5-8 Absolute-Value Functions

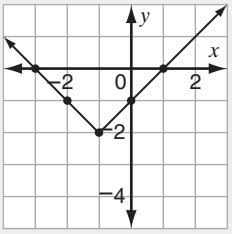
Name _____ Date _____

Graph the function. Identify the vertex, axis of symmetry, x- and y-intercepts, domain, and range. Tell whether the graph opens up or down.

$y = |x + 1| - 2$

Choose positive, negative, and zero values for x.

x	$y = \|x + 1\| - 2$
−3	0
−2	−1
−1	−2
0	−1
1	0



The vertex is $(-1, -2)$.
The axis of symmetry is $x = -1$.
The x-intercepts are $-3, 1$.
The y-intercept is -1.
The domain is all real numbers.
The range is $y \geq -2$.
The graph opens up.

Identify the vertex of each of the following absolute-value functions.
(*Hint:* The vertex occurs where the absolute-value expression equals zero.)

1. $y = |x + 7|$

$|x + 7| = 0$
$x = -7; y = 0$
$(-7, 0)$

2. $y = |x + 9|$ _____

3. $y = |x - 4|$ _____

4. $y = |x - 10|$ _____

5. $y = |x| + 6$ _____

6. $y = |x| + 11$ _____

7. $y = |x| - 22$ _____

8. $y = |x| - 15$ _____

9. $y = |x + 3| - 6$ _____

10. $y = |x + 8| - 16$ _____

11. $y = |x - 4| - 12$ _____

12. $y = |x - 25| - 31$ _____

13. $y = |x + 11| + 19$ _____

14. $y = |x + 13| + 14$ _____

15. $y = |x - 39| + 42$ _____

16. $y = |x - 26| + 51$ _____

17. $y = -|x - 6| + 2$ _____

18. $y = -|x - 7| + 8$ _____

19. $y = -|x + 6.5|$ _____

20. $y = -|x + 7.3|$ _____

21. $y = \left|x + \frac{2}{3}\right| - \frac{5}{4}$ _____

22. $y = \left|x + \frac{5}{8}\right| - \frac{7}{12}$ _____

23. $y = -\left|x - \frac{1}{9}\right| - 1.2$ _____

24. $y = -\left|x - \frac{1}{8}\right| - 2.7$ _____

Graph each absolute-value function on a separate sheet of paper. Identify the vertex, axis of symmetry, *x*- and *y*-intercepts, domain, and range. Tell whether the graph opens up or down.

25. $y = |x + 6|$

vertex: (−6, 0)
axis of symmetry: $x = -6$
***x*-intercept: −6; *y*-intercept: 6**
domain: all real numbers
range: $y \geq 0$; opens up

26. $y = |x + 8|$

27. $y = |x| + 9$

28. $y = |x| + 12$

29. $y = -|x| + 7$

30. $y = -|x| + 5$

31. $y = -|x + 2|$

32. $y = -|x + 4|$

33. $y = |x - 1.8| + 2.9$

34. $y = |x - 2.5| + 1.8$

35. $y = -\left|x + \frac{2}{3}\right| - \frac{1}{6}$

36. $y = -\left|x + \frac{1}{4}\right| - \frac{1}{2}$

Graph and compare each function.

37. How is the graph of $y = |x + 12|$ related to the graph of $y = |x|$?

38. How is the graph of $y = |x| - 8$ related to the graph of $y = |x|$?

TEST PREPARATION

39. Which equation has a vertex of $(-8, 11)$?

A. $y = -|x + 8| - 11$ **C.** $y = |x - 8| + 11$

B. $y = |x + 8| - 11$ **D.** $y = -|x + 8| + 11$

40. Which vertex belongs to the equation $y = -|2x + 3| + 4$?

F. $\left(-\frac{2}{3}, 4\right)$ **H.** $\left(-\frac{3}{2}, 4\right)$

G. $\left(-4, \frac{3}{2}\right)$ **J.** $\left(-4, \frac{2}{3}\right)$