

# Algebra Review

## EXAMPLE 1 Solving Literal Equations

Given the formula for the surface area of a right cylinder, solve for  $h$ .

$$S = 2\pi r^2 + 2\pi rh$$

$$S = 2\pi r(r + h) \quad \text{or} \quad S - 2\pi r^2 = 2\pi rh$$

$$\frac{S}{2\pi r} = r + h \quad \frac{(S - 2\pi r^2)}{2\pi r} = h$$

$$\frac{S}{2\pi r} - r = h$$

## EXERCISES

Solve the literal equation for the indicated variable. Assume variables are positive.

1.  $A = \ell w$ ;  $w$
2.  $V = \frac{4}{3}\pi r^3$ ;  $r$
3.  $A = \frac{1}{2}bh$ ;  $h$
4.  $A = \frac{1}{2}h(b_1 + b_2)$ ;  $b_1$
5.  $A = \pi r^2$ ;  $r$
6.  $C = 2\pi r$ ;  $r$
7.  $V = s^3$ ;  $s$
8.  $P = 2\ell + 2w$ ;  $\ell$
9.  $V = \ell wh$ ;  $h$
10.  $V = \pi r^2 h$ ;  $h$
11.  $S = 6s^2$ ;  $s$
12.  $a^2 + b^2 = c^2$ ;  $b$

## EXAMPLE 2 Algebraic Expressions

- a. Write an expression for seven less than a number.  
 $x - 7$

- b. Write an equation for three less than six times a number is five times the same number plus 5, then solve.  
 $6x - 3 = 5x + 5$   
 $x - 3 = 5$   
 $x = 8$

## EXERCISES

Write the expression or equation. Solve the equations.

13. Five plus a number
14. A number squared increased by the square root of 2
15. Twice a number decreased by fourteen
16. Six less than three times a number
17. A number plus two decreased by nine times the number
18. Half of a number plus three times the number
19. The product of five and a number decreased by seven equals thirteen.
20. Sixteen less than twice a number is 10.

21. Twice a number increased by the product of the number and fourteen results in forty-eight.
22. Half of a number is three times the sum of the number and five.

### EXAMPLE 3 *Percent Problems*

- a. What number is 12% of 75?

$$x = 0.12(75)$$

$$x = 9$$

- b. 6 is what percent of 40?

$$6 = 40p$$

$$0.15 = p$$

$$p = 15\%$$

### EXERCISES

Solve.

23. What number is 30% of 120?
24. What distance is 15% of 340 miles?
25. What number is 71% of 200?
26. How much money is 50% of \$25?
27. 34 is what percent of 136?
28. 11 dogs is what percent of 50 dogs?
29. 200 is what percent of 50?
30. 8 weeks is what percent of a year?
31. 3 is 30% of what number?
32. 16 meters is 64% of what distance?
33. If sales tax is 8%, how much tax is charged on a \$25.95 purchase?
34. 15 out of 18 players on a team came to a tournament. What percent of the players were absent?

### EXAMPLE 4 *Simplifying Rational Expressions*

Simplify.

a.  $\frac{8x^2 + 12x}{4x^2 + 16x}$

$$\frac{4x(2x + 3)}{4x(x + 4)}$$

$$\frac{2x + 3}{x + 4}$$

b.  $\frac{y^2 - 9}{y^2 + 6y + 9}$

$$\frac{(y + 3)(y - 3)}{(y + 3)(y + 3)}$$

$$\frac{y - 3}{y + 3}$$

### EXERCISES

Simplify.

35.  $\frac{5x}{10x^2}$

36.  $\frac{16a^3}{8a}$

37.  $\frac{(5x^2 + x)}{(5x + 1)}$

38.  $\frac{9w^3 + 27w}{3w^3 + 9w}$

39.  $\frac{5a + 10}{5a - 40}$

40.  $\frac{5x^2 + 15x}{30x^2 - 5x}$

41.  $\frac{14d^2 - 2d}{6d^2 + 8d}$

42.  $\frac{2y - 12}{24 - 2y}$

43.  $\frac{36s^2 - 4s}{4s^2 - 12s}$

44.  $\frac{-5h + 1}{h + 1}$

45.  $\frac{t^2 - 1}{t^2 + 2t + 1}$

46.  $\frac{m^2 - 4m + 4}{m^2 - 4}$