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Linearity, Intercepts, and Symmetry ▪ Form C

Mixed Exercises

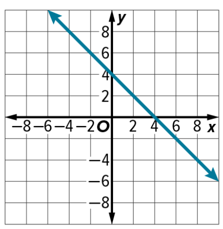
Determine whether each equation represents is a linear function. Justify your answer. Algebraically determine whether each equation is even, odd, or neither.

1. $-\frac{3}{x} + y = 15$ **2.** $x = y + 8$ **3.** $y = 8$

4. $y = \sqrt{x} + 3$ **5.** $y = 3x^2 - 1$ **6.** $y = 2x^3 + x + 1$

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.

7.



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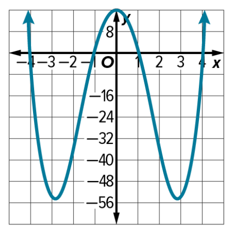

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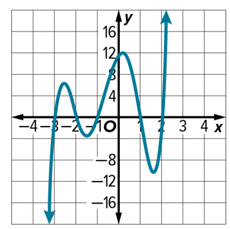
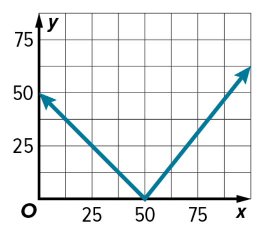
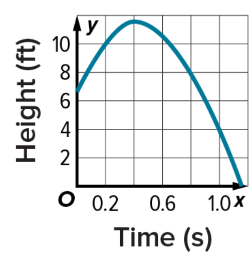


10. **GAMES** Pedro is creating an online racquetball game. In one play, the motion of the ball across the screen is partially modeled by the graph shown. State whether the graph has line symmetry or point symmetry, and identify any lines or points of symmetry.



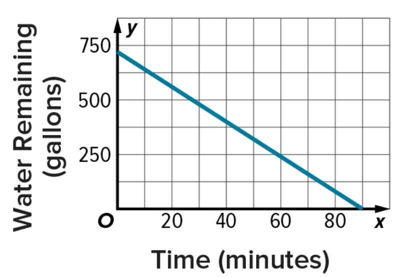
11. **BASKETBALL** Tiana tossed a basketball. The graph shows the height of the basketball as a function of time. State whether the graph has line symmetry or point symmetry, and identify any lines of symmetry or points of symmetry.



14. **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.



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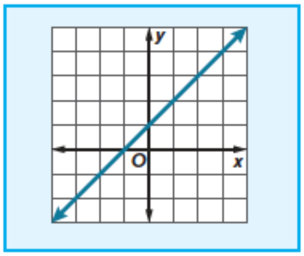
18. **ANALYZE** The table shows a function modeling the number of gifts y Cornell can wrap after x hours spent wrapping. Can the table be modeled by a *linear* or *nonlinear* function? Explain.

Hours	0	1	2	3	4
Gifts	0	12	24	36	48

20. **WHICH ONE DOESN'T BELONG?** Of the four equations shown, identify the one that does not belong. Explain your reasoning.

$y = 2x + 3$

x	y
0	4
1	2
2	0
3	−2



$y = 2xy$

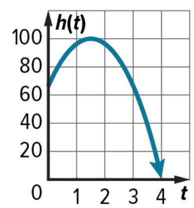
Extrema and End Behavior ▪ Form C

Mixed Exercises

1. **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.

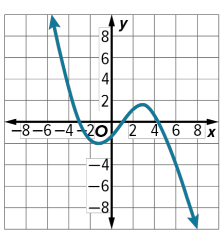
a. Estimate the t-coordinate at which the height of the fish changes from increasing to decreasing. Describe the meaning in terms of the context of the situation.

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.

2.



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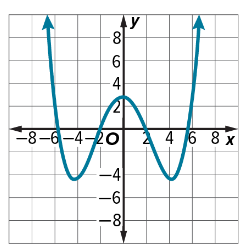

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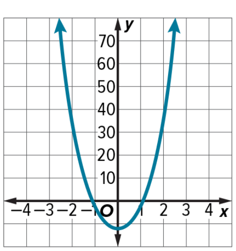

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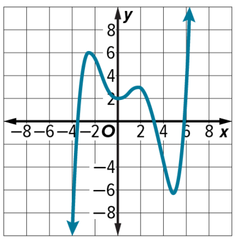
5. **SCIENCE** The table shows the density of water at its saturation pressure for various temperatures. Interpret the end behavior of the graph of the function as temperature increases.

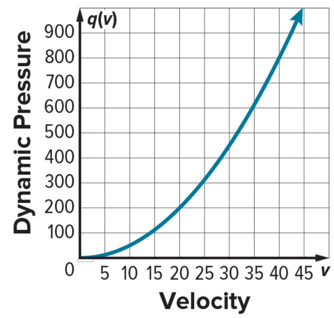
Temperature (°C)	0	50	100	150	200	250	300	350
Density (g/cm^3)	1.000	0.988	0.958	0.917	0.865	0.799	0.713	0.573

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.

6.

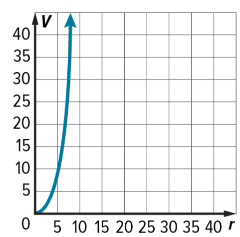


9. **CHEMISTRY** Dynamic pressure is generated by the velocity of a moving fluid and is given by $q(v) = \frac{1}{2}pv^2$, where p is the density of the fluid and v is the velocity of the fluid. Water has a density of 1 g/cm^3. What happens to the dynamic pressure of water when the velocity continuously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



10. **DRILLING** The volume of a drill bit can be estimated by the formula for a cone, $V = \frac{1}{3}\pi h r^2$, 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.



12. **CREATE** Sketch graphs of a linear function and a nonlinear function with the following end behavior: as $x \to -\infty$, $f(x) \to \infty$ and as $x \to \infty$, $f(x) \to -\infty$.

14. **PRESEVERE** Sketch a graph with the following characteristics:

- 2 relative maxima
- 2 relative minima
- end behavior: $x \to \infty$, $f(x) \to \infty$ and as $x \to -\infty$, $f(x) \to -\infty$

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15. **FIND THE ERROR** Joshua states that the end behavior of the graph is: as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$ and as $x \rightarrow +\infty$, $f(x) \rightarrow +\infty$. What error did he make?