NAME _____ DATE _____ PERIOD _____

Linearity, Intercepts, and Symmetry · Form B

Example 1

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

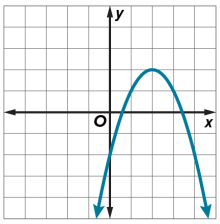
1. $y = 3x$

2. $2x + y = 10$

Example 2

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

3.



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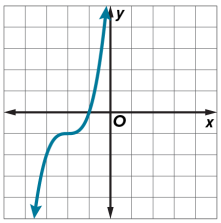


Example 3

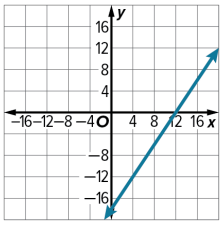
5. **MEASUREMENT** The table shows a function modeling the number of inches and feet. Can the table be modeled by a *linear* or *nonlinear* function? Explain.

Inches	0	1	2	3	4
Feet	0	12	24	36	48

Examples 4 and 5

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

6.



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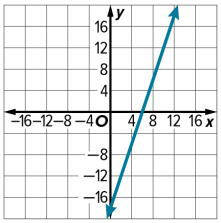

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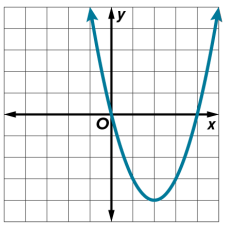


Example 6

9. **MONEY** At the beginning of the week, Aksa's parents deposited $20 into Aksa's lunch account. The amount of money Aksa had left after each day is shown in the table, where *x* is the number of days and *y* is the remaining balance.

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

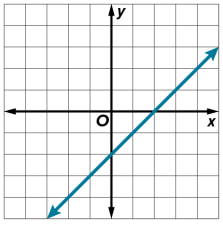
b. What do the *x*- and *y*-intercepts represent?

Days	Account Balance
0	$20
1	$16
2	$12
3	$8
4	$4
5	$0

Example 7

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

10.



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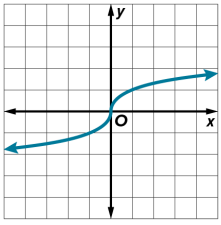
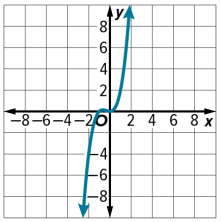


NAME _____ DATE _____ PERIOD _____

Example 8

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

12. $f(x) = x^3 + x^2$



Mixed Exercises

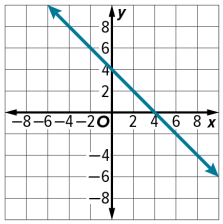
Determine whether each equation represents is a linear function. Justify your answer. Algebraically determine whether each equation is even, odd, or neither.

13. $-\frac{3}{x} + y = 15$

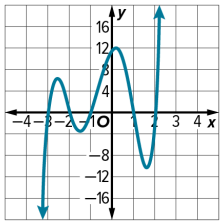
14. $y = 8$

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.

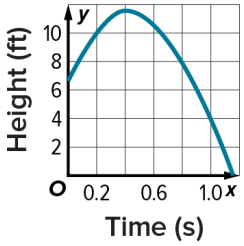
16.



17.



18. **BASKETBALL** Tiana tossed a basketball. The graph shows the height of the basketball as a function of time. State whether the graph has line symmetry or point symmetry, and identify any lines of symmetry or points of symmetry.

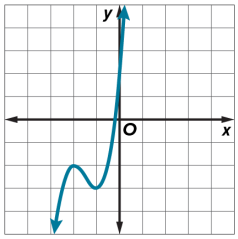


Extrema and End Behavior · Form B

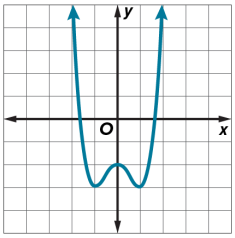
Examples 1 and 2

Identify and estimate the *x*- and *y*-values of the extrema. Round to the nearest tenth if necessary.

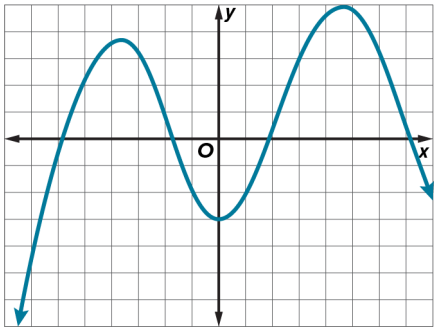
1.



2.



3. **LANDSCAPES** Jalen uses a graph of a function to model the shape of two hills in the background of a videogame that he is writing. Estimate the *x*-coordinates at which the relative maxima and relative minima occur. Describe the meaning of the extrema in the context of the situation.

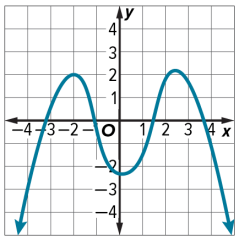


Examples 3–5

NAME _____ DATE _____ PERIOD _____

Describe the end behavior of each function.

4.



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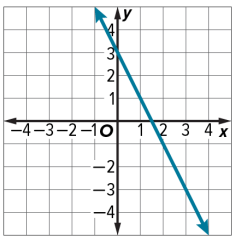
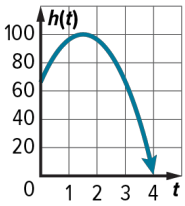


Mixed Exercises

6. MODEL The height of a fish t seconds after it is thrown to a dolphin from a 64-foot-tall platform can be modeled by the equation $h(t) = -6t^2 + 48t + 64$, where $h(t)$ is the height of the fish in feet. The graph of the polynomial is shown.

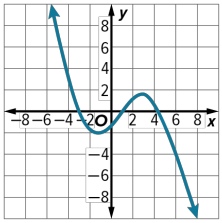
a. Estimate the t-coordinate at which the height of the fish changes from increasing to decreasing. Describe the meaning in terms of the context of the situation.

b. Describe and interpret the end behavior of $h(t)$ in the context of the situation.



Identify and estimate the *x*- and *y*-values of the extrema. Round to the nearest tenth if necessary. Then use the graphs to describe the end behavior of each function.

7.



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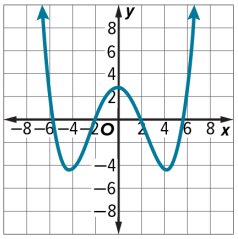

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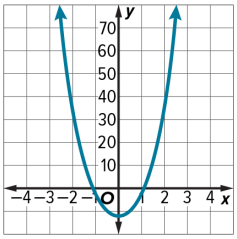
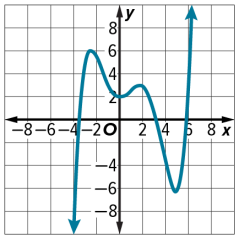


10. SCIENCE The table shows the density of water at its saturation pressure for various temperatures. Interpret the end behavior of the graph of the function as temperature increases.

Temperature (°C)	0	50	100	150	200	250	300	350
Density (g/cm^3)	1.000	0.988	0.958	0.917	0.865	0.799	0.713	0.573

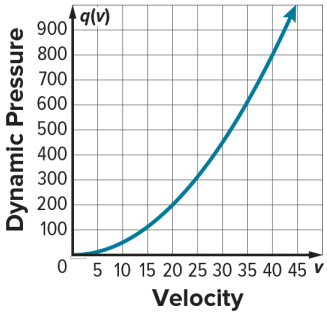
Identify and estimate the *x*- and *y*-values of the extrema. Round to the nearest tenth if necessary. Then use the graphs to describe the end behavior of each function.

11.



NAME _____ DATE _____ PERIOD _____

14. **CHEMISTRY** Dynamic pressure is generated by the velocity of a moving fluid and is given by $q(v) = \frac{1}{2}pv^2$, where p is the density of the fluid and v is the velocity of the fluid. Water has a density of 1 g/cm^3. What happens to the dynamic pressure of water when the velocity continuously increases?



15. **DRILLING** The volume of a drill bit can be estimated by the formula for a cone, $V = \frac{1}{3}\pi hr^2$, where h is the height of the bit and r is its radius. Substituting $\frac{\sqrt{3}}{3}r$ for h, the volume of the drill bit is estimated as $\frac{\sqrt{3}}{9}\pi r^3$.

The graph shows the function of drill bit volume. Describe the end behavior.