PRACTICE & PROBLEM SOLVING

Scan for Multimedia

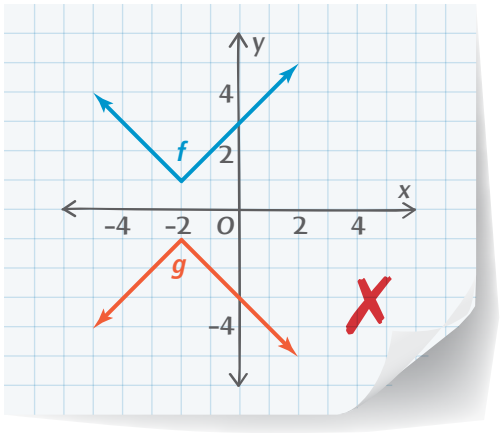
Practice Tutorial

Additional Exercises Available Online

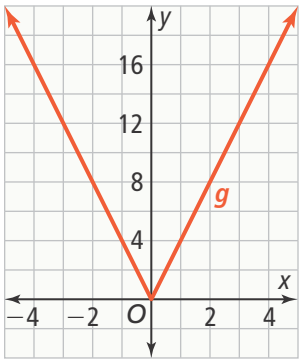
UNDERSTAND

13. **Use Structure** Write a function g with the parent function $f(x) = x^2$ that has a vertex at $(3, -6)$.

14. **Error Analysis** Describe and correct the error a student made in graphing $g(x) = f(-x)$ as a reflection across the y-axis of the graph of $f(x) = |x + 2| + 1$.



15. **Higher Order Thinking** Describe the transformation g of $f(x) = |x|$ as a stretch and as a compression. Then write two equations to represent the function. What can you conclude? Explain.



16. **Use Structure** The graph of the parent function $f(x) = x^2$ is reflected across the y-axis. Write an equation for the function g after the reflection. Show your work. Based on your equation, what happens to the graph? Explain.

17. **Error Analysis** Monisha is comparing $f(x) = |x|$ and $g(x) = |2x - 4|$. She said the graph of g is a horizontal translation of the graph of f 4 units to the right and a horizontal compression of the graph of f by a factor of 2. What is Monisha's error?

PRACTICE

Graph each function as a translation of its parent function, f. How did the transformation affect the domain and range? SEE EXAMPLE 1

18. $g(x) = |x| - 5$

19. $g(x) = (x + 1)^2$

20. $g(x) = |x - 3|$

21. $g(x) = x^2 + 2$

What is the equation for the image graph? Check by graphing. SEE EXAMPLE 2

22. Reflect $f(x) = x^2 + 1$ across the x-axis.

23. Reflect $f(x) = x^2 + 1$ across the y-axis.

Graph each function as a vertical stretch or compression of the parent function $f(x) = |x|$. SEE EXAMPLE 3

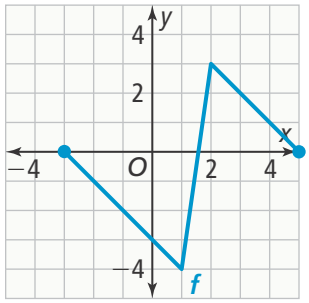
24. $g(x) = 0.25|x|$

25. $g(x) = 3x^2$

26. $g(x) = 1.5|x|$

27. $g(x) = 0.75x^2$

28. Use the graph of $f(x)$ to graph $y = f(x + 1) + 2$. SEE EXAMPLE 4



What transformations of $f(x) = x^2$ are applied to the function g? SEE EXAMPLE 5

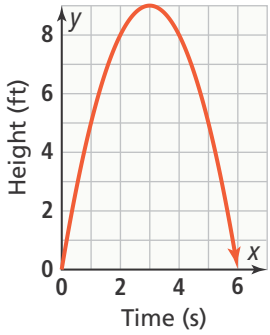
29. $g(x) = 2(x + 1)^2$

30. $g(x) = (x - 3)^2 + 5$

31. $g(x) = -x^2 - 6$

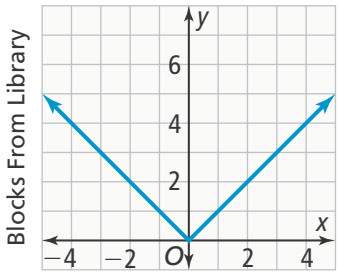
32. $g(x) = 4(x - 7)^2 - 9$

33. The graph shows the height y in feet of a flying insect x seconds after taking off from the ground. Write an equation that represents the height of the insect as a function of time. SEE EXAMPLE 6



APPLY

34. Model With Mathematics Chiang walks to school each day. She passes the library halfway on her walk to school. She walks at a rate of 1 block per minute. The graph shows the distance Chiang is to the library as she walks to school.

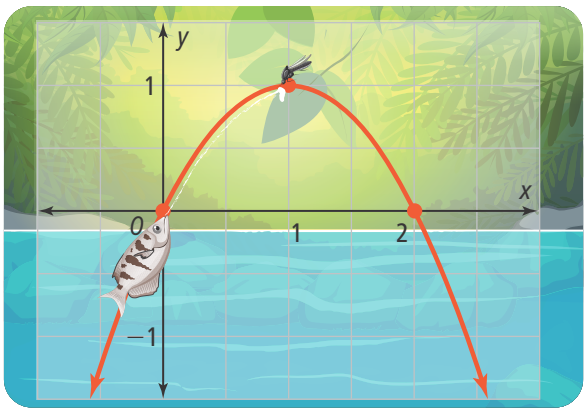


a. Write a function, f, to model the distance Chiang is from the library when she walks to school.

b. If Chiang jogs to school, she travels at a rate of 2.5 blocks per minute. Write a function, g, to model the distance Chiang is from the library when she jogs to school.

c. Graph the function, g, that models the distance Chiang is from the library when she jogs to school.

35. Model With Mathematics The archer fish spits water at flying insects to knock them into the water. The path of the water is shown with x and y distances in feet. Write an equation to represent the path of the water in relation to the coordinate grid. Then determine the coordinates of the point of maximum height of the water.



ASSESSMENT PRACTICE

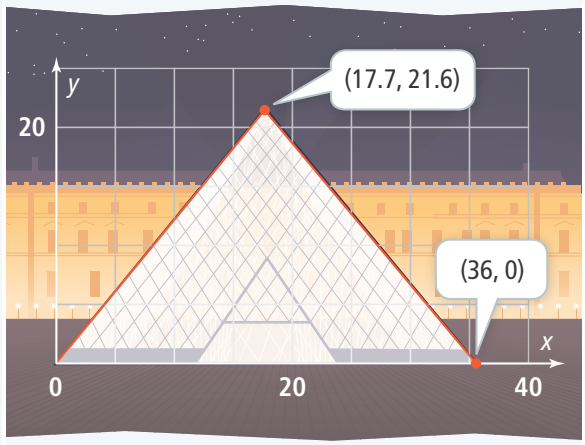
36. Match each equation on the left to an equation on the right that has the same translation of $y = |x|$.

A. $y = |x| - 1$
B. $y = -|x + 1|$
C. $y = -|x + 1| - 1$
D. $y = |x + 1| - 1$
E. $y = 2|x| - 1$
F. $y = |x + 1|$

37. SAT/ACT Which translation is part of transforming $f(x) = x^2$ into $h(x) = (x + 4)^2 - 2$?

Ⓐ left 4 units
Ⓑ left 2 units
Ⓒ right 2 units
Ⓓ right 4 units

38. Performance Task The Louvre Pyramid in Paris is shown on the coordinate grid, where x and y are measured in meters and the ground is represented by the x-axis.



Part A The outline of the Pyramid is a transformation of the function $f(x) = |x|$. Write a function g to model the outline of the Pyramid.

Part B What is the domain and range of the function that models the outline of the Pyramid? What do the domain and range represent?