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Chapter 3 Fair Game Review

Evaluate the expression when $x = \frac{1}{2}$ and $y = -3$.

1. $-4xy$

2. $6x - 3y$

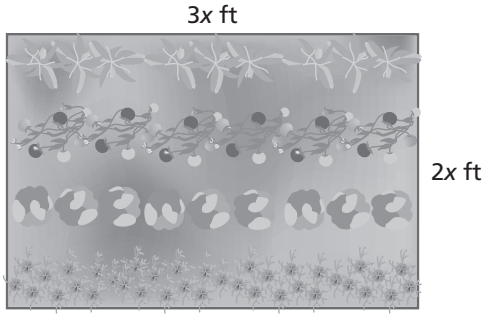
3. $-5y + 8x + 1$

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

5. $2x + 4\left(x + \frac{1}{2}\right) + 7$

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

7. Find the area of the garden when $x = 2$ feet.



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Chapter 3

Fair Game Review (continued)

Write the phrase as an algebraic expression.

8. the sum of eight and a number y

9. six less than a number p

10. the product of seven and a number m

11. eight less than the product of eleven and a number c

12. a number r deceased by the quotient of a number r and two

13. the product of nine and the sum of a number z and four

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3.1 Algebraic Expressions

For use with Activity 3.1

Essential Question How can you simplify an algebraic expression?

1 ACTIVITY: Simplifying Algebraic Expressions

Work with a partner.

a. Evaluate each algebraic expression when $x = 0$ and when $x = 1$. Use the results to match each expression in the left table with its equivalent expression in the right table.

	Expression	Value When $x = 0$	Value When $x = 1$
A.	$3x + 2 - x + 4$		
B.	$5(x - 3) + 2$		
C.	$x + 3 - (2x + 1)$		
D.	$-4x + 2 - x + 3x$		
E.	$-(1 - x) + 3$		
F.	$2x + x - 3x + 4$		
G.	$4 - 3 + 2(x - 1)$		
H.	$2(1 - x + 4)$		
I.	$5 - (4 - x + 2x)$		
J.	$5x - (2x + 4 - x)$		

	Expression	Value When $x = 0$	Value When $x = 1$
a.	4		
b.	$-x + 1$		
c.	$4x - 4$		
d.	$2x + 6$		
e.	$5x - 13$		
f.	$-2x + 10$		
g.	$x + 2$		
h.	$2x - 1$		
i.	$-2x + 2$		
j.	$-x + 2$		

b. Compare each expression in the left table with its equivalent expression in the right table. In general, how do you think you obtain the equivalent expression in the right table?

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2 ACTIVITY: Writing a Math Lesson

Work with a partner. Use your results from Activity 1 to write a lesson on simplifying an algebraic expression.

Simplifying an Algebraic Expression

Key Idea Use the following steps to simplify an algebraic expression.

Describe steps you can use to simplify an expression.

1.

2.

3.

Examples ← Write 3 examples. Use expressions from Activity 1.

a.

b.

c.

Exercises ← Write 3 exercises. Use expressions different from the ones in Activity 1.

Simplify the expression.

1.

2.

3.

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3.1 Algebraic Expressions (continued)

What Is Your Answer?

3. **IN YOUR OWN WORDS** How can you simplify an algebraic expression? Give an example that demonstrates your procedure.

4. **REASONING** Why would you want to simplify an algebraic expression? Discuss several reasons.

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3.1 Practice

For use after Lesson 3.1

Identify the terms and like terms in the expression.

1. $3x + 4 - 7x - 6$

2. $-9 + 2.5y - 0.7y + 1 + 6.4y^2$

Simplify the expression.

3. $5a - 2a + 9$

4. $m - \frac{1}{6} - 4m + \frac{5}{6}$

5. $2.3w - 7 + 8.1 - 3w$

6. $7(d - 1) + 2$

7. $13g + 2(4k - g)$

8. $20(p + 2) + 16(-3 - p)$

9. Write an expression in simplest form that represents the cost for shampooing and cutting w women's hair and m men's hair.

	Women	**Men**
Cut	\$15	\$7
Shampoo	\$5	\$2

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3.2 Adding and Subtracting Linear Expressions

For use with Activity 3.2

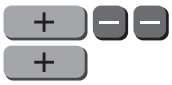
Essential Question How can you use algebra tiles to add or subtract algebraic expressions?

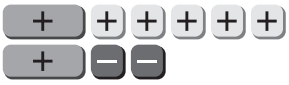
Key: = variable	= −variable	= zero pair
= 1	= −1	= zero pair

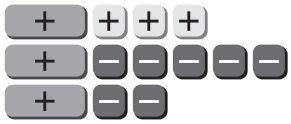
1 ACTIVITY: Writing Algebraic Expressions

Work with a partner. Write an algebraic expression shown by the algebra tiles.

a.

b. 

c. 

d. 

2 ACTIVITY: Adding Algebraic Expressions

Work with a partner. Write the sum of two algebraic expressions modeled by the algebra tiles. Then use the algebra tiles to simplify the expression.

a.

b.

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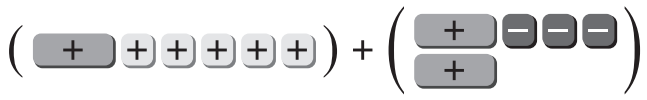
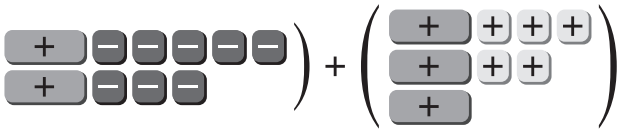
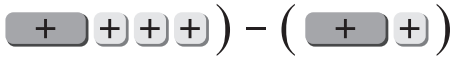
3.2 Adding and Subtracting Linear Expressions (continued)

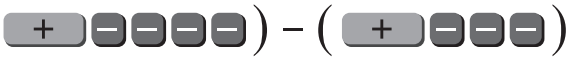
c. 

d. 

3 ACTIVITY: Subtracting Algebraic Expressions

Work with a partner. Write the difference of two algebraic expressions modeled by the algebra tiles. Then use the algebra tiles to simplify the expression.

a. 

b. 

c.

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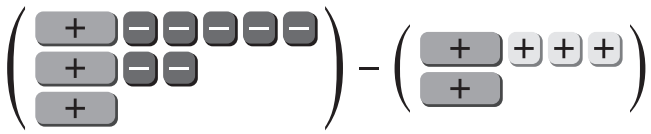
3.2 Adding and Subtracting Linear Expressions (continued)

d. 

4 ACTIVITY: Adding and Subtracting Algebraic Expressions

Work with a partner. Use algebra tiles to model the sum or difference. Then use the algebra tiles to simplify the expression.

a. $(2x + 1) + (x - 1)$

b. $(2x - 6) + (3x + 2)$

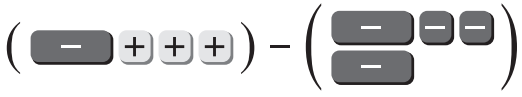
c. $(2x + 4) - (x + 2)$

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

What Is Your Answer?

5. IN YOUR OWN WORDS How can you use algebra tiles to add or subtract algebraic expressions?

6. Write the difference of two algebraic expressions modeled by the algebra tiles. Then use the algebra tiles to simplify the expression.



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3.2 Practice

For use after Lesson 3.2

Find the sum or difference.

1. $(x - 2) + (x + 6)$

2. $(2n - 4) - (4n - 3)$

3. $2(-3y - 1) + (2y + 7)$

4. $(1 - 3k) - 4(2 + 2.5k)$

5. $(6g - 9) + \frac{1}{3}(15 - 9g)$

6. $\frac{1}{2}(2r + 4) - \frac{1}{4}(16 - 8r)$

7. You earn $(4x + 12)$ points after completing x levels of a video game and then lose $(2x - 5)$ points. Write an expression that represents the total number of points you have now.

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Extension 3.2

Practice

For use after Extension 3.2

Factor the expression using the GCF.

1. $7 + 28$

2. $25 + 50$

3. $7b - 7$

4. $8a - 16$

5. $8x + 12$

6. $12y + 24t$

7. $10w + 50z$

8. $10v + 12u$

9. $9a + 15b$

Factor out the coefficient of the variable.

10. $\frac{1}{2}a - \frac{1}{2}$

11. $\frac{1}{4}d - \frac{3}{4}$

12. $\frac{5}{6}s + \frac{2}{3}$

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Extension 3.2 **Practice (continued)**

Factor out the coefficient of the variable.

13. $\frac{3}{10}y - \frac{2}{5}$

14. $1.1x + 9.9$

15. $3.4c + 10.2$

16. Factor -2 out of $-6x + 10$.

17. Factor $-\frac{1}{3}$ out of $\frac{1}{3}y - \frac{3}{2}$.

18. A square window has a perimeter of $(8x + 12)$ feet. Write an expression that represents the side length of the window (in feet).

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3.3 Solving Equations Using Addition or Subtraction

For use with Activity 3.3

Essential Question How can you use algebra tiles to solve addition or subtraction equations?

1 ACTIVITY: Solving Equations

Work with a partner. Use algebra tiles to model and solve the equation.

a. $x - 3 = -4$

Model the equation $x - 3 = -4$. Draw a sketch of your tiles.

To get the variable tile by itself, remove the ____ tiles on the left side by adding _____ tiles to each side.

How many *zero pairs* can you remove from each side? Circle them.

The remaining tiles show the value of x.

$x =$ _____

b. $z - 6 = 2$

c. $p - 7 = -3$

d. $-15 = t - 5$

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3.3 Solving Equations Using Addition or Subtraction (continued)

2 ACTIVITY: Solving Equations

Work with a partner. Use algebra tiles to model and solve the equation.

a. $-5 = n + 2$

b. $y + 10 = -5$

c. $7 + b = -1$

d. $8 = 12 + z$

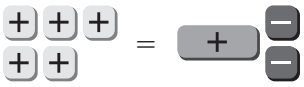
3 ACTIVITY: Writing and Solving Equations

Work with a partner. Write an equation shown by the algebra tiles. Then solve.

a.

b.

c.

d. 

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3.3 Solving Equations Using Addition or Subtraction (continued)

4 ACTIVITY: Using a Different Method to Find a Solution

Work with a partner. The *melting point* of a solid is the temperature at which the solid melts to become a liquid. The melting point of the element bromine is about 19°F. This is about 57°F more than the melting point of mercury.

a. Which of the following equations can you use to find the melting point of mercury? What is the melting point of mercury?

$x + 57 = 19$	$x - 57 = 19$	$x + 19 = 57$	$x + 19 = -57$

b. **CHOOSE TOOLS** How can you solve this problem without using an equation? Explain. How are these two methods related?

What Is Your Answer?

5. **IN YOUR OWN WORDS** How can you use algebra tiles to solve addition or subtraction equations? Give an example of each.

6. **STRUCTURE** Explain how you could use inverse operations to solve addition or subtraction equations without using algebra tiles.

7. What makes the cartoon funny?

"Dear Sir: Yesterday you said $x = 2$. Today you are saying $x = 3$. Please make up your mind."

8. The word *variable* comes from the word *vary*. For example, the temperature in Maine varies a lot from winter to summer. Write two other English sentences that use the word *vary*.

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3.3 Practice

For use after Lesson 3.3

Solve the equation. Check your solution.

1. $y + 12 = -26$

2. $15 + c = -12$

3. $-16 = d + 21$

4. $n + 12.8 = -0.3$

5. $1\frac{1}{8} = g - 4\frac{2}{5}$

6. $-5.47 + k = -14.19$

Write the word sentence as an equation. Then solve.

7. 42 less than x is -50.

8. 32 is the sum of a number z and 9.

9. A clothing company makes a profit of \$2.3 million. This is \$4.1 million more than last year. What was the profit last year?

10. A drop on a wooden roller coaster is $-98\frac{1}{2}$ feet. A drop on a steel roller coaster is $100\frac{1}{4}$ feet lower than the drop on the wooden roller coaster. What is the drop on the steel roller coaster?

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3.4 Solving Equations Using Multiplication or Division

For use with Activity 3.4

Essential Question How can you use multiplication or division to solve equations?

1 ACTIVITY: Using Division to Solve Equations

Work with a partner. Use algebra tiles to model and solve the equation.

a. $3x = -12$

Model the equation $3x = -12$. Draw a sketch of your tiles.

Your goal is to get one variable tile by itself. Because there are _____ variable tiles, divide the _____ tiles into _____ equal groups. Circle the groups.

Keep one of the groups. This shows the value of x. Draw a sketch of the remaining tiles.

$x =$ _____.

b. $2k = -8$

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3.4 Solving Equations Using Multiplication or Division (continued)

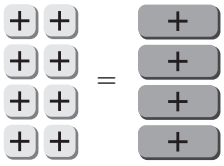
c. $-15 = 3t$

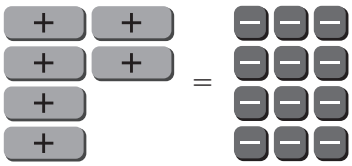
d. $-20 = 5m$

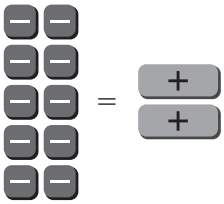
e. $4h = -16$

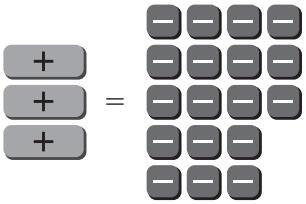
2 ACTIVITY: Writing and Solving Equations

Work with a partner. Write an equation shown by the algebra tiles. Then solve.

a. 

b. 

c. 

d. 

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3.4 Solving Equations Using Multiplication or Division (continued)

3 ACTIVITY: Using a Different Method to Find a Solution

Work with a partner. Choose the equation you can use to solve each problem. Solve the equation. Then explain how to solve the problem without using an equation. How are the two methods related?

a. For the final part of a race, a handcyclist travels 32 feet each second across a distance of 400 feet. How many seconds does it take for the handcyclist to travel the last 400 feet of the race?

$32x = 400$	$400x = 32$	$\frac{x}{32} = 400$	$\frac{x}{400} = 32$

b. The melting point of the element radon is about $-96°\text{F}$. The melting point of nitrogen is about 3.6 times the melting point of radon. What is the melting point of nitrogen?

$3.6x = -96$	$x + 96 = 3.6$	$\frac{x}{3.6} = -96$	$-96x = 3.6$

c. This year, a hardware store has a profit of $-\$6.0$ million. This profit is $\frac{3}{4}$ of last year's profit. What is last year's profit?

$\frac{x}{-6} = \frac{3}{4}$	$-6x = \frac{3}{4}$	$\frac{3}{4} + x = -6$	$\frac{3}{4}x = -6$

What Is Your Answer?

4. IN YOUR OWN WORDS How can you use multiplication or division to solve equations? Give an example of each.

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3.4 Practice

For use after Lesson 3.4

Solve the equation. Check your solution.

1. $\frac{d}{5} = -6$

2. $8x = -6$

3. $-15 = \frac{z}{-2}$

4. $3.2n = -0.8$

5. $-\frac{3}{10}h = 15$

6. $-1.1k = -1.21$

Write the word sentence as an equation. Then solve.

7. A number divided by -8 is 7.

8. The product of -12 and a number is 60.

9. You earn \$0.85 for every cup of hot chocolate you sell. How many cups do you need to sell to earn \$55.25?

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3.5 Solving Two-Step Equations

For use with Activity 3.5

Essential Question How can you use algebra tiles to solve a two-step equation?

1 ACTIVITY: Solving a Two-Step Equation

Work with a partner. Use algebra tiles to model and solve $2x - 3 = -5$.

Model the equation $2x - 3 = -5$.
Draw a sketch of your tiles.

Remove the _____ red tiles on the left side by adding _____ yellow tiles to each side.

How many *zero pairs* can you remove from each side?
Circle them.

Because there are _____ green tiles, divide the red tiles into _____ equal groups.
Circle the groups.

Keep one of the groups. This shows the value of x.
Draw a sketch of the remaining tiles.

$x =$ _____.

2 ACTIVITY: The Math behind the Tiles

Work with a partner. Solve $2x - 3 = -5$ without using algebra tiles. Complete each step. Then answer the questions.

a. Which step is first, adding 3 to each side or dividing each side by 2?

b. How are the above steps related to the steps in Activity 1?

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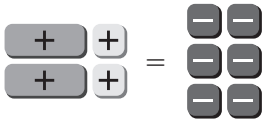
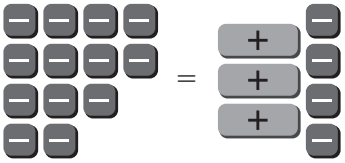
3 ACTIVITY: Solving Equations Using Algebra Tiles

Work with a partner.

- **Write an equation shown by the algebra tiles.**
- **Use algebra tiles to model and solve the equation.**
- **Check your answer by solving the equation without using algebra tiles.**

a. 

b. 

4 ACTIVITY: Working Backwards

Work with a partner.

a. Your friend pauses a video game to get a drink. You continue the game. You double the score by saving a princess. Then you lose 75 points because you do not collect the treasure. You finish the game with –25 points. How many points did you have when you started?

One way to solve the problem is to work backwards. To do this, start with the end result and retrace the events.

You started the game with _____ points.

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3.5 Solving Two-Step Equations (continued)

b. You triple your account balance by making a deposit. Then you withdraw $127.32 to buy groceries. Your account is now overdrawn by $10.56. By working backwards, find your account balance before you made the deposit.

What Is Your Answer?

5. IN YOUR OWN WORDS How can you use algebra tiles to solve a two-step equation?

6. When solving the equation $4x + 1 = -11$, what is the first step?

7. REPEATED REASONING Solve the equation $2x - 75 = -25$. How do your steps compare with the strategy of working backwards in Activity 4?

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3.5 Practice

For use after Lesson 3.5

Solve the equation. Check your solution.

1. $3a - 5 = -14$

2. $10 = -2c + 22$

3. $18 = -5b - 17$

4. $-12 = -8z + 12$

5. $1.3n - 0.03 = -9$

6. $-\frac{5}{11}h + \frac{7}{9} = \frac{2}{9}$

7. The length of a rectangle is 3 meters less than twice its width.

a. Write an equation to find the length of the rectangle.

b. The length of the rectangle is 11 meters. What is the width of the rectangle?

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