NAME _____ DATE _____ PERIOD _____

Linearity, Intercepts, and Symmetry · Form A

Example 1

Determine whether each function is a linear function. Justify your answer.

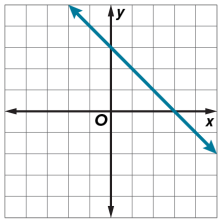
2. $y = -2 + 5x$

4. $y = 4x^2$

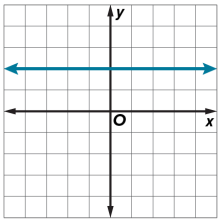
Example 2

Determine whether each graph represents a *linear* or *nonlinear* function.

6.



8.



Example 3

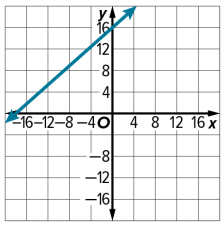
10. **ASTRONOMY** The table shows the velocity of *Cassini 2*, a space probe, as it passes Saturn. Is the velocity modeled by a *linear* or *nonlinear* function? Explain.

Cassini 2 Velocity					
Time (s)	5	10	15	20	25
Velocity (mph)	50,000	60,000	70,000	60,000	50,000

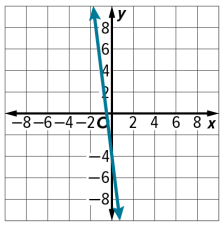
Examples 4 and 5

Use the graph to estimate the *x*- and *y*-intercepts.

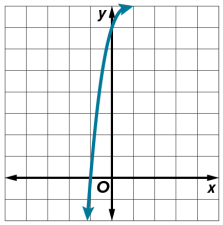
12.



14.



16.



Example 6

18. **GOLF** In golf, the first shot on every hole can be hit off a tee. The table shows the height *y* of the golf ball *x* seconds after it has been hit off the tee.

Time (sec)	0	1	3	5	7
Height (in.)	3	20	36	28	0

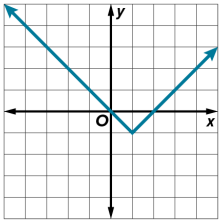
a. What are the *x*- and *y*-intercepts?

b. What do the *x*- and *y*-intercepts represent?

Example 7

Identify the type of symmetry for the graph of each function.

20.

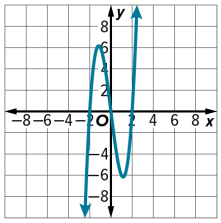


NAME _____ DATE _____ PERIOD _____

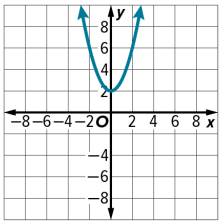
Example 8

Determine whether each function is *even*, *odd*, or *neither*. Confirm algebraically. If the function is odd or even, describe the symmetry.

22. $f(x) = 2x^3 - 8x$



24. $f(x) = x^2 + 2$



Mixed Exercises

Determine whether each equation represents is a linear function. Justify your answer. Algebraically determine whether each equation is even, odd, or neither.

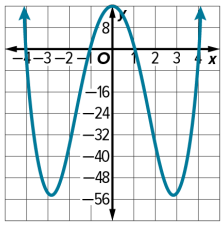
26. $x = y + 8$

28. $y = \sqrt{x} + 3$

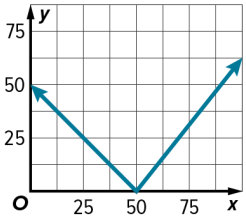
30. $y = 2x^3 + x + 1$

Determine whether each graph represents a *linear* or *nonlinear* function. Use the graph to estimate the *x*- and *y*-intercepts. Identify the type of symmetry in each graph.

32.



34. **GAMES** Pedro is creating an online racquetball game. In one play, the motion of the ball across the screen is partially modeled by the graph shown. State whether the graph has line symmetry or point symmetry, and identify any lines or points of symmetry.



36. **PROFIT** Stefon charges people $25 to test the air quality in their homes. The device he uses to test air quality cost him $500. The function $y = 25x - 500$ describes Stefon's net profit, y, as a function of the number of clients he gets, x.

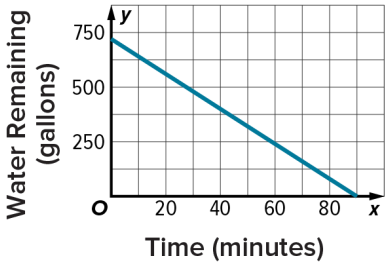
a. State whether the function is a linear function. Write *yes* or *no*. Explain.

b. What do the *x*- and *y*-intercepts of the function represent in terms of the situation?

38. **POOL** The graph represents a 720-gallon pool being drained.

a. What are the *x*- and *y*-intercepts? What do the *x*- and *y*-intercepts represent?

b. Does the graph display line symmetry? Explain why or why not in terms of the situation.



40. **USE A SOURCE** Research online to find an equation that models a car's braking distance in relation to its speed. Then identify and interpret the *y*-intercept of the equation.

41. **FIND THE ERROR** Javier claimed that all cubic functions are odd. Is he correct? If not, provide a counterexample.

43. **PRESEVERE** Determine whether an equation of the form $x = a$, where a is a constant, is *sometimes*, *always*, or *never* a linear function. Explain your reasoning.