MM1A1a Represent functions using function notation.

MM1A1b Graph the basic functions $f(x) = x^n$, where $n = 1$ to 3, $f(x) = \sqrt{x}$, $f(x) = |x|$, and $f(x) = \frac{1}{x}$.

MM1A1c Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the x- and y-axes.

Evaluate the function when x = −3, 0, and 2.

1. $f(x) = 15x + 4$

2. $g(x) = -9x + 1$

3. $p(x) = -7x - 5$

4. $h(x) = 3.25x$

5. $m(x) = -4.4x$

6. $f(x) = 6.1x - 3.3$

7. $s(x) = \frac{4}{5}x - 2$

8. $d(x) = -\frac{5}{3}x + 4$

9. $h(x) = \frac{3}{8}x - 6$

10. $f(x) = -2.5x + 7$

11. $h(x) = 4.2x - 3$

12. $g(x) = 6.1x - 2.2$

Find the value of x so that the function has the given value.

13. $f(x) = 4x - 2;\ 18$

14. $n(x) = 7x + 4;\ 39$

15. $q(x) = 6 - 5x;\ 21$

16. $g(x) = -3x + 8;\ 14$

17. $h(x) = 9x - 13;\ 23$

18. $r(x) = 12x - 30;\ 30$

19. $s(x) = -4x - 9;\ 3$

20. $c(x) = 8.5x - 3;\ 82$

21. $p(x) = -2.4x + 6;\ 18$

22. $d(x) = 3.3x - 1.1;\ 31.9$

***Compare* the graph of g(x) to the graph of f(x) = x.**

23.

24.

25.
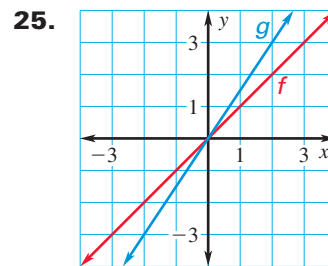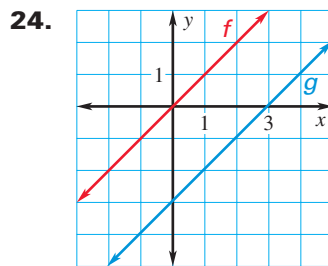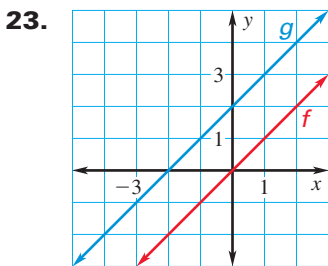
Graph the function. *Compare* your graph to the graph of f(x) = x.

26. $h(x) = x - 4$

27. $g(x) = x + 7$

28. $n(x) = 5x$

29. $d(x) = 8x$

30. $p(x) = \frac{1}{3}x$

31. $n(x) = -2x$

32. $p(x) = -\frac{1}{4}x$

33. $d(x) = x - 1.5$

34. $g(x) = x + 4.5$

UNIT 1

Exercise Set A *(continued)*

35. **Error Analysis** *Describe* and correct the error in comparing the graph of g with the graph of f.
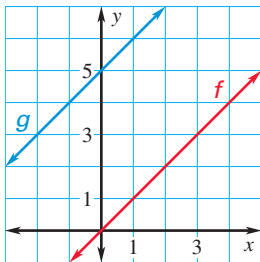
> The graph of g is a vertical shift of 5 units down of the graph of f. ✗

Match the function with the description of its graph in relation to the graph of $f(x) = x$.

36. $g(x) = 4x$ **37.** $g(x) = x + 4$ **38.** $g(x) = x - 4$

A. vertical shift of 4 units up of the graph of f

B. vertical shift of 4 units down of the graph of f

C. vertical stretch of the graph of f using a scale factor of 4

Graph the functions. *Compare* the graphs.

39. $g(x) = x - 1,\ h(x) = -x + 1$ **40.** $p(x) = x + 4,\ q(x) = -x + 4$

41. **Video Games** The number of hours people in the United States spent playing video games each year from 1998 to 2001 can be modeled by the function $f(x) = 11.9x + 46.4$ where x is the number of years since 1998.

  a. Graph the function and identify its domain and range.

  b. Find the value of $f(x)$ when $x = 2$. *Explain* what the solution means in this situation.

  c. Find the value of x so that $f(x) = 60$. *Explain* what the solution means in this situation.

42. **Pool Membership** A pool membership during the summer costs $7 per week. The total cost of a membership is given by $f(x) = 7x$. The pool also rents out lockers for $2 per week. The total cost of a membership and a rental is given by $g(x) = 9x$.

  a. Graph both functions. How is the graph of f related to the graph of g?

  b. What is the difference between a 12-week membership if you get a locker and if you don't? *Explain* how you got your answer.

Exercise Set B

MM1A1a Represent functions using function notation.

MM1A1b Graph the basic functions $f(x) = x^n$, where $n = 1$ to 3, $f(x) = \sqrt{x}$, $f(x) = |x|$, and $f(x) = \frac{1}{x}$.

MM1A1c Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the x- and y-axes.

Evaluate the function when $x = -3$, 2, and 4.5.

1. $f(x) = 5.2x - 4$

2. $g(x) = -6x + 2.2$

3. $p(x) = -3.2x - 7.1$

4. $h(x) = 8.5 - 10x$

5. $n(x) = 5x + 12.7$

6. $f(x) = -2.8x + 14.3$

7. $s(x) = \frac{7}{3}x - 2$

8. $d(x) = \frac{9}{2}x + \frac{3}{4}$

9. $h(x) = \frac{5}{4} - \frac{1}{2}x$

10. $f(x) = -7.2x + 6$

11. $g(x) = 2.25x - 3$

12. $h(x) = 4.3x - 2.1$

Find the value of x so that the function has the given value.

13. $f(x) = 8x + 9;\ -7$

14. $d(x) = 11x - 15;\ 40$

15. $p(x) = 14 - 4x;\ 26$

16. $h(x) = 13x - 4;\ -43$

17. $q(x) = 6x + 4;\ 13$

18. $g(x) = 9 - 7x;\ 44$

19. $f(x) = -5x + 13;\ -14$

20. $n(x) = 12x - 17;\ 19$

21. $s(x) = 20x - 34;\ -134$

22. $f(x) = -6.5x + 7.4;\ -70.6$

23. $g(x) = 10.2x - 8.1;\ -39.6$

24. $h(x) = 6.75x - 2.5;\ 58.25$

Compare the graph of $g(x)$ to the graph of $f(x) = x$.

25.

26.

27.
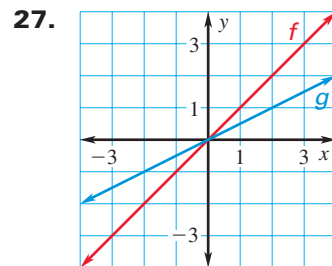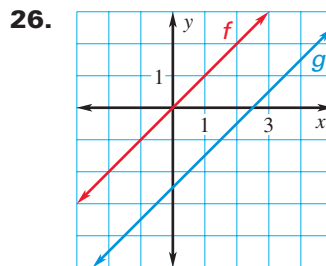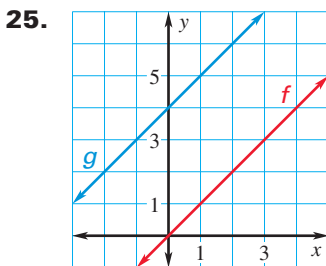
Graph the function. Compare your graph to the graph of $f(x) = x$.

28. $d(x) = x + 9$

29. $h(x) = x - 10$

30. $q(x) = 5x$

31. $g(x) = \frac{1}{4}x$

32. $p(x) = \frac{3}{2}x$

33. $h(x) = -\frac{2}{3}x$

34. $d(x) = x - 7.5$

35. $g(x) = x + 8.5$

36. $p(x) = 2.5x$

Exercise Set B *(continued)*

37. **Error Analysis** *Describe* and correct the error in comparing the graph of g with the graph of f.

> The graph of g is a vertical shift of 5 units down of the graph of f. ✗
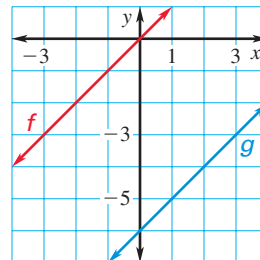
Match the function with the description of its graph.

38. $g(x) = 7x$

39. $g(x) = x + 7$

40. $g(x) = x - 7$

A. vertical shift of 7 units up of the graph of f

B. vertical shift of 7 units down of the graph of f

C. vertical stretch of the graph of f using a scale factor of 7

Graph the functions. *Compare* **the graphs.**

41. $g(x) = x - 4$, $h(x) = -x - 4$

42. $p(x) = x + 3$, $q(x) = -x - 3$

43. **Internet Usage** The number of hours people in the United States spent using the Internet each year from 1998 to 2001 can be modeled by the function $f(x) = 26.4x + 54.4$ where x is the number of years since 1998.

  a. Graph the function and identify its domain and range.

  b. Find the number of hours that people spent on the Internet in 2000. *Explain* how you found your answer.

  c. When did people spend about 120 hours per year on the Internet? *Explain* how you found your answer.

44. **Public Libraries** The number of public libraries in the United States from 1980 to 2000 can be modeled by the function $f(x) = 38.9x + 8685.8$ where x is the number of years since 1980.

  a. Graph the function and identify its domain and range.

  b. Find the number of public libraries in the United States in 1996. *Explain* how you found your answer.

  c. When were there 9000 public libraries in the United States? *Explain* how you found your answer.

45. **Gym Membership** You join a gym that charges a $75 initial sign up fee and $35 a month for a membership. The total cost of the membership can be modeled by $f(x) = 35x + 75$ where x is the number of months of the membership. After some time, you decide to rent a locker that costs $50 for the entire year. A function for the total cost of the membership with the locker rental is $g(x) = 35x + 125$. Graph both functions. How is the graph of g related to the graph of f?