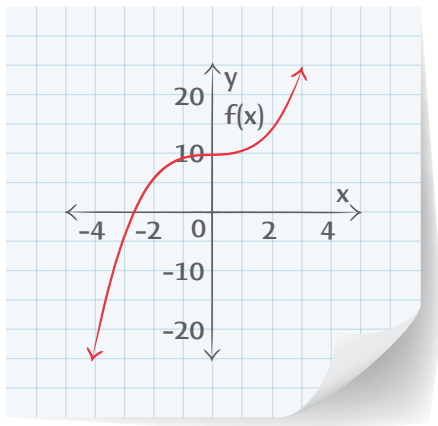


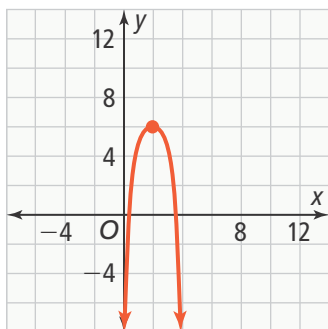


## UNDERSTAND

7. **Reason** If you use a graph to determine the equation of a function, explain how to check that your equation is correct.
8. **Error Analysis** Describe the error Terrence made in graphing the transformation of the cubic function  $g(x) = x^3$  to  $h(x) = \frac{1}{2}x^3 + 10$ .



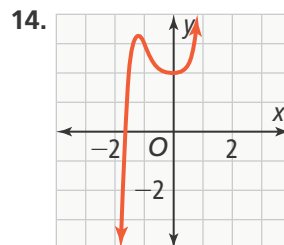
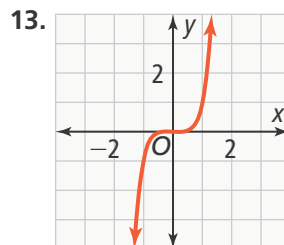
9. **Higher Order Thinking** Explain how to identify a transformation of the function  $y = x^3$  by looking at a graph. What do you look for to determine a translation? A reflection? A stretch or compression?
10. **Use Structure** Describe the steps used to determine the equation of the graph of the transformed parent quartic function.



11. **Reason** Explain why the function  $g(x) = 2x^5 + 3x^4 + 1$  is neither even nor odd.
12. **Construct Arguments** Provide an example that demonstrates the following statement is not true.  
*If the degree of a function is an even number, then the function is an even function.*

## PRACTICE

Use the graph to classify the polynomial function. Is it even, odd, or neither? **SEE EXAMPLE 1**



Use the equation to classify the polynomial function. Is it even, odd, or neither? **SEE EXAMPLE 2**

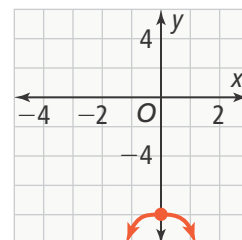
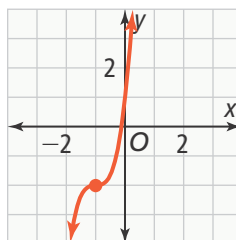
15.  $f(x) = 2x^5 + 4x^2$

16.  $g(x) = 6x^4 + 2x^2$

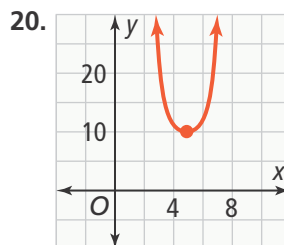
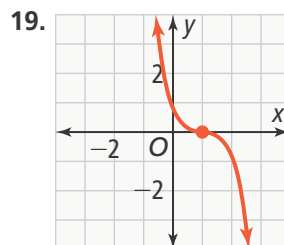
How do the graphs of transformations compare to the graph of the parent function? **SEE EXAMPLE 3**

17.  $f(x) = 3(x + 1)^3 - 2$

18.  $g(x) = -x^4 - 8$



Each graph is a transformation of the parent cubic function or quartic function. Determine the equation of the graph. **SEE EXAMPLE 4**



21. The volume of a rectangular room, in cubic yards, is given by the function shown. Write a new function with cubic feet as the units. **SEE EXAMPLE 5**

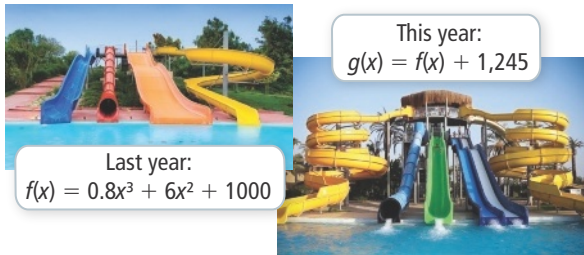


Volume in yards:  $(x) = x(3x)(x + 4) = 3x^3 + 12x^2$

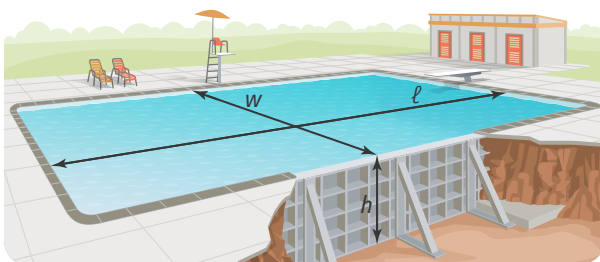


**APPLY**

- 22. Make Sense and Persevere** Last season the number of guests at an amusement park could be modeled by the function,  $f$ , where  $x$  represents the number of weeks since the park opened for the season. This year, since the park opened its new water slide, the number of guests at the park can be modeled by  $g$ .



- Write the function  $g$  in terms of  $x$ .
  - Describe the transformation of the graph of  $f$  compared to  $g$ .
  - Compare the number of weekly visitors from last year to this year.
- 23. Generalize** The volume of a storage box, in cubic feet, is given by the function  $V(x) = (x)(x + 1)^2$ . A freight company lists the shipping rates of items in cubic inches. Write a function for the volume of the box with cubic inches as the units.
- 24. Model With Mathematics** A swimming pool is in the shape of a rectangular prism. The width is one more than five times the height, and the length is one less than eleven times the height.



- Using  $x$  for the height, write a function  $V(x)$  to represent the volume of the pool.
- Compare the volume of this pool with a larger one that is the same height, but twice the length and twice the width of this pool. Write a function  $Z(x)$  for the volume of this larger pool.



**ASSESSMENT PRACTICE**

- 25.** Match the number in each function with its effect on the parent function.

$$f(x) = 2(x - 1)^4 + 5$$

$$g(x) = (x + 3)^6 - 7$$

- |                        |             |
|------------------------|-------------|
| I vertical stretch     | <b>A. 7</b> |
| II shift to the left   | <b>B. 5</b> |
| III shift to the right | <b>C. 3</b> |
| IV shift upward        | <b>D. 2</b> |
| V shift downward       | <b>E. 1</b> |

- 26. SAT/ACT** Which of the following functions is neither even nor odd?

Ⓐ  $f(x) = x^4 + 3x^2$

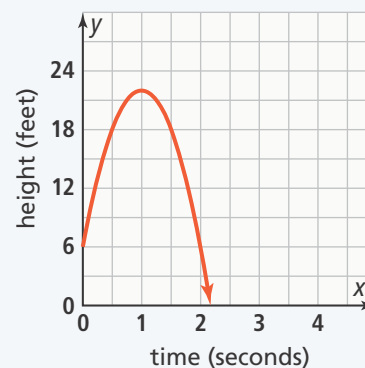
Ⓑ  $g(x) = 5x^3 - x$

Ⓒ  $h(x) = x^5 + 4x^3 + x^2$

Ⓓ  $k(x) = 9 - 8x^2$

Ⓔ  $p(x) = 5$

- 27. Performance Task** The height of a ball thrown in the air can be modeled by the function  $h(x) = -16t^2 + 32t + 6$ , where  $h(x)$  represents the height in feet of the ball after  $t$  seconds. The graph of this function is shown below.



**Part A** What do the vertex,  $y$ -intercept, and  $x$ -intercept represent?

**Part B** If the ball is thrown from a height of 10 ft, how will this transform the graph?

**Part C** About how much longer will the ball be in the air when it is thrown from 10 ft compared to when it was thrown from 6 ft? (Hint: You may want to use your graphing calculator to compare the two graphs.)

