<th>PERFECT-SQUARE TRINOMIAL</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Difference of Two Squares (p. 560):

<table>
<thead>
<tr>
<th>DIFFERENCE OF TWO SQUARES</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 561)
Get Organized Write an example of each type of special product and factor it.

<table>
<thead>
<tr>
<th>Special Product</th>
<th>Factored Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect-square trinomial with positive coefficient of middle term</td>
<td></td>
</tr>
<tr>
<td>Perfect-square trinomial with negative coefficient of middle term</td>
<td></td>
</tr>
<tr>
<td>Difference of two squares</td>
<td></td>
</tr>
</tbody>
</table>
Lesson Objectives
Choose an appropriate method for factoring a polynomial; Combine methods for factoring a polynomial

Key Concepts
Methods to Factor Polynomials (p. 568):

<table>
<thead>
<tr>
<th>METHODS TO FACTOR POLYNOMIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Polynomial</td>
</tr>
<tr>
<td>Binomials</td>
</tr>
<tr>
<td>Trinomials</td>
</tr>
<tr>
<td>Polynomials of Four or More Terms</td>
</tr>
</tbody>
</table>

Think and Discuss (p. 568)
Get Organized Draw an arrow from each expression to the method you would use to factor it.

<table>
<thead>
<tr>
<th>Factoring Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polynomial</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>1. $16x^4 - 25y^8$</td>
</tr>
<tr>
<td>2. $x^2 + 10x + 25$</td>
</tr>
<tr>
<td>3. $9t^2 + 27t + 18t^4$</td>
</tr>
<tr>
<td>4. $a^2 + 3a - 7a - 21$</td>
</tr>
<tr>
<td>5. $100b^2 + 81$</td>
</tr>
</tbody>
</table>
8-1 Factors and Greatest Common Factors

Write the prime factorization of each number.

1. 66
2. 72
3. 325
4. 169

Find the GCF of each pair of monomials.

5. $30r^4$ and $12r^3$
6. $24z^3$ and $32z^2$
7. $16x^2y$ and $84xy^2$
8. $99s^6t^3$ and $45s^3t^6$

8-2 Factoring by GCF

Factor each polynomial. Check your answer.

9. $2s^2 - 4$
10. $-a^3 - 4a$
11. $36y^4 + 24y^2$

12. $4x^2 - 8x + 8$
13. $3b^3 - 15b^2 - 33b$
14. $14p^3 - 21p^2q$

Factor each polynomial by grouping. Check your answer.

15. $r^3 + 3r^2 + 2r + 6$
16. $7y^3 - 14y^2 - y + 2$
17. $5x^3 + 10x^2 + 3x + 6$

8-3 Factoring $x^2 + bx + c$

Factor each trinomial. Check your answer.

18. $a^2 - 5a - 14$
19. $x^2 + 7x + 10$
20. $n^2 + 4n - 12$
21. \( f^2 - 11f + 18 \)  
22. \( z^2 - z - 20 \)  
23. \( t^2 - t - 30 \)

24. Factor \( x^2 - 7x + 12 \). Check your answer.

8-4 Factoring \( ax^2 + bx + c \)

Factor each trinomial. Check your answer.

25. \( 3a^2 + 5a + 2 \)  
26. \( 6s^2 + 17s + 12 \)  
27. \( 5y^2 - 18y - 8 \)

28. \( 10z^2 + 12z - 16 \)  
29. \( 21x^2 + 44x - 32 \)  
30. \( 6t^2 - 31t + 35 \)

31. The area of a rectangle is \( 5x^2 + 22x + 8 \) cm\(^2\). The width is \( (x + 4) \) cm. 
What is the length of the rectangle?

8-5 Factoring Special Products

Determine whether each trinomial is a perfect square. If so, factor it.

32. \( 9t^2 - 30t + 25 \)  
33. \( z^2 + 8z - 16 \)  
34. \( 4y^2 + 36y + 81 \)

35. \( 4x^2 - 28x + 49 \)  
36. \( b^2 - 16b + 64 \)  
37. \( 16m^2 + 12m + 9 \)
Determine whether each trinomial is the difference of two squares. If so, factor it.

38. \(1 - 10s^4\)  
39. \(t^2 - 9\)  
40. \(121x^2 - 100\)  

41. \(25h^2 - 20\)  
42. \(9z^4 + 25\)  
43. \(25y^4 - 16x^2\)  

8-6 Choosing a Factoring Method

Factor each polynomial completely. Check your answer.

44. \(25b^3 + 30b^2 - 60b\)  
45. \(2x^2y + 16xy + 30y\)  
46. \(c^3 - 6c^2 - 4c + 24\)  

Write an expression for the situation. Factor your expression.

47. Nine times the square of Teresa’s shoe size plus twelve times Teresa’s shoe size plus four

48. The difference of the square of four times a DVD cost and 49
Answer these questions to summarize the important concepts from Chapter 8 in your own words.

1. Explain how to find the GCF of two terms that contain the same variable raised to different exponents.

2. What are the steps for factoring the GCF?

3. Explain, in words, how to factor the quadratic trinomial $x^2 + bx + c$.

4. Explain how to determine the signs of the factors of $c$ when factoring a trinomial of the form $x^2 + bx + c$.

For more review of Chapter 8:

- Complete the Chapter 8 Study Guide and Review on pages 574–577 of your textbook.
- Complete the Ready to Go On quizzes on pages 557 and 573 of your textbook.
This table contains important vocabulary terms from Chapter 9. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
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</thead>
<tbody>
<tr>
<td>axis of symmetry</td>
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<tr>
<td>completing the square</td>
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<tr>
<td>discriminant</td>
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<td>maximum</td>
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<td>minimum</td>
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<tr>
<td>parabola</td>
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<tr>
<td>Term</td>
<td>Page</td>
<td>Definition</td>
<td>Clarifying Example</td>
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<td>--------------------</td>
</tr>
<tr>
<td>quadratic equation</td>
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<tr>
<td>quadratic function</td>
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<tr>
<td>vertex</td>
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<td></td>
<td></td>
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<tr>
<td>zero of a function</td>
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</tbody>
</table>
Lesson Objectives
Identify quadratic functions and determine whether they have a minimum or maximum; Graph a quadratic function and give its domain and range

Vocabulary

quadratic function (p. 590):

parabola (p. 591):

vertex (p. 592):

minimum (p. 592):

maximum (p. 592):
### Key Concepts

Minimum and Maximum Values (p. 592):

<table>
<thead>
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<th>WORDS</th>
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<table>
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<th>GRAPHS</th>
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</table>

#### Think and Discuss (p. 593)

**Get Organized** In each box, describe a way of identifying quadratic functions.

[Diagram: Identifying Quadratic Functions]

- [ ]
- [ ]
- [ ]
Lesson Objectives
Find the zeros of a quadratic function from its graph; Find the axis of symmetry and the vertex of a parabola

Vocabulary
zero of a function (p. 599):

axis of symmetry (p. 600):
Key Concepts

Finding the Axis of Symmetry by Using Zeros (p. 600):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>GRAPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Zero</td>
<td></td>
<td><img src="image1" alt="Graph of One Zero" /></td>
</tr>
<tr>
<td>Two Zeros</td>
<td></td>
<td><img src="image2" alt="Graph of Two Zeros" /></td>
</tr>
</tbody>
</table>

Finding the Axis of Symmetry by Using the Formula (p. 601):

<table>
<thead>
<tr>
<th>FORMULA</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Finding the Vertex of a Parabola (p. 601):

<table>
<thead>
<tr>
<th>FINDING THE VERTEX OF A PARABOLA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Step 2</td>
</tr>
<tr>
<td>Step 3</td>
</tr>
</tbody>
</table>
Think and Discuss (p. 603)

Get Organized  In each box, sketch a graph that fits the given description.
Lesson Objectives
Graph a quadratic function in the form \( y = ax^2 + bx + c \)

Key Concepts

Think and Discuss (p. 609)

Get Organized Complete the graphic organizer using your own quadratic function.

\[
\text{Quadratic Function} \quad y = x^2 + \frac{3}{2x} + 2
\]

Vertex: 

Axis of symmetry: 

Sketch of graph:
Lesson Objectives
Graph and transform quadratic functions

Key Concepts
Width of a Parabola (p. 613):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Vertical Translations of a Parabola (p. 615):

Think and Discuss (p. 616)
Get Organized Complete the graphic organizer by explaining how each change affects the graph $y = ax^2 + c$.

- $|a|$ is increased?
- $c$ is increased?
- $|a|$ is decreased?
- $c$ is decreased?
Lesson Objectives

Solve quadratic equations by graphing

Vocabulary

quadratic equation (p. 622):

Key Concepts

Solving Quadratic Equations by Graphing (p. 622):

Step 1
Step 2
Step 3

Think and Discuss (p. 624)

Get Organized In each of the boxes, write the steps for solving quadratic equations by graphing.
Lesson Objectives
Solve quadratic equations by factoring

Key Concepts
Zero Product Property (p. 630):

For all real numbers $a$ and $b$,

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Think and Discuss (p. 633)

Get Organized In each box, write a step used to solve a quadratic equation by factoring.

1. 
2. 
3. 

Solve Quadratic Equations by Factoring
Lesson Objectives

Solve quadratic equations by using square roots

Key Concepts

Square-Root Property (p. 636):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Think and Discuss (p. 639)

Get Organized  In each box, write an example of a quadratic equation with the given number of solutions. Solve each equation.

Solving Quadratic Equations by Using Square Roots When the Equation Has…

- No real solutions:
- One solution:
- Two solutions:
Lesson Objectives
Solve quadratic equations by completing the square

Vocabulary
completing the square (p. 645):
________________________________________________________________

Key Concepts
Completing the Square (p. 645):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
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</table>

Solving a Quadratic Equation by Completing the Square (p. 646):

Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
Think and Discuss (p. 648)

Get Organized  In each box, write and solve an example using the given type of quadratic equation.

Solving Quadratic Equations by Completing the Square
Lesson Objectives
Solve quadratic equations by using the Quadratic Formula; Determine the number of solutions of a quadratic equation by using the discriminant

Vocabulary
discriminant (p. 654):

Key Concepts
The Quadratic Formula (p. 652):

The Discriminant of the Quadratic Equation $ax^2 + bx + c = 0$ (p. 654):
### Method of Solving Quadratic Equations (p. 656):

<table>
<thead>
<tr>
<th>METHOD</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphing</td>
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<tr>
<td>Factoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using square roots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completing the square</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using the Quadratic Formula</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Think and Discuss (p. 657)

**Get Organized** In each box, write the number of real solutions.

![Diagram](Image)

- \( b^2 - 4ac > 0 \)
- \( b^2 - 4ac < 0 \)
- \( b^2 - 4ac = 0 \)
9-1 Identify Quadratic Functions

Tell whether each function is quadratic. Explain.

1. \(y + 2 = 4x + 3x + 12\)
2. \(\{(−2, 11), (−1, 1), (0, −5), (1, −7), (2, −5)\}\)

Tell whether the graph of each quadratic function opens upward or downward and whether the parabola has a maximum or a minimum.

3. \(y = −x^2 + 4x − 1\)
4. \(y = 2x^2 + 3x + 5\)

5. Graph the function \(y = \frac{3}{4}x^2 − x + 4\) and give the domain and range.

9-2 Characteristics of Quadratic Functions

Find the zeros of each function from its graph. Then find its axis of symmetry.

6. 7. 8.

Find the vertex of each parabola.

9. \(y = x^2 + 6x − 7\)
10. \(y = x^2 − 10x + 21\)
11. \(y = 3x^2 + 9x − 12\)
9-3 Graphing Quadratic Functions

Graph each quadratic function.

12. \( y = 2x^2 + 6x + 1 \)
13. \( y + 3x^2 = \frac{1}{3}x - 1 \)
14. \( y = \frac{1}{4}x^2 - 2x + 4 \)

9-4 Transforming Quadratic Functions

Compare the graph of each function with the graph of \( f(x) = x^2 \).

15. \( g(x) = x^2 - 5 \)
16. \( g(x) = -\frac{4}{5}x^2 \)

9-5 Solving Quadratic Equations by Graphing

Solve each equation by graphing the related function.

17. \( x^2 - 4x = 0 \)
18. \( 2x - 3 = -\frac{1}{3}x^2 \)
19. \( -8x^2 - 4 = -16x \)
20. A baseball is thrown upward with an initial velocity of 96 feet per second. The equation \( h = -16t^2 + 96t \) represents the height, \( h \), of a baseball after \( t \) seconds. Graph the equation. How long will it take the baseball to return to the ground?

![Graph of the equation](graph.png)

9-6 Solving Quadratic Equations by Factoring

Use the Zero Product Property to solve each equation.

21. \((x - 5)(x + 2) = 0\)  
22. \((2x - 5)(4x - 5) = 0\)  
23. \(x(x - 5) = 0\)

Solve each quadratic equation by factoring.

24. \(x^2 + 5x + 6 = 0\)  
25. \(2x^2 + 5x = 12\)  
26. \(4x^2 = 4x - 1\)

9-7 Solving Quadratic Equations by Using Square Roots

Solve using square roots.

27. \(2x^2 = 72\)  
28. \(0 = 5x^2 - 245\)  
29. \(25x^2 - 16 = 0\)

30. \(4x^2 + 13 = 49\)  
31. \(8x^2 + 10 = 42\)  
32. \(36x^2 - 59 = -10\)
Solve. Round to the nearest hundredth.

33. \(84 - 7x^2 = -22\)  
34. \(6x^2 + 44 = 128\)  
35. \(13x^2 - 186 = 94\)

9-8 Completing the Square

Complete the square for each expression.

36. \(x^2 - 14x + \Box\)  
37. \(x^2 + 6x + \Box\)  
38. \(x^2 - 11x + \Box\)

Solve by completing the square.

39. \(x^2 + 10x - 11 = 0\)  
40. \(x^2 - 24x + 63 = 0\)  
41. \(2x^2 - 6x = 20\)

42. \(3x^2 + 4x + 4 = 3\)  
43. \(4x^2 - 12 = 0\)  
44. \(x^2 - 2x = 2\)

45. The area of a rectangle is given by \(A = x^2 + 4x - 5\). Find the expressions for possible lengths and widths of the rectangle.

9-9 The Quadratic Formula and the Discriminant

Solve using the Quadratic Formula. Round your answer to the nearest hundredth.

46. \(2x^2 - 4x - 3 = 0\)  
47. \(4x^2 + 7x + 2 = 0\)  
48. \(8x^2 + 10x - 33 = 0\)

49. \(x^2 + 2x = 1\)  
50. \(2x^2 = 1 - 5x\)  
51. \(x(x - 2) = 4\)
Find the number of solutions of each equation using the discriminant.

52. \(14x^2 - 19x - 40 = 0\)  
53. \(10x^2 - 9x + 6 = 0\)  
54. \(-3x^2 = 18x + 27\)

55. \(x^2 - 16x = -64\)  
56. \(3x^2 = -2x - 5\)  
57. \(2x^2 - 5x - 12 = 0\)
CHAPTER 9 Big Ideas

Answer these questions to summarize the important concepts from Chapter 9 in your own words.

1. Explain how to find the axis of symmetry of a parabola that opens upward or downward by using zeros.

2. Explain how to find the vertex of a parabola that opens upward or downward.

3. What are the steps of solving a quadratic equation by factoring?

4. What are the steps for solving a quadratic equation by completing the square?

For more review of Chapter 9:

- Complete the Chapter 9 Study Guide and Review on pages 662–665 of your textbook.
- Complete the Ready to Go On quizzes on pages 621 and 661 of your textbook.
This table contains important vocabulary terms from Chapter 10. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>bar graph</td>
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<tr>
<td>box-and-whisker plot</td>
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<td>circle graph</td>
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<tr>
<td>Term</td>
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<td>Definition</td>
<td>Clarifying Example</td>
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<td>stem-and-leaf plot</td>
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</table>
Lesson Objectives
Organize data in tables and graphs; choose a table or graph to display data

Vocabulary
bar graph (p. 678): _________________________________________________
________________________________________________________________
line graph (p. 679): ________________________________________________
________________________________________________________________
circle graph (p. 680): _______________________________________________
________________________________________________________________

Key Concepts
Think and Discuss (p. 682)
Get Organized In each box, tell which kind of graph is described.

Graph Type

[Diagram with boxes for bar graph, line graph, and circle graph]
Lesson Objectives
Create stem-and-leaf plots; Create frequency tables and histograms

Vocabulary

stem-and-leaf plot (p. 687): __________________________________________
________________________________________________________________
frequency (p. 688): _________________________________________________
________________________________________________________________
frequency table (p. 688): ____________________________________________
________________________________________________________________
histogram (p. 688): _________________________________________________
________________________________________________________________
cumulative frequency (p. 689): _______________________________________
________________________________________________________________

Key Concepts

Think and Discuss (p. 689)

Get Organized Complete the graphic organizer.

Bar Graphs

How are they alike?

Histograms

How are they different?
Lesson Objectives
Describe the central tendency of a data set; Create box-and-whisker plots

Vocabulary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean (p. 694):</td>
<td></td>
</tr>
<tr>
<td>median (p. 694):</td>
<td></td>
</tr>
<tr>
<td>mode (p. 694):</td>
<td></td>
</tr>
<tr>
<td>range (p. 694):</td>
<td></td>
</tr>
<tr>
<td>outlier (p. 695):</td>
<td></td>
</tr>
<tr>
<td>quartile (p. 695):</td>
<td></td>
</tr>
<tr>
<td>interquartile range (IQR) (p. 695):</td>
<td></td>
</tr>
<tr>
<td>box-and-whisker plot (p. 695):</td>
<td></td>
</tr>
</tbody>
</table>
Key Concepts

Think and Discuss (p. 696)

Get Organized  Tell which measure of central tendency answers each question.

<table>
<thead>
<tr>
<th>Measures of Central Tendency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measure</strong></td>
</tr>
<tr>
<td>&quot;What is the average?&quot;</td>
</tr>
<tr>
<td>&quot;What is the most common value?&quot; (Can also be used to describe non-numerical data, such as favorite color.)</td>
</tr>
</tbody>
</table>
Lesson Objectives
Recognize misleading graphs; Recognize misleading statistics

Vocabulary
random sample (p. 703):

Key Concepts

Think and Discuss (p. 703)

Get Organized  Complete the graphic organizer. Add more boxes if needed.

Ways Graphs and Statistics can be Misleading
Lesson Objectives
Determine the experimental probability of an event; Use experimental probability to make predictions

Vocabulary
experiment (p. 713): ________________________________________________

trial (p. 713): _____________________________________________________

outcome (p. 713): _________________________________________________

sample space (p. 713): _____________________________________________

event (p. 713): __________________________________________________

probability (p. 713): ____________________________________________

experimental probability (p. 714): _________________________________

prediction (p. 715): _____________________________________________
**Key Concepts**

Experimental Probability (p. 714):

Think and Discuss (p. 715)

**Get Organized** In each box, write an example of an event that has the given likelihood.

- Impossible:
- As Likely as Not:
- Certain:
- Unlikely:
- Likely:
Lesson Objectives

Determine the theoretical probability of an event; Convert between probabilities and odds

Vocabulary

equally likely (p. 720):

theoretical probability (p. 720):

fair (p. 720):

complement (p. 721):

odds (p. 722):
Key Concepts

Theoretical Probability (p. 720):

\[
\text{theoretical probability} = \frac{\text{number of ways the event can occur}}{\text{total number of equally likely outcomes}}
\]

Odds (p. 722):

<table>
<thead>
<tr>
<th>ODDS IN FAVOR OF AN EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ODDS AGAINST AN EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 723)

Get Organized  Complete the graphic organizer using the spinner.

<table>
<thead>
<tr>
<th>Probabilities on Spinner</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P(\text{gray}) )</td>
</tr>
<tr>
<td>( P(\text{not gray}) )</td>
</tr>
<tr>
<td>Odds in favor of gray</td>
</tr>
<tr>
<td>Odds against gray</td>
</tr>
</tbody>
</table>
Lesson Objectives

Find the probability of independent events; Find the probability of dependent events

Vocabulary

independent events (p. 726): _________________________________________
________________________________________________________________
dependent events (p. 726): __________________________________________
________________________________________________________________

Key Concepts

Probability of Independent Events (p. 727):

Probability of Dependent Events (p. 729):

Think and Discuss (p. 730)

Get Organized  Complete the graphic organizer.

Example of dependent events:  Example of independent events:
Lesson Objectives
solve problems involving permutations; solve problems involving combinations

Vocabulary

compound event (p. 737): ___________________________________________
________________________________________

combination (p. 737): _______________________________________________
________________________________________

permutation (p. 737): _______________________________________________
________________________________________
Key Concepts

Fundamental Counting Principle (p. 736):

If there are \( m \) ways to choose a first item and \( n \) ways to choose a second item after the first item has been chosen, then there are \( m \cdot n \) ways to choose both items.

Permutations (p. 738):

<table>
<thead>
<tr>
<th>FORMULA</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLE</td>
</tr>
</tbody>
</table>

Combinations (p. 739):

<table>
<thead>
<tr>
<th>FORMULA</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLE</td>
</tr>
</tbody>
</table>
Think and Discuss (p. 739)

Get Organized  Complete the graphic organizer.

<table>
<thead>
<tr>
<th><strong>Fundamental Counting Principle</strong></th>
<th><strong>Permutation</strong></th>
<th><strong>Combination</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>When to use:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Formula:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10-1 Organizing and Displaying Data

1. The table shows fifty students’ favorite colors. Choose a type of graph to display the given data. Make the graph, and explain why you chose that type of graph.

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>blue</td>
</tr>
<tr>
<td>11</td>
<td>pink</td>
</tr>
<tr>
<td>17</td>
<td>red</td>
</tr>
<tr>
<td>10</td>
<td>yellow</td>
</tr>
<tr>
<td>6</td>
<td>green</td>
</tr>
</tbody>
</table>

10-2 Frequency and Histograms

2. Eleven tenth-grade classes had a car wash. The number of cars washed in a weekend is given below. Use the data to make a stem-and-leaf plot.

15, 13, 9, 15, 30, 20, 26, 23, 23, 21, 18

3. The test scores of a science class are given below. Use the data to make a frequency table with intervals.

73, 55, 82, 96, 76, 62, 43, 90, 68, 70, 85, 59, 66, 77, 81, 85, 65, 100, 61, 72, 42, 80, 75

10-3 Data Distributions

4. The average monthly rainfall in twelve consecutive months in one city was 73.6 mm, 62.6 mm, 90.5 mm, 95.6 mm, 117.5 mm, 95.8 mm, 113.2 mm, 100.5 mm, 82.8 mm, 72.3 mm, 94.4 mm, and 83.3 mm.

a. Find the mean, median, mode, and range of the monthly rainfall.
b. Which value describes the average yearly rainfall?


c. Which value describes the spread of the data?

10-4 Misleading Graphs and Statistics

5. The graph shows how students divide a 24 hour day. Explain why the graph is misleading. What might people believe because of the graph? Who might want to use this graph?

10-5 Experimental Probability

An experiment consists of pushing the random button on a MP3 player with seven different genres. Use the results in the table to find the experimental probability of each event.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>9</td>
</tr>
<tr>
<td>Alternative</td>
<td>11</td>
</tr>
<tr>
<td>Rock</td>
<td>16</td>
</tr>
<tr>
<td>Classical</td>
<td>6</td>
</tr>
<tr>
<td>Country</td>
<td>11</td>
</tr>
<tr>
<td>Jazz</td>
<td>12</td>
</tr>
<tr>
<td>Reggae</td>
<td>5</td>
</tr>
</tbody>
</table>

6. selecting Reggae

7. selecting Urban and Classical

8. not selecting Jazz

9. selecting a genre that does not begin with the letter R

10. selecting a genre that begins with the letter C
10-6 Theoretical Probability

Find the theoretical probability of each outcome.

11. randomly choosing the letter E from the letters in TENNESSEE

12. flipping 3 coins and having all land heads up

13. The probability of winning a game is 40%. What are the odds of not winning?

14. rolling an even number on a number cube that is not a prime number

15. The odds against choosing a red marble from a bag are 2:9. What is the probability of choosing a red marble?

10-7 Independent and Dependant Events

16. A blue number cube and a yellow number cube are tossed. What is the probability that the number on the blue cube is even and the number on the yellow cube is less than 5?

17. Brian has a jar of quarters from 3 different states: 10 Ohio quarters, 15 Utah quarters and 25 Vermont quarters. Suppose Brian removes 3 quarters from the jar without replacing any of them. What is the probability that he will remove an Ohio quarter on the first draw, a Utah quarter on the second draw, and a Vermont quarter on the final draw?

18. A three-person endurance team is chosen randomly from a group of three men and three women. What is the probability that the team will consist of one women and one man?

10-8 Combinations and Permutations

19. There are 6 members of a club. How many ways can they elect a treasurer and a secretary?
20. How many ways can a sample of 4 chocolates be selected from a box of 12 chocolates? 

21. Seven students are in the finals of a dance competition. Only first, second, and third place are awarded. How many ways can the students finish in the competition? 

22. A standard deck of cards consists of 4 suits (spades, hearts, diamonds, and clubs) of 13 cards each. How many different ways can 5 cards be chosen from the deck? 

23. How many different ways can 5 students line up in a row of 5? 

24. A soccer team has 13 players. How many different ways can the coach choose two players to be captains? 
Answer these questions to summarize the important concepts from Chapter 10 in your own words.

1. Explain how to find the median when there is an even number of data values in a data set.

2. List four ways graphs and statistics can be misleading.

3. Explain the difference between experimental and theoretical probability.

4. Explain the difference between independent and dependent events. Give an example of an independent and a dependent event.

5. There are 15 players on the softball team. How many different ways can the coach choose 9 starters? Tell whether this situation involves combinations or permutations. Explain.

For more review of Chapter 10:
- Complete the Chapter 10 Study Guide and Review on pages 750–753.
- Complete the Ready to Go On quizzes on pages 711 and 745.
This table contains important vocabulary terms from Chapter 11. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>common ratio</td>
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<td></td>
</tr>
<tr>
<td>compound interest</td>
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<td></td>
<td></td>
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<tr>
<td>exponential decay</td>
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<td></td>
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<tr>
<td>exponential function</td>
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<td></td>
<td></td>
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<tr>
<td>exponential growth</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>extraneous solution</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>half-life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Page</td>
<td>Definition</td>
<td>Clarifying Example</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------</td>
<td>------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>geometric sequence</td>
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</tr>
<tr>
<td>like radicals</td>
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<td></td>
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<tr>
<td>radical equation</td>
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<tr>
<td>radical expression</td>
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<tr>
<td>radicand</td>
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<td></td>
<td></td>
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<tr>
<td>square root function</td>
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</tr>
</tbody>
</table>
Lesson Objectives
Recognize and extend geometric sequences; Find the nth term of a geometric sequence

Vocabulary
geometric sequence (p. 766) _________________________________________

common ratio (p. 766) ______________________________________________

Key Concepts
Think and Discuss (p. 768)
Get Organized In each box, write a way to represent the geometric sequence.

Ways to Represent Geometric Sequence 1, 2, 4, 8, ...

Table
Formula
Words
Lesson Objectives
Evaluate exponential functions; Identify and graph exponential functions

Vocabulary
exponential function (p. 772)

Key Concepts
Exponential Functions (p. 772):

Think and Discuss (p. 775)
Get Organized In each box, give an example of an appropriate exponential function and sketch its graph.
Lesson Objectives

Solve problems involving exponential growth and decay

Vocabulary

- exponential growth (p. 781)
- compound interest (p. 782)
- exponential decay (p. 783)
- half-life (p. 783)

Key Concepts

Exponential Growth (p. 781):

Compound Interest (p. 782):
Exponential Decay (p. 783):

Half-life (p. 783):

Think and Discuss (p. 784)

Get Organized  Complete the graphic organizer.
Lesson Objectives

Compare linear, quadratic, and exponential models; Given a set of data, decide which type of function models the data and write an equation to describe the function.

Key Concepts

General Forms of Functions (p. 791):

<table>
<thead>
<tr>
<th>LINEAR</th>
<th>QUADRATIC</th>
<th>EXPONENTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 792)

Get Organized In each box, list some characteristics and sketch a graph of each type of model.

Modeling Data

Linear | Quadratic | Exponential
Lesson Objectives
Identify square-root functions and their domains and ranges; Graph square-root functions

Vocabulary
square-root function (p. 798)

Key Concepts
Square-Root Function (p. 798):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>EXAMPLES</th>
<th>NONEXAMPLES</th>
</tr>
</thead>
</table>

Translation of the Graph of $f(x) = \sqrt{x}$ (p. 799):
Think and Discuss (p. 800)

Get Organized In each box, graph the function and give its domain.

Square-Root Functions

\[ y = \sqrt{x} \]
\[ y = \sqrt{x} + 5 \]
\[ y = \sqrt{5x} \]
Lesson Objectives
Simplify radical expressions

Vocabulary
radical expression (p. 805)

radicand (p. 805)

Key Concepts
Simplest Form of a Square-Root Expression (p. 805):

Product Property of Square Roots (p. 806):

Quotient Property of Square Roots (p. 806):
Think and Discuss (p. 808)

Get Organized
In each box, write the property and give an example.

<table>
<thead>
<tr>
<th>Product Property of Square Roots</th>
<th>Quotient Property of Square Roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Words</td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td></td>
</tr>
</tbody>
</table>
Adding and Subtracting Radical Expressions

Lesson Objectives
Add and subtract radical expressions

Vocabulary
like radicals (p. 811)

Key Concepts
Think and Discuss (p. 813)

Get Organized  Complete the graphic organizer.

[Diagram: Like Radicals
  Definition
  Examples
  Nonexamples]
Lesson Objectives
Multiply and divide radical expression; Rationalize denominators

Key Concepts
Think and Discuss (p. 818)
Get Organized In each box, give an example and show how to simplify it.
Lesson Objectives
Solve radical equations

Vocabulary
radical equation (p. 822)
extraneous solution (p. 824)

Key Concepts
Power Property of Equality (p. 822):

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss (p. 826)
Get Organized  Write and solve a radical equation using the boxes to show each step.

Solving Radical Equations
1.  

2.  

3.  

4.  

WORDS NUMBERS ALGEBRA
11.1 Geometric Sequences

Find the next three terms in each geometric sequence.

1. 16, -8, 4, -2, 1, ...
2. 0.01, 0.06, 0.36, 2.16, ...
3. 1458, 486, 162, 54, ...

4. What is the 8th term of the geometric sequence 1, 3, 9, 27, ...?

5. The first term of a geometric sequence is 77, and the common ratio is 0.7. What is the 7th term of the sequence?

6. The ninth term of a geometric sequence is -3. The common ratio is -1. Find the first term of the sequence.

11.2 Exponential Functions

7. The function \( f(x) = 2500(0.5)^x \), where \( x \) is the time in years, models the number of gaming systems sold to students at a middle school. How many gaming systems will be sold in 4 years?

Graph each exponential function.

8. \( y = 6(2)^x \)
9. \( y = -5(0.5)^x \)
10. \( y = -\left(\frac{1}{2}\right)^x \)
11-3 Exponential Growth and Decay

Write a function to model each situation. Then find the value of the function after the given amount of time.

11. Ed invested $5000 for college tuition and he expects to receive 5% interest annually; 5 years.

12. A $1600 computer is losing value at a rate of 10% per year; 3 years.

13. $3500 is invested at a rate of 5.5% compounded quarterly; 4 years.

14. Francium-233 has a half-life of approximately 22 minutes. Find the amount of francium-233 left from an 88-gram sample after 54 minutes.

11-4 Linear, Quadratic, and Exponential Models

Look for a pattern in each data set to determine which kind of model best describes the data.

15. \{(-20, 17), (-10, 12), (0, 7), (10, 2), (20, -3)\}

16. \{(-7, 5), (-6, -4), (-5, -7), (-4, -4), (-3, 5)\}

Graph each data set. Which kind of model best describes the data?

17. \{(-2, -12), (2, 2), (6, 8), (10, 6), (14, -4)\}

18. \{(-1, 0.125), (0, 0.25), (1, 0.5), (2, 1), (4, 4)\}
11-5 Square-Root Functions

Find the domain of each square-root function.

19. \( y = \sqrt{x} + 2 - 1 \)  
20. \( y = \sqrt{4x} - 1 \)  
21. \( y = \sqrt{2(x - 4)} + 3 \)

Graph each square-root function.

22. \( y = \sqrt{x + 3} - 2 \)  
23. \( y = \frac{1}{4}\sqrt{x + 2} \)

11-6 Radical Expressions

Simplify. All variables represent nonnegative numbers.

24. \( \sqrt{108} \)  
25. \( \sqrt[4]{\frac{324}{4}} \)  
26. \( -\sqrt{25a^4b^6} \)

27. \( \sqrt[4]{\frac{72}{49}} \)  
28. \( \sqrt[6]{\frac{16a^6}{b^4}} \)  
29. \( \sqrt[11]{\frac{98a^2b^4}{48b^2}} \)

30. How long is the diagonal of a football field that is 100 yards long and 50 yards wide? Give the answer as a radical expression in simplest form. Then estimate the length to the nearest yard.

11-7 Adding and Subtracting Radical Expressions

Simplify each expression.

31. \( 2\sqrt{3} + 5\sqrt{3} \)  
32. \( 2\sqrt{7a} + 5\sqrt{63a} \)  
33. \( 5\sqrt{3} + 2\sqrt{75} \)

34. \( 4\sqrt{5} + 3\sqrt{7} \)  
35. \( 5\sqrt{8} - 3\sqrt{18} + \sqrt{3} \)  
36. \( 2\sqrt{20x} + 3\sqrt{5x} \)
11-8 Multiplying and Dividing Radical Expressions

Multiply. Write each product in simplest form.

37. $\sqrt{3}\sqrt{5}$  
38. $2\sqrt{18}(3\sqrt{8})$  
39. $2\sqrt{6}(3\sqrt{7})$

40. $(2\sqrt{5})^2$  
41. $(6 - \sqrt{2})(6 + \sqrt{2})$  
42. $(\sqrt{a} - 5)(3\sqrt{a} + 7)$

Simplify each quotient.

43. $\frac{\sqrt{6}}{\sqrt{3}}$  
44. $\frac{4}{2\sqrt{3}}$  
45. $\frac{\sqrt{50}}{\sqrt{y^2}}$

46. $\frac{6\sqrt{10}}{8\sqrt{2}}$  
47. $\frac{-12\sqrt{24}}{3\sqrt{2}}$  
48. $\frac{2\sqrt{x}}{\sqrt{x + \sqrt{y}}}$

11-9 Solving Radical Equations

Solve each equation. Check your answer.

49. $\sqrt{x} = 5$  
50. $\sqrt{2x} - 4 = 2$  
51. $\sqrt{x} + 7 = 10$

52. $\frac{\sqrt{x}}{4} = 5$  
53. $\sqrt{x} + 5 - \sqrt{x} = 1$  
54. $\sqrt{7} - x + \sqrt{x} + 11 = 6$

55. A rectangle has an area of 72 $m^2$. Its length is 9 $m$, and its width is $(\sqrt{x} - 20)$ $m$. What is the value of $x$?
Answer these questions to summarize the important concepts from Chapter 11 in your own words.

1. Explain the difference between exponential growth and exponential decay.

2. When the independent variable changes by a constant amount, what are the characteristics of linear functions, quadratic functions, and exponential functions?

3. Explain the difference between the graphs $f(x) = \sqrt{x} + 4$ and $f(x) = \sqrt{x} + 4$.

4. Explain how you know when a square-root expression is in simplest form.

5. Explain how to solve the equation $\sqrt{x} - 5 = 20$. 
For more review of Chapter 11:

- Complete the Chapter 11 Study Guide and Review on pages 836–839 of your textbook.
- Complete the Ready to Go On quizzes on pages 797 and 831 of your textbook.
This table contains important vocabulary terms from Chapter 12. As you work through the chapter, fill in the page number, definition, and a clarifying example for each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
<th>Definition</th>
<th>Clarifying Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>asymptote</td>
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<td></td>
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<tr>
<td>discontinuous</td>
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<td>function</td>
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<tr>
<td>excluded value</td>
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<td>equation</td>
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<td>Term</td>
<td>Page</td>
<td>Definition</td>
<td>Clarifying Example</td>
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<tr>
<td>rational expression</td>
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<tr>
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**Lesson Objectives**

Identify, write, and graph inverse variations

**Vocabulary**

inverse variation (p. 851):

**Key Concepts**

Inverse Variations (p. 851):

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Product Rule for Inverse Variation (p. 853):

**Think and Discuss (p. 854)**

**Get Organized** In each box, write an example of the parts of the given inverse variation.

\[ y = \frac{8}{x} \]

- Constant of variation
- Graph
- Solutions
Lesson Objectives
Identify excluded values of rational functions; graph rational functions

Vocabulary

rational function (p. 858): ________________________________

excluded value (p. 858): ________________________________

discontinuous function (p. 858): ________________________________

asymptote (p. 858): ________________________________
**Key Concepts**

**Identifying Asymptotes (p. 859):**

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**Think and Discuss (p. 862)**

Get Organized In each box, find the asymptotes for the given rational function.

\[
y = \frac{1}{x - 2}
\]

\[
y = \frac{1}{x + 2}
\]

\[
y = \frac{1}{x} + 2
\]

\[
y = \frac{1}{x} - 2
\]
**Lesson Objectives**
Simplify rational expressions; Identify excluded values or rational expressions

**Vocabulary**
rational expression (p. 851):

**Key Concepts**

**Think and Discuss** (p. 869)
**Get Organized** In each box, find the asymptotes for the given rations function.

**Ways of Simplifying Rational Expressions**

- Using properties of exponents
- Using opposite binomials
- Factoring the numerator
- Factoring the denominator
Lesson Objectives
Multiply and divide rational expressions

Key Concepts

Multiplying Rational Expressions (p. 878):

Dividing Rational Expressions (p. 880):

Think and Discuss (p. 881)

Get Organized In each box, describe how to perform the operation with rational expressions.
Lesson Objectives
add and subtract rational expression with like denominators; add and subtract rational expressions with unlike denominators

Key Concepts
Adding Rational Expressions with Like Denominators (p. 885):

Think and Discuss (p. 888)
Get Organized In each box, compare and contrast operations with fractions and rational numbers.
**Lesson Objectives**
Divide a polynomial by a monomial or binomial

**Key Concepts**
Dividing Polynomials (p. 893):

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**Think and Discuss (p. 897)**

**Get Organized** In each box, show an example

Long Division

- Polynomials
- Whole numbers
Lesson Objectives
Solve rational equations; Identify extraneous solutions

Vocabulary
rational equation (p. 900):
__________________________________________________________________

Key Concepts

Think and Discuss (p. 903)

Get Organized In each box, write the solution and check.

Solving Rational Equations

- Solve by using cross products.
- Solve by using the LCD.
12-1 Inverse Variation

Tell whether each relationship represents an inverse variation. Explain.

1. \[
\begin{array}{c|c c c}
 x & -8 & -6 & -4 \\
 y & -2 & -3 & -4 \\
\end{array}
\]

2. \[y = \frac{x}{4}\]

3. \[y = \frac{4}{x}\]

4. \[xy = -4\]

5. \[x + y = -4\]

6. Write and graph the inverse variation in which \(y = \frac{1}{2}\) and \(x = 18\).

12-2 Rational Functions

Identify the excluded values and the vertical and horizontal asymptotes for each rational function. Then graph each function.

7. \[y = \frac{3}{x}\]

8. \[y = \frac{5}{x + 3}\]

9. \[y = \frac{5}{2x - 10} + 1\]
12-3 Simplifying Rational Expressions

Simplify each rational expression, if possible. Identify any excluded values.

10. \( \frac{8x^4}{2x^5} \)  
11. \( \frac{12x - 6}{14x - 7} \)  
12. \( \frac{8 - x}{x^2 - 7x - 8} \)

13. \( \frac{4x - 6}{2x^2 - x - 3} \)  
14. \( \frac{x^2 + 4x}{x^2 - 16} \)  
15. \( \frac{4x^2 + 3x - 10}{25 - 16x^2} \)

12-4 Multiplying and Dividing Rational Expressions

Multiply or divide. Simplify your answer.

16. \( \frac{7x^2}{3} \cdot \frac{9}{14x} \)  
17. \( \frac{9x^2}{x^2 + 12x + 36} \div \frac{12x}{x^2 + 6x} \)

18. \( \frac{x^2 + 2x - 15}{x^2 - 4x - 45} \div \frac{x^2 + x - 12}{x^2 - 5x - 36} \)

19. \( \frac{25x^2 - 20x + 4}{x^2 - 1} \cdot \frac{x + 1}{10x - 4} \)

12-5 Adding and Subtracting Rational Expressions

Add or subtract. Simplify your answer.

20. \( \frac{y^2}{y - 1} - \frac{1}{y - 1} \)  
21. \( \frac{10x}{5x - 2} + \frac{7x - 2}{5x - 2} \)  
22. \( \frac{8}{y^2 - 4y} + \frac{2}{y} \)
23. \( \frac{x}{x^2 + x - 2} - \frac{1}{x + 2} \)  
24. \( \frac{x}{x^2 - 5x + 6} - \frac{3}{x - 3} \)  
25. \( \frac{1}{x + y} + \frac{3x - 3y}{x^2 - y^2} \)

### 12-6 Dividing Polynomials

Divide.

26. \( (21x^3 - 35x^2) \div 7x \)  
27. \( (8x^4 - 3x^3) \div x^2 \)  
28. \( (25x^5 + 15x^4 - 5x^2) \div 5x^2 \)

Divide using long division.

29. \( (x^2 + 9x + 14) \div (x + 7) \)  
30. \( (x^2 - 9x - 10) \div (x + 1) \)

31. \( (3x^3 - 5x^2 + 10x - 3) \div 3x + 1 \)

### 12-7 Solving Rational Equations

Solve. Check your answers.

32. \( \frac{x - 1}{15} = \frac{2}{5} \)  
33. \( x + 1 = \frac{72}{x} \)  
34. \( \frac{10}{x(x - 2)} + \frac{4}{x} = \frac{5}{x - 2} \)

30. Don can stock shelves in 5 hours. It takes Kim 3 hours to stock the same shelves. How long will it take them to stock the shelves if they work together?
Answer these questions to summarize the important concepts from Chapter 12 in your own words.

1. Explain why \( y = \frac{1}{x - 3} \) has an asymptote at \( x = 3 \).

2. When is a rational expression in simplest form?

3. What are the steps for adding or subtracting rational expressions?

4. What are the steps for using long division to divide a polynomial by a binomial?

For more review of Chapter 12:

- Complete the Chapter 12 Study Guide and Review on pages 910–913 of your textbook.
- Complete the Ready to Go On quizzes on pages 877 and 907 of your textbook.