

Answers for 6.4

For use with pages 442–445

6.4 Skill Practice

1. An inverse relation interchanges the input and output values of the original relation.

2. The composition of both functions is equal to x .

3. $y = \frac{x+1}{4}$

4. $y = \frac{5-x}{2}$

5. $y = \frac{x+6}{7}$

6. $y = \frac{x+28}{10}$

7. $y = \frac{x-7}{12}$

8. $y = \frac{x+5}{-18}$

9. $y = \frac{x-\frac{1}{3}}{5}$

10. $y = \frac{6-3x}{2}$

11. $y = \frac{7-5x}{3}$

12. Each term must be divided by 6;
 $x + 11 = 6y$, $\frac{x+11}{6} = y$.

13. Switching the roles of x and y does not include switching the sign of the variables; $x = -y + 3$,
 $x - 3 = -y$, $3 - x = y$.

14. *Sample answer:* $f(x) = \frac{x-2}{3}$

15. $f(g(x)) = x - 4 + 4 = x$,
 $g(f(x)) = x + 4 - 4 = x$

16. $f(g(x)) = 2\left(\frac{1}{2}x - \frac{3}{2}\right) + 3$
 $= x - 3 + 3 = x$,

$$g(f(x)) = \frac{1}{2}(2x + 3) - \frac{3}{2}$$
$$= x + \frac{3}{2} - \frac{3}{2} = x$$

17. $f(g(x)) = \frac{1}{4}[(4x)^{1/3}]^3 = \frac{1}{4}(4x) = x$,

$$g(f(x)) = \left(4\left(\frac{1}{4}x^3\right)\right)^{1/3}$$
$$= (x^3)^{1/3} = x$$

18. $f(g(x)) = \frac{1}{5}(5x + 5) - 1$
 $= x + 1 - 1 = x$,

$$g(f(x)) = 5\left(\frac{1}{5}x - 1\right) + 5$$
$$= x - 5 + 5 = x$$

19. $f(g(x)) = 4\left(\frac{1}{4}x - \frac{9}{4}\right) + 9$
 $= x - 9 + 9 = x$,

$$g(f(x)) = \frac{1}{4}(4x + 9) - \frac{9}{4}$$
$$= x + \frac{9}{4} - \frac{9}{4} = x$$

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$$\begin{aligned} 20. f(g(x)) &= \left(5\left(\frac{x+2}{5}\right)^{1/2}\right)^2 - 2 \\ &= 5\left(\frac{x+2}{5}\right) - 2 \\ &= x + 2 - 2 = x, \end{aligned}$$

$$\begin{aligned} g(f(x)) &= \left(\frac{5x^2 + 2 - 2}{5}\right)^{1/2} \\ &= \left(\frac{5x^2}{5}\right)^{1/2} = (x^2)^{1/2} = x \end{aligned}$$

21. B

$$22. f^{-1}(x) = \sqrt[7]{x}$$

$$23. f^{-1}(x) = \sqrt[4]{\frac{x}{4}}$$

$$24. f^{-1}(x) = -\sqrt[6]{\frac{x}{-10}}$$

$$25. f^{-1}(x) = \frac{\sqrt[5]{x}}{2}$$

$$26. f^{-1}(x) = \sqrt[3]{\frac{-5x}{2}}$$

$$27. f^{-1}(x) = -\frac{5}{4}\sqrt{x}$$

28. C

29. function

30. function

31. not a function

32. function

33. function

34. function

35. not a function

36. not a function

37. not a function

$$38. f^{-1}(x) = \sqrt[4]{\frac{2x}{3}}$$

$$39. f^{-1}(x) = \sqrt[3]{x+2}$$

$$40. f^{-1}(x) = \sqrt[5]{\frac{4x-20}{3}}$$

$$41. f^{-1}(x) = -\sqrt[6]{\frac{40-5x}{2}}$$

$$42. f^{-1}(x) = \sqrt[3]{\frac{9x+6}{2}}$$

$$43. f^{-1}(x) = \sqrt[4]{x+9}$$

44. a. False. *Sample answer:* The graph of the inverse will not pass the vertical line test.

b. True. *Sample answer:* The graph of the inverse will pass the vertical line test.

45. $f^{-1}(x) = \frac{1}{m}x - \frac{b}{m}$, this is the graph of a line and the graphs of lines are always functions if $m \neq 0$; slope: $\frac{1}{m}$, y-intercept: $-\frac{b}{m}$.

6.4 Problem Solving

$$46. D = \frac{E}{0.81419}; \text{ about } \$307$$

$$47. \text{ a. } w = 2\ell - 6$$

b. 7 lb

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48. a. $F = \frac{9}{5}C + 32$; this will convert degrees Celsius to degrees Fahrenheit.

b. 77°F , 23°F

c. -40°

49. $\ell = \left(\frac{v}{1.34}\right)^2$; about 31.3 ft

50. $h = \left(\frac{A}{0.2195}\right)^{2.523}$; about 150 cm

51. a. When the x - and y -coordinates of the original function are switched around, it is the same as the original function. If $g(x) = -x$, then $g^{-1}(x)$ is found by solving $x = -y$, which is $-x = y$, the original function.

b. Sample answer:

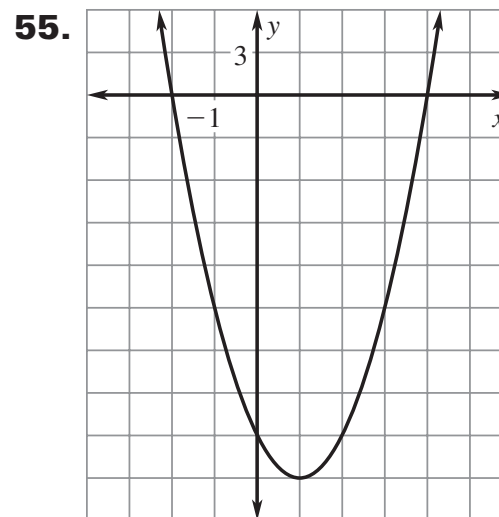
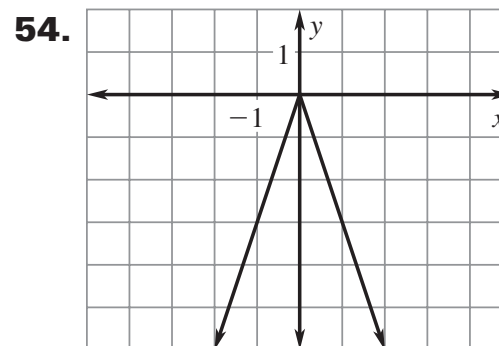
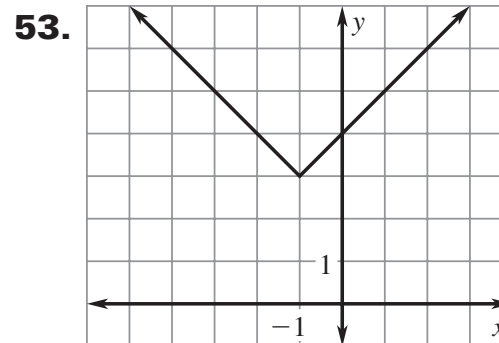
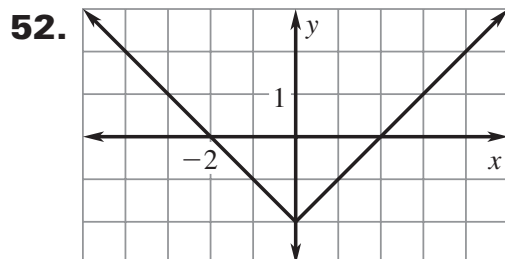
$$f(x) = -x + 2,$$

$$f(x) = -x - 7,$$

$$f(x) = -x + 4$$

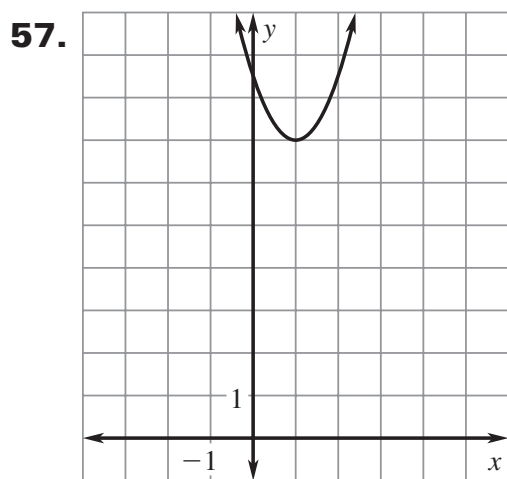
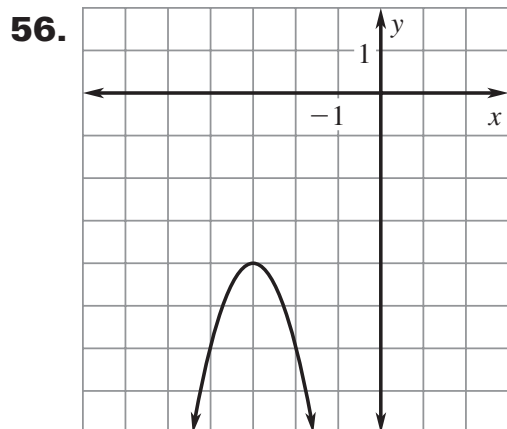
c. $f(x) = -x + b$

6.4 Mixed Review



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58. $(5.6, -1.8)$ **59.** $(-5.5, -6)$

60. $\left(-\frac{2}{89}, \frac{162}{89}\right)$ **61.** $-3, 0, 3$

62. $0, 2$

63. $-2\frac{1}{2}, \frac{5 \pm 5i\sqrt{3}}{4}$

64. $3, \pm 2i\sqrt{2}$

65. $-2.5, -2, 2.5$

66. $-1\frac{1}{2}, 1\frac{1}{2}, -\frac{\sqrt{15}}{3}i, \frac{\sqrt{15}}{3}i$