

LESSON

14

# Solving for One Variable in Terms of Another Variable

## Review It!

When you solve for one variable in terms of another variable, remember this word:

**term** a number, variable, or product of a number and one or more variables

$$-2x - 3y + 4$$

↑   ↑   ↑  
three terms

To solve an equation for  $y$ , get  $y$  by itself.

Solve the equation  $3x + 8y = 24$  for  $y$ .

**Step 1** Decide how to get the  $y$ -term by itself.

$8y$  is on the left side.

To get  $8y$  by itself, remove  $3x$ .

What operation removes  $3x$ ? \_\_\_\_\_

**REMEMBER** Subtraction undoes addition.

**Step 2** Get the  $y$ -term by itself.

$$3x + 8y = 24$$

$$3x \quad 3x + 8y = 24 \quad 3x \leftarrow$$

$$8y = 24 - 3x$$

**REMEMBER** Do the same thing to both sides of the equation.

**Step 3** Decide how to get  $y$  by itself.

Multiplication "glues" the 8 and the  $y$  together.

What operation will get  $y$  by itself? \_\_\_\_\_

**REMEMBER** Multiplication and division are inverse operations.

**Step 4** Get  $y$  by itself.

$$8y = 24 - 3x$$

$$\frac{8y}{8} = \frac{24 - 3x}{8}$$

$$y = \frac{24 - 3x}{8}$$

**THINK**  $\frac{8y}{8} = y$

So,  $3x + 8y = 24$  is the same equation as  $y = \frac{24 - 3x}{8}$

## Try It!

Get the  $y$ -term alone on one side.

## Ask Yourself

1.  $-3x + 8y = 24$

\_\_\_\_\_

2.  $10x + 5y = 45$

\_\_\_\_\_

1. Do you need to move the  $y$ -term? yes, or no?

Solve for  $y$ .

3.  $-3x + 8y = 24$

\_\_\_\_\_

4.  $10x + 5y = 45$

\_\_\_\_\_

3. Add which term to both sides?  $-3x$ , or  $3x$ ?

5.  $2x - 11y = 4$

\_\_\_\_\_

6.  $6x + 12y = 1$

\_\_\_\_\_

7.  $-10x + 7y = 10$

\_\_\_\_\_

8.  $4x - 3y = -12$

\_\_\_\_\_

Solve.

9. The area of a rectangle can be found using the formula  $A = lw$ , where  $l$  represents the length and  $w$  represents the width of the rectangle. Solve  $A = lw$  for  $l$ .

\_\_\_\_\_

9. What does  $lw$  mean?  $l \times w$ , or  $l + w$ ?

10. The cost of a repair job can be found using the equation  $2x + 3y = 15$ . Solve the equation for  $y$ .

\_\_\_\_\_

**On Your Own!**

Circle the best answer for each question.

1. Solve
- $V = lwh$
- for
- $h$
- .

- A.  $h = \frac{hw}{V}$   
 B.  $h = \frac{Vlw}{l}$   
 C.  $h = \frac{V}{lw}$   
 D.  $h = \frac{Vl}{w}$

2. Solve
- $3a - 18b = 15$
- for
- $a$
- .

- A.  $a = 6b - 5$   
 B.  $a = 5b + 6$   
 C.  $a = 5 - 6b$   
 D.  $a = 6b + 5$

3. Solve
- $4m + 3n = 12$
- for
- $n$
- .

- A.  $n = 3 - \frac{3m}{4}$   
 B.  $n = 4 - \frac{4m}{3}$   
 C.  $n = \frac{4m}{3+12}$   
 D.  $n = \frac{4m}{3+4}$

4. Solve
- $5x + 2y = 5$
- for
- $y$
- .

- A.  $y = 5 - \frac{5x}{2}$   
 B.  $y = \frac{5+5x}{2}$   
 C.  $y = 5 + \frac{5x}{2}$   
 D.  $y = \frac{5-5x}{2}$

5. Solve
- $\frac{1}{5}a - \frac{4}{5}b = -6$
- for
- $a$
- .

- A.  $a = \frac{4}{5}b - 6$   
 B.  $a = \frac{4}{5}b - 30$   
 C.  $a = 4b - 30$   
 D.  $a = 4b - 6$

6. The distance Daniel travels is given by the formula
- $d = rt$
- , where
- $d$
- is distance traveled,
- $r$
- is rate of speed, and
- $t$
- is time. Solve the equation
- $d = rt$
- for
- $t$
- .

- A.  $t = \frac{d}{r}$   
 B.  $t = \frac{r}{d}$   
 C.  $t = dr$   
 D.  $t = d - r$

7. A craft store sells stamps for \$4 and ink pads for \$3. The cost of
- $x$
- stamps and
- $y$
- ink pads is given by the expression
- $4x + 3y$
- . Elizabeth spends \$20 for stamps and ink pads. Solve the equation
- $4x + 3y = 20$
- for
- $x$
- .

- A.  $x = 5 - 3y$   
 B.  $x = 5 - \frac{3y}{4}$   
 C.  $x = 20 - 3y$   
 D.  $x = 20 - \frac{3y}{4}$

8. The distance around Fred's triangular field can be represented by the equation
- $3x + 4y + 5z = 20$
- .

**Part A** Solve the equation  $3x + 4y + 5z = 20$  for  $y$ .  
 Show your work.

**Part B** Solve the equation  $3x + 4y + 5z = 20$  for  $z$ .  
 Show your work.

**Math Words**

Fill in the blanks.

9. A number, variable, or product of a number and one or more variables is a \_\_\_\_\_.

- 10.
- $3x$
- and
- $9x$
- are
- $x$
- \_\_\_\_\_.

11. If you add a term to one side of an equation, you must also \_\_\_\_\_ the term to the other side of the equation.