NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 1.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
algebraic expression al•juh•BRAY•ik		
coefficient CO•i•FISH•unt		
conclusion		
conditional		
counterexample		
data		
deductive reasoning dee•DUK•tiv		
equation EE•KWAY•zhun		
equivalent expressions ee•KWIV•a•lunt		
evaluate ee•val•yoo•WAYT		
factors		
formula FOR•myu•la		
frequency table		
histogram		
hypothesis hi•PA•the•sis		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
if-then statement		
inductive reasoning in•DUK•tiv		
like terms		
line graph		
numerical expression noo•MARE•ik•ul		
order of operations		
population		
product		
quotient		
sample		
sampling		
simplest form		
simplify		
stem-and-leaf plot		
term		
variable VARE•ee•a•bul		
whole numbers		

NAME _____ DATE _____ PERIOD _____

1–1 Reading to Learn Mathematics

Writing Expressions and Equations

Key Terms

algebraic (al je BRAY ik) expression an expression containing numbers and variables along with $+$, $-$, $\times$, and/or $\div$

equation a mathematical sentence that contains $=$

factors quantities being multiplied

numerical (noo MER i cal) expression an expression containing numbers along with $+$, $-$, $\times$, and/or $\div$

product the result of numbers being multiplied

variable (VER y a bull) symbols used to represent unknown numbers

Reading the Lesson

1. Why is the symbol $\times$ avoided in algebra?

2. What are the factors in the algebraic expression $3xy$?

3. Write the Roman numeral of the algebraic expression that best matches each phrase.

a. three more than a number n _____ **I.** $5(x - 4)$

b. five times the difference of x and 4 _____ **II.** $\frac{1}{2}r$

c. one half the number r _____ **III.** $n + 3$

d. the product of x and y divided by 2 _____ **IV.** $\frac{xy}{2}$

4. Translate each sentence into an equation.

a.

Two	times	the sum of x and three	minus	four	equals	four	times	x.

b.

The difference of k and 3	is	two	times	k	divided by	five.

Helping You Remember

5. Explain in your own words the difference between an equation and an expression.

NAME _____ DATE _____ PERIOD _____

1–2 Reading to Learn Mathematics

Order of Operations

Key Terms

order of operations a method to find the correct value of an expression

evaluate (ee val you WATE) find the value of an expression by replacing the variables with numbers

Reading the Lesson

1. The first step in evaluating an expression is to find the value of expressions inside grouping symbols. List three types of grouping symbols found in algebraic expressions.

2. Read the order of operations on page 8 in your textbook. For each of the following expressions, write *addition*, *subtraction*, *multiplication*, or *division* to tell what operation to use first when evaluating the expression.

a. $400 - 5[12 + 9]$

b. $17 + 3 \cdot 6$

c. $69 + 57 \div 3 + 16 \cdot 4$

d. $\frac{19 + 3 \cdot 4}{6 \div 2}$

3. Write the Roman numeral of the sentence that best matches each term.

a. Multiplicative Property of Zero _____

b. Substitution Property _____

c. Symmetric Property _____

d. Transitive Property _____

I. If $2 + 4 = 5 + 1$ and $5 + 1 = 6$, then $2 + 4 = 6$.

II. $4 \cdot 0 = 0$

III. If $12 = 8 + 4$, then $8 + 4 = 12$.

IV. If $n = 2$, then $5n = 5 \cdot 2$.

Helping You Remember

4. The prefix trans- means "across" or "through." Explain how this can help you remember the meaning of the Transitive Property of Equality.

1–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Commutative and Associative Properties

Key Terms

counterexample an example that shows that the statement is not true

simplify Eliminate all parentheses in an expression and then add, subtract, multiply, or divide.

whole numbers the set of numbers {0, 1, 2, 3, …}

Reading the Lesson

1. Write the Roman numeral of the term that best matches each equation.

a. $3 + 6 = 6 + 3$ _____

b. $2 + (3 + 4) = (2 + 3) + 4$ _____

c. $2 \cdot (3 \cdot 4) = (2 \cdot 3) \cdot 4$ _____

d. $2 \cdot (3 \cdot 4) = 2 \cdot (4 \cdot 3)$ _____

I. Associative Property of Addition

II. Associative Property of Multiplication

III. Commutative Property of Addition

IV. Commutative Property of Multiplication

2. What property can you use to change the order of the numbers being added?

3. What property can you use to change the way three numbers being multiplied are grouped?

4. What property can you use to determine whether the sum of two whole numbers will be a whole number?

5. Determine whether the following statement is *true* or *false*. If false, give a counterexample. *Subtraction of whole numbers is commutative.*

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

1–4 Reading to Learn Mathematics

The Distributive Property

Key Terms

coefficient (co e FISH ent) the numerical part of a term
equivalent (e KWIV a lent) expressions expressions whose values are the same
like terms terms with the same variables
simplest form no like terms or grouping symbols
term a number, variable, product, or quotient of numbers and/or variables

Reading the Lesson

1. Explain how the Distributive Property could be used to rewrite $3(1 + 5)$.

2. Explain how the Distributive Property could be used to rewrite $5(6 - 4)$.

3. Write three examples of each type of term.

Term	Example
number	
variable	
product of a number and a variable	
quotient of a number and a variable	

4. Tell how you can use the Distributive Property to write $12m + 8m$ in simplest form. Use the word *coefficient* in your explanation.

Helping You Remember

5. How can the everyday meaning of the word *identity* help you understand and remember what the additive identity is and what the multiplicative identity is?

NAME _____ DATE _____ PERIOD _____

1–5 Reading to Learn Mathematics

A Plan for Problem Solving

Key Terms

formula an equation that states a rule for the relationship between quantities

problem-solving strategies methods of approaching a problem to find a solution

Reading the Lesson

1. List eight strategies to solve problems.

2. A 1-ounce serving of chips has 140 Calories. There are about 14 servings of chips in a bag. How many calories are there in a bag of chips? Answer each question below to use each step in the four-step plan to solve the problem.

Explore What do you know?

What do you want to know?

Plan What is the best strategy to use?

Estimate your answer.

Solve Solve the problem.

Helping You Remember

3. If you cannot remember all the steps of the Four Step Problem-Solving Plan, write a phrase that uses the first letters of the first word in each step. Write those letters here with your phrase.

NAME _____ DATE _____ PERIOD _____

1–6 Reading to Learn Mathematics

Collecting Data

Key Terms

cumulative frequency table a table in which the frequencies are accumulated for each item

data numerical information

frequency table a table of tally marks used to record and display how often events occur

population a large group of data

sample a small group used to represent a population

sampling a method that uses a sample to make predictions about a population

tally marks a type of mark used to display data

Reading the Lesson

Suppose the principal at a school wants to use Saturdays as make-up days when school was closed due to bad weather. The principal selects and then polls a group of students to see if the student body supports the idea.

1. Identify the population and the sample.

The principal needs to decide how to select the students to be polled. Determine whether each is a good sample. Explain why or why not.

2. All of the students are asked to enter through the main doors. Every twenty-fifth student is selected to be polled.

3. Only those students who are in the four classrooms closest to the principal's office are selected for the poll.

4. A computer is programmed to randomly select 10 students.

5. Students are first divided according to grade and then chosen at random from each group.

Helping You Remember

6. What are the characteristics of a good sample?

NAME _____ DATE _____ PERIOD _____

1–7 Reading to Learn Mathematics

Displaying and Interpreting Data

Key Terms

cumulative frequency histogram a histogram for which the frequencies are accumulated for each item

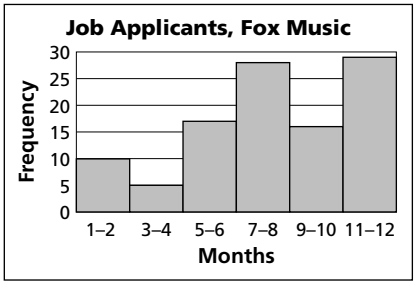
histogram a graph that displays data from frequency tables over equal intervals

line graph data displayed to show trends or changes

stem-and-leaf plot data organized into two columns, stems and leaves

Reading the Lesson

1. The manager of Fox Music tallied the number of people who applied for jobs at the store. This information is displayed as a histogram.



a. In which month was the number of applicants the least?

b. In which month was the number of applicants the most?

2. Mrs. Anderson's science class recorded the daily high temperature every day for 30 days.

High Temperature (°F)					
68	65	68	70	70	70
65	66	68	72	73	76
75	78	81	78	74	71
72	78	77	74	70	68
67	69	68	66	65	63

a. Make a stem-and-leaf plot in the space provided for the daily high temperature.

b. Which temperature occurred most frequently?

c. What were the highest and lowest temperatures recorded?

Helping You Remember

3. At first glance, a histogram looks like a typical bar graph. What are some key features of histograms that can help you to remember how histograms are different from other types of bar graphs?

NAME _____ DATE _____ PERIOD _____

2

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 2.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
absolute value		
additive inverse A•duh•tiv		
coordinate co•OR•duh•net		
coordinate plane		
coordinate system		
dimensions		
element		
graph		
integers IN•tah•jerz		
matrix MAY•triks		
natural numbers		
negative numbers		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
number line		
opposites		
ordered array		
ordered pair		
origin OR•a•jin		
quadrants KWA•druntz		
scalar multiplication SKAY•ler		
Venn diagram		
x-axis		
x-coordinate		
y-axis		
y-coordinate		
zero pair		

NAME _____ DATE _____ PERIOD _____

2–1 Reading to Learn Mathematics

Graphing Integers on a Number Line

Key Terms

absolute value the distance a number is from 0 on a number line

coordinate (co OR di net) the number that corresponds to a point on a number line

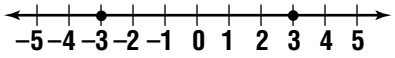
graph to plot points named by numbers on a number line

number line a line with equal distances marked off to represent numbers

Reading the Lesson

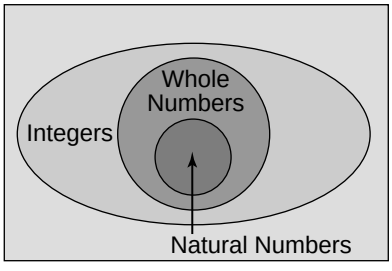
1. Refer to the number line.

a. What do the arrowheads on each end of the number line mean?



b. What is the absolute value of −3? What is the absolute value of 3? Explain.

2. Refer to the Venn diagram shown at the right. Write *true* or *false* for each of the following statements.



a. All whole numbers are integers.

b. All natural numbers are integers.

c. All whole numbers are natural numbers.

d. All natural numbers are whole numbers.

e. All whole numbers are positive numbers.

f. All integers are natural numbers.

g. Whole numbers are a subset of natural numbers.

h. Natural numbers are a subset of integers.

Helping You Remember

3. One way to remember a mathematical concept is to connect it to something you have seen or heard in everyday life. Describe a situation that illustrates the concept of absolute value.

NAME _____ DATE _____ PERIOD _____

2–2 Reading to Learn Mathematics

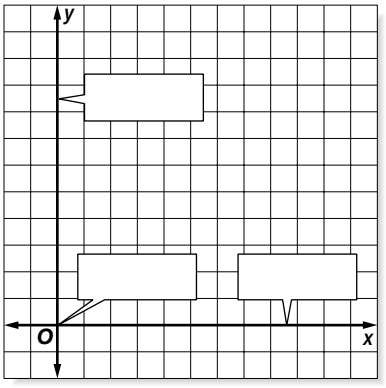
The Coordinate plane

Key Terms

coordinate plane the plane containing the *x*- and *y*-axes
coordinate system the grid formed by the intersection of two perpendicular number lines that meet at their zero points
ordered pair a pair of numbers used to locate any point on a coordinate plane
quadrant one of the four regions into which the *x*- and *y*-axes separate the coordinate plane
***x*-axis** the horizontal number line on a coordinate plane
***y*-axis** the vertical number line on a coordinate plane
***x*-coordinate** the first number in a coordinate pair
***y*-coordinate** the second number in a coordinate pair

Reading the Lesson

1. Identify each part of the coordinate system.



2. Use the ordered pair $(-2, 3)$.

a. Explain how to identify the x- and y-coordinates.

b. Name the x-and y-coordinates.

c. Describe the steps you would use to locate the point at $(-2, 3)$ on the coordinate plane.

3. What does the term *quadrant* mean?

Helping You Remember

4. Describe a method to remember how to write an ordered pair.

2–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Adding Integers

Key Terms

additive inverses two numbers are additive inverses if their sum is 0

opposite additive inverse

zero pair the result of positive algebra tiles paired with negative algebra tiles

Reading the Lesson

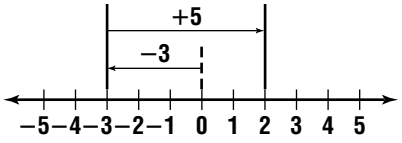
1. Explain how to add integers with the same sign.

2. Explain how to add integers with opposite signs.

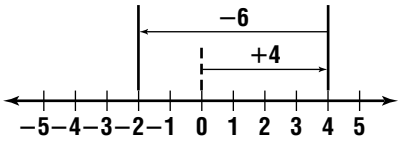
3. If two numbers are additive inverses, what must be true about their absolute values?

4. Use the number line to find each sum.

a. $-3 + 5$



b. $4 + (-6)$



c. How do the arrows show which number has the greater absolute value?

d. Explain how the arrows can help you determine the sign of the answer.

Write an equation for each situation.

5. a five-yard penalty and a 13-yard pass

6. gained 11 points and lost 18 points

7. a deposit of $25 and a withdrawal of $15

Helping You Remember

8. Explain how you can remember the meaning of "zero pair."

NAME _____ DATE _____ PERIOD _____

2–4 Reading to Learn Mathematics

Subtracting Integers

Key Terms

additive inverses two numbers are additive inverses if their sum is 0

opposite additive inverse

zero pair the result of positive algebra tiles paired with negative algebra tiles

Reading the Lesson

1. Write each subtraction problem as an addition problem.

a. $12 - 4$

b. $-15 - 7$

c. $0 - 11$

d. $-20 - 34$

e. $-15 - (-4)$

f. $16 - (-18)$

2. Describe how to find each difference. Then find each difference.

a. $8 - 11$

b. $5 - (-8)$

c. $17 - 14$

d. $-8 - 19$

3. Explain how zero pairs are used to subtract with algebra tiles.

Helping You Remember

4. Explain why knowing the rules for adding integers can help you to subtract integers.

NAME _____ DATE _____ PERIOD _____

2–5 Reading to Learn Mathematics

Multiplying Integers

Key Terms

factors the numbers being multiplied

product the result when two or more factors are multiplied together

Reading the Lesson

1. Complete: If two numbers have different signs, the one number is positive and the other number is _____.

2. Complete the table.

	Multiplication Example	Are the signs of the numbers the *same* or *different*?	Is the product *positive* or *negative*?
a.	$(-4)(9)$		
b.	$(-2)(-13)$		
c.	$5(-8)$		
d.	$6(3)$		

3. Explain what the term "additive inverse" means. Then give an example.

Helping You Remember

4. Describe how you know that the product of -3 and -5 is positive. Then describe how you know that the product of 3 and -5 is negative.

NAME _____ DATE _____ PERIOD _____

2–6 Reading to Learn Mathematics

Dividing Integers

Key Terms

additive inverses two numbers are additive inverses if their sum is 0

opposite additive inverse

zero pair the result of positive algebra tiles paired with negative algebra tiles

Reading the Lesson

1. Write the math sentence *18 divided by 6* two different ways. Then find the quotient.

2. Write *negative* or *positive* to describe each quotient. Explain your answer.

	Expression	Negative or Positive?	Explanation
a.	$15 \div 12$		
b.	$9 \div -10$		
c.	$\frac{35}{-7}$		
d.	$\frac{-78}{-13}$		
e.	$\frac{-13x}{2}$		
f.	$\frac{46}{6y}$		

Helping You Remember

3. Explain how knowing the rules for multiplying integers can help you to divide integers.

3–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 3.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
cross products		
empty set		
equivalent equations		
inequality IN·ee·KWAL·a·tee		
mean		
measure of central tendency		
measure of variation		
median		
mode		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
open sentence		
range		
rational numbers RA·shun·ul		
replacement set		
sequence SEE·kwens		
solution		
solving		
statement		
unit cost		

3–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Rational Numbers

Key Terms

cross products the products of the terms on the diagonals when two fractions are compared

inequality (in e KWAL I tee) a statement that compares two nonequal measures

rational number a number that can be expressed as $\frac{a}{b}$, where a and b are integers and $b \neq 0$

unit cost the cost per unit used to make comparisons

Reading the Lesson

1. Complete the following sentence using the words *denominator*, *fraction*, and *numerator*. You know that a number is a rational number if it can be written as a

_____ that has a _____ and

_____ that are integers, where the denominator is not equal to zero.

2. Explain why $\frac{-3}{7}$, $0.\overline{6}$, and 15 are rational numbers.

3. List the four symbols that indicate that a sentence is an inequality.

4. Which is a better buy, three 1-liter bottles of soda for \$2.25, or one 2-liter bottle for \$1.60? Explain your answer.

Helping You Remember

5. Suppose you are comparing a pair of fractions. Describe a method to remember how to determine which fraction is greater.

3–2

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Adding and Subtracting Rational Numbers

Key Terms

rational number a number that can be expressed as $\frac{a}{b}$, where a and b are integers and $b \neq 0$

Reading the Lesson

1. To add two rational numbers, you can use a number line. Each number will be represented by an arrow.

a. Where on the number line does the arrow for the first number begin?

b. Arrow for negative numbers will point to the _____ (left/right). Arrows for positive numbers will point to the _____ (left/right).

2. Two students added the same pair of rational numbers. Both students got the correct sum. One student used a number line. The other student used absolute value. Then they compared their work.

a. How do the arrows show which number has the greater absolute value?

b. If the longer arrow points to the left, then the sum is _____ (positive/negative). If the longer arrow points to the right, then the sum is _____ (positive/negative).

3. Identify when the Commutative Property (+) and the Associative Property (+) are used and then find the sum of $13.2 + (-15.9) + 8.1$.

a. $13.2 + 8.1 + (-15.9)$ _____ (Comm. Prop. (+)/Assoc. Prop. (+))

b. $(13.2 + 8.1) + (-15.9)$ _____ (Comm. Prop. (+)/Assoc. Prop. (+))

c. $(13.2 + 8.1) + (-15.9) =$ _____

Helping You Remember

4. Explain why knowing the rules for adding and subtracting integers is helpful when adding and subtracting rational numbers.

NAME _____ DATE _____ PERIOD _____

3–3 Reading to Learn Mathematics

Mean, Median, Mode, and Range

Key Terms

mean the sum of the numbers in a set of data divided by the number of items of data

measure of central tendency a number used to describe a set of data because it represents a middle value

measure of variation a number used to describe the distribution of a set of data

median the middle number when data are arranged in numerical order

mode the number that occurs most often in a set of data

range the difference between the greatest and least values in a set of data

Reading the Lesson

1. Amalia received scores of 8.2, 9.0, 7.3, 8.2, 7.7, 8.6, and 8.4 in a diving competition. Which measure of central tendency should be used to find each of the following? Then solve.

a. the score Amalia received the most often

b. her average score

c. the middle score

2. Use the stem-and-leaf plot shown at the right.

a. What is the median of the data set? Describe how you found your answer.

Stem	Leaf
2	0 1 1 2 5
3	2 2 2 7 9 9
4	1 3 3
5	6 6 8 9
6	0 1 8 8 8

4|2 = 42

b. What is the mean? Round to the nearest tenth if necessary. Describe how you found your answer.

c. What is the mode? Describe how you found your answer.

Helping You Remember

3. Use a dictionary or the Internet to find the definition of *median*. How is the everyday definition similar to the mathematical definition?

3–4

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Equations

Key Terms

open sentence a sentence that is neither true nor false until the variable has been replaced by a number

replacement set a set of numbers from which replacements for a variable may be chosen

solution the replacement for a variable that results in a true sentence

solving finding the replacement for a variable that results in a true sentence

statement a sentence that is either true or false, but not both

Reading the Lesson

1. How can you tell whether a mathematical sentence is an open sentence?

2. Consider the equation $3n + 6 = 15$ with the replacement set $\{0, 1, 2, 3, 4, 5\}$.

a. Describe the process to find the solution(s) of the equation.

b. Complete the chart to find the solution(s) of the equation.

Value for n	$3n + 6 = 15$	True or False?
0	$3(0) + 6 \stackrel{?}{=} 15$	false
1	$3(1) + 6 \stackrel{?}{=} 15$	false
2	$3(2) + 6 \stackrel{?}{=} 15$	false
3	$3(3) + 6 \stackrel{?}{=} 15$	true
4	$3(4) + 6 \stackrel{?}{=} 15$	false
5	$3(5) + 6 \stackrel{?}{=} 15$	false

Helping You Remember

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

3–5

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Equations by Using Models

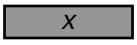
Key Terms

solution the replacement for a variable that results in a true sentence

solving finding the replacement for a variable that results in a true sentence

Reading the Lesson

1. For each algebra tile, write the part of the equation that it represents.

a. 

b. 

c. 

_____ _____ _____

2. In the space provided below draw the algebra tiles used for each step to solve the equation $x - 2 = 4$.

a. Step 1

b. Step 2

c. Step 3

d. Step 4

Helping You Remember

3. Describe how using algebra tiles can help you solve an equation.

3–6

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Addition and Subtraction Equations

Key Terms

equivalent equation when the same number is added to each side of an equation

Reading the Lesson

1. To solve $x + 17 = 46$ using the Subtraction Property of Equality, you would subtract

_____ from each side.

2. To solve $y - 9 = -30$ using the Addition Property of Equality, you would add

_____ to each side.

3. Write an equation that you could solve by subtracting 32 from each side.

4. A student used the Subtraction Property of Equality to solve an equation. Explain why it would also be possible to use the Addition Property of Equality to solve the equation.

5. Chang is using algebra tiles to model the equation $x + 4 = 2$. Describe how to solve this equation with algebra tiles.

Helping You Remember

6. Explain how you decide whether to use the Addition Property or the Subtraction Property of Equality to solve an equation.

3–7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Equations Involving Absolute Value

Key Terms

empty set a solution set with no members, symbolized by { } or Ø

Reading the Lesson

1. Determine whether each sentence is *sometimes*, *always*, or *never* true. Explain.

a. $|x - 3| = 12$

b. $-3 = |m + (-6)|$

c. $|n| - 8 = 4$

d. $6 = |y| + 7$

e. $4 = |j|$

2. James solved the following absolute value equation. Did he solve the problem correctly? Explain.

$$|x - 6| - 3 = 5$$

$$|x - 6| - 3 + 3 = 5 + 3$$

$$|x - 6| = 8$$

$$x = 14$$

Helping You Remember

3. Use a dictionary or the Internet to find the definition of *compound*. How is the everyday definition similar to the mathematical definition?

4

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 4.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
combination		
consecutive integers con·SEC·yoo·tiv		
event		
Fundamental Counting Principle		
factorial fak·TOR·ee·ul		
grouping symbols		
identity		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
multiplicative inverses mul·tah·PLIK·uh·tiv		
outcomes		
permutation PUR·myu·TAY·shun		
reciprocal ree·SIP·ruh·kul		
sample space		
tree diagram		

4–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Multiplying Rational Numbers

Key Terms

rational numbers a number that can be expressed in the form of a fraction $\frac{a}{b}$, where a and b are integers and $b \neq 0$

Reading the Lesson

1. Write the Roman numeral of the property that best matches each sentence.

a. For any numbers a and b, $ab = ba$.

b. For any numbers a, b, and c, $(ab)c = a(bc)$.

c. The product of any number and -1 is the additive inverse of the number.

d. The sum, difference, or product of two rational numbers is also a rational number.

I. Multiplicative Property of -1

II. Commutative Property of Multiplication

III. Closure Property of Rational Numbers

IV. Associative Property of Multiplication

2. Write *negative* or *positive* to describe the product. Explain your answer.

	Expression	Negative or Positive?	Explanation
a.	$-6.2 \cdot (-0.3)$		
b.	$4(-8.2)$		
c.	$\frac{-4}{3}(6)$		
d.	$\frac{-3}{8} \cdot \frac{-5}{7}$		

Helping You Remember

3. How would you explain the rules for multiplying fractions to a classmate?

NAME _____ DATE _____ PERIOD _____

4–2 Reading to Learn Mathematics

Counting Outcomes

Key Terms

event one of the possible outcomes

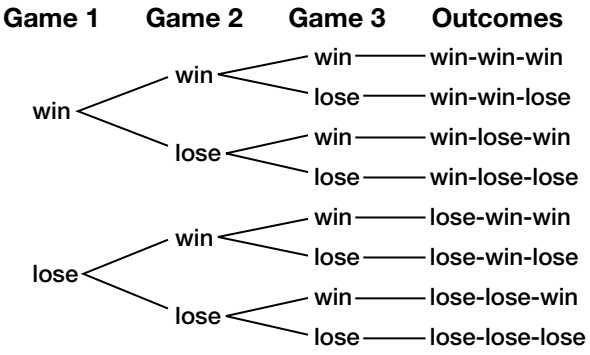
outcomes all possible combinations of a counting problem or the results of an experiment

sample space the list of all possible outcomes

tree diagram a diagram used to show the total number of possible outcomes

Reading the Lesson

Use the tree diagram above for Exercises 1–4.



1. What is the sample space?

2. Name two different outcomes.

3. Three different outcomes result in a win/loss record of 2-1. What are they?

4. Use the Fundamental Counting Principle to complete the chart.

	Game 1		Game 2		Game 3		Number of Outcomes
Number of Choices		·		·		=	

Helping You Remember

5. Suppose you are training the new disc jockey for a school radio station. He has chosen 10 selections to play from a new CD. How could you use factorials to explain to him the number of different ways the selections could be played?

NAME _____ DATE _____ PERIOD _____

4–3 Reading to Learn Mathematics

Dividing Rational Numbers

Key Terms

multiplicative inverses two numbers are multiplicative inverses if their product is 1

reciprocal the multiplicative inverse of a number

Reading the Lesson

1. Fill in the blank with the appropriate word or phrase.

a. The _____ of $\frac{2}{3}$ is $\frac{3}{2}$.

b. To divide a fraction by any nonzero number, _____ by its _____.

c. If the numbers being multiplied have different signs, then the sign of the quotient is _____.

d. Two numbers are _____ if their product is 1.

2. Write *negative* or *positive* to describe each quotient. Explain your answer.

	Expression	Negative or Positive?	Explanation
a.	$\frac{48.6}{16.2}$		
b.	$-13.44 \div 1.92$		
c.	$\frac{3}{7} \div \left(-\frac{4}{5}\right)$		
d.	$-\frac{6}{17} \div \left(-\frac{17}{19}\right)$		

Helping You Remember

3. Is it helpful to use the rules for multiplying fractions when dividing fractions? Explain.

NAME _____ DATE _____ PERIOD _____

4–4 Reading to Learn Mathematics

Solving Multiplication and Division Equations

Key Terms

equation a mathematical sentence that contains =

solving finding the replacement for a variable that results in a true sentence

Reading the Lesson

Complete the sentence after each equation to tell how you would solve the equation.

1. $\frac{x}{7} = 16$ _____ each side by _____.

2. $5x = 125$ _____ each side by _____, or multiply each side by _____.

3. $-8k = 96$ Divide each side by _____, or multiply each side by _____.

4. Explain how rewriting $4\frac{1}{3}x = 2\frac{1}{8}$ as $\frac{13}{3}x = \frac{17}{8}$ helps you solve the equation.

Helping You Remember

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

4–5

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Multi-Step Equations

Key Terms

consecutive integers integers in counting order

Reading the Lesson

1. What does the phrase *undo the operations* mean? Give an example.

2. a. If we undo operations in reverse of the order of operations, what operations do we do first?

b. What operations do we do last?

3. Suppose you want to solve $\frac{x + 3}{5} = 6$.

a. What is the grouping symbol in the equation $\frac{x + 3}{5} = 6$?

b. What is the first step in solving the equation?

c. What is the next step in solving the equation?

4. Write an equation for the problem below.

Seven	times	*k*	minus	five	equals	negative forty-seven

5. The sum of two consecutive odd integers is -36.

a. Write an equation for this situation.

b. What are the two consecutive odd integers?

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

4–6 Reading to Learn Mathematics

Variables on Both Sides

Key Terms
identity an equation that is true for every value of the variable

Reading the Lesson

1. Suppose you want to help a friend solve $6k + 7 = 3k - 8$. What would you advise her to do first? Why?

2. State the first step in solving each equation.

a. $-3x + 6 = -10x + 10$

b. $-3.6 + 4.2z = 3 - 2.1z$

c. $\frac{1}{9}y - 3 = \frac{5}{9}y$

3. On a quiz, Miguel solved three equations. His teacher said all the work was correct, but she asked him to write short sentences to tell what the solutions were. In what follows, you see the *last* equation in his work for each equation. Write sentences to describe the solutions.

a. $x = -4$

b. $6m = 6m$

c. $12 = 37$

4. In Question 3, one of the equations Miguel solved is an identity. Which equation is it? Explain how you know.

Helping You Remember

5. An equation with variables is an identity when the equation is always true. In other words, the expressions on the left and right sides always have the same value. Look up the word *identity* in the dictionary. Write all the definitions that are similar to the mathematical definition.

4–7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Grouping Symbols

Key Terms

grouping symbols symbols that group terms together in an expression or equation

Reading the Lesson

1. Cassandra and three of her friends are going to the movies. If each person orders a small popcorn at $2.50 and buys a ticket for $8.50, what is the total cost for the four friends to go to the movies?

a. Write an equation to represent this situation.

total cost	is	number of people	sum of cost for 1 person

b. Solve the equation.

2. When solving $2(3x - 4) = 3(x + 5)$, why is it helpful first to use the Distributive Property?

3. In the spaces provided, provide a reason for each step of the solution of the equation.

$28x = \frac{1}{2}(30 + 6x) + 10$

a. $28x = 15 + 3x + 10$ _____

b. $28x = 3x + 25$ _____

c. $25x = 25$ _____

d. $x = 1$ _____

Helping You Remember

4. List the order of operations. Include grouping symbols.

NAME _____ DATE _____ PERIOD _____

5

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 5.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
base		
box-and-whisker plot		
circle graph		
complement kahm•PLU•ment		
compound event		
dimensional analysis duh•MEN•shun•ul		
empirical probability im•PEER•i•kul		
experimental probability ek•speer•uh•MEN•tul		
extremes		
inclusive in•KLOO•siv		
independent events		
lower quartile KWAR•tile		
mutually exclusive MYOO•chew•a•lee		
odds		
percent		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
percent equation		
percent of decrease		
percent of increase		
percent proportion		
percentage		
percentile		
probability PRA•buh•BIL•i•tee		
proportion pro•POR•shun		
random		
rate		
ratio		
scale		
scale drawing		
scale model		
theoretical probability thee•uh•RET•i•kul		
unit rate		
upper quartile		

NAME _____ DATE _____ PERIOD _____

5–1 Reading to Learn Mathematics

Solving Proportions

Key Terms

proportion an equation stating that two ratios are equivalent

rate the ratio of two measurements having different units of measure

ratio the quotient of two numbers

unit rate a simplified rate with a denominator of 1

Reading the Lesson

1. Complete the following sentence.

A ratio is a comparison of two numbers by _____.

2. Describe two ways to decide whether the sentence $\frac{2}{5} = \frac{8}{20}$ is a proportion.

3. For each proportion, tell what the cross products are.

a. $\frac{14}{35} = \frac{6}{15}$ _____

b. $\frac{6}{8} = \frac{12}{16}$ _____

4. A jet flying at a steady speed traveled 825 miles in 2 hours. If you solved the proportion $\frac{825}{2} = \frac{x}{1.5}$, what would the answer tell you about the jet?

Helping You Remember

5. Write how you would explain solving a proportion to a friend who missed Lesson 5-1.

NAME _____ DATE _____ PERIOD _____

5–2 Reading to Learn Mathematics

Scale Drawings and Models

Key Terms

scale the ratio of the length of a model to the corresponding length of the real object

scale drawing a drawing that represents a real object

scale model a model that represents a real object

Reading the Lesson

1. List the information needed to determine the scale of a model.

2. For each situation, write the scale of the model to the real object.

a. a model car is 12 centimeters long, the real car is 12 feet long

b. the distance between two cities on a map is 2 inches, they are 50 miles apart

3. Write a proportion and solve for each of the following.

a. A 24-inch tall model was made in a scale of 1:3. What is the height of the actual object?

b. A flower that is 18 inches long is drawn to a scale of 1 centimeter to 1 inch. What is the height of the flower in the drawing?

Helping You Remember

4. Look up the word "scale" in a dictionary. Write out the definition that is most similar to the definition used in this lesson.

5–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

The Percent Proportion

Key Terms

base the number that is divided into the percentage

circle graph shows the relationship between parts and the whole

percent a ratio that compares a number to 100

percentage the number that is divided by the base

Reading the Lesson

1. Dominick received an 86% on a math test. Write two different possible ratios of the number of points received and the number of points available.

2. Lavonne is making a circle graph to illustrate how she spends her day. In a 24-hour day, she sleeps 8 hours, goes to school for 6 hours, goes to work for 3 hours, does homework for 2 hours, and the rest of her day she describes as "other."

a. Find each percent. Round to the nearest whole percent if necessary.

b. Explain how to check that the percentages are correct.

c. Find the measure of each angle in the circle graph. Round to the nearest tenth if necessary.

d. Explain how to check that the measures of each angle are correct.

Helping You Remember

3. Explain how you can remember the meaning of "percent."

NAME _____ DATE _____ PERIOD _____

5–4 Reading to Learn Mathematics

The Percent Equation

Key Terms

mixture problems problems that combine two or more parts into a whole

rate the decimal form of a percent

simple interest the amount paid or earned for the use of your money

Reading the Lesson

1. For each of the following, identify the percentage, base, and rate. Use n for the unknown value.

a. 25 is 30% of what number?

b. What is 15% of 200?

c. 33 is 150% of what number?

d. Find 25% of 15.

Percentage	Base	Rate

2. A chemistry experiment calls for a 25% solution of sodium chloride. If the teacher has 50 milliliters of a 15% solution, how many milliliters of a 50% solution should be added?

a. Complete the chart.

	Amount of Solution (mL)	Amount of Sodium Chloride
15% solution		
50% solution		
25% solution		

b. Write an equation to represent the mixture problem. (You do not have to solve the problem.)

Helping You Remember

3. Explain how to change a percentage to a rate.

5–5

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Percent of Change

Key Terms

discount the amount that the cost of an item is reduced by
percent of decrease a decrease represented by a percent
percent of increase an increase represented by a percent
sales tax a tax that is added on to the cost of an item

Reading the Lesson

1. If you use (original amount) − (new amount) to find the change for a percent of change problem, then the problem involves a percent of _____ (increase/decrease).

2. If you use (new amount) − (original amount) to find the change for a percent of change problem, then the problem involves a percent of _____ (increase/decrease).

Complete the chart.

	Original Amount	New Amount	Percent Proportion	Percent Increase or Percent Decrease?
3.	10	13		
4.	10	7		
5.	50	42		
6.	50	58		

7. When you find a discount price, do you add to or subtract from the original price?

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

5–6

Reading to Learn Mathematics

Probability and Odds

Key Terms

odds a ratio that compares the number of ways an event can occur to the number of ways it cannot occur

probability a ratio that compares the number of favorable outcomes to the number of possible outcomes

random all outcomes are equally likely to happen

Reading the Lesson

1. Write whether each statement is *true* or *false*. If false, replace the underlined word or number to make a true statement.

a. Probability can be written as a fraction, a decimal, or a percent.

b. The outcomes happen at random when all outcomes are equally likely to happen.

c. The probability of an impossible event is 1.

d. The odds against an event occurring are the odds that he event will occur.

2. Explain why the probability of an event cannot be greater than 1 while the odds of an event can be greater than 1.

Helping You Remember

3. Probabilities are usually written as fractions, decimals, or percents. Odds are usually written with a colon (for example, 1:3). How can the spelling of the word *colon* help you remember this?

5–7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Compound Events

Key Terms

compound events two or more simple events connected by the words *and* or *or*

inclusive two events that can occur at the same time

independent events the outcome of one event does not affect the outcome of the other event

mutually exclusive two events that cannot occur at the same time

Reading the Lesson

1. Write an example of each term and the corresponding formula to complete the chart.

	Term	Example	Formula
a.	independent events		
b.	mutually exclusive events		
c.	inclusive events		

2. In probability, what is meant by the phrase *with replacement*?

Helping You Remember

3. Use a dictionary or the Internet to find definitions of the following terms. Write the definition that best relates to the way each term is used in probability.

a. *independent* _____

b. *exclusive* _____

c. *inclusive* _____

6

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 6.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
constant of variation VARE•ee•AY•shun		
dependent variable		
direct variation		
domain		
equation in two variables		
function		
functional notation		
functional value		
functional variable		
independent variable		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
inverse variation		
linear equation LIN•ee•ur		
range		
rate problem		
relation		
solution set		
vertical line test		
x-coordinate		
y-coordinate		

NAME _____ DATE _____ PERIOD _____

6–1 Reading to Learn Mathematics

Relations

Key Terms

domain the first coordinates in a relation
range the second coordinates in a relation
relation a set of ordered pairs
***x*-coordinate** the first number in an ordered pair
***y*-coordinate** the second number in an ordered pair

Reading the Lesson

1. Look at page 239 in your textbook. In Example 1, you see the same relation represented by a set of ordered pairs, a table, and a graph.

a. In the set of ordered pairs, where do you see the numbers for the domain? the numbers for the range?

b. Which columns of the table represent the domain and the range?

c. How do the table and the graph show that there are five ordered pairs in the relation?

2. Which tells you more about a relation, a list of the ordered pairs or the domain and range of the relation? Explain.

Helping You Remember

3. The first letters in two words and their order in the alphabet can sometimes help you remember their mathematical meaning. Two key terms in this lesson are *domain* and *range*. Describe how the alphabet method could help you remember their meaning.

NAME _____ DATE _____ PERIOD _____

6–2 Reading to Learn Mathematics

Equations as Relations

Key Terms

equation in two variables an equation that contains two unknown values

solution set a set of solutions to a problem

Reading the Lesson

1. Refer to the equation $p = 0.71d$.

a. In the equation, p represents _____ and d represents _____.

b. How many variables are in the equation?

2. Suppose you make the following table to solve an equation that uses the domain $\{-3, -2, -1, 0, 1\}$.

x	$x - 4$	y	(x, y)
-3	$-3 - 4$	-7	$(-3, -7)$
-2	$-2 - 4$	-6	$(-2, -6)$
-1	$-1 - 4$	-5	$(-1, -5)$
0	$0 - 4$	-4	$(0, -4)$
1	$1 - 4$	-3	$(1, -3)$

a. What is the equation?

b. Which column shows the *domain*?

c. Which column shows the *range*?

d. Which column shows the *solution set*?

3. What is meant by "solving an equation for y in terms of x"?

Helping You Remember

4. How would you explain to a classmate who was absent for this lesson how to solve the equation $6x + 3y = 9$ with a domain of $\{0, 1, 2, 3\}$? (You do not need to solve the problem.)

NAME _____ DATE _____ PERIOD _____

6–3 Reading to Learn Mathematics

Graphing Linear Relations

Key Terms

linear equation an equation with a graph that is a straight line

Reading the Lesson

1. The graph of $y = 8$ is a _____ (horizontal/vertical) line.

2. The graph of $x = 8$ is a _____ (horizontal/vertical) line.

3. Describe the graph of a linear equation.

4. Determine whether each equation is a linear equation. Explain.

	Equation	Linear or non-linear?	Explanation
a.	$2x = 3y + 1$		
b.	$4xy + 2y = 7$		
c.	$2x^2 = 4y - 3$		
d.	$\frac{x}{5} - \frac{4y}{3} = 2$		

Helping You Remember

5. Describe the method you would use to graph $4x + 2y = 8$.

NAME _____ DATE _____ PERIOD _____

6–4 Reading to Learn Mathematics

Functions

Key Terms

function a type of relation in which each x-coordinate has exactly one y-coordinate

functional notation writing equations of the form "$y =$ ..." as "$f(x) =$ ..."

functional value a y-coordinate that corresponds to a specific x-coordinate

vertical line test if a vertical line passes through exactly one point of the graph of a relation, then the relation is a function

Reading the Lesson

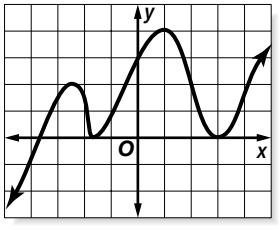
1. The statement, "Relations in which each element of the range is paired with exactly one element of the domain are called functions," is false. How can you change the underlined words to make the statement true?

2. Determine whether easch relation is a function. Explain your answer.

a.

x	−2	−1	0	4
y	1	2	3	7

b.



Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

6–5 Reading to Learn Mathematics

Direct Variation

Key Terms

constant of variation the number k in an equation of the form $y = kx$

dependent variable the variable whose value depends on the value of the independent variable

direct variation an equation of the form $y = kx$, where $k \neq 0$

independent variable the variable whose value is chosen

rate problems problems involving the formula distance = rate × time or $d = rt$

Reading the Lesson

1. What is the form of a direct variation equation?

2. The solution set of the equation $y = 2x$ for a given domain is $\{(-2, -4), (0, 0), (2, 4), (7, 14)\}$. Tell whether each sentence is *true* or *false*. If false, replace the underlined word(s) to make a true sentence.

a. The domain contains the values represented by the independent variable.

b. The domain contains the numbers −4, 0, 4, and 14.

c. For each number in the domain, the range contains a corresponding number that is a value of the dependent variable.

3. For each situation, write an equation with the proper constant of variation.

a. The distance d varies directly as time t.

b. The perimeter p of a pentagon with all sides of equal length varies directly as the length s of a side of the pentagon.

c. The wages W earned by an employee vary directly with the number of hours h that are worked.

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

6–6 Reading to Learn Mathematics

Inverse Variation

Key Terms
inverse variation an equation of the form $xy = k$

Reading the Lesson

1. Write *direct variation*, *inverse variation*, or *neither* to describe the relationship between x and y described by each equation.

a. $y = 3x$ **b.** $xy = 5$ **c.** $y = -8x$

d. $y = \frac{2}{x}$ **e.** $x = \frac{10}{y}$ **f.** $y = 7x - 1$

2. Why does the equation $xy = 0$ *not* describe an inverse variation?

3. Describe the difference between a graph of a direct variation and a graph of an inverse variation.

4. For each problem, y varies inversely as x. Write an equation you can use to solve for k. Then write a proportion you could use to solve the problem.

	Problem	Equation	Proportion
a.	If $y = 8$ when $x = 12$, find y when $x = 4$.		
b.	If $x = 50$ when $y = 6$, find x when $y = 30$.		

Helping You Remember

5. To remember how to set up a proportion to solve a problem involving inverse variation, write a sentence describing the form the proportion should have.

7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 7.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
best-fit line		
correlation coefficient CORE•uh•LAY•shun		
extrapolation ek•STRA•puh•LAY•shun		
family of graphs		
interpolation in•TER•puh•LAY•shun		
linear regression		
median-median line		
parallel lines PARE•uh•lel		
parent graph		
perpendicular lines PER•pun•DI•kyoo•lur		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
point-slope form		
rate of change		
residual		
rise		
run		
scatter plot		
slope		
slope-intercept form IN•ter•SEPT		
x-intercept		
y-intercept		

7–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Slope

Key Terms

slope $\frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$

Reading the Lesson

1. Describe each type of slope and include a sketch.

	Type of Slope	Description of Graph	Sketch
a.	positive		
b.	negative		
c.	zero		
d.	undefined		

2. Describe how each expression is related to *slope*.

a. $\frac{y_2 - y_1}{x_2 - x_1}$

b. $\frac{\text{rise}}{\text{run}}$

c. $\frac{\$52{,}000 \text{ increase in spending}}{26 \text{ months}}$

Helping You Remember

3. The word *rise* is usually associated with going up. Sometimes going from one point on the graph does not involve a rise and a run but a fall and a run. Describe how you could select points so that it is always a rise from the first point to the second point.

NAME _____ DATE _____ PERIOD _____

7–2 Reading to Learn Mathematics

Writing Equations in Point-Slope Form

Key Terms

point-slope form a form of a linear equation you can use when you know the slope and the coordinates of one point

slope-intercept (IN ter sept) form a form of a linear equation you can use when you know the slope and the *y*-intercept

Reading the Lesson

1. In the formula $y - y_1 = m(x - x_1)$, what do x_1 and y_1 represent?

2. Complete the chart below by writing the formula for each form of equation. Then write an example of each equation.

	Form of Equation	Formula	Example
a.	point-slope form		
b.	standard form		

3. What information is needed in order to write an equation of the line?

Helping You Remember

4. Suppose you could not remember the formulas listed in the table above. Which of the forms would you concentrate on for writing linear equations? Explain why you chose that form.

7–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Writing Equations in Slope-Intercept Form

Key Terms

***x*-intercept** the x-coordinate of the point at which a graph crosses the x-axis

***y*-intercept** the y-coordinate of the point at which a graph crosses the y-axis

Reading the Lesson

1. Suppose you are given that a line goes through (2, 5) and has a slope of -2. Use this information to complete the following equation.

$$y = mx + b$$

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

2. Read the problem. Then answer each part of the exercise.

A ruby-throated hummingbird weighs about 0.6 gram at birth and gains weight at a rate of about 0.2 gram per day until fully grown.

a. Write a verbal equation to show how the words are related to finding the average weight of a ruby-throated hummingbird at any given week. Use the words *weight at birth*, *rate of growth*, *weight*, and *weeks after birth*. Below the equation, fill in any values you know and put a question mark under the items that you do not know.

$$\square = \square \times \square + \square$$

b. Define what variables to use for the unknown quantities.

c. Use the variables you defined and what you know from the problem to write an equation.

Helping You Remember

3. One way to remember something is to explain it to another person. Write how you would explain to someone the process for using the y-intercept and slope to graph a linear equation.

NAME _____ DATE _____ PERIOD _____

7–4 Reading to Learn Mathematics

Scatter Plots

Key Terms

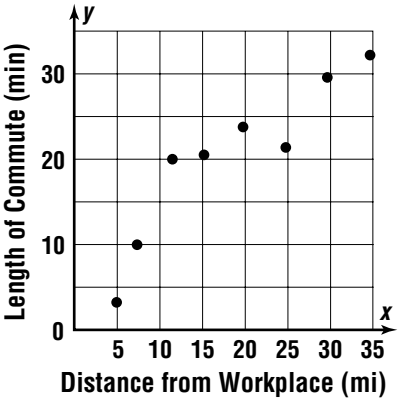
scatter plot a graph in which data is displayed as ordered pairs

Reading the Lesson

1. Look up the word *scatter* in a dictionary. How does this definition compare to the term *scatter plot*?

2. What are the advantages of using a scatter plot to display a set of data?

3. Refer to the scatter plot shown at the right.



a. Which quantity is the independent quantity? the dependent quantity?

b. What conclusion can you draw from the scatter plot?

c. Explain how to make a prediction from the scatter plot.

Helping You Remember

4. How can you remember whether a set of data points shows a positive relationship or a negative relationship?

7–5

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Graphing Linear Equations

Key Terms

***x*-intercept** the x-coordinate of the point at which a graph crosses the x-axis

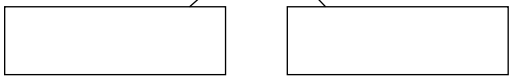
***y*-intercept** the y-coordinate of the point at which a graph crosses the y-axis

Reading the Lesson

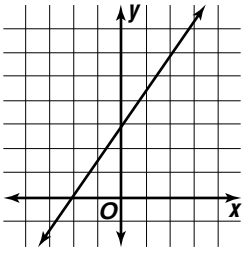
1. Explain how to find the x- or y-intercept of an equation.

2. Identify the parts of the slope-intercept form of the equation.

$y = mx + b$



3. Refer to the graph shown at the right.



a. What is the y-intercept of the graph?

b. What is the x-intercept of the graph?

4. Is it easier to find the slope and y-intercept for an equation written in standard form or an equation written in slope-intercept form? Explain.

Helping You Remember

5. Explain the difference between the x-intercept and the y-intercept of a graph.

NAME _____ DATE _____ PERIOD _____

7–6 Reading to Learn Mathematics

Families of Linear Graphs

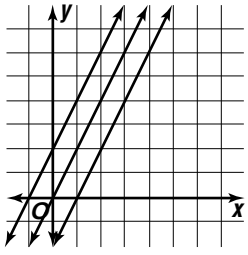
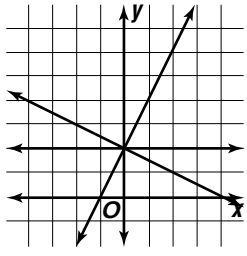
Key Terms

families of graphs several graphs that have at least one common characteristic

parent graph the simplest graph in a family of graphs

Reading the Lesson

1. Complete the chart for each set of graphs.

	Graphs	Family of Graphs?	Parent Graph?	Explain.
a.				
b.				

2. A long distance company charges 10¢ per minute. A competing company charges 8¢ per minute. Write an equation to represent each plan. Do they form a family of graphs? Explain.

Helping You Remember

3. Explain how the terms *parent graph* and *family of graphs* can help you remember the meaning of each term.

7–7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Parallel and Perpendicular Lines

Key Terms

parallel (PAR a lel) lines lines that are always the same distance apart and never meet

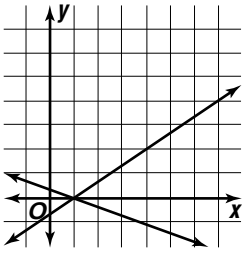
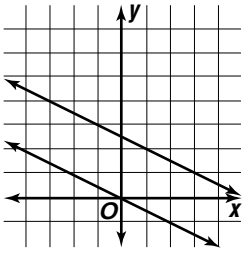
perpendicular (per pen DIK yoo lar) lines lines that meet to form right angles

Reading the Lesson

1. Parallel lines _____ (always/never) intersect.

2. Perpendicular lines _____ (always/never) intersect.

3. Complete the chart for each set of graphs.

	Graphs	Parallel, Perpendicular, or Neither?	Explain
a.			
b.			

Helping You Remember

4. One way to remember the relationship between slopes of parallel lines is the phrase, "same direction, same slope." Think of a phrase to help you remember how the slopes of perpendicular lines are related.

8

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 8.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
base		
composite number kahm•PA•zit		
converse		
exponent ek•SPO•nent		
hypotenuse hi•PA•tin•oos		
irrational numbers i•RA•shun•ul		
leg		
negative exponent		
perfect square		
power		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
prime factorization FAK•tor•i•ZAY•shun		
prime number		
Pythagorean Theorem puh•THA•guh•REE•un		
radical RAD•ik•ul		
radical expression		
radical sign		
scientific notation		
square root		

8–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Powers and Exponents

Key Terms

base the number being multiplied by itself

exponent (eks PO nent) tells how many times a number is used as a factor

perfect square the product of a number and itself

power a number that is expressed using exponents

Reading the Lesson

1. Refer to the expression x^n.

a. What is the base?

b. What is the exponent?

c. What is the power?

2. Refer to the diagram of perfect squares on page 336. Which number is the next perfect square? Draw the square array of dots.

3. Is 18 a perfect square? Explain why or why not.

4. Multiplying 5 and 3 is not the same as raising 5 to the third power. How does the way you write "5 times 3" and "5 to the third power" in symbols help you remember that they give different results?

Helping You Remember

5. One way to remember the order of operations is the phrase, "Please excuse my dear Aunt Sally." Explain how this is a helpful phrase.

NAME _____ DATE _____ PERIOD _____

8–2 Reading to Learn Mathematics

Multiplying and Dividing Powers

Key Terms

base the number that is raised to a power
exponents tells how many times the base is used as a factor
power a number that is expressed using exponents
product the result of multiplication
quotient the result of division

Reading the Lesson

1. Explain what the statement $\frac{a^m}{a^n} = a^{m-n}$ means.

2. To find c in the formula $c = \left(\frac{1}{10}\right)^{\text{pH}}$, you can find the power of the numerator, the power of the denominator, and divide. This is an example of what property?

3. Use the Quotient of Powers Property to explain why $3^0 = 1$.

4. Each of these expressions has been solved incorrectly. Write the correct answer and explain why the given solution is incorrect.

a. $b^3 \cdot b^5 = b^{15}$

b. $a^3 \cdot b^3 = ab^6$

c. $c^4 \cdot c^5 \cdot c^6 = c^{17}$

d. $\frac{m^6}{m^3} = m^2$

Helping You Remember

5. Describe how to simplify the expression $\frac{4x^5}{2x^2}$.

8–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Negative Exponents

Key Terms

negative exponent a base that is raised to a negative power, $a^{-n} = \frac{1}{a^n}$

Reading the Lesson

1. Complete the table.

10^3	10^2	10^1	10^0	10^{-1}	10^{-2}	10^{-3}	10^{-4}

2. Are the expressions -3^4 and 3^{-4} equivalent? Explain why or why not.

3. Consider the expression 5^{-4}.

a. Explain why the expression is not simplified.

b. Define the term *reciprocal*.

c. 5^{-4} is a reciprocal of what power?

d. What is the simplified form of 5^{-4}?

Helping You Remember

4. Describe how to simplify the expression $\frac{y^2}{y^6}$.

NAME _____ DATE _____ PERIOD _____

8–4 Reading to Learn Mathematics

Scientific Notation

Key Term

scientific notation a number written in the form $a \times 10^n$, where a is at least 1 and less than 10 and n is an integer

Reading the Lesson

1. Is the number 0.0543×10^4 in scientific notation? Explain.

2. Complete each sentence to change from scientific notation to standard notation.

a. To express 3.64×10^6 in standard notation, move the decimal point _____ places to the _____.

b. To express 7.825×10^{-3} in standard notation, move the decimal point _____ places to the _____.

3. Complete each sentence to change from standard notation to scientific notation.

a. To express 0.0007865 in scientific notation, move the decimal point _____ places to the right and write _____.

b. To express 54,000,000,000 in scientific notation, move the decimal point _____ places to the left and write _____.

4. Write *positive* or *negative* to complete each sentence.

a. _____ powers of 10 are used to express very large numbers in scientific notation.

b. _____ powers of 10 are used to express very small numbers in scientific notation.

Helping You Remember

5. Explain how to estimate how many times greater the mass of Saturn is than the mass of Pluto, if the mass of Saturn is 5.69×10^{26} kilograms and the mass of Pluto is 1.27×10^{22} kilograms.

8–5

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Square Roots

Key Terms

composite (com PAH sit) number a whole number that has more than two factors

prime factorization (fac tor i ZAY shun) the expression of a number as the product of prime factors

prime number a whole number that has exactly two factors, 1 and the number

radical (RAD i cull) sign the symbol used to indicate the square root

square root one of two equal factors of a number

Reading the Lesson

1. The number 13 is a _____ (prime/composite) number because _____.

2. The number 21 is a _____ (prime/composite) number because _____.

3. Write each of the following as a mathematical expression that uses the $\sqrt{\ }$ symbol.

a. the square root of 15

b. the negative square root of 730

c. negative 6 times the square root of 115

d. 10 times the square root of 85

Helping You Remember

4. Describe how to simplify $\sqrt{\frac{25}{64}}$.

NAME _____ DATE _____ PERIOD _____

8–6 Reading to Learn Mathematics

Estimating Square Roots

Key Terms

irrational numbers numbers in which the decimal value does not terminate or repeat

perfect square the product of a number and itself

Reading the Lesson

1. Draw a Venn diagram in the space provided to show the relationship between the whole numbers, natural numbers, integers, rational numbers, and irrational numbers.

2. A student wrote on a quiz that $\sqrt{28}$ was between 25 and 36. Should this student receive full credit? Explain why or why not.

3. Complete the chart for each of the following square roots.

	Square Root	$\sqrt{?} < \sqrt{x} < \sqrt{?}$	Estimate
	$\sqrt{45}$	$\sqrt{36} < \sqrt{45} < \sqrt{49}$	7
a.	$\sqrt{18}$		
b.	$\sqrt{88}$		
c.	$\sqrt{112}$		
d.	$\sqrt{125}$		

Helping You Remember

4. Use a dictionary to find the meaning of the prefix "ir-." How can this help you remember the meaning of the term *irrational*?

8–7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

The Pythagorean Theorem

Key Terms

hypotenuse (hi PAH te noos) the longest side in a right triangle

leg one of the two sides that form the right angle in a right triangle

Pythagorean (pi THAG o re an) Theorem a true relationship among the lengths of the three sides of a right triangle

Reading the Lesson

Complete each sentence.

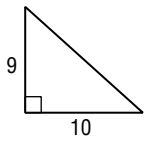
1. The words *leg* and *hypotenuse* refer to the sides of a _____ triangle.

2. In a right triangle, each of the two sides that form the right angle is a _____ of the right triangle.

3. The longest side of a right triangle is called the _____ of the right triangle.

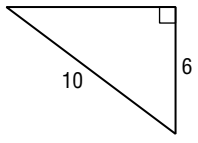
Write an equation that you could solve to find the missing side length of each right triangle.

4.



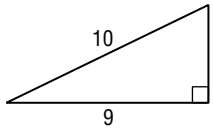
_____

5.



_____

6.



_____

7. Suppose you are given three positive numbers. Explain how you can decide whether these numbers are the lengths of the sides of a right triangle.

Helping You Remember

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

9

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 9.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
binomial by•NO•mee•ul		
degree		
FOIL method		
like terms		
monomial ma•NO•mee•ul		
polynomial PA•lee•NO•mee•ul		
trinomial try•NO•mee•ul		

NAME _____ DATE _____ PERIOD _____

9–1 Reading to Learn Mathematics

Polynomials

Key Terms

binomial (by NO me al) a polynomial with two terms

monomial (mah NO me al) a number, a variable, or a product of numbers and variables that has only positive exponents

polynomial (pahl i NO me al) the sum of one or more monomials

trinomial (try NO me al) a polynomial with three terms

Reading the Lesson

1. What is the meaning of the prefixes *mono-*, *bi-*, and *tri-*?

2. Write examples of words that begin with the prefixes *mono-*, *bi-*, and *tri-*.

3. Complete the table.

	monomial	binomial	trinomial	polynomial with more than three terms
Example	$3r^2t$	$2x^2 + 3x$	$5x^2 + 3x + 2$	$7s^2 + s^4 + 2s^3 - s + 5$
Number of Terms				

4. What is the degree of the monomial $3xy^2z$?

5. What is the degree of the polynomial $4x^4 + 2x^3y^3 + y^2 + 14$? Explain how you found your answer.

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

9–2 Reading to Learn Mathematics

Adding and Subtracting Polynomials

Key Terms

additive inverse the sum of a number and its additive inverse is zero

polynomial a sum of monomials

Reading the Lesson

1. Use the example $(-3x^3 + 4x^2 + 5x + 1) + (-5x^3 - 2x^2 + 2x - 7)$.

a. Show what is meant by grouping like terms horizontally.

b. Show what is meant by aligning like terms in column form.

c. Choose one method, then add the polynomials.

2. How is subtracting a polynomial like subtracting a rational number?

3. An algebra student got the following exercise wrong on his homework. What was his error?

$(3x^5 - 3x^4 + 2x^3 - 4x^2 + 5) - (2x^5 - x^3 + 2x^2 - 4)$

$= [3x^5 + (-2x^5)] + (-3x^4) + [2x^3 + (-x^3)] + [-4x^2 + (-2x^2)] + (5 + 4)$

$= x^5 - 3x^4 + x^3 - 6x^2 + 9$

Helping You Remember

4. How is adding and subtracting polynomials vertically like adding and subtracting decimals vertically?

NAME _____ DATE _____ PERIOD _____

9–3 Reading to Learn Mathematics

Multiplying a Polynomial by a Monomial

Key Terms

monomial a number, a variable, or a product of numbers and variables that have only positive exponents and no variable exponents

polynomial a sum of monomials

Reading the Lesson

1. Refer to Lesson 9-3.

a. How is the Distributive Property used to multiply a polynomial by a monomial?

b. Use the Distributive Property to complete the following.

$2y^2(3y^2 + 2y - 7) = 2y^2(\_\_\_\_\_) + 2y^2(\_\_\_\_\_) - 2y^2(\_\_\_\_\_)$

$= \_\_\_\_\_ + \_\_\_\_\_ - \_\_\_\_\_$

$-3x^3(x^3 - 2x^2 + 3) = \_\_\_\_\_ - \_\_\_\_\_ + \_\_\_\_\_$

$= \_\_\_\_\_ + \_\_\_\_\_ - \_\_\_\_\_$

2. What is the difference between simplifying an expression and solving an equation?

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

9–4 Reading to Learn Mathematics

Multiplying Binomials

Key Terms
binomial a sum of two monomials
FOIL Method a method of multiplying two binomials

Reading the Lesson

1. How is multiplying binomials similar to multiplying two-digit numbers?

2. Complete the table using the FOIL method.

			Product of First Terms	+	Product of Outer Terms	+	Product of Inner Terms	+	Product of Last Terms
a.	$(x + 5)(x - 3)$	=		+		+		+	
		=		+		+		+	
		=		+		−			
b.	$(3y + 6)(y - 2)$	=		+		+		+	
		=		+		+		+	
		=		−					

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

9–5 Reading to Learn Mathematics

Special Products

Key Terms

binomial a sum of two monomials

FOIL Method a method of multiplying two binomials

Reading the Lesson

1. Refer to pages 405 and 407.

a. When multiplying two binomials, there are three special products. What are the three special products that may result when multiplying two binomials?

b. Explain what is meant by the name of each special product.

2. Use the examples in the lesson to complete the table.

		Symbols	Product	Example	Product
a.	**Square of a Sum**				
b.	**Square of a Difference**				
c.	**Product of a Sum and a Difference**				

3. What is another phrase that describes the product of the sum and difference of two terms?

Helping You Remember

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

10

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 10.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
difference of squares		
factoring		
greatest common factor (GCF)		
perfect square trinomial		
prime polynomial		

NAME _____ DATE _____ PERIOD _____

10–1 Reading to Learn Mathematics

Factors

Key Terms

factors a number or variable which a product is divisible by

factor tree a visual method of factoring a number

prime factorization when a number is expressed as a product of its prime factors

Reading the Lesson

1. Every whole number greater than 1 is either composite or _____.

2. Complete each statement.

a. In the prime factorization of a whole number, each factor is a _____ number.

b. In the prime factorization of a negative integer, all the factors are prime except the factor _____.

3. Explain why the monomial $5x^2y$ is *not* in factored form.

4. Explain the steps used below to find the greatest common factor (GCF) of 84 and 120.

a. $84 = 2 \cdot 2 \cdot 3 \cdot 7$

b. $120 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5$

c. Common prime factors: 2, 2, 3

d. $2 \cdot 2 \cdot 3 = 12$

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

10–2 Reading to Learn Mathematics

Factoring Using the Distributive Property

Key Terms

factoring the process of finding the factors of a product

prime polynomial a polynomial that cannot be factored

Reading the Lesson

1. When factoring using the Distributive Property, what goes outside the parentheses?

2. Refer to the polynomial $5ab + 25b^2 - 5b$.

a. What is the GCF of this polynomial?

b. Write this polynomial in factored form.

c. Explain how to check your answer.

3. The expression $x(6x - 9)$ is a factored form of the polynomial $6x^2 - 9x$.

a. Is this the completely factored form? Explain why or why not.

b. Provide an example of a completely factored polynomial.

c. Provide an example of a polynomial that is not completely factored.

Helping You Remember

4. What are the steps you follow to factor a polynomial?

NAME _____ DATE _____ PERIOD _____

10–3 Reading to Learn Mathematics

Factoring Trinomials: $x^2 + bx + c$

Key Terms

trinomial a polynomial with three terms

Reading the Lesson

Tell what sum and product you want m and n to have to use the pattern $(x + m)(x + n)$ to factor the given trinomial.

1. $x^2 + 10x + 24$ sum: _____ product: _____

2. $x^2 - 12x + 20$ sum: _____ product: _____

3. $x^2 - 4x - 21$ sum: _____ product: _____

4. $x^2 + 6x - 16$ sum: _____ product: _____

5. To factor $x^2 - 18x + 32$, you can look for numbers with a product of 32 and a sum of -18. Explain why the numbers in the pair you are looking for must both be negative.

6. When factoring trinomials of the form $x^2 + bx + c$, look for two numbers that have a sum of _____ and a product of _____.

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

10–4 Reading to Learn Mathematics

Factoring Trinomials: $ax^2 + bx + c$

Key Terms
trinomial a polynomial with three terms

Reading the Lesson

1. Refer to the trinomial $4x^2 + 11x + 6$.

a. What are the possibilities for the first term in each binomial?

b. What are the possibilities for the last term in each binomial?

c. What are the two binomials?

2. Suppose you want to factor the trinomial $3x^2 + 14x + 8$.

a. What is the first step?

b. What is the second step?

3. Explain how you know that the trinomial $2x^2 - 7x + 4$ is a prime polynomial.

Helping You Remember

4. What are steps you could use to remember how to find the factors of a trinomial written in the form of $ax^2 + bx + c$?

NAME _____ DATE _____ PERIOD _____

10–5 Reading to Learn Mathematics

Special Factors

Key Terms

difference of squares a binomial that can be factored into two binomials

perfect square trinomial a trinomial that has two equal binomial factors

Reading the Lesson

1. Explain why each binomial is a difference of squares.

a. $4x^2 - 25$

b. $49a^2 - 64b^2$

2. Match each polynomial from the first column with a factoring technique in the second column. Some of the techniques may be used more than once. If none of the techniques can be used to factor the polynomial, write *none*.

a. $9x^2 - 64$

b. $9x^2 + 12x + 4$

c. $x^2 - 5x + 6$

d. $4x^2 + 13x + 9$

e. $9xy + 3y + 6x + 2$

f. $x^2 - 4x + 4$

g. $2x^2 - 16$

I. factor as $x^2 + bx + c$

II. factor as $ax^2 + bx + c$

III. difference of squares

IV. factoring by grouping

V. perfect square trinomial

VI. factor out the GCF

Helping You Remember

3. How can you remember whether a binomial can be factored as a difference of squares?

NAME _____ DATE _____ PERIOD _____

11

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 11.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
axis of symmetry SIH•muh•tree		
completing the square		
discriminant dis•KRIMH•uh•nunt		
exponential function EKS•po•NEN•chul		
geometric sequence JEE•uh•MET•rik		
initial value		
maximum		
minimum		
parabola puh•RA•buh•la		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
quadratic equation kwad•RAT•ik		
Quadratic Formula		
quadratic function		
roots		
vertex VER•teks		
zeros		

11–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Graphing Quadratic Functions

Key Terms

axis of symmetry (SIM e tree) the vertical line containing the vertex of a parabola

maximum the highest point of a parabola

minimum the lowest point of a parabola

parabola (pa RAB o la) the shape of a quadratic function

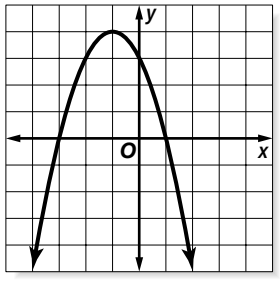
quadratic (kwa DRAT ic) function a function that can be described by an equation of the form $y = ax^2 + bx + c$, where $a \neq 0$

vertex the maximum or minimum of a parabola

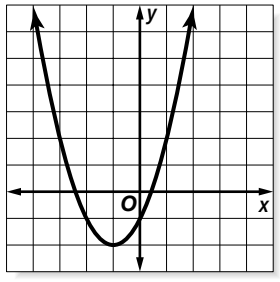
Reading the Lesson

1. Complete each statement about Graphs A and B.

A.



B.



a. Each graph is a curve called a _____.

b. The highest point of graph A is located at _____. This point is the _____ (maximum/minimum) point of the graph.

c. The lowest point of graph B is located at _____. This point is the _____ (maximum/minimum) point of the graph.

2. If you fold a parabola along a line to get two halves that match exactly, the line where you fold the parabola is the _____ of the parabola. This line goes through the _____ of the parabola.

3. For a quadratic function $y = ax^2 + bx + c$, the parabola opens upward if a _____ 0. It opens downward if a _____ 0.

Helping You Remember

4. The word *vertex* is from the Latin word *vertere*, which means to turn. How can you use this idea to remember the meaning of the vertex of a parabola?

NAME _____ DATE _____ PERIOD _____

11–2 Reading to Learn Mathematics

Families of Quadratic Functions

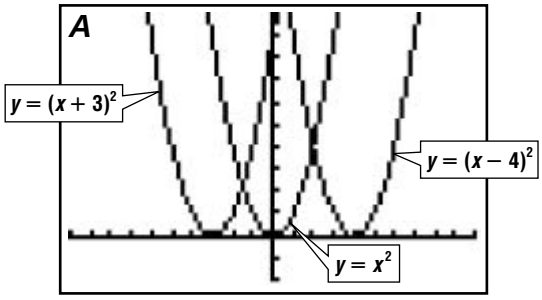
Key Terms

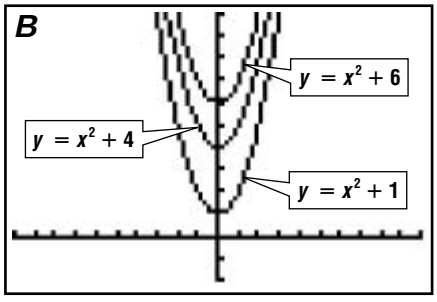
family of graphs A group of two or more graphs that have at least one common characteristic

Reading the Lesson

1. List three characteristics that a family of parabolas can have in common.

2. Refer to these parabolas that were graphed on a calculator.





a. Do the parabolas graphed in A form a family of parabolas? Explain why or why not.

b. Do the parabolas graphed in B form a family of parabolas? Explain why or why not.

c. Is the parent graph the same parabola for A and B?

Helping You Remember

3. How can you use what you learned about families of linear graphs to better understand families of quadratic functions?

11–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Quadratic Equations by Graphing

Key Terms

quadratic equation an equation of the form $ax^2 + bx + c$, where $a \neq 0$

roots the solutions of a quadratic equation

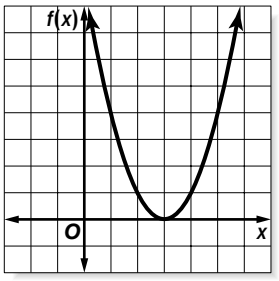
zeros the x-intercepts of a quadratic function

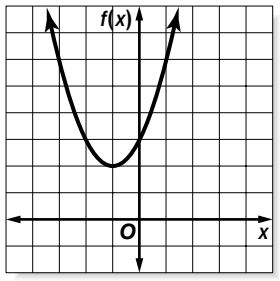
Reading the Lesson

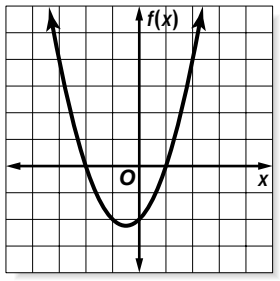
1. The x-intercepts of the graph of a quadratic function are the x-coordinates of the points where the graph of the function intersects the x-axis. At those points, the y-coordinates are equal to _____. This explains why the x-intercepts are called _____ of the quadratic function.

2. The graphs of three functions are shown below. Use the graphs to provide the requested information about the related quadratic equations.

A. $f(x) = x^2 - 6x + 9$ **B.** $f(x) = x^2 + 2x + 3$ **C.** $f(x) = x^2 + x - 2$







a. For Graph A, the related quadratic equation is _____.

How many solutions are there?

Name any solutions.

b. For Graph B, the related quadratic equation is _____.

How many solutions are there?

Name any solutions.

c. For Graph C, the related quadratic equation is _____.

How many solutions are there?

Name any solutions.

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

11–4 Reading to Learn Mathematics

Solving Quadratic Equations by Factoring

Key Terms

Zero Product Property When the product of two numbers equals zero, then either one or both of the numbers equals zero

Reading the Lesson

1. How would you explain to a classmate when it is possible to use the Zero Product Property to solve an equation?

2. How many solutions are possible for the equation $0 = x^2 + 7x - 18$? Explain.

3. Provide a reason for each step in the solution of the equation.

$2x^2 + 8x = 42$

$2x^2 + 8x - 42 = 0$ _____

$2(x^2 + 4x - 21) = 0$ _____

$2(x - 3)(x + 7) = 0$ _____

$x - 3 = 0 \quad x + 7 = 0$ _____

$x = 3 \qquad x = -7$ _____

Helping You Remember

4. Recall that when graphing a quadratic equation it is useful to find the roots or zeros of the equation. Explain how the Zero Product Property can be used to find the roots of the quadratic equation, $y = x^2 - 3x + 2$?

11–5

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Quadratic Equations by Completing the Square

Key Terms

completing the square a method to make any quadratic expression a perfect square

Reading the Lesson

1. Draw a line under each quadratic equation that you could solve by taking the square root of each side.

$x^2 + 6x + 9 = 100$ $x^2 - 14x + 40 = 25$ $x^2 - 16x + 64 = 26$

$x^2 - 20x + 80 = 16$ $x^2 + 10x + 36 = 49$ $x^2 - 12x + 36 = 6$

2. How can you tell whether it is possible to solve a quadratic equation by taking the square root of each side?

3. Explain how to find what number is needed for the ■ in order to make $x^2 - 20x + ■$ a perfect square.

4. To solve $3x^2 - 6x = 54$ by completing the square, why does it help first to divide both sides by 3?

Helping You Remember

5. The method of completing the square might be easier to remember if you can connect it to what you know about perfect square trinomials. How is completing the square related to the method you use to determine whether a trinomial is a perfect square trinomial?

11–6

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

The Quadratic Formula

Key Terms

Quadratic Formula a formula that can be used to solve any quadratic equation

Reading the Lesson

1. Suppose you want to solve $12x^2 + 7x = 15$ using the Quadratic Formula.

a. What should you do first?

b. What are the values you need to substitute for a, b, and c in the Quadratic Formula?

c. Apply the Quadratic Formula using the above values, but do not solve the equation.

2. For each quadratic equation, determine which method is the best to find the exact solutions. Then explain your choice.

	Quadratic Equation	Method	Explanation
a.	$4x^2 + 3x + 1 = 0$		
b.	$x^2 + 6x - 3 = 0$		
c.	$x^2 - 5x - 14 = 0$		

Helping You Remember

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

11–7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Exponential Functions

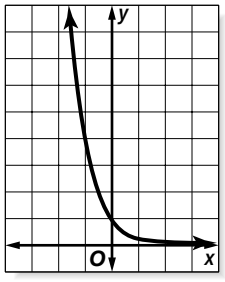
Key Terms

exponential function a function in which the exponent is a variable

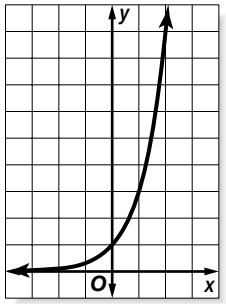
Reading the Lesson

1. The graphs of two exponential functions of the form $y = a^x$ are shown below.

A.



B.



a. In Graph A, the y-intercept is _____. The y values decrease as the x values _____.

b. If the constant 3 is added to the function shown in Graph B, then the y-intercept would be _____. The y values _____ as the x values increase.

2. a. When you look for a pattern of exponential behavior in a set of data, what is the pattern you are looking for?

b. If a set of data has a negative common factor, does it display exponential behavior?

Helping You Remember

3. What comparisons can you make between the quadratic function $y = x^2$ and the exponential function $y = 2^x$ to help remember the differences between quadratic and exponential functions?

12

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 12.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
boundary		
compound inequality		
half-plane		
intersection		
quadratic inequalities		
set-builder notation		
union		

12–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Inequalities and Their Graphs

Key Terms

inequality a statement that compares two measures that are not necessarily equal

Reading the Lesson

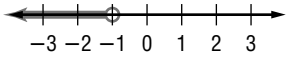
Write the letter of the graph that matches each inequality.

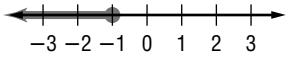
1. $x \leq -1$ _____.

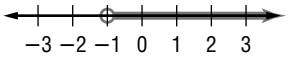
2. $x \geq -1$ _____.

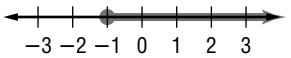
3. $x < -1$ _____.

4. $x > -1$ _____.

a. 

b. 

c. 

d. 

5. How would you read each inequality symbol in words?

Inequality Symbol	Words
$<$	
$>$	
$\leq$	
$\geq$	

Helping You Remember

6. Explain how you can remember which inequality graphs are graphed with open circles and which with shaded circles.

12–2

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Addition and Subtraction Inequalities

Key Terms

inequality a statement that compares two measures that are not necessarily equal

set-builder notation a method of writing the solution set for an inequality; $\{ x \mid x > 3 \}$

Reading the Lesson

1. For each inequality, determine whether to first add or subtract to solve the inequality.

a. $n + 4 > -5$

b. $6 - m < -3$

c. $t + 6 > 5$

d. $12 > v - 3$

e. $-2 + x < 14 - 3x$

f. $8y < 4 + y$

2. Write and solve an inequality for each of the following sentences.

a. A number subtracted from 21 is no less than -2.

b. 5 more than a number is at least 15.

c. A number added to 12 is a minimum of -1.

d. 18 less than a number is at most 45.

Helping You Remember

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

12–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Multiplication and Division Inequalities

Key Terms

inequality a statement that compares two measures that are not necessarily equal

Reading the Lesson

1. When you _____ each side of an inequality by a negative number, you _____ the direction of the inequality symbol.

2. Write an inequality that describes each situation.

a. A number n divided by 8 is greater than 5.

b. Twelve times a number k is at least 7.

c. A number x divided by -10 is less than or equal to 50.

d. Three fifths of a number n is at most 13.

e. Nine is greater than or equal to one half of a quantity m.

3. Use words to tell what each inequality says.

a. $12 < 6n$

b. $\frac{t}{-3} \geq 14$

c. $11x \leq 32$

Helping You Remember

4. In your own words, write a rule for multiplying and dividing inequalities by positive and negative numbers.

NAME _____ DATE _____ PERIOD _____

12–4 Reading to Learn Mathematics

Solving Multi-Step Inequalities

Key Terms

inequality a statement that compares two measures that are not necessarily equal

Reading the Lesson

1. What does the phrase "undoing the operations in reverse of the order of operations" mean?

2. Describe how checking the solution of an inequality is different from checking the solution of an equation.

3. Describe how the Distributive Property can be used to remove the grouping symbols in the inequality $4x - 7(2x + 8) \leq 3x - 5$.

4. Is it possible to have no solution when you solve an inequality? Explain your answer and give an example.

Helping You Remember

5. Make a checklist of steps you can use when solving inequalities.

NAME _____ DATE _____ PERIOD _____

12–5 Reading to Learn Mathematics

Solving Compound Inequalities

Key Terms

compound inequality two or more inequalities that are connected by the words *and* or *or*

intersection the set of elements common to two inequalities

union the set of elements in each of two inequalities

Reading the Lesson

1. When is a compound inequality containing *and* true?

2. The graph of a compound inequality containing *and* is the _____ of the graphs of the two inequalities.

3. When is a compound inequality containing *or* true?

4. The graph of a compound inequality containing *or* is the _____ of the graphs of the two inequalities.

5. Suppose you use yellow to show the graph of Inequality #1 on the number line. You use blue to show the graph of Inequality #2. Write *and* or *or* in each blank to complete the sentence.

a. The part that is green is the graph of Inequality #1 _____ Inequality #2.

b. All colored parts form the graph of Inequality #1 _____ Inequality #2.

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

12–6

Reading to Learn Mathematics

Solving Inequalities Involving Absolute Value

Key Terms

absolute value the distance from a number to zero on a number line

open sentence a mathematical statement with one or more variables

tolerance the amount of error or uncertainty that is allowed when taking measurements

Reading the Lesson

1. Complete each compound sentence by writing *and* or *or* in the blank. Use the result to graph the absolute value sentence.

	Absolute Value Sentence	Compound Sentence	Graph
a.	$\|2x + 2\| = 8$	$2x + 2 = 8$ _____ $2x + 2 = -8$	
b.	$\|x - 5\| \leq 4$	$x - 5 \leq 4$ _____ $x - 5 \geq -4$	
c.	$\|2x - 3\| > 5$	$2x - 3 > 5$ _____ $2x - 3 < -5$	
d.	$\|2x - 2\| \leq 6$	$2x - 2 \leq 6$ _____ $2x - 2 \geq -6$	
e.	$\|4x + 2\| > 10$	$4x + 2 > 10$ _____ $4x + 2 < -10$	
f.	$\|x - 3\| \leq 5$	$x + 3 \leq 5$ _____ $x + 3 \geq -5$	

2. How would you write the compound sentence $3x + 7 \geq 5$ or $3x + 7 \leq -5$ as an absolute value sentence?

Helping You Remember

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

12–7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Graphing Inequalities in Two Variables

Key Terms

boundary a line that separaes the coordinate plane into half-planes

half-plane the region of the graph of an inequality on one side of a boundary

Reading the Lesson

1. Complete the chart to show which type of line is needed for each symbol.

	Symbol	Type of Line	Boundary Part of Solution?
a.	$<$		
b.	$>$		
c.	$\leq$		
d.	$\geq$		

2. If a test point results in a false statement, what do you know about the graph?

3. If a test point results in a true statement, what do you know about the graph?

4. When can the origin *not* be used as a test point?

Helping You Remember

5. The two-variable inequalities in this lesson can be solved for y in terms of x to get a sentence in slope-intercept form. It looks much like a slope-intercept equation, but it has an inequality symbol instead of an equals sign. For example, $4x + 2y \leq 5$ can be written as $y \leq -2x + \frac{5}{2}$. Explain how to graph an inequality once it is written in slope-intercept form. Use the idea that *greater* can mean *above* and *less* can mean *below*.

13

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 13.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
augmented matrix		
consistent kun•SIS•tunt		
dependent		
digit problems		
elimination ee•LIM•in•AY•shun		
identity matrix		
inconsistent in•kun•SIS•tunt		
independent		
matrices MAY•tra•seez		

(continued on the next page)

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
quadratic-linear system of equations		
row operations		
substitution SUB•sti•TOO•shun		
system of equations		
system of inequalities		

NAME _____ DATE _____ PERIOD _____

13–1 Reading to Learn Mathematics

Graphing Systems of Equations

Key Terms

system of equations a set of two or more equations

Reading the Lesson

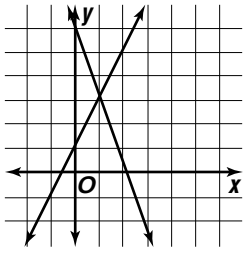
1. What is the solution to a system of equations?

2. If you are solving a system of equations by graphing, why is it important to check your answer?

3. Each figure shows the graph of a system of equations. Complete the chart for graphs A and B.

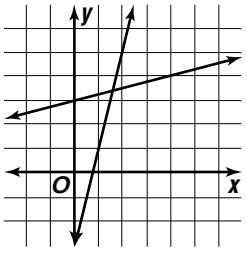
A. $y = 2x + 1$

$y = -3x + 6$



B. $y = 4x - 3$

$y = \frac{1}{4}x + 3$



	Solve by graphing	Check estimate	Is estimate correct?
a.			
b.			

Helping You Remember

4. When you are solving a system of equations by graphing, what can you do to draw a graph that is as accurate as possible?

13–2

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solutions of Systems of Equations

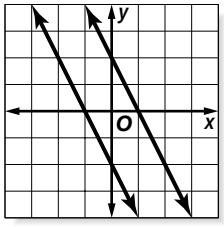
Key Terms

consistent a system of equations with at least one solution
dependent a system of equations with infinitely many solutions
inconsistent a system of equations with no solution
independent a system of equations with exactly one solution
system of equations a set of two or more equations

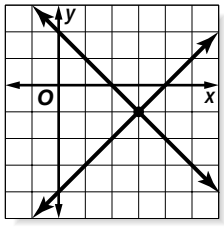
Reading the Lesson

1. Each figure shows the graph of a system of two equations. Write the letter of the figures that illustrate each statement.

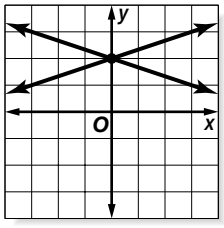
A.



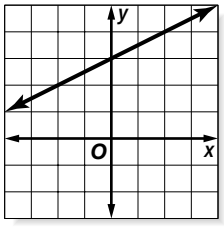
B.



C.



D.



a. A system of two linear equations can have an infinite number of solutions.

b. A system of equations is consistent if there is at least one ordered pair that satisfies both equations.

c. If two graphs are parallel, there are no ordered pairs that satisfy both equations.

d. If a system of equations has exactly one solution, it is independent.

e. If a system of equations has an infinite number of solutions, it is dependent.

Helping You Remember

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

13–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Substitution

Key Terms

substitution an algebraic method to solve a system of equations

Reading the Lesson

1. Describe how you would use substitution to solve each system of equations.

a. $y = -2x$
$x + 3y = 15$

b. $3x - 2y = 12$
$x = 2y$

c. $x + 2y = 7$
$2x - 8y = 8$

d. $-3x + 5y = 81$
$2x + y = 24$

2. Amy solved a system of equations and her result was $-8 = -8$. All of her work was correct. Describe the graph of the system. Explain.

3. Luis solved a system of equations and his result was $5 = -2$. All of his work was correct. Describe the graph of the system. Explain.

Helping You Remember

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

13–4

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Elimination Using Addition and Subtraction

Key Terms

elimination an algebraic method to solve a system of equations by adding or subtracting the equations

Reading the Lesson

1. Write *addition* or *subtraction* to tell which operation it would be easiest to use to eliminate a variable of the system. Explain your choice.

	System of Equations	Operation	Explanation
a.	$3x + 5y = 12$ $-3x + 2y = 6$		
b.	$3x + 5y = 7$ $3x - 2y = 8$		
c.	$-x - 4y = 9$ $4x - 4y = 6$		
d.	$5x - 7y = 17$ $8x + 7y = 9$		

Helping You Remember

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

13–5

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Elimination Using Multiplication

Key Terms

elimination an algebraic method to solve a system of equations by adding or subtracting the equations

Reading the Lesson

1. Could elimination by multiplication be used to solve the system shown below? Explain.

$3x - 5y = 15$

$-6x + 7y = 11$

2. Tell whether it would be easiest to use substitution, elimination by addition, elimination by subtraction, or elimination by multiplication to solve the system. Explain your choice.

	System of Equations	Solution Method	Explanation
a.	$-3x + 4y = 2$ $3x + 2y = 10$		
b.	$x - 2y = 0$ $5x - 4y = 8$		
c.	$6x - 5y = -18$ $2x + 10y = 27$		
d.	$-2x + 3y = 9$ $3x + 3y = 12$		

Helping You Remember

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

13–6

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Quadratic-Linear Systems of Equations

Key Terms

quadratic-linear system of equations a set of a quadratic function and a linear function

Reading the Lesson

1. How many possible solutions are there for a quadratic-linear system of equations?

2. Of the methods you have learned to solve systems of equations, which methods can you use to solve a quadratic-linear system of equations?

3. Are there any methods that can be used to solve a linear system of equations that *cannot* be applied to a quadratic-linear system of equations? Explain.

4. Describe how you would solve each quadratic-linear system of equations.

a. $y = x^2$
$y = 2x + 3$

b. $y = x^2 - 6$
$y = 3$

c. $y = \frac{1}{2}x - 4$
$y = -3x^2 + 5$

Helping You Remember

5. How can you apply what you have learned about solving systems of linear equations to solving a quadratic-linear system of equations?

13–7

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Graphing Systems of Inequalities

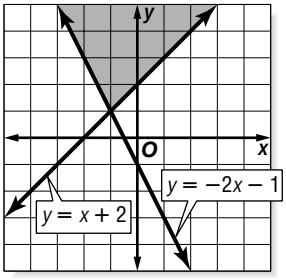
Key Terms

system of inequalities a set of two or more inequalities

Reading the Lesson

Write the inequality symbols that you need to get a system whose graph looks like the one shown. Use $<$, $\leq$, $>$, or $\geq$.

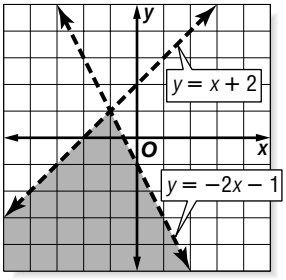
1.



y _____ $x + 2$

y _____ $-2x - 1$

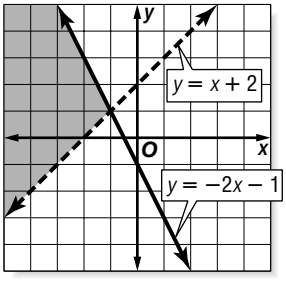
2.



y _____ $x + 2$

y _____ $-2x - 1$

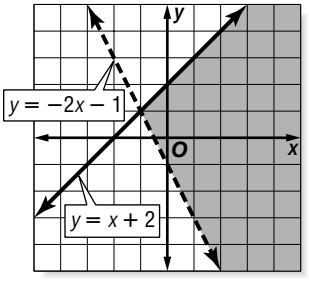
3.



y _____ $x + 2$

y _____ $-2x - 1$

4.



y _____ $x + 2$

y _____ $-2x - 1$

Helping You Remember

5. Describe how you would explain the process of using a graph to solve a system of inequalities to a friend who missed Lesson 13-7.

14

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 14.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
conjugates CON•ja•guts		
Distance Formula		
radicand RA•di•KAND		
radical equations		
rationalizing the denominator RA•shun•ul•eyes•ing		

14–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

The Real Numbers

Key Terms

real numbers the set of numbers consisting of the set of rational numbers and the set of irrational numbers

Reading the Lesson

1. The irrational numbers and rational numbers together form the set of _____ numbers.

2. The _____ Property states that each real number corresponds to a point on the number line.

3. For each of the following, choose the Roman numeral of each set of numbers to which each real number belongs. Each real number may belong to more than one set of numbers.

a. 3.6

b. -5

c. $4.\overline{12}$

d. 0

e. 120

I. Natural numbers

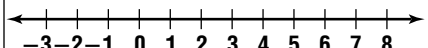
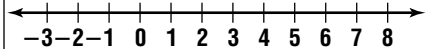
II. Whole numbers

III. Integers

IV. Rational numbers

V. Irrational numbers

4. For each square root, determine which two perfect squares the square root is between. Then use a calculator to find the approximation to the nearest tenth of the square root. Finally, graph each on the number line.

	Square Root	$\sqrt{?} <$ square root $< \sqrt{?}$	Decimal Approximation	Number Line
a.	$\sqrt{15}$			
b.	$\sqrt{41}$			

Helping You Remember

5. Write a phrase or sentence to help you remember which set of numbers is the largest.

NAME _____ DATE _____ PERIOD _____

14–2 Reading to Learn Mathematics

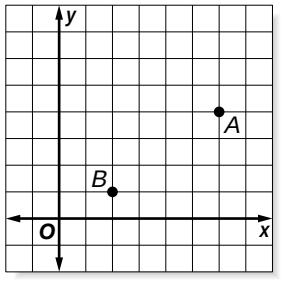
The Distance Formula

Key Terms

Distance Formula a formula derived from the Pythagorean Theorem to find the distance between two ordered pairs on the coordinate plane

Reading the Lesson

1. Suppose you want to use the Distance Formula to find the distance between (6, 4) and (2, 1). Use $(x_1, y_1) = (6, 4)$ and $(x_2, y_2) = (2, 1)$. Complete the equations by writing the correct numbers in the blanks.



a. $x_1 =$ ____ $y_1 =$ ____ $x_2 =$ ____ $y_2 =$ ____

b. $d = \sqrt{(\_\_\_\_ - \_\_\_\_)^2 + (\_\_\_\_ - \_\_\_\_)^2}$

2. Suppose you want to use the Distance Formula to find the distance between (3, 7) and (9, −2). Use $(x_1, y_1) = (3, 7)$ and $(x_2, y_2) = (9, -2)$. Complete the equations by writing the correct numbers in the blanks.

a. $x_1 =$ ____ $y_1 =$ ____ $x_2 =$ ____ $y_2 =$ ____

b. $d = \sqrt{(\_\_\_\_ - \_\_\_\_)^2 + (\_\_\_\_ - \_\_\_\_)^2}$

3. A classmate is using the Distance Formula to find the distance between two points. She has done everything correctly so far, and her equation is $d = \sqrt{(-2 - 5)^2 + (7 - 11)^2}$. This equation will give her the distance between what two points?

Helping You Remember

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

NAME _____ DATE _____ PERIOD _____

14–3 Reading to Learn Mathematics

Simplifying Radical Expressions

Key Terms

conjugates (CON je gets) two expressions of the form $a\sqrt{b} + c\sqrt{d}$ and $a\sqrt{b} - c\sqrt{d}$

radical expression an expression that contains a square root

radicand the number under the radical sign

rationalizing the denominator a method used to remove radicals from the denominator of a fraction

Reading the Lesson

1. Write out each step to simplify the radical expression $\sqrt{88}$.

2. Of $5\sqrt{3}$, $5\sqrt{6}$, and $3\sqrt{3}$, which two radical expressions have the same radicand?

3. a. How can you tell that the radical expression $\sqrt{28x^2y^4}$ is *not* in simplest form?

b. To simplify $\sqrt{28x^2y^4}$, you first find the _____ of $28x^2y^4$. You then apply the _____. In this case, $\sqrt{4 \cdot 7 \cdot x^2 \cdot y^4}$ is equal to the product _____. You can simplify again to get a final answer of $2|x|\, y^2\sqrt{7}$.

4. What method would you use to simplify $\frac{\sqrt{12t}}{\sqrt{15}}$?

5. What should you do to write the conjugate of a binomial of the form $a\sqrt{b} + c\sqrt{d}$? To write the conjugate of a binomial of the form $a\sqrt{b} - c\sqrt{d}$?

Helping You Remember

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

14–4

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Adding and Subtracting Radical Expressions

Key Terms

radical expression an expression that contains a square root

radicand the number under the radical sign

Reading the Lesson

1. Radical expressions can be added or subtracted if they have the same _____.

2. The first step to add or subtract two radical expressions is to find the _____ of each radicand.

3. The Distributive Property can be used to simplify _____ as well as monomials.

4. Indicate whether the following expressions are in simplest form. Explain your answer.

a. $6\sqrt{3} - \sqrt{12}$

b. $12\sqrt{6} + 7\sqrt{10}$

c. $4\sqrt{15} - 3\sqrt{60}$

d. $3\sqrt{20} + 5\sqrt{30}$

Helping You Remember

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

14–5

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Radical Equations

Key Terms

radical equation an equation that contains a radical expression
radical expression an expression that contains a square root
radicand the number under the radical sign

Reading the Lesson

1. To solve a radical equation, you first isolate the radical on one side of the equation. Why do you then square each side of the equation?

2. a. Provide the reason for each step in the solution of the given radical equation.

$\sqrt{5x - 1} - 4 = x - 3$	Original equation
$\sqrt{5x - 1} = x + 1$	_____
$\left(\sqrt{5x - 1}\right)^2 = (x + 1)^2$	_____
$5x - 1 = x^2 + 2x + 1$	_____
$0 = x^2 - 3x + 2$	_____
$0 = (x - 1)(x - 2)$	_____
$x - 1 = 0$ or $x - 2 = 0$	_____
$x = 1$ $\quad$ $x = 2$	_____

b. To be sure that 1 and 2 are the correct solutions, into which equation should you substitute to check?

3. a. How can you determine whether a radical equation will have two solutions or only one solution?

b. Is it necessary to check each solution? Explain.

Helping You Remember

4. How can you use the letters ISC to remember the three steps in solving a radical equation?

15

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 15.
As you study the chapter, complete each term's definition or description.
Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
excluded value		
least common denominator (LCD)		
least common multiple (LCM)		
rational equation RA • shun • ul		
rational expression		
rational function		
uniform motion problems		
work problems		

15–1

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Simplifying Rational Expressions

Key Terms

excluded values any value assigned to a variable that results in a denominator of zero

rational expression an expression that is an algebraic fraction in which the numerator and denominator are both polynomials

rational function a function that contains a rational expression

Reading the Lesson

1. Write *yes* or *no* to tell whether each expression is or is not a rational expression. If an expression is not a rational expression, explain why.

a. $\frac{x-2}{-6x+7}$ **b.** $\frac{n^2-15}{2n^3+n-4}$ **c.** $\frac{\sqrt{3x-4}}{5x}$

Complete each sentence.

2. An excluded value for a rational expression that contains the variable _____ is a value of x that makes the _____ of the rational expression equal to _____.

3. To simplify a rational expression, you divide the numerator and denominator of the expression by their _____.

4. If you simplify $\frac{7x-14}{x^2-5x+6}$, you will find that $\frac{7x-14}{x^2-5x+6} = \frac{7}{x-3}$. Write the equation you should solve to find the excluded values. Do not solve the equation.

Helping You Remember

5. Explain how you can use what you know about simplifying fractions for rational numbers to remember how to simplify rational expressions.

15–2

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Multiplying and Dividing Rational Expressions

Key Terms

rational expression an algebraic fraction with a numerator and a denominator that are polynomials

Reading the Lesson

1. The product of two rational expressions can always be found by multiplying the numerators and multiplying the _____.

2. Rewrite each division problem as a multiplication problem.

a. $\frac{3b + 15}{b + 1} \div (b - 2)$

b. $\frac{2c^2}{d} \div \frac{c}{3d}$

3. If the numerators or denominators of two rational expressions involve quadratic expressions with two or three terms, try to _____ these expressions before you multiply the rational expressions.

4. Explain how dividing rational expressions is similar to dividing rational numbers in fraction form.

Helping You Remember

5. Suppose that a friend was absent when the class worked on this lesson. Tell how you can explain to your friend the procedure for multiplying rational expressions.

15–3

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Dividing Polynomials

Key Terms

rational expression an algebraic fraction with a numerator and a denominator that are polynomials

Reading the Lesson

Complete each sentence.

1. To divide a polynomial by a monomial, you can divide each _____ of the polynomial by the monomial.

2. You can use factoring to divide a polynomial by a binomial if a _____ of the polynomial is equal to the binomial divisor.

3. If you cannot see a way to factor a polynomial, then you can divide it by a binomial by using _____.

4. In Example 3 on page 652 in the Student Edition, the polynomial that is being divided cannot be factored. In such cases, the quotient can be written as the sum of a polynomial and a fraction whose numerator is a number and whose denominator is equal to the _____.

5. If you are dividing a polynomial by a binomial, what number should you use to represent a missing term of the polynomial?

Helping You Remember

6. Describe two methods to divide polynomials. If you only remember one of these methods, which method is best?

NAME _____ DATE _____ PERIOD _____

15–4 Reading to Learn Mathematics

Combining Rational Expressions with Like Denominators

Key Terms

rational expression an algebraic fraction with a numerator and a denominator that are polynomials

Reading the Lesson

1. To add or subtract rational expressions with like denominators, add or subtract the _____ and then write the sum or difference over the _____.

2. For each addition or subtraction problem, write the needed expression in each box on the right side of the equation.

a. $\frac{5n}{7} + \frac{8}{7} = \frac{5n + \square}{7}$

b. $\frac{7x}{x-1} + \frac{x+3}{x-1} = \frac{\square + (x+3)}{\square}$

c. $\frac{3}{2m+5} - \frac{6m+1}{2m+5} = \frac{3 - (\square)}{\square}$

d. $\frac{d-c}{c+2d} - \frac{c-d}{c+2d} = \frac{\square - (c-d)}{c+2d}$

e. $\frac{7}{3x-4} - \frac{5}{4-3x} = \frac{7 + \square}{3x-4}$

f. $\frac{8}{6x-1} + \frac{9}{1-6x} = \frac{8 + (\square)}{6x-1}$

Helping You Remember

3. How can you use what you know about addition and subtraction of rational numbers that have like denominators to remember how to add and subtract rational expressions that have like denominators?

NAME _____ DATE _____ PERIOD _____

15–5 Reading to Learn Mathematics

Combining Rational Expressions with Unlike Denominators

Key Terms

least common multiple (LCM) the least number that is a common multiple of two or more numbers

least common denominator (LCD) the LCM of the denominators

Reading the Lesson

1. Answer each question about the monomials $49k^2n^3$ and $21kn^5$.

a. What prime numbers are factors of these monomials?

b. How many times are these prime factors used in each monomial?

c. How many times should you use 3 as a factor in the LCM of the two monomials? How many times should you use 7 as a factor in the LCM?

d. How many times should you use k as a factor in the LCM? How many times should you use n as a factor in the LCM?

2. How is the LCD for two rational expressions related to the LCM of the denominators?

3. How does the LCD of two rational expressions help you add or subtract the expressions?

Helping You Remember

4. Making a short list of the steps in a procedure can help you remember the procedure. Make a short list of the main steps you can use to add or subtract rational expressions with unlike denominators.

15–6

NAME _____ DATE _____ PERIOD _____

Reading to Learn Mathematics

Solving Rational Equations

Key Terms

rational equation an equation that contains at least one rational expression

uniform motion problem problems using the formula distance = rate × time, or $d = rt$

Reading the Lesson

1. How can you tell by looking at a rational equation whether you can solve it by using cross products?

2. How does multiplying both sides of a rational equation by the LCD help you solve the equation?

3. For the following exercise, provide a reason for each step in the space provided.

Solve $\frac{3(x+2)}{x-2} - \frac{6}{x+2} = -7$.

$$\frac{3(x+2)}{x-2} - \frac{6}{x+2} = -7$$

$(x-2)(x+2)\left(\frac{3(x+2)}{x-2} - \frac{6}{x+2}\right) = (x-2)(x+2)(-7)$ _____

$3(x+2)(x+2) - 6(x-2) = -7(x^2-4)$ _____

$3x^2 + 12x + 12 - (6x - 12) = -7x^2 + 28$ _____

$3x^2 + 12x + 12 - 6x + 12 = -7x^2 + 28$ _____

$3x^2 + 6x + 24 = -7x^2 + 28$ _____

$10x^2 + 6x - 4 = 0$ _____

$2(5x-2)(x+1) = 0$ _____

$5x - 2 = 0$ or $x + 1 = 0$ _____

$5x = 2$ $\quad x = -1$ _____

$x = \frac{2}{5}$ _____

Helping You Remember

4. How can the word *lucid* help you remember that multiplying by the LCD is one method you can use to solve a rational equation?