

4.4 EXERCISES

PRACTICE

Sketch the graphs of the following functions. Pay particular attention to intercepts, if any, and locate these accurately. See Examples 1 through 4.

1. $f(x) = -\frac{x}{2}$

2. $g(x) = 2x^2$

3. $F(x) = x^{\frac{1}{2}}$

4. $h(x) = x^{-1}$

5. $p(x) = -\frac{2}{x}$

6. $q(x) = -\sqrt[3]{x}$

7. $G(x) = -|x|$

8. $k(x) = \frac{1}{x^3}$

9. $G(x) = \frac{\sqrt{x}}{2}$

10. $H(x) = 0.5x^{\frac{1}{3}}$

11. $r(x) = 3|x|$

12. $p(x) = -\frac{1}{x^2}$

13. $W(x) = \frac{x^4}{16}$

14. $k(x) = \frac{x^3}{9}$

15. $h(x) = 2\sqrt[3]{x}$

16. $d(x) = 2x^5$

17. $S(x) = 4x^{-2}$

18. $f(x) = -x^2$

19. $r(x) = \frac{\sqrt[3]{x}}{3}$

20. $s(x) = \frac{|x|}{3}$

21. $t(x) = \frac{x^6}{4}$

22. $f(x) = 2\llbracket x \rrbracket$

23. $P(x) = -\llbracket x \rrbracket$

24. $m(x) = \left\llbracket \frac{x}{2} \right\rrbracket$

25. $f(x) = \begin{cases} 3-x & \text{if } x < -2 \\ x^{\frac{1}{3}} & \text{if } x \geq -2 \end{cases}$

26. $g(x) = \begin{cases} -x^2 & \text{if } x \leq 1 \\ x^2 & \text{if } x > 1 \end{cases}$

27. $r(x) = \begin{cases} \frac{1}{x} & \text{if } x < 1 \\ -x & \text{if } x > 1 \end{cases}$

28. $p(x) = \begin{cases} x+1 & \text{if } x < -2 \\ x^3 & \text{if } -2 \leq x < 3 \\ -1-x & \text{if } x \geq 3 \end{cases}$

29. $q(x) = \begin{cases} -1 & \text{if } x \in \mathbb{Z} \\ 1 & \text{if } x \notin \mathbb{Z} \end{cases}$

30. $s(x) = \begin{cases} \frac{x^2}{3} & \text{if } x < 0 \\ -\frac{x^2}{3} & \text{if } x \geq 0 \end{cases}$

31. $v(x) = \begin{cases} x^2 & \text{if } -1 \leq x \leq 1 \\ |x| & \text{if } x < -1 \text{ or } x > 1 \end{cases}$

32. $M(x) = \begin{cases} x & \text{if } x \in \mathbb{Z} \\ -x & \text{if } x \notin \mathbb{Z} \end{cases}$

33. $t(x) = \begin{cases} x^4 & \text{if } x \leq 1 \\ \llbracket x \rrbracket & \text{if } x > 1 \end{cases}$

34. $N(x) = \begin{cases} x^2 & \text{if } x \in \mathbb{Z} \\ \llbracket x \rrbracket & \text{if } x \notin \mathbb{Z} \end{cases}$

$$35. h(x) = \begin{cases} -|x| & \text{if } x < 2 \\ \lceil x \rceil & \text{if } x \geq 2 \end{cases}$$

$$36. u(x) = \begin{cases} \lceil x \rceil & \text{if } x \leq 1 \\ 2x - 2 & \text{if } x > 1 \end{cases}$$

Match the following functions to their graphs.

$$37. f(x) = -2x^4$$

$$38. f(x) = -\frac{7}{9x^4}$$

$$39. f(x) = -4 \left\lceil \frac{x}{4} \right\rceil$$

$$40. f(x) = -\frac{7\sqrt[3]{x}}{3}$$

$$41. f(x) = -\frac{8}{9}|x|$$

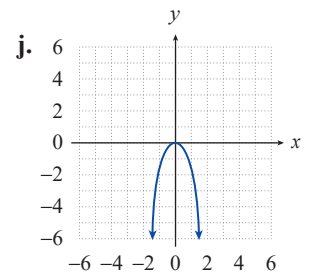
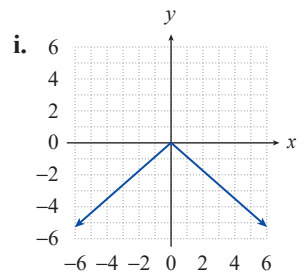
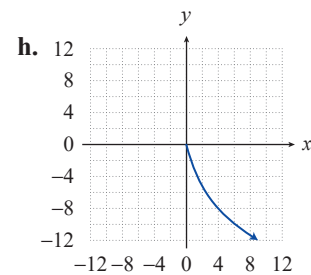
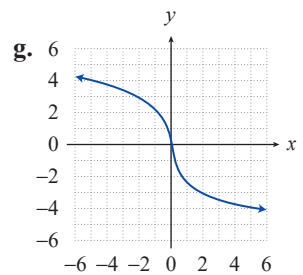
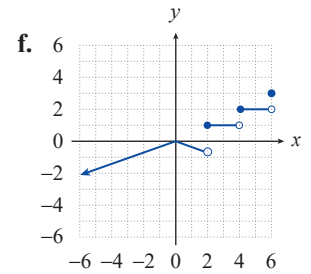
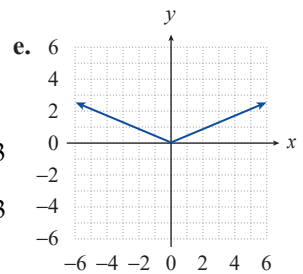
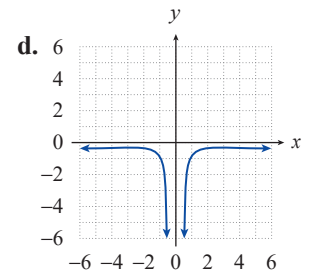
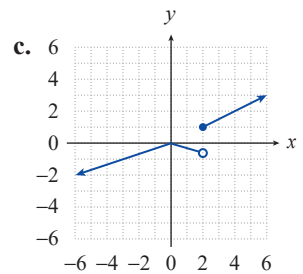
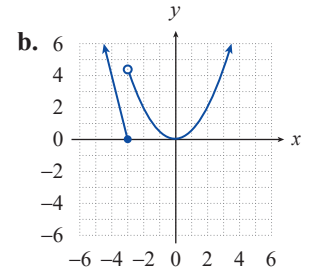
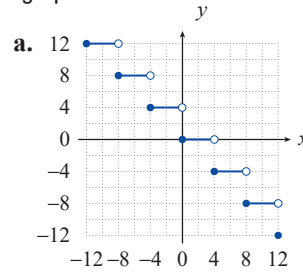
$$42. f(x) = -4\sqrt{x}$$

$$43. f(x) = \frac{3}{7}|x|$$

$$44. f(x) = \begin{cases} -4x - 12 & \text{if } x \leq -3 \\ \frac{5}{10}x^2 & \text{if } x > -3 \end{cases}$$

$$45. f(x) = \begin{cases} -\frac{1}{3}|x| & \text{if } x < 2 \\ \left\lceil \frac{x}{2} \right\rceil & \text{if } x \geq 2 \end{cases}$$

$$46. f(x) = \begin{cases} -\frac{1}{3}|x| & \text{if } x < 2 \\ \frac{x}{2} & \text{if } x \geq 2 \end{cases}$$



 TECHNOLOGY

Use a graphing utility to graph the following functions. Experiment with different viewing windows until you obtain a sketch that seems to capture the meaningful parts of the graph.

47. $f(x) = 10x^5 - x^3$

48. $g(x) = x^5 + x^2$

49. $f(x) = x^3 - 5x^2 + x$

50. $g(x) = \sqrt{x} - x^2$

51. $f(x) = \sqrt{x} + 3x - 1$

52. $g(x) = x^4 - 3x^3 + 2$