1. Find an algebraic expression to represent each of the following.

(a) The square of y is subtracted from 5, and the result is multiplied by 37.

(b) Three times x is squared, and the result is divided by 7.

(c) The product of $(x + 4)$ and y is added to 18.

2. Simplify each of the following algebraic expressions.

(a) $3x^2 - 6 + x + 11 - x^2 + 5x$

(b) $3(5x - 1) - x + 4$

(c) $\dfrac{x^2 - 16}{x - 4}$, where $x \neq 4$

(d) $(2x + 5)(3x - 1)$

3.

(a) What is the value of $f(x) = 3x^2 - 7x + 23$ when $x = -2$?

(b) What is the value of $h(x) = x^3 - 2x^2 + x - 2$

when $x = 2$?

(c) What is the value of $k(x) = \frac{5}{3}x - 7$ when $x = 0$?

4. If the function g is defined for all nonzero numbers y by

$g(y) = \frac{y}{|y|}$, find the value of each of the following.

(a) $g(2)$

(b) $g(-2)$

(c) $g(2) - g(-2)$

5. Use the rules of exponents to simplify the following.

(a) $\left(n^5\right)\left(n^{-3}\right)$

(b) $\left(s^7\right)\left(t^7\right)$

(c) $\dfrac{r^{12}}{r^4}$

(d) $\left(\dfrac{2a}{b}\right)^5$

(e) $\left(w^5\right)^{-3}$

(f) $\left(5^0\right)\left(d^3\right)$

(g) $\dfrac{\left(x^{10}\right)\left(y^{-1}\right)}{\left(x^{-5}\right)\left(y^5\right)}$

(h) $\left(\dfrac{3x}{y}\right)^2 \div \left(\dfrac{1}{y}\right)^5$

6. Solve each of the following equations for x.

(a) $5x - 7 = 28$

(b) $12 - 5x = x + 30$

(c) $5(x + 2) = 1 - 3x$

(d) $(x + 6)(2x - 1) = 0$

(e) $x^2 + 5x - 14 = 0$

(f) $x^2 - x - 1 = 0$

7. Solve each of the following systems of equations for x and y.

(a) $\begin{aligned} x + y &= 24 \\ x - y &= 18 \end{aligned}$

(b) $\begin{aligned} 3x - y &= -5 \\ x + 2y &= 3 \end{aligned}$

(c) $\begin{aligned} 15x - 18 - 2y &= -3x + y \\ 10x + 7y + 20 &= 4x + 2 \end{aligned}$

8. Solve each of the following inequalities for x.

(a) $-3x > 7 + x$

(b) $25x + 16 \geq 10 - x$

(c) $16 + x > 8x - 12$

9. For a given two-digit positive integer, the tens digit is 5
    more than the units digit. The sum of the digits is 11.
    Find the integer.

10. If the ratio of $2x$ to $5y$ is 3 to 4, what is the ratio of x to y ?

11. Kathleen's weekly salary was increased by 8 percent to
    $237.60. What was her weekly salary before the increase?

12. A theater sells children's tickets for half the adult ticket
    price. If 5 adult tickets and 8 children's tickets cost a total
    of $27, what is the cost of an adult ticket?

13. Pat invested a total of $3,000. Part of the money was invested in a money market account that paid 10 percent simple annual interest, and the remainder of the money was invested in a fund that paid 8 percent simple annual interest. If the interest earned at the end of the first year from these investments was $256, how much did Pat invest at 10 percent and how much at 8 percent?

14. Two cars started from the same point and traveled on a straight course in opposite directions for exactly 2 hours, at which time they were 208 miles apart. If one car traveled, on average, 8 miles per hour faster than the other car, what was the average speed of each car for the 2-hour trip?

15. A group can charter a particular aircraft at a fixed total cost. If 36 people charter the aircraft rather than 40 people, then the cost per person is greater by $12.

(a) What is the fixed total cost to charter the aircraft?

(b) What is the cost per person if 40 people charter the aircraft?

16. An antiques dealer bought c antique chairs for a total of x dollars. The dealer sold each chair for y dollars.

(a) Write an algebraic expression for the profit, P, earned from buying and selling the chairs.

(b) Write an algebraic expression for the profit per chair.

17. In the coordinate system in Algebra Figure 16 below, find the following.

(a) Coordinates of point Q

(b) Lengths of PQ, QR, and PR

(c) Perimeter of $\triangle PQR$

(d) Area of $\triangle PQR$

(e) Slope, y-intercept, and equation of the line passing through points P and R
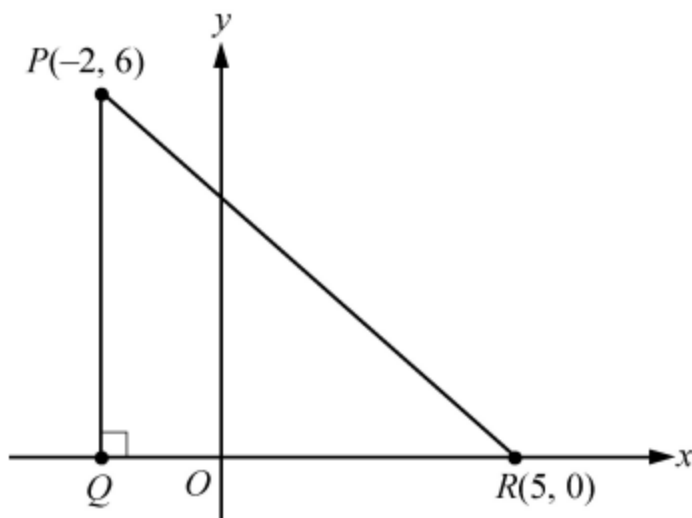
18. In the xy-plane, find the following.

(a) Slope and y-intercept of the line with equation $2y + x = 6$

(b) Equation of the line passing through the point $(3, 2)$ with y-intercept 1

(c) The y-intercept of a line with slope 3 that passes through the point $(-2, 1)$

(d) The x-intercepts of the graphs in (a), (b), and (c)

19. For the parabola $y = x^2 - 4x - 12$ in the xy-plane, find the following.

(a) The x-intercepts

(b) The y-intercept

(c) Coordinates of the vertex

20. For the circle $(x - 1)^2 + (y + 1)^2 = 20$ in the xy-plane, find the following.

(a) Coordinates of the center

(b) Radius

(c) Area

21. For each of the following functions, give the domain and a description of the graph $y = f(x)$ in the xy-plane, including its shape, and the x- and y-intercepts.

(a) $f(x) = -4$

(b) $f(x) = 100 - 900x$

(c) $f(x) = 5 - (x + 20)^2$

(d) $f(x) = \sqrt{x + 2}$

(e) $f(x) = x + |x|$