

# Reteaching 2-1

## Solving One-Step Equations

**OBJECTIVE:** Solving one-step equations

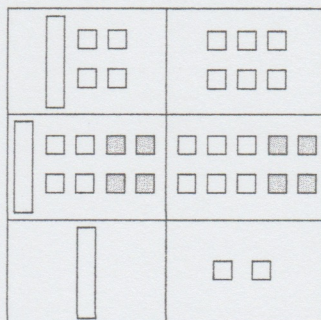
**MATERIALS:** Tiles

As you model an equation with tiles, ask yourself what operation has been performed on the variable. With the tiles, perform the inverse operation on each side of the equation. Simplify by removing zero pairs.

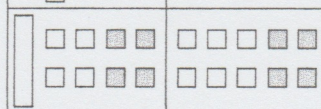
### Examples

Model each equation with tiles and solve.

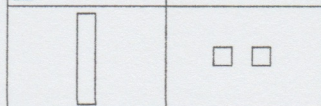
1.  $x + 4 = 6$



← Model the equation with tiles.



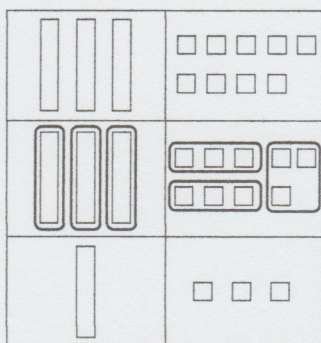
← Subtract 4 from each side of the equation.



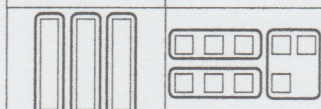
← Simplify by removing zero pairs.

$x = 2$

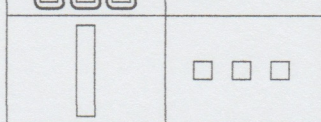
2.  $3x = 9$



← Model the equation with tiles.



← Divide each side into three identical groups.



← Solve for x.

$x = 3$

### Exercises

Model each equation with tiles and solve.

1.  $x + 3 = 10$

2.  $y - 4 = 2$

3.  $-6 = 3y$

4.  $2x = 6$

5.  $y + 1 = 4$

6.  $5y = 10$

7.  $x - 5 = 4$

8.  $12 = 4x$

9.  $x + 4 = 2$

Solve.

10.  $17 = -8 + x$

11.  $-0.5 = \frac{d}{4}$

12.  $0.8 = \frac{a}{5}$

13.  $5.2 + h = 0.3$

14.  $14 = x + 7$

15.  $6x = 15$



**Practice 2-1****Solving One-Step Equations****Solve each equation. Check your answer.**

- |                         |                                     |                      |
|-------------------------|-------------------------------------|----------------------|
| 1. $g - 6 = 2$          | 2. $15 + b = 4$                     | 3. $8 = h + 24$      |
| 4. $63 = 7x$            | 5. $x + 7 = 17$                     | 6. $-2n = -46$       |
| 7. $\frac{c}{14} = -3$  | 8. $\frac{x}{2} = 13$               | 9. $\frac{a}{5} = 3$ |
| 10. $r - 63 = -37$      | 11. $5 + d = 27$                    | 12. $2b = -16$       |
| 13. $4y = 48$           | 14. $c - 25 = 19$                   | 15. $a + 4 = 9.6$    |
| 16. $x + 29 = 13$       | 17. $-3d = -63$                     | 18. $3f = -21.6$     |
| 19. $-\frac{x}{8} = 12$ | 20. $a - \frac{1}{3} = \frac{2}{3}$ | 21. $n - 3 = -3$     |

**Write an equation to model each situation. Then solve.**

22. A stack of 12 bricks is 27 in. high. What is the height of each brick?
23. The sum of Juanita's age and Sara's age is 33 yr. If Sara is 15 years old, how old is Juanita?
24. The tallest player on the basketball team is  $77\frac{3}{4}$  in. tall. This is  $9\frac{1}{2}$  in. taller than the shortest player. How tall is the shortest player?
25. The equatorial diameter of Jupiter is about 89,000 mi. This is about 11.23 times the equatorial diameter of Earth. What is the equatorial diameter of Earth? Round to the nearest integer.
26. The distance from Baltimore to New York is about 171 mi. This is about 189 mi less than the distance from Baltimore to Boston. How far is Baltimore from Boston if you stop in New York along the way?

**Solve each equation. Check your answer.**

- |                                     |                                      |                            |
|-------------------------------------|--------------------------------------|----------------------------|
| 27. $y - 8 = -15$                   | 28. $a + 27.7 = -36.6$               | 29. $3x = 27$              |
| 30. $a + 5 = -19$                   | 31. $m - 9.5 = -27.4$                | 32. $-54 = -6s$            |
| 33. $x + \frac{1}{3} = \frac{5}{6}$ | 34. $-\frac{s}{3} = 7$               | 35. $\frac{m}{12} = -4.2$  |
| 36. $\frac{a}{3} = -11$             | 37. $-\frac{z}{8} = -3.7$            | 38. $-\frac{y}{11} = -6.1$ |
| 39. $-17.5 = 2.5d$                  | 40. $b - 48 = -29$                   | 41. $96 = -3h$             |
| 42. $-4.2x = 15.96$                 | 43. $x + 87.8 = 38.1$                | 44. $-5x = 85$             |
| 45. $-\frac{x}{5} = 4.8$            | 46. $d + \frac{2}{3} = -\frac{1}{2}$ | 47. $-\frac{t}{2} = -9$    |
| 48. $45.6 = 6x$                     | 49. $19.5 = -39.5 + f$               | 50. $m - 21 = -43$         |

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**Reteaching 2-2****Solving Two-Step Equations****OBJECTIVE:** Solving two-step equations**MATERIALS:** None

The order of operations tells you to do multiplication and division before you do addition and subtraction. However, when solving two-step equations, you must first do any addition or subtraction necessary to isolate the variable on one side of the equation. Start by asking yourself, "Has any adding or subtracting been done to the variable?" If the answer is yes, perform the inverse operation. Then repeat this step for multiplication and division.

**Example**

Write the steps and solve the equation.

$$3x + 4 = 10$$

← **Think:** Is any adding or subtracting being done to the variable? 4 is being added. What is the inverse of adding 4?

$$3x + 4 - 4 = 10 - 4$$

← **Subtract 4 from each side.**

$$3x = 6$$

← **Simplify.**

$$3x = 6$$

← **Think:** Is any multiplying or dividing being done to the variable? It is being multiplied by 3. What is the inverse of multiplying by 3?

$$\frac{3x}{3} = \frac{6}{3}$$

← **Divide each side by 3.**

$$x = 2$$

← **Simplify.**

**Exercises**

Fill in the blanks to complete the steps and solve the equation.

1. 
$$\frac{s}{6} - 5 = -8$$

← **Think:** Is any adding or subtracting being done to the variable? \_\_\_\_\_ is being \_\_\_\_\_. What is the \_\_\_\_\_ of subtracting 5?

$$\frac{s}{6} - 5 + 5 = -8 + 5$$

← \_\_\_\_\_ 5 to \_\_\_\_\_ side.

$$\frac{s}{6} = -3$$

← **Simplify.**

$$\frac{s}{6} = -3$$

← **Think:** Is any multiplying or dividing being done to the variable? It is being \_\_\_\_\_ by 6. What is the inverse of \_\_\_\_\_ by 6?

$$6\left(\frac{s}{6}\right) = 6(-3)$$

← **Multiply each \_\_\_\_\_ by \_\_\_\_\_.**

$$s = \underline{\hspace{2cm}}$$

← **Simplify.**

Solve each equation.

2.  $3x - 4 = 8$

3.  $\frac{x}{4} + 3 = 10$

4.  $4y + 5 = -7$



**Practice 2-2****Solving Two-Step Equations****Solve each equation. Check your answer.**

1.  $5a + 2 = 7$

2.  $2x + 3 = 7$

3.  $3b + 6 = 12$

4.  $9 = 5 + 4t$

5.  $4a + 1 = 13$

6.  $-t + 2 = 12$

**Write an equation to model each situation. Then solve.**

7. You want to buy a bouquet of yellow roses and baby's breath for \$16. The baby's breath costs \$3.50 per bunch, and the roses cost \$2.50 each. You want one bunch of baby's breath and some roses for your bouquet. How many roses can you buy?
8. Suppose you walk at the rate of 210 ft/min. You need to walk 10,000 ft. How many more minutes will it take you to finish if you have already walked 550 ft?
9. Suppose you have shelled 6.5 lb of pecans, and you can shell pecans at a rate of 1.5 lb per hour. How many more hours will it take you to shell a total of 11 lb of pecans?
10. To mail a first class letter, the U.S. Postal Service charges \$.34 for the first ounce and \$.21 for each additional ounce. It costs \$1.18 to mail your letter. How many ounces does your letter weigh?
11. Suppose you want to buy one pair of pants and several pairs of socks. The pants cost \$24.95, and the socks are \$5.95 per pair. How many pairs of socks can you buy if you have \$50.00 to spend?

**Solve each equation. Check your answer.**

12.  $5.8n + 3.7 = 29.8$

13.  $67 = -3y + 16$

14.  $-d + 7 = 3$

15.  $\frac{m}{9} + 7 = 3$

16.  $6.78 + 5.2x = -36.9$

17.  $5z + 9 = -21$

18.  $3x - 7 = 35$

19.  $36.9 = 3.7b - 14.9$

20.  $4s - 13 = 51$

21.  $9f + 16 = 70$

22.  $11.6 + 3a = -16.9$

23.  $-9 = -\frac{h}{12} + 5$

24.  $-c + 2 = 5$

25.  $-67 = -8n + 5$

26.  $22 = 7 - 3a$

27.  $\frac{k}{3} - 19 = -26$

28.  $-21 = \frac{n}{3} + 2$

29.  $3x + 5.7 = 15$

30.  $\frac{a}{5} - 2 = -13$

31.  $2x + 23 = 49$

32.  $\frac{x}{2} + 8 = -3$

**Justify each step.**

33.  $24 - x = -16$

34.  $\frac{x}{7} + 4 = 15$

35.  $-8 = 2x - 5$

a.  $24 - x - 24 = -16 - 24$

a.  $\frac{x}{7} + 4 - 4 = 15 - 4$

a.  $-8 + 5 = 2x - 5 + 5$

b.  $-x = -40$

b.  $\frac{x}{7} = 11$

b.  $-3 = 2x$

c.  $-1(-x) = -1(-40)$

c.  $7(\frac{x}{7}) = 7(11)$

c.  $-\frac{3}{2} = \frac{2x}{2}$

d.  $x = 40$

d.  $x = 77$

d.  $-\frac{3}{2} = x$



**Reteaching 2-3****Solving Multi-Step Equations****OBJECTIVE:** Combining like terms**MATERIALS:** None**Example**Simplify  $3a - 6x + 4 - 2a + 5x$  by combining like terms.Ring each term that has the variable  $a$ . Draw a rectangle around each term that has the variable  $x$ , and a triangle around each constant term.

$$\textcircled{3a} \quad \boxed{-6x} \quad \triangle + 4 \quad \textcircled{-2a} \quad \boxed{+5x}$$

Group the like terms by reordering the terms so that all matching shapes are together.

$$\textcircled{3a} \quad \textcircled{-2a} \quad \boxed{-6x} \quad \boxed{+5x} \quad \triangle + 4$$

Combine like terms by adding coefficients.

$$a - x + 4$$

**Exercises****Draw circles, rectangles, and triangles to help you combine like terms and simplify each expression.**

1.  $3a + 5 - x + 7x - 2a$

2.  $2x - 5 + 3a - 5x + 10a$

3.  $7b - b - x + 5 - 2x - 7b$

4.  $-6m + 3t + 4 - 4m - 2t$

5.  $2r + 3s - 5r$

6.  $4 - p - 2x + 3p - 7x$

7.  $3k - 2x + 6k + 5$

8.  $3 + 2a - 7x + 2.5 + 5x$

9.  $4a + 3 - 2y - 5a - 7 + 4y$

10.  $c - 3 + 2x - 6c + 4x$

**Simplify each expression.**

11.  $2b + 2 - x + 4$

12.  $-5 - c - 4 + 3c$

13.  $\frac{1}{2}a - 5 - \frac{1}{2}a$

14.  $1.5y - 1.5 + 0.5y + 0.5z + 1$

15.  $6a + 3b - 2a + 4$

16.  $\frac{2}{3}a + 5 - \frac{1}{3}a - 7$

17.  $-8 + x - 2 + 3x$

18.  $x + y - z + 4x - 5y + 2z$

19.  $\frac{7}{8}x + 5 - \frac{3}{8}x - 4$

20.  $10y - 3x + 5 - 8 - 2y$



**Practice 2-3****Solving Multi-Step Equations**

Solve each equation. Check your answer.

1.  $2n + 3n + 7 = -41$
2.  $2x - 5x + 6.3 = -14.4$
3.  $2z + 9.75 - 7z = -5.15$
4.  $3h - 5h + 11 = 17$
5.  $2t + 8 - t = -3$
6.  $6a - 2a = -36$
7.  $3c - 8c + 7 = -18$
8.  $7g + 14 - 5g = -8$
9.  $2b - 6 + 3b = 14$
10.  $2(a - 4) + 15 = 13$
11.  $7 + 2(a - 3) = -9$
12.  $13 + 2(5c - 2) = 29$
13.  $5(3x + 12) = -15$
14.  $4(2a + 2) - 17 = 15$
15.  $2(m + 1) = 16$
16.  $-4x + 3(2x - 5) = 31$
17.  $-6 - 3(2k + 4) = 18$
18.  $3(t - 12) = 27$
19.  $-w + 4(w + 3) = -12$
20.  $4 = 0.4(3d - 5)$
21.  $-4d + 2(3 + d) = -14$
22.  $2x + \frac{3}{4}(4x + 16) = 7$
23.  $2(3a + 2) = -8$
24.  $5(t - 3) - 2t = -30$
25.  $5(b + 4) - 6b = -24$
26.  $\frac{2}{5}(5k + 35) - 8 = 12$
27.  $0.4(2s + 4) = 4.8$
28.  $\frac{2}{3}(9b - 27) = 36$
29.  $\frac{1}{2}(12n - 8) = 26$
30.  $0.5(2x - 4) = -17$
31.  $18 = \frac{c + 5}{2}$
32.  $\frac{2}{9}s = -6$
33.  $\frac{1}{3}x = \frac{1}{2}$
34.  $\frac{2}{3}g + \frac{1}{2}g = 14$
35.  $\frac{3x + 7}{2} = 8$
36.  $\frac{2x - 6}{4} = -7$
37.  $\frac{2}{3}k + \frac{1}{4}k = 22$
38.  $-\frac{4}{7}h = -28$
39.  $-8 = \frac{4}{5}k$
40.  $\frac{3}{4} - \frac{1}{3}z = \frac{1}{4}$
41.  $-9 = \frac{3}{4}m$
42.  $\frac{5}{6}c - \frac{2}{3}c = \frac{1}{3}$
43.  $\frac{4}{5} = -\frac{4}{7}g$
44.  $\frac{9x + 6 - 4x}{2} = 8$
45.  $-\frac{1}{6}d = -4$

Write an equation to model each situation. Then solve.

46. The attendance at a baseball game was 400 people. Student tickets cost \$2 and adult tickets cost \$3. Total ticket sales were \$1050. How many tickets of each type were sold?
47. The perimeter of a pool table is 30 ft. The table is twice as long as it is wide. What is the length of the pool table?
48. Lopez spent  $\frac{1}{3}$  of his vacation money for travel and  $\frac{2}{5}$  of his vacation money for lodging. He spent \$1100 for travel and lodging. What is the total amount of money he spent on his vacation?
49. Victoria weighs  $\frac{5}{7}$  as much as Mario. Victoria weighs 125 lb. How much does Mario weigh?
50. Denise's cell phone plan is \$29.95 per month plus \$.10 per minute for each minute over 300 minutes of call time. Denise's cell phone bill is \$99.95. For how many minutes was she billed?

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**Reteaching 2-4****Equations with Variables on Both Sides****OBJECTIVE:** Solving equations with variables on both sides**MATERIALS:** None

To solve equations with variables on both sides, use these strategies:

- Rewrite the equation until all terms with variables are combined on one side and all constant terms are combined on the other side. As you rewrite the equation, use inverse operations and the equality properties.
- When you perform an operation on one side, you must do the same on the other.

**Example**Solve  $5a - 12 = 3a + 7$ .

$$\boxed{5a} - 12 = \boxed{3a} + 7$$

$$5a - 12 = 3a + 7$$

$$5a - 12 - 3a = 3a + 7 - 3a$$

$$2a - 12 = 7$$

$$2a - 12 + 12 = 7 + 12$$

$$2a = 19$$

$$a = 9.5$$

Check  $5(9.5) - 12 \stackrel{?}{=} 3(9.5) + 7$ 

$$47.5 - 12 \stackrel{?}{=} 28.5 + 7$$

$$35.5 = 35.5 \quad \checkmark$$

← Circle all the terms with variables.

← Put rectangles around all constant terms. Plan steps to collect variable terms on one side and constant terms on the other.

← To get variables on the same side, subtract  $3a$  from each side.

← Combine like terms.

← To get constants on the other side, add 12 to each side.

← Combine like terms.

← To undo multiplication by 2, divide each side by 2.

In what other ways could you solve for  $a$ ? You could add 12 to each side, then subtract  $3a$  from each side. Or, you could subtract  $5a$  from each side, then subtract 7 from each side.

**Exercises****Fill in the blanks to show a plan to solve each equation.**

1.  $9x + 4 = 6x - 11$  \_\_\_\_\_  $6x$  \_\_\_\_\_ each side; subtract \_\_\_\_\_ from each side.

2.  $4b - 13 = 7b - 28$  Subtract \_\_\_\_\_ from each side; \_\_\_\_\_ 28 \_\_\_\_\_ each side.

**Use circles and rectangles to mark the variables and constant terms. Write a plan that tells the steps you would use and then solve each equation.**

3.  $7c - 4 = 9c - 11$

4.  $3 - 4d = 6d - 17$

5.  $5e + 13 = 7e - 21$

**Solve and check each equation.**

6.  $8f - 12 = 5f + 12$

7.  $3k + 5 = 2(k + 1)$

8.  $9 - x = 3x + 1$



**Practice 2-4****Equations with Variables on Both Sides**

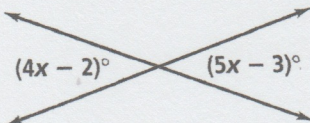
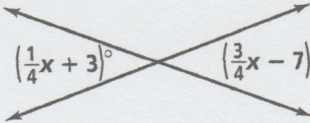
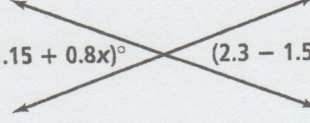
Solve each equation. Check your answer. If appropriate, write *identity* or *no solution*.

- |   |   |                                    |
|---|---|------------------------------------|
| 1. $7 - 2n = n - 14$                            | 2. $2(4 - 2r) = -2(r + 5)$                                    | 3. $3d + 8 = 2d - 7$               |
| 4. $6t = 3(t + 4) - t$                          | 5. $8z - 7 = 3z - 7 + 5z$                                     | 6. $7x - 8 = 3x + 12$              |
| 7. $3(n - 1) = 5n + 3 - 2n$                     | 8. $2(6 - 4d) = 25 - 9d$                                      | 9. $4s - 12 = -5s + 51$            |
| 10. $8(2f - 3) = 4(4f - 8)$                     | 11. $6k - 25 = 7 - 2k$  | 12. $3v - 9 = 7 + 2v - v$          |
| 13. $4(b - 1) = -4 + 4b$                        | 14. $\frac{1}{4}x + \frac{1}{2} = \frac{1}{4}x - \frac{1}{2}$ | 15. $6 - 4d = 16 - 9d$             |
| 16. $\frac{2}{3}a - \frac{3}{4} = \frac{3}{4}a$ | 17. $2s - 12 + 2s = 4s - 12$                                  | 18. $3.6y = 5.4 + 3.3y$            |
| 19. $4.3v - 6 = 8 + 2.3v$                       | 20. $4b - 1 = -4 + 4b + 3$                                    | 21. $\frac{2}{3}(6x + 3) = 4x + 2$ |
| 22. $6y + 9 = 3(2y + 3)$                        | 23. $4g + 7 = 5g - 1 - g$                                     | 24. $2(n + 2) = 5n - 5$            |
| 25. $6 - 3d = 5(2 - d)$                         | 26. $6.1h = 9.3 - 3.2h$                                       | 27. $-4.4s - 2 = -5.5s - 4.2$      |
| 28. $3(2f + 4) = 2(3f - 6)$                     | 29. $\frac{3}{4}t - \frac{5}{6} = \frac{2}{3}t$               | 30. $3v + 8 = 8 + 2v + v$          |
| 31. $\frac{1}{2}d - \frac{3}{4} = \frac{3}{5}d$ | 32. $5(r + 3) = 2r + 6$                                       | 33. $8 - 3(p - 4) = 2p$            |

Write an equation to model each situation. Then solve. Check your answer.

34. Hans needs to rent a moving truck. Suppose Company A charges a rate of \$40 per day and Company B charges a \$60 fee plus \$20 per day. For what number of days is the cost the same?
35. Suppose a video store charges nonmembers \$4 to rent each video. A store membership costs \$21 and members pay only \$2.50 to rent each video. For what number of videos is the cost the same?
36. Suppose your club is selling candles to raise money. It costs \$100 to rent a booth from which to sell the candles. If the candles cost your club \$1 each and are sold for \$5 each, how many candles must be sold to equal your expenses?

Find the value of  $x$ .

37. 
38. 
39. 



**Reteaching 2-5****Equations and Problem Solving**

**OBJECTIVE:** Solving real-world problems involving equations with variables on both sides

**MATERIALS:** None

A table is useful in organizing information from a real-world problem.

Below are examples of tables for several types of application problems.

	<b>Rate × Time = Distance</b>		
Object 1			
Object 2			

	<b>Length × Width = Area</b>		
Rectangle 1			
Rectangle 2			

**Example**

An airplane takes off from an airport at 7:00 A.M. traveling at a rate of 350 mi/h. Two hours later, a jet takes off from the same airport following the same flight path at 490 mi/h. In how many hours will the jet catch up with the airplane?

Define: Let  $t$  = the time the airplane travels.  
Let  $t - 2$  = the time the jet travels.

Set up table:

	<b>Rate × Time = Distance</b>		
<b>Airplane</b>	350	$t$	$350t$
<b>Jet</b>	490	$t - 2$	$490(t - 2)$

Relate: distance traveled by airplane = distance traveled by jet

Write:  $350t = 490(t - 2)$

$$350t = 490t - 980$$

$$350t - 490t = 490t - 980 - 490t$$

$$-140t = -980$$

$$\frac{-140t}{-140} = \frac{-980}{-140}$$

$$t = 7$$

← Use the distributive property.

← Subtract  $490t$  from each side.

← Combine like terms.

← Divide each side by  $-140$ .

← Simplify.

Final answer: The jet will catch up with the airplane in 5 hours.

**Exercises**

**Solve each problem.**

- Mary leaves her house at noon, traveling in her car at 45 mi/h. Later, Mary's brother Joe leaves their house and travels in the same direction at 60 mi/h. If Joe leaves at 2:00 P.M., at what time will he catch up with Mary?
- Mike leaves school on his bike at 1:00 P.M., traveling at 12 mi/h. Janis leaves the same school one quarter of an hour later, traveling at 16 mi/h in the same direction. At what time will Janis catch up with Mike?



**Practice 2-5****Equations and Problem Solving**

Write and solve an equation for each situation.

1. A passenger train's speed is 60 mi/h, and a freight train's speed is 40 mi/h. The passenger train travels the same distance in 1.5 h less time than the freight train. How long does each train take to make the trip?
2. Lois rode her bike to visit a friend. She traveled at 10 mi/h. While she was there, it began to rain. Her friend drove her home in a car traveling at 25 mi/h. Lois took 1.5 h longer to go to her friend's than to return home. How many hours did it take Lois to ride to her friend's house?
3. May rides her bike the same distance that Leah walks. May rides her bike 10 km/h faster than Leah walks. If it takes May 1 h and Leah 3 h to travel that distance, how fast does each travel?
4. The length of a rectangle is 4 in. greater than the width. The perimeter of the rectangle is 24 in. Find the dimensions of the rectangle.
5. The length of a rectangle is twice the width. The perimeter is 48 in. Find the dimensions of the rectangle.
6. At 10:00 A.M., a car leaves a house at a rate of 60 mi/h. At the same time, another car leaves the same house at a rate of 50 mi/h in the opposite direction. At what time will the cars be 330 miles apart?
7. Marla begins walking at 3 mi/h toward the library. Her friend meets her at the halfway point and drives her the rest of the way to the library. The distance to the library is 4 miles. How many hours did Marla walk?
8. Fred begins walking toward John's house at 3 mi/h. John leaves his house at the same time and walks toward Fred's house on the same path at a rate of 2 mi/h. How long will it be before they meet if the distance between the houses is 4 miles?
9. A train leaves the station at 6:00 P.M. traveling west at 80 mi/h. On a parallel track, a second train leaves the station 3 hours later traveling west at 100 mi/h. At what time will the second train catch up with the first?
10. It takes 1 hour longer to fly to St. Paul at 200 mi/h than it does to return at 250 mi/h. How far away is St. Paul?
11. Find three consecutive integers whose sum is 126.
12. The sum of four consecutive odd integers is 216. Find the four integers.
13. A rectangular picture frame is to be 8 in. longer than it is wide. Dennis uses 84 in. of oak to frame the picture. What is the width of the frame?
14. Each of two congruent sides of an isosceles triangle is 8 in. less than twice the base. The perimeter of the triangle is 74 in. What is the length of the base?

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# Reteaching 2-6

Formulas

**OBJECTIVE:** Solving a literal equation for one of its variables

**MATERIALS:** None

Variables are symbols used to represent numbers. Any symbol can be used. Notice how these literal equations have been rewritten using geometric symbols.

$$a = b + c$$

$$\bigcirc = \blacktriangle + \square$$

$$xy = pq$$

$$\bigcirc \cdot \bullet = \blacktriangle \cdot \square$$

$$\frac{s}{t} = \frac{r}{q}$$

$$\frac{\bigcirc}{\bullet} = \frac{\square}{\blacktriangle}$$

## Example

Solve  $\bigcirc \cdot \bullet = \blacktriangle \cdot \square$  for  $\blacktriangle$  and then for  $\square$ .

Solving for  $\blacktriangle$ :  $\bigcirc \cdot \bullet = \blacktriangle \cdot \square$

$$\frac{\bigcirc \bullet}{\square} = \frac{\blacktriangle \square}{\square}$$

← Divide each side by  $\square$ ,  $\square \neq 0$ .

$$\frac{\bigcirc \bullet}{\square} = \blacktriangle$$

← Simplify.

Solving for  $\square$ :  $\bigcirc \cdot \bullet = \blacktriangle \cdot \square$

$$\frac{\bigcirc \bullet}{\blacktriangle} = \frac{\blacktriangle \square}{\blacktriangle}$$

← Divide each side by  $\blacktriangle$ ,  $\blacktriangle \neq 0$ .

$$\frac{\bigcirc \bullet}{\blacktriangle} = \square$$

← Simplify.

## Exercises

Solve each literal equation for  $\bigcirc$ . Show your steps.

1.  $\bigcirc + \square = \blacktriangle$

2.  $\frac{\bigcirc}{\bullet} = \frac{\square}{\blacktriangle}$

3. Choose your own symbols (such as  $\otimes$ ,  $\star$ ,  $\star$ ,  $\heartsuit$ ) and use them to write a literal equation. Solve for one of the symbols. Show each step.

Solve each equation for the given variable.

4.  $5x + a = y$ ;  $a$

5.  $m = 6(p + q)$ ;  $q$

6.  $2x + 3y = 8$ ;  $x$

7.  $xy = 3z$ ;  $z$

8.  $w = 3(x + y + z)$ ;  $y$

9.  $2w - 8y = z$ ;  $y$



## Practice 2-6

## Formulas

Solve each formula in terms of the given variable.

1.  $ad = f$ ;  $a$
2.  $n + 3 = q$ ;  $n$
3.  $2(j + k) = m$ ;  $k$
4.  $2s + t = r$ ;  $t$
5.  $m + 2n = p$ ;  $n$
6.  $\frac{2}{w} = \frac{x}{5}$ ;  $w$
7.  $5a - b = 7$ ;  $a$
8.  $h = \frac{p}{n}$ ;  $p$
9.  $5d - 2g = 9$ ;  $g$
10.  $x + 3y = z$ ;  $x$
11.  $y = mx + b$ ;  $x$
12.  $V = \ell wh$ ;  $\ell$

The formula  $A = 2h(\ell + w)$  gives the lateral area  $A$  of a rectangular solid with length  $\ell$ , width  $w$ , and height  $h$ .

13. Solve this formula for  $h$ .
14. Find  $h$  if  $A = 144 \text{ cm}^2$ ,  $\ell = 7 \text{ cm}$ , and  $w = 5 \text{ cm}$ .
15. Solve this formula for  $\ell$ .
16. Find  $\ell$  if  $A = 729.8 \text{ in.}^2$ ,  $h = 17.8 \text{ in.}$ , and  $w = 6.4 \text{ in.}$
17. Find  $h$  if  $A = 37.4 \text{ ft}^2$ ,  $\ell = 4.3 \text{ ft}$ , and  $w = 6.7 \text{ ft}$ .
18. Find  $\ell$  if  $A = 9338 \text{ m}^2$ ,  $h = 29 \text{ m}$ , and  $w = 52 \text{ m}$ .

The formula  $P = \frac{F}{A}$  gives the pressure  $P$  for a force  $F$  and an area  $A$ .

19. Solve this formula for  $A$ .
20. Find  $A$  if  $P = 14.8 \text{ lb/in.}^2$  and  $F = 2960 \text{ lb}$ .
21. Solve this formula for  $F$ .
22. Find  $F$  if  $P = 240 \text{ lb/in.}^2$  and  $A = 20 \text{ in.}^2$ .
23. Find  $A$  if  $P = 46.8 \text{ lb/in.}^2$  and  $F = 2340 \text{ lb}$ .
24. Find  $F$  if  $P = 24.5 \text{ lb/in.}^2$  and  $A = 33.8 \text{ in.}^2$ .

Solve each formula in terms of the given variable.

25.  $3n - t = s$ ;  $t$
26.  $\frac{b+3}{e} = \frac{f}{2}$ ;  $e$
27.  $w = 2xyz$ ;  $y$
28.  $k = 3mh + 3$ ;  $h$
29.  $ab = 6 + cd$ ;  $a$
30.  $2a + 4b = d$ ;  $b$
31.  $4xy + 3 = 5z$ ;  $y$
32.  $-2(3a - b) = c$ ;  $b$

The formula  $V = \frac{1}{3}\ell wh$  gives the volume  $V$  of a rectangular pyramid with length  $\ell$ , width  $w$ , and height  $h$ .

33. Solve this formula for  $w$ .
34. Find  $w$  if  $V = 64 \text{ m}^3$ ,  $\ell = 6 \text{ m}$ , and  $h = 4 \text{ m}$ .
35. Solve this formula for  $h$ .
36. Find  $h$  if  $V = 30.45 \text{ ft}^3$ ,  $\ell = 6.3 \text{ ft}$ , and  $w = 2.5 \text{ ft}$ .
37. Find  $w$  if  $V = 2346 \text{ in.}^3$ ,  $\ell = 17 \text{ in.}$ , and  $h = 18 \text{ in.}$
38. Find  $h$  if  $V = 7 \text{ ft}^3$ ,  $\ell = \frac{7}{4} \text{ ft}$ , and  $w = \frac{3}{4} \text{ ft}$ .

Solve each formula in terms of the given variable.

39.  $2m - 3p = 1$ ;  $p$
40.  $a = b + cd$ ;  $b$
41.  $a + b = 2xz$ ;  $z$
42.  $x = 2y + 3z$ ;  $y$
43.  $\frac{a}{b} = \frac{c}{d}$ ;  $d$
44.  $2ab + 4 = d$ ;  $a$
45.  $\frac{5}{2} = \frac{1}{2}(b - c)$ ;  $b$
46.  $d(a - b) = c$ ;  $a$