

**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.  $m - 21 = -43$

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

**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?

# Practice 2-4

## Equations with Variables on Both Sides

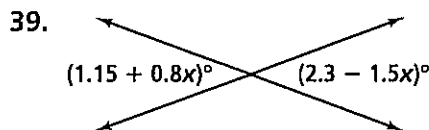
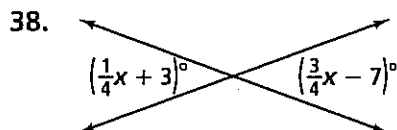
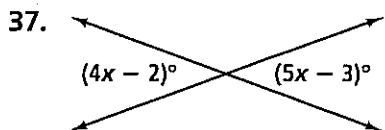
Solve each equation. Check your answer. If appropriate, write *identity* or *no solution*.

- |   |   |                                    |
|---|---|------------------------------------|
| 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  $x$ .



**Practice 2-5**

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?

# 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. $d(a - b) = c; a$ |

## Practice 2-7

Using Measures of Central Tendency

Find the mean, median, mode, and range.

- |  |  |
|--|--|
| <p>1. number of cars sold in the past 10 days<br/>1 5 3 2 1 0 4 2 6 1</p> <p>3. prices of a sweater in 5 different stores<br/>\$31.25 \$27.50 \$28.00 \$36.95 \$32.10</p> <p>5. hourly wages<br/>\$7.25 \$6.75 \$8.10 \$9.56 \$7.10 \$7.75</p> | <p>2. utility bills for the past 6 months<br/>\$90 \$120 \$140 \$135 \$112 \$126</p> <p>4. scores on a 10-point quiz<br/>7 9 10 8 4 2 6 10 8</p> <p>6. ages of students on the quiz team<br/>15 15 14 16 17 16 16 15</p> |
|--|--|

Write and solve an equation to find the value of  $x$ .

- |  |   |
|--|---|
| <p>7. 4.8, 1.6, 5.2, <math>x</math>; mean 3.7</p> <p>9. 100, 172, 85, 92, <math>x</math>; mean 115</p> | <p>8. 40, 98, 94, 102, 21, <math>x</math>; mean 88</p> <p>10. 25.6, 19.3, 19, <math>x</math>, mean 24</p> |
|--|---|
11. In his eight games against Boston, a baseball pitcher threw the following number of strikeouts: 1, 2, 4, 2, 1, 3, 3, and 0. In his five games against St. Louis, he recorded strikeouts as follows: 3, 1, 2, 3, and 2. Did the pitcher average more strikeouts against Boston or against St. Louis?
12. Randy had grades of 85, 92, 96, and 89 on his last four math tests. What grade does he need on his next test to have an average of 92?
13. To test the exhaust fumes of a car, an inspector took six samples. The exhaust samples contained the following amounts of gas in parts per million (ppm): 8, 5, 7, 6, 9, and 5. If the maximum allowable mean is 6 ppm, did the car pass the test? Explain.
14. A coffee machine is considered reliable if the range of amounts of coffee that it dispenses is less than 2 fluid ounces (fl oz). In eight tries, a particular machine dispensed the following amounts: 7.1, 6.8, 7.6, 7.1, 7.4, 6.8, 7, and 6.7 fl oz. Is the machine reliable? Explain.
15. According to its producer, an off-Broadway show would make a profit if an average of at least 1100 tickets were sold per show. For the past 12 shows, the number of tickets sold was as follows: 1000, 800, 1600, 900, 1200, 900, 800, 1700, 900, 1200, 1000, and 1200. Using the mean as the average, did the show make a profit for these 12 shows?
16. a. A bakery collected the following data about the number of loaves of fresh bread sold on each of 24 business days. Make a stem-and-leaf plot for the data.
- |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|
| 43 | 39 | 17 | 38 | 50 | 42 | 34 | 28 | 37 | 42 | 40 | 33 |
| 72 | 36 | 45 | 21 | 29 | 44 | 41 | 37 | 40 | 35 | 51 | 54 |
- b. Find the mean, median, mode, and range of the data.
17. a. The following numbers of calls were made to the police department in the last 24 days. Make a stem-and-leaf plot for the data.
- |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|
| 32 | 42 | 35 | 52 | 58 | 52 | 46 | 61 | 52 | 63 | 81 | 61 |
| 63 | 39 | 41 | 48 | 62 | 61 | 58 | 34 | 49 | 47 | 49 | 31 |
- b. Find the mean, median, mode, and range of the data.

# Reteaching 2-1

## Solving One-Step Equations

**OBJECTIVE:** Solving one-step equations

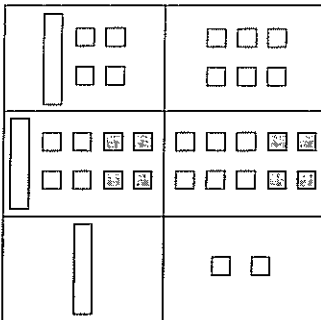
**MATERIALS:** Tiles

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.  $x + 4 = 6$



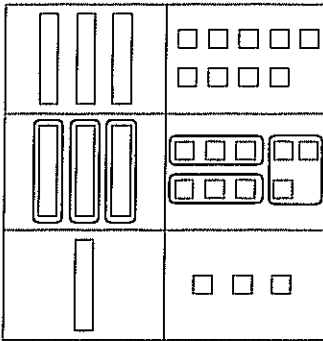
$x = 2$

← Model the equation with tiles.

← Subtract 4 from each side of the equation.

← Simplify by removing zero pairs.

2.  $3x = 9$



$x = 3$

← Model the equation with tiles.

← Divide each side into three identical groups.

← Solve for  $x$ .

### 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.  $6x = 15$



# Reteaching 2-2

<b>OBJECTIVE:</b> Solving two-step equations	<b>MATERIALS:</b> None
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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.

$$3x + 4 = 10 \quad \leftarrow \text{Think: Is any adding or subtracting being done to the variable? 4 is being added. What is the inverse of adding 4?}$$

$$3x + 4 - 4 = 10 - 4 \quad \leftarrow \text{Subtract 4 from each side.}$$

$$3x = 6 \quad \leftarrow \text{Simplify.}$$

$$3x = 6 \quad \leftarrow \text{Think: Is any multiplying or dividing being done to the variable? It is being multiplied by 3. What is the inverse of multiplying by 3?}$$

$$\frac{3x}{3} = \frac{6}{3} \quad \leftarrow \text{Divide each side by 3.}$$

$$x = 2 \quad \leftarrow \text{Simplify.}$$

### Exercises

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

$$1. \quad \frac{s}{6} - 5 = -8 \quad \leftarrow \text{Think: Is any adding or subtracting being done to the variable? _____ is being _____. What is the _____ of subtracting 5?}$$

$$\frac{s}{6} - 5 + 5 = -8 + 5 \quad \leftarrow \text{_____ 5 to _____ side.}$$

$$\frac{s}{6} = -3 \quad \leftarrow \text{Simplify.}$$

$$\frac{s}{6} = -3 \quad \leftarrow \text{Think: Is any multiplying or dividing being done to the variable? It is being _____ by 6. What is the inverse of _____ by 6?}$$

$$6\left(\frac{s}{6}\right) = 6(-3) \quad \leftarrow \text{Multiply each _____ by _____ .}$$

$$s = \underline{\hspace{2cm}} \quad \leftarrow \text{Simplify.}$$

Solve each equation.

2.  $3x - 4 = 8$

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

4.  $4y + 5 = -7$

# Reteaching 2-3

## Solving Multi-Step Equations

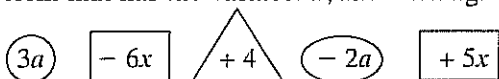
**OBJECTIVE:** Combining like terms

**MATERIALS:** None

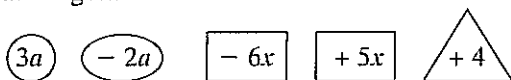
### Example

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.



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



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

# Reteaching 2-4

Equations with Variables on Both Side:

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

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

← Circle all the terms with variables.

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

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

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

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

$$2a - 12 = 7$$

← Combine like terms.

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

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

$$2a = 19$$

← Combine like terms.

$$a = 9.5$$

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

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

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

$$35.5 = 35.5 \checkmark$$

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.  $9 - x = 3x + 1$

# 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.

**Rate × Time = Distance**

**Length × Width = Area**

Object 1			
Object 2			

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:

**Rate × Time = Distance**

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

$350t = 490t - 980$

← Use the distributive property.

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

← Subtract  $490t$  from each side.

$-140t = -980$

← Combine like terms.

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

← Divide each side by  $-140$ .

$t = 7$

← 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?

# 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.

$$a = b + c \qquad \bigcirc = \blacktriangle + \square$$

$$xy = pq \qquad \bigcirc \cdot \bullet = \blacktriangle \cdot \square$$

$$\frac{s}{t} = \frac{r}{q} \qquad \frac{\bigcirc}{\bullet} = \frac{\square}{\blacktriangle}$$

## 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  $\clubsuit, \heartsuit, \spadesuit, \diamondsuit$ ) 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.  $2w - 8y = z; y$



# Chapter 2 Answers

## Practice 2-1

1. 8 2. -11 3. -16 4. 9 5. 10 6. 23 7. -42 8. 26 9. 15  
 10. 26 11. 22 12. -8 13. 12 14. 44 15. 5.6 16. -16  
 17. 21 18. -7.2 19. -96 20. 1 21. 0  
 22.  $12h = 27$ ; 2.25 in. 23.  $15 + J = 33$ ; 18 years old  
 24.  $S + 9\frac{1}{2} = 77\frac{3}{4}$ ;  $68\frac{1}{4}$  in. 25.  $11.23d = 89,000$ ; 7925 mi  
 26.  $d - 189 = 171$ ; 360 mi 27. -7 28. -64.3 29. 9  
 30. -24 31. -17.9 32. 9 33.  $\frac{1}{2}$  34. -21 35. -50.4  
 36. -33 37. 29.6 38. 67.1 39. -7 40. 19 41. -32  
 42. -3.8 43. -49.7 44. -17 45. -24 46.  $-\frac{7}{6}$  47. 18  
 48. 7.6 49. 59 50. -22

## Practice 2-2

1. 1 2. 2 3. 2 4. 1 5. 3 6. -10  
 7.  $3.50 + 2.50r = 16$ ; 5 roses  
 8.  $210m + 550 = 10,000$ ; 45 min  
 9.  $6.5 + 1.5h = 11$ ;  $3h$  10.  $0.34 + 0.21n = 1.18$ ; 5 oz  
 11.  $24.95 + 5.95s = 50$ ; 4 pair 12. 4.5 13. -17 14. 4  
 15. -36 16. -8.4 17. -6 18. 14 19. 14 20. 16 21. 6  
 22. -9.5 23. 168 24. -3 25. 9 26. -5 27. -21  
 28. -69 29. 3.1 30. -55 31. 13 32. -22  
 33. a. Subtr. Prop. of Eq.  
     b. Simplify.  
     c. Mult. Prop. of Eq.  
     d. Simplify.  
 34. a. Subtr. Prop. of Eq.  
     b. Simplify.  
     c. Mult. Prop. of Eq.  
     d. Simplify.  
 35. a. Add. Prop. of Eq.  
     b. Simplify.  
     c. Div. Prop. of Eq.  
     d. Simplify.

## Practice 2-3

1. -9.6 2. 6.9 3. 2.98 4. -3 5. -11 6. -9 7. 5  
 8. -11 9. 4 10. 3 11. -5 12. 2 13. -5 14. 3 15. 7  
 16. 23 17. -6 18. 21 19. -8 20. 5 21. 10 22. -1  
 23. -2 24. -5 25. 44 26. 3 27. 4 28. 9 29. 5  
 30. -15 31. 31 32. -27 33.  $\frac{3}{2}$  34. 12 35. 3 36. -11  
 37. 24 38. 49 39. -10 40.  $\frac{3}{2}$  41. -12 42. 2 43.  $-\frac{7}{5}$   
 44. 2 45. 24 46.  $2n + 3(400 - n) = 1050$ ; 150 student  
 tickets, 250 adult tickets 47.  $w + 2w + w + 2w = 30$ ; 10 ft  
 48.  $\frac{1}{3}t + \frac{2}{5}t = 1100$ ; \$1500 49.  $\frac{5}{7}m = 125$ ; 175 lb  
 50.  $29.95 + 0.10m = 99.95$ ; 700 min

## Practice 2-4

1. 7 2. 9 3. -15 4. 3 5. identity 6. 5 7. no solution  
 8. 13 9. 7 10. no solution 11. 4 12. 8 13. identity  
 14. no solution 15. 2 16. -9 17. identity 18. 18 19. 7  
 20. identity 21. identity 22. identity 23. no solution  
 24. 3 25. 2 26. 1 27. -2 28. no solution 29. 10

30. identity 31.  $-\frac{15}{2}$  32. -3 33. 4  
 34.  $40d = 60 + 20d$ ; 3 days 35.  $4v = 21 + 2.50v$ ; 14 videos  
 36.  $100 + c = 5c$ ; 25 candles 37. 1 38. 20 39. 0.5

## Practice 2-5

1.  $60(t - 1.5) = 40t$ ; freight train: 4.5 h, passenger train: 3 h  
 2.  $10(t + 1.5) = 25t$ ; 2.5 h  
 3.  $r + 10 = 3r$ ; Leah: 5 km/h, May: 15 km/h  
 4.  $24 = 2(w + 4) + 2w$ ; width: 4 in., length: 8 in.  
 5.  $48 = 2(2w) + 2w$ ; width: 8 in., length: 16 in.  
 6.  $60t + 50t = 330$ ; 1:00 P.M.  
 7.  $3t = \frac{1}{2}(4)$ ;  $\frac{2}{3}$  h or 40 min  
 8.  $3t + 2t = 4$ ;  $\frac{4}{5}$  h or 48 min  
 9.  $80t = 100(t - 3)$ ; 9:00 A.M.  
 10.  $200(t + 1) = 250t$ ; 1000 mi  
 11.  $x + x + 1 + x + 2 = 126$ ; 41, 42, 43  
 12.  $x + x + 2 + x + 4 + x + 6 = 216$ ; 51, 53, 55, 57  
 13.  $84 = 2(w + 8) + 2w$ ; 17 in.  
 14.  $x + 2x - 8 + 2x - 8 = 74$ ; 18 in.

## Practice 2-6

1.  $a = \frac{f}{d}$  2.  $n = q - 3$  3.  $k = \frac{m - 2j}{2}$  4.  $t = r - 2s$   
 5.  $n = \frac{p - m}{2}$  6.  $w = \frac{10}{x}$  7.  $a = \frac{b + 7}{5}$  8.  $p = hn$   
 9.  $g = \frac{5d - 9}{2}$  10.  $x = z - 3y$  11.  $x = \frac{y - b}{m}$   
 12.  $\ell = \frac{V}{wh}$  13.  $h = \frac{A}{2(\ell + w)}$  14. 6 cm 15.  $\ell = \frac{A}{2h} - w$   
 16. 14.1 in. 17. 1.7 ft 18. 109 m 19.  $A = \frac{F}{P}$  20. 200 in.<sup>2</sup>  
 21.  $F = PA$  22. 4800 lb 23. 50 in.<sup>2</sup> 24. 828.1 lb  
 25.  $t = 3n - s$  26.  $e = \frac{2(b + 3)}{f}$  27.  $y = \frac{w}{2xz}$   
 28.  $h = \frac{k - 3}{3m}$  29.  $a = \frac{6 + cd}{b}$  30.  $b = \frac{d - 2a}{4}$   
 31.  $y = \frac{5z - 3}{4x}$  32.  $b = \frac{c + 6a}{2}$  33.  $w = \frac{3V}{\ell h}$  34. 8 m  
 35.  $h = \frac{3V}{\ell w}$  36. 5.8 ft 37. 23 in. 38. 16 ft  
 39.  $p = \frac{2m - 1}{3}$  40.  $b = a - cd$  41.  $z = \frac{a + b}{2x}$   
 42.  $y = \frac{x - 3z}{2}$  43.  $d = \frac{bc}{a}$  44.  $a = \frac{d - 4}{2b}$   
 45.  $b = 5 + c$  46.  $a = \frac{c + bd}{d}$

## Practice 2-7

1. 2.5; 2; 1; 6 2. \$120.50; \$123; no mode; \$50 3. \$31.16; \$31.25;  
 no mode; \$9.45 4. 7.11; 8; 8 and 10; 8 5. \$7.75; \$7.50;  
 no mode; \$2.81 6. 15.5; 15.5; 15 and 16; 3  
 7.  $\frac{4.8 + 1.6 + 5.2 + x}{4} = 3.7$ ; 3.2

# Chapter 2 Answers (continued)

8.  $\frac{40 + 98 + 94 + 102 + 21 + x}{6} = 88; 173$

9.  $\frac{100 + 172 + 85 + 92 + x}{5} = 115; 126$

10.  $\frac{25.6 + 19.3 + 19 + x}{4} = 24; 32.1$

11. against St. Louis 12. 98 13. no; The mean was 6.7 ppm.

14. yes; The range is 0.9 fl oz.

15. yes; The average number of tickets sold was 1100.

## 16a. Loaves of Bread Sold

1	7
2	1 8 9
3	3 4 5 6 7 7 8 9
4	0 0 1 2 2 3 4 5
5	0 1 4
6	
7	2

1 1 7 means 17

16b. 39.5; 39.5; 37, 40 and 42; 55

## 17a. Number of Calls Made

3	1 2 4 5 9
4	1 2 6 7 8 9 9
5	2 2 2 8 8
6	1 1 1 2 3 3
7	
8	1

4 1 9 means 49

17b. 50.7; 50.5; 52 and 61; 50

## Reteaching 2-1

1-9. Check students' models.

1. 7 2. 6 3. -2 4. 3 5. 3 6. 2 7. 9 8. 3 9. -2

10. 25 11. -2 12. 4 13. -4.9 14. 7 15. 2.5

## Reteaching 2-2

1. 5, subtracted, inverse; add, each; divided, dividing; side, 6; -18 2. 4 3. 28 4. -3

## Reteaching 2-3

1.  $a + 6x + 5$  2.  $13a - 3x - 5$  3.  $-b - 3x + 5$

4.  $-10m + t + 4$  5.  $-3r + 3s$  6.  $2p - 9x + 4$

7.  $9k - 2x + 5$  8.  $2a - 2x + 5.5$  9.  $-a + 2y - 4$

10.  $-5c + 6x - 3$  11.  $2b - x + 6$  12.  $2c - 9$

13. -5 14.  $2y + 0.5z - 0.5$  15.  $4a + 3b + 4$

16.  $\frac{1}{3}a - 2$  17.  $4x - 10$  18.  $5x - 4y + z$  19.  $\frac{1}{2}x + 1$

20.  $8y - 3x - 3$

## Reteaching 2-4

1. subtract; from; 4 2.  $4b$ ; add; to 3-5. Check students' work. 3. 3.5 4. 2 5. 17 6. 8 7. -3 8. 2

## Reteaching 2-5

1. 8:00 P.M. 2. 2:00 P.M.

## Reteaching 2-6

1.  $\bigcirc = \blacktriangle - \square$  2.  $\bigcirc = \frac{\bullet \square}{\blacktriangle}$  3. Check students' work.

4.  $a = y - 5x$  5.  $q = \frac{m - 6p}{6}$  6.  $x = \frac{8 - 3y}{2}$

7.  $z = \frac{xy}{3}$  8.  $y = \frac{w - 3x - 3z}{3}$  9.  $y = \frac{2w - z}{8}$

## Reteaching 2-7

1. \$915.60; \$900; no mode 2. 5.375; 5; no mode

3. 12; 9; no mode 4. 73.5; 73; 72 5. 70; 70; 70

## Enrichment 2-1

J	I	D	B
M	A	P	H
G	O	K	N
E	L	F	C

## Enrichment 2-2

1. You must multiply each element in the first matrix by 3 and add each result to the corresponding element in the second matrix to obtain the corresponding element in the third matrix.

2. 2 3. 4 4. -2 5.  $\frac{1}{2}$

6.  $w = -2; x = 2; y = 3; z = -1$

7.  $w = \frac{1}{3}; x = -\frac{1}{3}; y = -\frac{1}{3}; z = \frac{3}{2}$

8.  $w = 10; x = 0; y = -1; z = 4$

## Enrichment 2-3

1.  $9.8 \text{ m/s}^2$  2.  $9.8 \text{ m/s}^2$  3.  $9.8 \text{ m/s}^2$  4. They are all  $9.8 \text{ m/s}^2$ ;

The gravitational force is constant. 5. 39 m/s 6. 19.5 m

7. 175.5 m 8. 122.5 m 9. 490 m 10.  $s = \frac{1}{2}gt^2$

## Enrichment 2-4

1. 4375 cartridges 2. 15 mi 3. when he sells the 13th tree

4. 572 scooters 5. 53 sets of 10