Algebra 2
Summer Assignment

For each section…

1) Read the vocabulary box.

2) Read the examples.

3) After each example are some exercises. Do all of the exercises on separate paper. You may need graph paper for some of the exercises.

4) Bring this packet and all work with you to the first day of class. This assignment will be checked for a grade.

Name _____ Date _____

LESSON 1.1 Reteaching with Practice

For use with pages 3–8

GOAL **Graph, order, and use real numbers.**

Vocabulary

The **opposite,** or additive inverse, of any number b is $-b$. If b is positive, then $-b$ is negative. If b is negative, then $-b$ is positive.

The **reciprocal,** or multiplicative inverse, of any nonzero number b is $-\frac{1}{b}$.

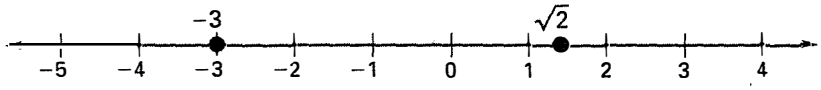
EXAMPLE 1 Graph real numbers on a number line

Graph the real numbers -3 and $\sqrt{2}$ on a number line.

Solution

Use a calculator to approximate $\sqrt{2}$ to the nearest tenth: $\sqrt{2} \approx 1.4$.

On the number line, graph $\sqrt{2}$ between 1 and 2 as shown below.



Exercises for Example 1

Graph the numbers on a number line.

1. $\sqrt{3}$ and -1 **2.** -4 and 5 **3.** $\frac{1}{2}$ and 0

Graph the numbers on a number line. Order the numbers in increasing order.

4. 2, -3, $\frac{2}{3}$, -2, and $\sqrt{6}$ **5.** 4, -5, $\frac{1}{4}$, 0, and -4

EXAMPLE 2 Identify properties of real numbers

Identify the property that the statement illustrates.

a. $3 \cdot 4 = 4 \cdot 3$ **b.** $-7 + 7 = 0$

c. $0 + 8 = 8$ **d.** $5(4 + 2) = 5(4) + 5(2)$

Solution

a. Commutative property of multiplication

b. Inverse property of addition

c. Identity property of addition

d. Distributive property

Name _____ Date _____

LESSON 1.1

Reteaching with Practice *continued*

For use with pages 3–8

Exercises for Example 2

Identify the property that the statement illustrates.

6. $36 + (12 + 11) = (36 + 12) + 11$

7. $22 \cdot \frac{1}{22} = 1$

8. $20(33 + 40) = 20(33) + 20(40)$

9. $4 \cdot 5 = 5 \cdot 4$

10. $6 + 0 = 6$

EXAMPLE 3 **Operations with real numbers**

a. Find the difference of 7 and -3.

Solution

$7 - (-3) = 7 + 3$ Add 3, the opposite of -3.

$= 10$ Simplify.

b. Find the quotient of -10 and $-\frac{1}{4}$.

Solution

$-10 \div -\frac{1}{4} = -10 \cdot -4$ Multiply by -4, the reciprocal of $-\frac{1}{4}$.

$= 40$ Simplify.

Exercises for Example 3

Select and perform an operation to answer the question.

11. What is the sum of -6 and -8?

12. What is the difference of -9 and 3?

13. What is the product of 4 and -5?

14. What is the quotient of 18 and $-\frac{1}{9}$?

15. What is the product of -10 and -14?

16. What is the difference of 18 and -10?

Name _____ Date _____

LESSON 1.2 Reteaching with Practice

For use with pages 9–15

GOAL **Define and use algebraic expressions.**

Vocabulary

A **base** of a power is the number or expression that is used as a factor in a repeated multiplication.

An **exponent** is a number or variable that represents the number of times the base of a power is used as a factor.

An expression formed by repeated multiplication of the same factor is called a **power.**

An expression that consists of numbers, operations, and grouping symbols is called a **numerical expression.**

A **variable** is a letter used to represent one or more numbers.

An expression involving variables is an **algebraic expression.**

EXAMPLE 1 Evaluate powers

a. -3^2 **b.** $(-3)^2$

Solution

a. $-(3 \cdot 3) = -9$ **b.** $(-3)(-3) = 9$

Order of Operations

First, do operations that occur within grouping symbols.

Next, evaluate powers.

Then, do multiplications and divisions from left to right.

Finally, do additions and subtractions from left to right.

EXAMPLE 2 Evaluate an algebraic expression

Evaluate $3x^2 + 4x - 5$ when $x = -2$.

Solution

$3x^2 + 4x - 5 = 3(-2)^2 + 4(-2) - 5$ Substitute -2 for x.

$= 3(4) + 4(-2) - 5$ Evaluate power.

$= 12 - 8 - 5$ Multiply.

$= -1$ Subtract.

LESSON 1.2

Name _____ Date _____

LESSON 1.2

Reteaching with Practice *continued*

For use with pages 9–15

Exercises for Examples 1 and 2

1. Evaluate $-x^2 + 3x$ when $x = 2$.

2. Evaluate $2x^2 - x + 1$ when $x = -1$.

3. Evaluate $6 - b^2$ when $b = 5$.

4. Evaluate $3d^2 + 4d$ when $d = -2$.

EXAMPLE 3 **Write and evaluate a mathematical model**

You are going to a bowling alley. Renting bowling shoes costs $1.50. Each game you bowl costs $2. Write an expression that represents the total cost of bowling. Then find the cost if you want to bowl 3 games.

Solution

Verbal Model

Cost per game	•	Games played	+	Shoe rental

Labels

Cost to bowl each game = 2	(dollars per game)
Number of games being played = g	(game)
Cost to rent shoes = 1.50	(dollars)

Algebraic Model $2g + 1.50$

Answer ▶ When you play 3 games, your cost will be $2(3) + 1.50 = \$7.50$.

Exercises for Example 3

5. Repeat Example 3 if you are bowling 4 games and each game costs $2.50.

6. You buy a DVD player for $129 and plan to rent DVDs each month. Each rental costs $1.95. Write an expression for the total amount you spend during the first 12 months that you own the DVD player, including the price of the DVD player. Evaluate the expression for 6 DVD rentals per month.

7. You are buying a skateboard. The board costs $40 and a set of 4 wheels costs $24. Since you plan to ride the skateboard to school, you want to order extra sets of wheels. Write an expression for the total amount you spend ordering your new skateboard with w sets of wheels. Find the cost if you decide to order 5 sets of wheels.

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LESSON 1.3 Reteaching with Practice

For use with pages 16–23

GOAL **Simplify algebraic expressions.**

Vocabulary

In an expression that can be written as a sum, the parts added together are called the **terms.**

When a term is a product of a number and a power of a variable, the number is called the **coefficient** of the power.

Like terms have the same variable parts.

If a term has a number part but no variable part, it is called a **constant term.**

An expression in which all grouping symbols are removed and all like terms are combined is a **simplified expression.**

EXAMPLE 1 Identify coefficients and like terms

Identify the coefficients and like terms in the expression $2x - 4x^2 + 5 - 7x^2 - 3 + 9x$.

Solution

Begin by writing the expression as a sum in order to identify the terms.

$2x - 4x^2 + 5 - 7x^2 - 3 + 9x = 2x + (-4x^2) + 5 + (-7x^2) + (-3) + 9x$

The coefficients of the expression are 2, -4, -7, and 9. The terms $2x$ and $9x$ are like terms. The terms $-4x^2$ and $-7x^2$ are also like terms. The terms 5 and -3 are also like terms.

Exercises for Example 1

1. $5x - 7 - 3x^2 + 4x$

2. $6y^2 + 7y - 8 - 3y^2 + 5y$

3. $-3t + 8t^2 + 8t + 9 + 4t^2$

4. $12w^2 - 5w + 3 + 8w^2 + 3w - 7$

EXAMPLE 2 Simplify by combining like terms

$-6(y - 2) + 4(y - 1) = -6y + 12 + 4y - 4$		Distributive property
	$= (-6y + 4y) + (12 - 4)$	Group like terms.
	$= -2y + 8$	Combine like terms.

Exercises for Example 2

Simplify by combining like terms.

5. $3t + 5t^2 - 2t + 6t^2$

6. $7(q - 2) + 5q + 14$

7. $-4(m - 2) + 3(m + 1)$

8. $8d + 2d^2 - 3(d + d^2)$

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LESSON 1.3

Reteaching with Practice *continued*

For use with pages 16–23

EXAMPLE 3 Simplify expressions with grouping symbols

Simplify the expression $2x + 5(3x - 7)$.

Solution

$2x + 5(3x - 7) = 2x + 15x - 35$ Distributive property

$= (2x + 15x) - 35$ Group like terms.

$= 17x - 35$ Combine like terms.

Exercises for Example 3

Simplify the expression.

9. $5(6y - 8) + 3y$

10. $7h - 2(5h + 4)$

11. $4(-5n - 7) + 3(3n - 9)$

12. $-6(4d - 2) - 4(2d + 8)$

EXAMPLE 4 Simplify a mathematical model

The width of a rectangular patio is $n + 3$ and the length of the patio is $7n$. Write and simplify an expression that represents the perimeter of the patio. Then find the perimeter if $n = 2$ feet.

Solution

Write a verbal model. Then write an algebraic expression.

Number of sides	·	Width (in feet)	+	Number of sides	·	Length (in feet)
↓		↓		↓		↓
2	·	$(n + 3)$	+	2	·	$7n$

An algebraic expression for the perimeter is $P = 2(n + 3) + 2(7n)$.

$2(n + 3) + 2(7n) = 2n + 6 + 14n$ Distributive property

$= (2n + 14n) + 6$ Group like terms.

$= 16n + 6$ Combine like terms.

When $n = 2$, the perimeter is $16(2) + 6 = 32 + 6 = 38$ feet.

Exercises for Example 4

13. The width of a rectangular patio is $2n + 3$ and the length of the patio is $5n$. Write and simplify an expression that represents the perimeter of the patio. Then find the perimeter if $n = 4$ feet.

14. You purchase 12 packages of wrapping paper. Large packages cost \$7 and small packages cost \$4.50. Write and simplify an expression that represents the total cost if n of the 12 packages are large packages. Then find the total cost if 8 of the 12 packages are large packages.

Name _____ Date _____

LESSON 1.4

Reteaching with Practice

For use with pages 24–32

GOAL **Solve linear equations.**

Vocabulary

An **equation** is a statement that two expressions are equal.

A **linear equation** in one variable is an equation that can be written in the form $ax + b = 0$ where a and b are constants and $a \neq 0$.

A number is a **solution** of an equation if substituting the number for the variable results in a true statement.

EXAMPLE 1 Solve an equation with a variable on one side

Solve $6x - 8 = 10$.

Solution

$6x - 8 = 10$	Write original equation.
$6x = 18$	Add 8 to each side.
$x = 3$	Divide each side by 6.

EXAMPLE 2 Solve an equation with a variable on both sides

Solve $8z + 7 = -2z - 3$.

Solution

$8z + 7 = -2z - 3$	Write original equation.
$10z + 7 = -3$	Add $2z$ to each side.
$10z = -10$	Subtract 7 from each side.
$z = -1$	Divide each side by 10.

Exercises for Examples 1 and 2

Solve the equation. Check your solution.

1. $14x = 7$

2. $3n + 2 = 14$

3. $-6t - 5 = 13$

4. $11q - 4 = 6q - 9$

5. $5a - 1 = 2a + 11$

6. $-2m + 3 = 7m - 6$

Name _____ Date _____

LESSON 1.4

LESSON 1.4 **Reteaching with Practice** *continued*
For use with pages 24–32

EXAMPLE 3 Solve an equation using the distributive property

Solve $2(3x + 1) = -3(x - 2)$.

Solution

$2(3x + 1) = -3(x - 2)$	Write original equation.
$6x + 2 = -3x + 6$	Distributive property
$9x + 2 = 6$	Add $3x$ to each side.
$9x = 4$	Subtract 2 from each side.
$x = \frac{4}{9}$	Divide each side by 9.

Exercises for Example 3

7. Solve $4(2x - 1) = 3(x + 2)$.

8. Solve $5(x + 3) = -(x - 3)$.

EXAMPLE 4 Use a verbal model

You want to buy a new mountain bike that costs $335. You have already saved $125 and earn $35 each week at your after school job. How many weeks will it take to save for your mountain bike? Write and solve an equation to find the number of weeks it will take to save for the bike.

Solution

Verbal Model

Cost of bike	=	Money saved	+	Weekly pay	•	Number of weeks

Labels

Cost of the bike = 335	(dollars)
Money saved = 125	(dollars)
Weekly pay = 35	(dollars per week)
Number of weeks = w	(weeks)

Algebraic Model

$335 = 125 + 35w$	Write an equation.
$210 = 35w$	Subtract 125 from each side.
$6 = w$	Divide each side by 35.

Answer ▶ It will take you 6 weeks to earn the money to buy the mountain bike.

Exercises for Example 4

9. Repeat Example 4 if the mountain bike costs $382 and you earn $29 per week.

10. You are riding your mountain bike home from the park. The distance from the park to your house is 8 miles. You have already traveled 3 miles. If you are traveling at 0.25 mile per minute, how many more minutes until you reach home? Write and solve an equation to find the number of minutes it will take to reach your house.

11. You borrow $90 from a cousin. You will pay this back at $6 per week. Write and solve an equation to find the number of weeks it will take to pay back your cousin.

Name _____ Date _____

LESSON 1.5

Reteaching with Practice

For use with pages 33–39

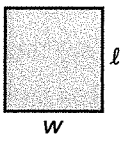
GOAL **Rewrite common formulas and equations that have more than one variable.**

Vocabulary

COMMON FORMULAS

	FORMULA	VARIABLES
Distance	$d = rt$	d = distance, r = rate, t = time
Simple Interest	$I = Prt$	I = interest, P = principal, r = rate, t = time
Temperature	$F = \frac{9}{5}C + 32$	F = degrees Fahrenheit, C = degrees Celsius

GEOMETRY FORMULAS



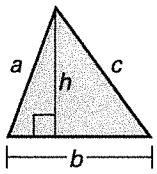
RECTANGLE

Perimeter

$P = 2\ell + 2w$

Area

$A = \ell w$



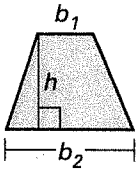
TRIANGLE

Perimeter

$P = a + b + c$

Area

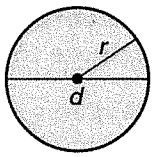
$A = \frac{1}{2}bh$



TRAPEZOID

Area

$A = \frac{1}{2}(b_1 + b_2)h$



CIRCLE

Circumference

$C = \pi d$ or $C = 2\pi r$

Area

$A = \pi r^2$

EXAMPLE 1 Rewrite a formula with two variables

Solve the formula $F = \frac{9}{5}C + 32$ for C.

$F = \frac{9}{5}C + 32$	Write temperature formula.
$5F = 9C + 160$	Multiply each side by 5.
$5F - 160 = 9C$	Subtract 160 from each side.
$\frac{5F - 160}{9} = C$	Divide each side by 9.

Exercise for Example 1

1. Solve the formula $C = 2\pi r$ for r. Then find the radius of a circle with a circumference of 88 inches.

Name _____ Date _____

LESSON 1.5

Reteaching with Practice *continued*

For use with pages 33–39

EXAMPLE 2 Rewrite a formula with three variables

Solve the formula $A = \ell w$ for ℓ. Then find ℓ when $A = 5$ square centimeters and $w = 2$ centimeters.

STEP 1 **Solve** the formula for ℓ.

$A = \ell w$ Write area formula.

$\frac{A}{w} = \frac{\ell w}{w}$ Divide each side by w.

$\frac{A}{w} = \ell$ Simplify.

STEP 2 **Substitute** the given values into the rewritten formula.

$\ell = \frac{5}{2} = 2.5$ Substitute 5 for A and 2 for w.

The length of the rectangle is 2.5 centimeters.

EXAMPLE 3 Solve a multi-step problem

You buy x shirts for \$8 each and y hats for \$4 each. Write an equation that represents your total purchases T (in dollars) and solve the equation for y. Evaluate the equation for $T = 28$ and $x = 2$.

STEP 1 **Write** a verbal model. Then write an equation.

Total purchases	=	Prices of shirts	•	Number of shirts	+	Price of hats	•	Number of hats

An equation is $T = 8x + 4y$.

STEP 2 **Solve** the equation for y.

$T = 8x + 4y$ Write equation.

$T - 8x = 4y$ Subtract $8x$ from each side.

$\frac{T - 8x}{4} = y$ Divide each side by 4.

STEP 3 **Calculate** y. If $T = 28$ and $x = 2$, then $y = \frac{28 - 8(2)}{4} = 3$.

If 2 shirts are purchased, then 3 hats are purchased.

Exercises for Examples 2 and 3

2. Solve the formula $P = 2\ell + 2w$ for w. Then find the width of a rectangle with a length of 11.5 centimeters and a perimeter of 92 centimeters.

3. In Example 3, how many hats can you buy if you buy 1 shirt and spend \$16?

Name _____ Date _____

LESSON 1.6

Reteaching with Practice

For use with pages 40–45

GOAL **Use problem solving strategies to solve real-life problems.**

Vocabulary

A **verbal model** is a word equation that represents a real-life problem.

An **algebraic model** is a mathematical statement that represents a real-life problem.

EXAMPLE 1 Use a formula

A rectangular flower garden has an area of 125 square feet. If the length of the garden is 12 feet, what is the width of the garden?

Solution

You can use the formula for the area of a rectangle as a verbal model.

Area (square feet)	=	Length (feet)	•	Width (feet)
↓		↓		↓
125	=	12	•	w

An equation for this situation is $125 = 12 \cdot w$. Solve for w.

$125 = 12 \cdot w$ Write equation.

$10.4 \approx w$ Divide each side by 12.

The width of the garden is about 10.4 feet.

Exercises for Example 1

1. The perimeter of a rectangular city park is 1080 yards. The width of the park is 240 yards. What is the length of the park?
2. A train travels at a speed of 44 miles per hour. How long will it take the train to travel 154 miles?

EXAMPLE 2 Look for a pattern

Look for a pattern in the table. Then write an equation that represents the table.

x	0	1	2	3
y	0	3	6	9

Solution

The x-values increase by 1 and the y-values increase by 3. You can use this pattern to write an equation $y = 3x$.

Name _____ Date _____

LESSON 1.6

Reteaching with Practice *continued*

For use with pages 40–45

Exercises for Example 2

Look for a pattern in the table. Then write an equation that represents the table.

3.

x	0	1	2	3
y	0	−2	−4	−6

4.

x	0	1	2	3
y	1	5	9	13

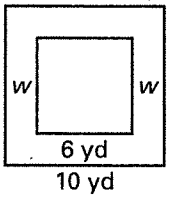
EXAMPLE 3

Draw a diagram

You are designing a square flower garden surrounded by a brick sidewalk of uniform width. The garden has a side length of 6 yards. The side length of the outside square is 10 yards. Draw a diagram to find the width of the sidewalk.

Solution

Begin by drawing and labeling a diagram, as shown below.



From the diagram, you can write and solve an equation to find w.

$w + 6 + w = 10$ Write equation.

$2w + 6 = 10$ Combine like terms.

$2w = 4$ Subtract 6 from each side.

$w = 2$ Divide each side by 2.

The width of the sidewalk is 2 yards.

Exercises for Example 3

5. You want to create an open rectangular box from a rectangular piece of cardboard. The cardboard has a length of 14 inches and you will cut 2 inch squares from each corner. Draw a diagram to find the length of the box.

6. A piece of fabric is 52 inches long. You cut the fabric into two pieces. The first piece is x inches long. The second piece is 14 inches longer than the first piece. Draw and label a diagram of the fabric. Then write and solve an equation to find x.

7. You want to create an open rectangular box from a square piece of cardboard. The cardboard is 20 inches by 20 inches and you will cut 3 inch squares from each corner. Draw a diagram to find the length of the box.