Some Algebra 2 Topics
… No Answers

Chapters 1–11 Cumulative Review Exercises

1. Solve the equation.
$$5(2y - 1) = 2y - 4 + 8y - 1$$

2. Solve the inequality. Graph the solution and write the solution in interval notation.
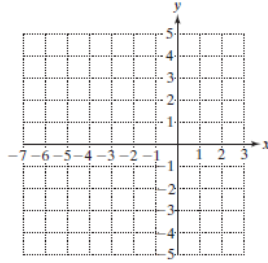$$4(x - 1) + 2 > 3x + 8 - 2x$$

3. The product of two integers is 150. If one integer is 5 less than twice the other, find the integers.

4. For $5y - 3x - 15 = 0$:

   a. Find the x- and y-intercepts.

   b. Find the slope.

   c. Graph the line.

5. The amount of money spent on motor vehicles and parts each year since the year 2000 is shown in the graph. Let $x = 0$ correspond to the year 2000. Let y represent the amount of money spent on motor vehicles and parts (in billions of dollars).

   a. Use any two data points to find the slope of the line.

   b. Find an equation of the line through the points. Write the answer in slope-intercept form.

   c. Use the linear model found in part (b) to predict the amount spent on motor vehicles and parts in the year 2010.

Amount Spent (in $ billions) on Motor Vehicles and Parts in United States
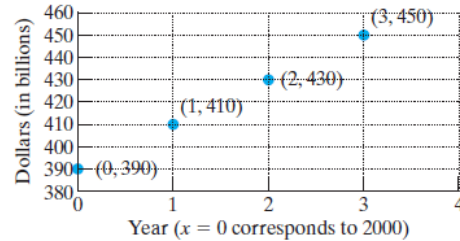
Source: Bureau of Economic Analysis, U.S. Department of Commerce

6. Find the slope and y-intercept of $3x - 4y = 6$ by first writing the equation in slope-intercept form.

7. A collection of dimes and quarters has a total value of \$2.45. If there are 17 coins, how many of each type are there?

8. Solve the system.

$$x + y = -1$$
$$2x - z = 3$$
$$y + 2z = -1$$

9. a. Given the matrix $\mathbf{A} = \begin{bmatrix} 1 & -2 & | & -8 \\ 0 & 3 & | & 6 \end{bmatrix}$, write the matrix obtained by multiplying the elements in the second row by $\frac{1}{3}$.

   b. Using the matrix obtained from part (a), write the matrix obtained by multiplying the second row by 2 and adding the result to the first row.

10. Solve the following system.

$$4x - 2y = 7$$
$$-3x + 5y = 0$$

11. Solve using Cramer's rule:

$$3x - 4y = 6$$
$$x + 2y = 12$$

12. For $f(x) = 3x - x^2 - 12$, find the function values $f(0), f(-1), f(2),$ and $f(4)$.

13. For $g = \{(2, 5), (8, -1), (3, 0), (-5, 5)\}$ find the function values $g(2), g(8), g(3),$ and $g(-5)$.

14. The quantity z varies jointly as y and as the square of x. If z is 80 when x is 5 and y is 2, find z when $x = 2$ and $y = 5$.

15. For $f(x) = \sqrt{x + 1}$ and $g(x) = x^2 + 6$, find $(g \circ f)(x)$.

16. a. Find the value of the expression $x^3 + x^2 + x + 1$ for $x = -2$.

    b. Factor the expression $x^3 + x^2 + x + 1$ and find the value when x is -2.

    c. Compare the values for parts (a) and (b).

17. Factor completely.

$$x^2 - y^2 - 6x - 6y$$

18. Multiply: $(x - 4)(x^2 + 2x + 1)$

19. Solve for x: $2x(x - 7) = x - 18$

20. Reduce the expression: $\dfrac{3a^2 - a - 2}{3a^2 + 8a + 4}$

21. Subtract: $\dfrac{2}{x + 3} - \dfrac{x}{x - 2}$

22. Solve: $\dfrac{2}{x + 3} - \dfrac{x}{x - 2} = \dfrac{-4}{x^2 + x - 6}$

23. Solve the radical equations.
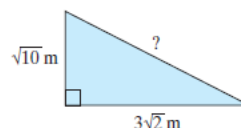
    a. $\sqrt{2x - 5} = -3$

    b. $\sqrt[3]{2x - 5} = -3$

24. Perform the indicated operations with complex numbers.

    a. $6i(4 + 5i)$

    b. $\dfrac{3}{4 - 5i}$

25. Find the length of the missing side.

26. An automobile starts from rest and accelerates at a constant rate for 10 sec. The distance, $d(t)$, in feet traveled by the car is given by

$$d(t) = 4.4t^2$$

where $0 \le t \le 10$ is the time in seconds.

    a. How far has the car traveled after 2, 3, and 4 sec, respectively?

    b. How long will it take for the car to travel 281.6 ft?

27. Solve the equation $125w^3 + 1 = 0$ by factoring and using the quadratic formula. (*Hint:* You will find one real solution and two imaginary solutions.)

28. Solve the rational equation.

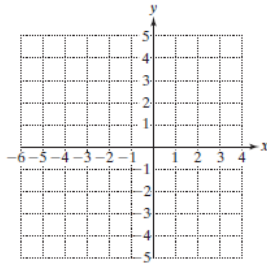$$\frac{x}{x+2} - \frac{3}{x-1} = \frac{1}{x^2+x-2}$$

29. Find the coordinates of the vertex of the parabola defined by $f(x) = x^2 + 10x - 11$ by completing the square.

30. Graph the quadratic function defined by $g(x) = -x^2 - 2x + 3$.

    a. Label the x-intercepts.

    b. Label the y-intercept.

    c. Label the vertex.

31. Solve the inequality and write the answer in interval notation.

$$|x - 9| - 3 < 7$$

32. Solve the inequality: $|2x - 5| \geq 4$

33. Write the expression in logarithmic form.
$8^{5/3} = 32$

34. Solve the equation: $5^2 = 125^x$

35. For $h(x) = x^3 - 1$, find $h^{-1}(x)$.

36. Write an equation representing the set of all points 4 units from the point $(0, 5)$.

37. Can a circle and a parabola intersect in only one point? Explain.

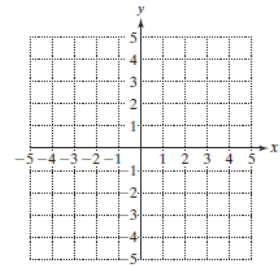**38.** Solve the system of nonlinear equations.

$$x^2 + y^2 = 16$$
$$y = -x^2 - 4$$

39. Graph the solution set.

$$y^2 - x^2 < 1$$

40. Graph the solution set to this system.

$$y > \left(\frac{1}{2}\right)^x$$
$$x < 0$$