

Warm Up

Lesson Presentation

Lesson Quiz

Holt McDougal Algebra 1

#### Warm up

1. Sara paid \$15.95 to become a member at a gym. She then paid a monthly membership fee. Her total cost for 12 months was \$735.95. How much was the monthly fee?

#### Warm up

2. Josie bought 4 cases of sports drinks for an upcoming meet. After talking to her coach, she bought 3 more cases and spent an additional \$6.95 on other items. Her receipts totaled \$74.15. Write and solve an equation to find how much each case of sports drinks cost.

4c + 3c + 6.95 = 74.15; \$9.60

### Example 1: Solving Equations with Variables on Both Sides

Solve 7n - 2 = 5n + 6.

7n - 2 = 5n + 6 -5n -5n 2n - 2 = 6 + 2 + 22n = 8

2 2

n = 4

To collect the variable terms on one side, subtract 5n from both sides.

Since n is multiplied by 2, divide both sides by 2 to undo the multiplication.

### Example 2: Simplifying Each Side Before Solving Equations

Solve $4 - 6a + 4a = -1 - 5(7 - 2a)$ .				
4 - 6a + 4a = -1 - 5(7 - 2a) Distribute -5 to the				
4 - 6a + 4a = -1 - 5(7) - 5(-2a) expression in parentheses.				
4 - 6a + 4a = -1 - 35 + 10a				
4 – 2 <i>a</i> = –36 + 10 <i>a</i>	Combine like terms.			
<u>+36</u> <u>+36</u>	Since – 36 is added to 10a,			
40 – 2 <i>a</i> = 10 <i>a</i>	add 36 to both sides.			
<u>+ 2a</u> + 2a	To collect the variable			
40 = 12 <i>a</i>	<i>terms on one side, add 2a to both sides.</i>			

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### **Example 2 Continued**

Solve 4 - 6a + 4a = -1 - 5(7 - 2a).

40 = 12a $\frac{40}{12} = \frac{12a}{12}$  $\frac{10}{3} = a$ 

Since a is multiplied by 12, divide both sides by 12.

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An **identity** is an equation that is true for all values of the variable. An equation that is an identity has infinitely many solutions.

Some equations are always false. These equations have no solutions.

### **Example 3: Infinitely Many Solutions or No Solutions**

Solve 12x - 3 + x = 5x - 4 + 8x.

12x - 3 + x = 5x - 4 + 8x

12x - 3 + x = 5x - 4 + 8x Identify like terms.

13x - 3 = 13x - 4 Combine like terms on the left and the right.

-13x -13x Subtract 13x from both sides.

-3 = -4 **×***False statement.* 

The equation 12x - 3 + x = 5x - 4 + 8x is a false equation. There is no value of x that will make the equation true. There are no solutions.

### **Example 4**

### Solve 2c + 7 + c = -14 + 3c + 21.

2c + 7 + c = -14 + 3c + 21

2c + 7 + c = -14 + 3c + 21 Identify like terms.

3 <i>c</i> +	7 = 3c + 7	Combine like terms on the left and the right.
-3 <i>c</i>	-3 <i>c</i>	Subtract 3c both sides.

 $7 = 7 \checkmark$  True statement.

The equation 2c + 7 + c = -14 + 3c + 21 is an identity. All values of *c* will make the equation true. All real numbers are solutions.



#### **Example 5: Application**

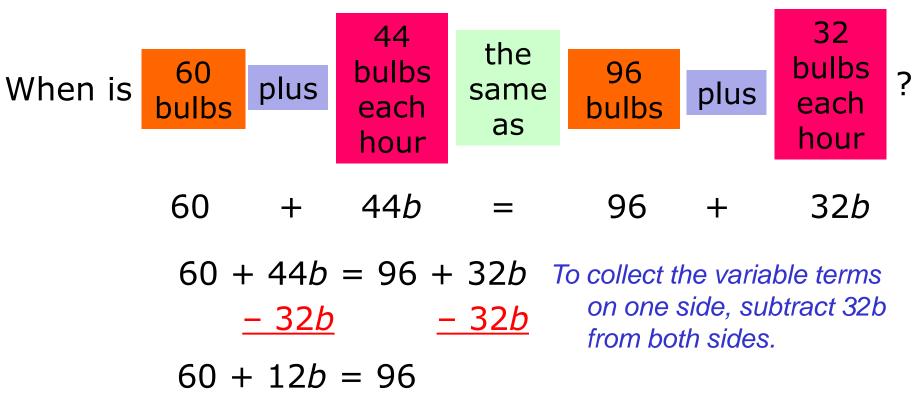
Jon and Sara are planting tulip bulbs. Jon has planted 60 bulbs and is planting at a rate of 44 bulbs per hour. Sara has planted 96 bulbs and is planting at a rate of 32 bulbs per hour. In how many hours will Jon and Sara have planted the same number of bulbs? How many bulbs will that be?

Person	Bulbs	
Jon	60 bulbs plus 44 bulbs per hour	
Sara	96 bulbs plus 32 bulbs per hour	



### **Example 5: Application Continued**

Let *b* represent bulbs, and write expressions for the number of bulbs planted.



#### **Example 5: Application Continued**

$$60 + 12b = 96$$

<u>-60 \_ 60</u>

$$L2b = 36$$

$$\frac{12b}{12} = \frac{36}{12}$$
  
 $b = 3$ 

Since 60 is added to 12b, subtract 60 from both sides.

Since b is multiplied by 12, divide both sides by 12 to undo the multiplication.

### **Example 5: Application Continued**

After 3 hours, Jon and Sara will have planted the same number of bulbs. To find how many bulbs they will have planted in 3 hours, evaluate either expression for b = 3:

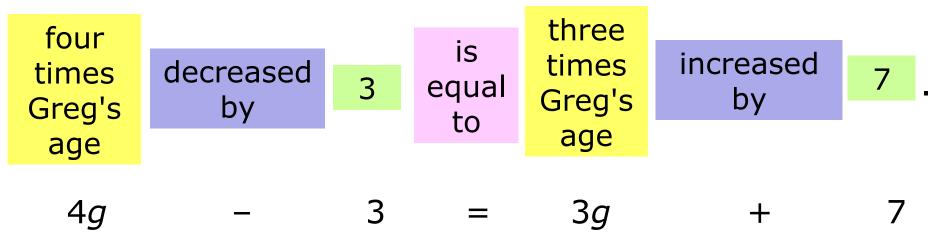
- 60 + 44b = 60 + 44(3) = 60 + 132 = 192
- 96 + 32b = 96 + 32(3) = 96 + 96 = 192

After 3 hours, Jon and Sara will each have planted 192 bulbs.

### Example 6

## Four times Greg's age, decreased by 3 is equal to 3 times Greg's age increased by 7. How old is Greg?

Let *g* represent Greg's age, and write expressions for his age.



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### **Example 6 Continued**

4g - 3 = 3 -3g - 3	-
<u> </u>	9
g - 3 =	7
<u>+ 3</u>	+ 3
g =	10

To collect the variable terms on one side, subtract 3g from both sides.

Since 3 is subtracted from g, add 3 to both sides.

Greg is 10 years old.

### **Lesson Quiz**

### Solve each equation.

- **1.** 7x + 2 = 5x + 8 **3 2.** 4(2x 5) = 5x + 4 **8**
- **3.** 6 7(a + 1) = -3(2 a)  $\frac{1}{2}$
- **4.** 4(3x + 1) 7x = 6 + 5x 2 all real numbers
- **5.**  $\frac{2}{3}(3x+9) = 8x$  **1 6.**  $\frac{2}{3}r + \frac{3}{4} = \frac{7}{12}$
- 7. A painting company charges \$250 base plus \$16 per hour. Another painting company charges \$210 base plus \$18 per hour. How long is a job for which the two companies costs are the same? 20 hours

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