5-9

Exercises

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GUIDED PRACTICE

Vocabulary Apply the vocabulary from this lesson to answer each question.

1. Changing the value of b in $f(x) = mx + b$ results in a ___?___ of the graph.
(*translation* or *reflection*)

2. Changing the value of m in $f(x) = mx + b$ results in a ___?___ of the graph.
(*translation* or *rotation*)

Graph $f(x)$ and $g(x)$. Then describe the transformation from the graph of $f(x)$ to the graph of $g(x)$.

SEE EXAMPLE 1
p. 358

3. $f(x) = x, g(x) = x - 4$

4. $f(x) = x, g(x) = x + 1$

5. $f(x) = x, g(x) = x + 2$

6. $f(x) = x, g(x) = x - 6.5$

SEE EXAMPLE 2
p. 358

7. $f(x) = x, g(x) = \frac{1}{4}x$

8. $f(x) = \frac{1}{5}x + 3, g(x) = x + 3$

9. $f(x) = 2x - 2, g(x) = 4x - 2$

10. $f(x) = x + 1, g(x) = \frac{1}{2}x + 1$

Graph $f(x)$. Then reflect the graph of $f(x)$ across the y-axis. Write a function $g(x)$ to describe the new graph.

SEE EXAMPLE 3
p. 359

11. $f(x) = -\frac{1}{5}x$

12. $f(x) = 2x + 4$

13. $f(x) = \frac{1}{3}x - 6$

14. $f(x) = 5x - 1$

Graph $f(x)$ and $g(x)$. Then describe the transformations from the graph of $f(x)$ to the graph of $g(x)$.

SEE EXAMPLE 4
p. 360

15. $f(x) = x, g(x) = 2x - 2$

16. $f(x) = x, g(x) = \frac{1}{3}x + 1$

17. $f(x) = -x - 1, g(x) = -4x$

18. $f(x) = -x, g(x) = -\frac{1}{2}x - 3$

SEE EXAMPLE 5
p. 360

19. Entertainment For large parties, a restaurant charges a reservation fee of $25, plus $15 per person. The total charge for a party of x people is $f(x) = 15x + 25$. How will the graph of this function change if the reservation fee is raised to $50? if the per-person charge is lowered to $12?

PRACTICE AND PROBLEM SOLVING

Graph $f(x)$ and $g(x)$. Then describe the transformation(s) from the graph of $f(x)$ to the graph of $g(x)$.

20. $f(x) = x, g(x) = x + \frac{1}{2}$

21. $f(x) = x, g(x) = x - 4$

22. $f(x) = \frac{1}{5}x - 1, g(x) = \frac{1}{10}x - 1$

23. $f(x) = x + 2, g(x) = \frac{2}{3}x + 2$

Graph $f(x)$. Then reflect the graph of $f(x)$ across the y-axis. Write a function $g(x)$ to describe the new graph.

24. $f(x) = 6x$

25. $f(x) = -3x - 2$

Graph $f(x)$ and $g(x)$. Then describe the transformations from the graph of $f(x)$ to the graph of $g(x)$.

26. $f(x) = 2x, g(x) = 4x - 1$

27. $f(x) = -7x + 5, g(x) = -14x$

28. School The number of chaperones on a field trip must include 1 teacher for every 4 students, plus 2 parents total. The function describing the number of chaperones for a trip of x students is $f(x) = \frac{1}{4}x + 2$. How will the graph change if the number of parents is reduced to 0? if the number of teachers is raised to 1 for every 3 students?

Describe the transformation(s) on the graph of $f(x) = x$ that result in the graph of $g(x)$. Graph $f(x)$ and $g(x)$, and compare the slopes and intercepts.

29. $g(x) = -x$

30. $g(x) = x + 8$

31. $g(x) = 3x$

32. $g(x) = -\frac{2}{7}x$

33. $g(x) = 6x - 3$

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

Sketch the transformed graph. Then write a function to describe your graph.

35. Rotate the graph of $f(x) = -x + 2$ until it has the same steepness in the opposite direction.

36. Reflect the graph of $f(x) = x - 1$ across the y-axis, and then translate it 4 units down.

37. Translate the graph of $f(x) = \frac{1}{6}x - 10$ six units up.

38. Hobbies A book club charges a membership fee of $20 and then $12 for each book purchased.

    a. Write and graph a function to represent the cost y of membership in the club based on the number of books purchased x.

    b. What if...? Write and graph a second function to represent the cost of membership if the club raises its membership fee to $30.

    c. Describe the relationship between your graphs from parts **a** and **b**.

Describe the transformation(s) on the graph of $f(x) = x$ that result in the graph of $g(x)$.

39. $g(x) = x - 9$

40. $g(x) = -x$

41. $g(x) = 5x$

42. $g(x) = -\frac{2}{3}x + 1$

43. $g(x) = -2x$

44. $g(x) = \frac{1}{5}x$

45. Careers Kelly works as a salesperson. She earns a weekly base salary plus a commission that is a percent of her total sales. Her total weekly pay is described by $f(x) = 0.20x + 300$, where x is total sales in dollars.

    a. What is Kelly's weekly base salary?

    b. What percent of total sales does Kelly receive as commission?

    c. What if...? What is the change in Kelly's salary plan if the weekly pay function changes to $g(x) = 0.25x + 300$? to $h(x) = 0.2x + 400$?

46. Critical Thinking To transform the graph of $f(x) = x$ into the graph of $g(x) = -x$, you can reflect the graph of $f(x)$ across the y-axis. Find another transformation that will have the same result.

47. Write About It Describe how a reflection across the y-axis affects each point on a graph. Give an example to illustrate your answer.

MULTI-STEP TEST PREP

48. This problem will prepare you for the Multi-Step Test Prep on page 364.

    a. Maria is walking from school to the softball field at a rate of 3 feet per second. Write a rule that gives her distance from school (in feet) as a function of time (in seconds). Then graph.

    b. Give a real-world situation that could be described by a line parallel to the one in part **a**.

    c. What does the y-intercept represent in each of these situations?