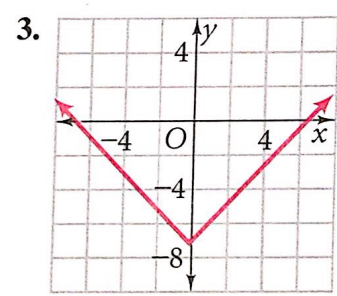
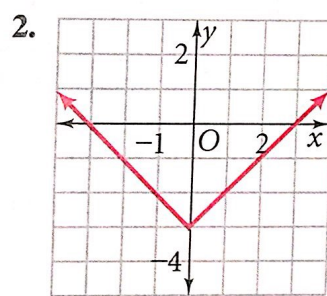
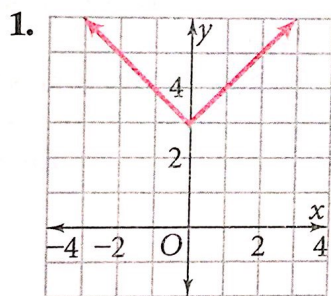


Practice by Example

Example 1
(page 325)

Describe how each graph is like the graph of $y = |x|$ and how it is different.



Example 2
(page 326)

Graph each function by translating $y = |x|$.

4. $y = |x| + 2$

5. $y = |x| - 4$

6. $y = |x| + 8$

7. $y = |x| + 1$

8. $y = |x| - 6$

9. $y = |x| - 2.5$

Example 3
(page 326)

Write an equation for each translation of $y = |x|$.

10. 9 units up
11. 6 units down
13. $\frac{5}{2}$ units up
14. 5.90 units up

Example 4
(page 327)

Graph each function by translating $y = |x|$.

16. $y = |x - 3|$
17. $y = |x + 3|$
19. $y = |x + 5|$
20. $y = |x - 7|$

Example 5
(page 327)

Write an equation for each translation of $y = |x|$.

22. left 9 units
23. right 9 units
25. left $\frac{3}{2}$ units
26. left 0.5 unit

B Apply Your Skills

Problem Solving Hint

For Exercises 28–31, you can check your work by substituting ordered pairs from the graph into the corresponding equation.

At the right is the graph of $y = -|x|$.

Graph each function by translating $y = -|x|$.

28. $y = -|x| + 3$
29. $y = -|x| - 3$
30. $y = -|x + 3|$
31. $y = -|x - 3|$

Write an equation for each translation of $y = -|x|$.

32. 2 units up
33. 2.25 units left
34. $\frac{3}{2}$ units down
35. 4 units right

36. The graph at the right shows a translation of $y = |x|$ where there is both a vertical and a horizontal change. Which equation below is an equation for this graph?

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

Graph each translation of $y = |x|$.

Sample For $y = |x + 3| - 2$, the 3 indicates the translation of the graph 3 units left. The 2 indicates the translation of the graph 2 units down.

37. $y = |x - 1| + 2$
38. $y = |x + 2| - 1$
39. $y = |x - 3| - 4$
40. $y = |x + 3| + 4$

41. a. Graph $y = |x - 2| + 3$. (*Hint:* Read the sample above for Exercises 37–40.)

- b. The vertex of an absolute value function is the point at which the function changes direction. What is the vertex of $y = |x - 2| + 3$?

- c. What relationship do you see between the vertex and the equation?

- d. **Writing** Explain how you would graph any equation of the form $y = |x - a| + b$.

C Challenge

42. a. Graph $y = |2x|$ by making a table of values.
b. Translate $y = |2x|$ to graph $y = |2x| + 3$.
c. Translate $y = |2x|$ to graph $y = |2(x - 1)|$.
d. Translate $y = |2x|$ to graph $y = |2(x - 1)| + 3$.

12. 0.25 units up
15. 1 unit down

18. $y = |x - 1|$
21. $y = |x + 2.5|$

24. right $\frac{5}{2}$ units
27. right 8.2 units

