

Study Guide and Review - Chapter 6

Choose a word or term that best completes each statement.

1. If both compositions result in the _____, then the functions are inverse functions.

ANSWER:

identity function

2. In a(n) _____, the results of one function are used to evaluate a second function.

ANSWER:

composition of functions

3. Radicals are _____ if *both* the index and the radicand are identical.

ANSWER:

like radical expressions

4. When there is more than one real root, the nonnegative root is called the _____.

ANSWER:

principal root

5. To eliminate radicals from a denominator or fractions from a radicand, you use a process called _____.

ANSWER:

rationalizing the denominator

6. Equations with radicals that have variables in the radicands are called _____.

ANSWER:

radical equations

7. Two relations are _____ if and only if one relation contains the element (b, a) when the other relation contains the element (a, b) .

ANSWER:

inverse relations

8. When solving a radical equation, sometimes you will obtain a number that does not satisfy the original equation. Such a number is called a(n) _____.

ANSWER:

extraneous solution

9. The square root function is a type of _____.

ANSWER:

radical function

Find $[f \circ g](x)$ and $[g \circ f](x)$.

10. $f(x) = 2x + 1$
 $g(x) = 4x - 5$

ANSWER:

$$[f \circ g](x) = 8x - 9$$

$$[g \circ f](x) = 8x - 1$$

11. $f(x) = x^2 + 1$
 $g(x) = x - 7$

ANSWER:

$$[f \circ g](x) = x^2 - 14x + 50$$

$$[g \circ f](x) = x^2 - 6$$

Study Guide and Review - Chapter 6

12. $f(x) = x^2 + 4$
 $g(x) = -2x + 1$

ANSWER:

$$[f \circ g](x) = 4x^2 - 4x + 5$$

$$[g \circ f](x) = -2x^2 - 7$$

13. $f(x) = 4x$
 $g(x) = 5x - 1$

ANSWER:

$$[f \circ g](x) = 20x - 4$$

$$[g \circ f](x) = 20x - 1$$

14. $f(x) = x^3$
 $g(x) = x - 1$

ANSWER:

$$[f \circ g](x) = x - 3x^2 + 3x - 1$$

$$[g \circ f](x) = x^3 - 1$$

15. $f(x) = x^2 + 2x - 3$
 $g(x) = x + 1$

ANSWER:

$$[f \circ g](x) = x^2 + 4x$$

$$[g \circ f](x) = x^2 + 2x - 2$$

16. **MEASUREMENT** The formula $f = 3y$ converts yards y to feet f and $f = \frac{n}{12}$ converts inches n to feet f . Write a composition of functions that converts yards to inches.

ANSWER:

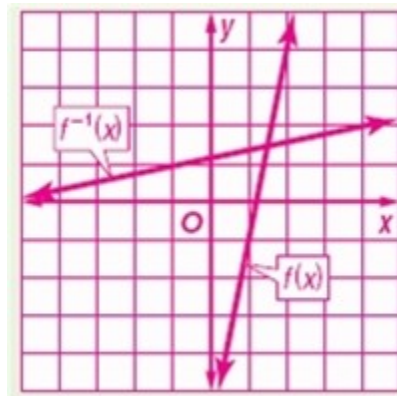
$$n = 36y$$

Find the inverse of each function. Then graph the function and its inverse.

17. $f(x) = 5x - 6$

ANSWER:

$$f^{-1}(x) = \frac{x + 6}{5}$$

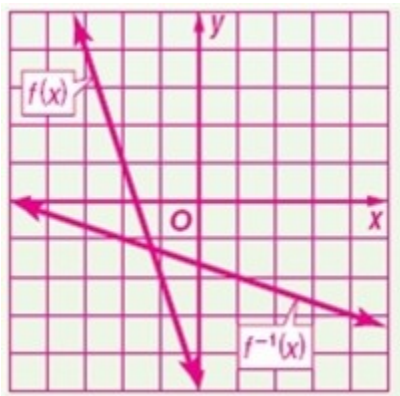


Study Guide and Review - Chapter 6

18. $f(x) = -3x - 5$

ANSWER:

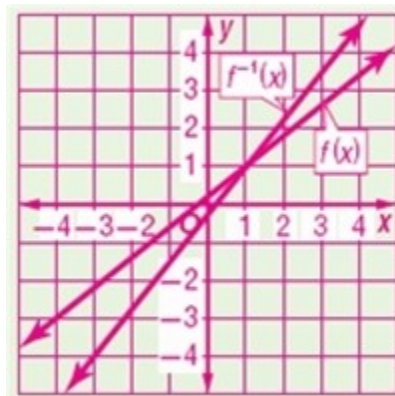
$$f^{-1}(x) = \frac{x+5}{-3}$$



20. $f(x) = \frac{4x+1}{5}$

ANSWER:

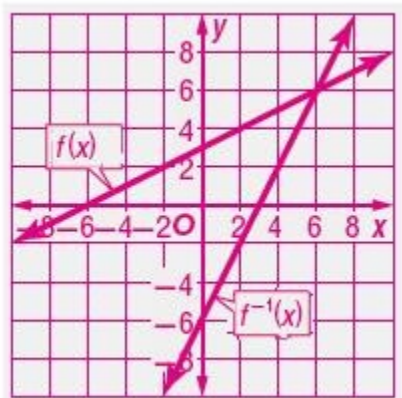
$$f^{-1}(x) = \frac{5x-1}{4}$$



19. $f(x) = \frac{1}{2}x + 3$

ANSWER:

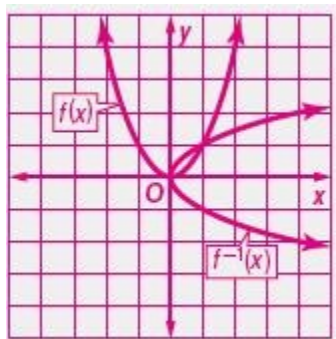
$$f^{-1}(x) = 2x - 6$$



21. $f(x) = x^2$

ANSWER:

$$f^{-1}(x) = \pm \sqrt{x}$$

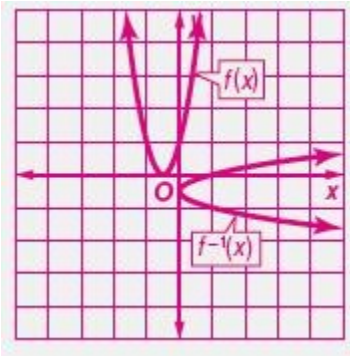


Study Guide and Review - Chapter 6

22. $f(x) = (2x+1)^2$

ANSWER:

$$f^{-1}(x) = \frac{-1 \pm \sqrt{x}}{2}$$



23. **SHOPPING** Samuel bought a computer. The sales tax rate was 6% of the sale price, and he paid \$50 for shipping. Find the sale price if Samuel paid a total of \$1322.

ANSWER:

\$1200

Use the horizontal line test to determine whether the inverse of each function is also a function.

24. $f(x) = 3x^2$

ANSWER:

No

25. $h(x) = x^3 - 3$

ANSWER:

Yes

26. $g(x) = -3x^4 + 2x - 1$

ANSWER:

No

27. $g(x) = 4x^3 - 5x$

ANSWER:

No

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

ANSWER:

No

29. $h(x) = 4x^4 - 5x$

ANSWER:

No

30. **FINANCIAL LITERACY** During the last month, Jonathan has made two deposits of \$45, made a deposit of double his original balance, and has withdrawn \$35 five times. His balance is now \$189. Write an equation that models this problem. How much money did Jonathan have in his account at the beginning of the month?

ANSWER:

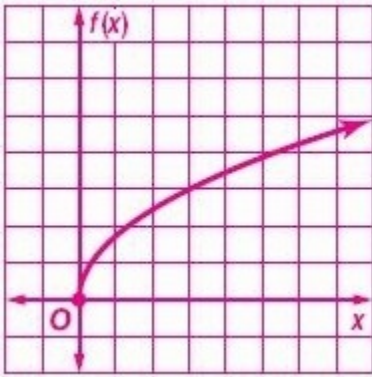
$$x + 2(45) + 2x - 5(35) = 189; \text{ about } \$91.33$$

Study Guide and Review - Chapter 6

Graph each function. State the domain and range.

31. $f(x) = \sqrt{3x}$

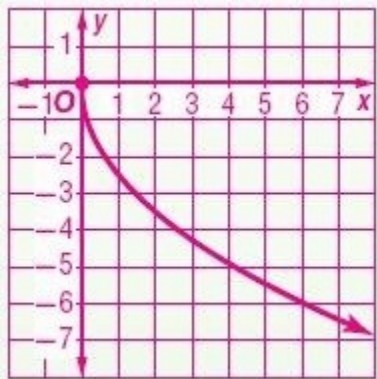
ANSWER:



$D = \{x \mid x \geq 0\}; R = \{f(x) \mid f(x) \geq 0\}$

32. $f(x) = -\sqrt{6x}$

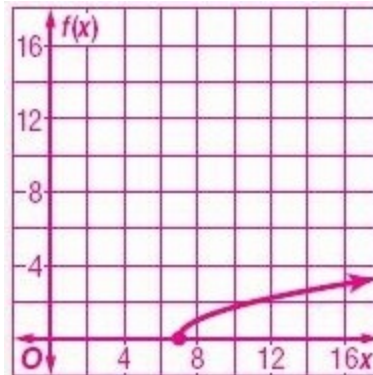
ANSWER:



$D = \{x \mid x \geq 0\}; R = \{f(x) \mid f(x) \leq 0\}$

33. $f(x) = \sqrt{x-7}$

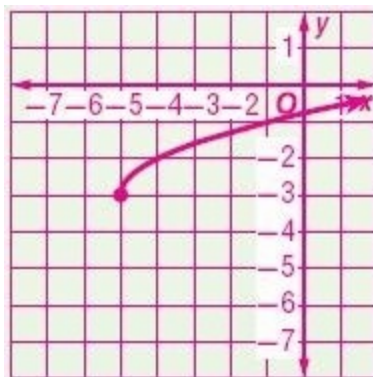
ANSWER:



$D = \{x \mid x \geq 7\}; R = \{f(x) \mid f(x) \geq 0\}$

34. $f(x) = \sqrt{x+5} - 3$

ANSWER:

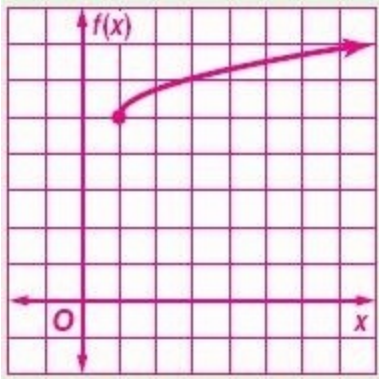


$D = \{x \mid x \geq -5\}; R = \{f(x) \mid f(x) \geq -3\}$

Study Guide and Review - Chapter 6

35. $f(x) = \frac{3}{4}\sqrt{x-1} + 5$

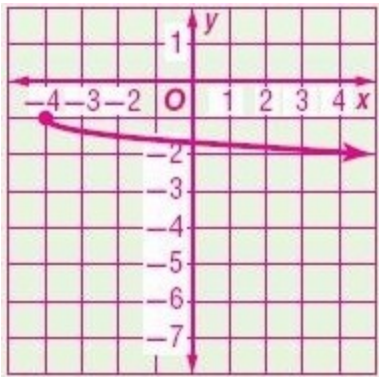
ANSWER:



$D = \{x | x \geq 1\}; R = \{f(x) | f(x) \geq 5\}$

36. $f(x) = -\frac{1}{3}\sqrt{x+4} - 1$

ANSWER:



$D = \{x | x \geq -4\}; R = \{f(x) | f(x) \leq -1\}$

37. **GEOMETRY** The area of a circle is given by the formula $A = \pi r^2$. What is the radius of a circle with an area of 300 square inches?

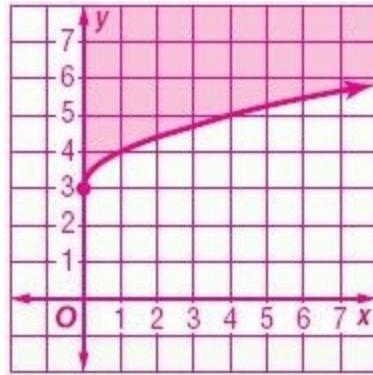
ANSWER:

about 9.8 in.

Graph each inequality.

38. $y \geq \sqrt{x} + 3$

ANSWER:



39. $y > -\sqrt{x-1} + 2$

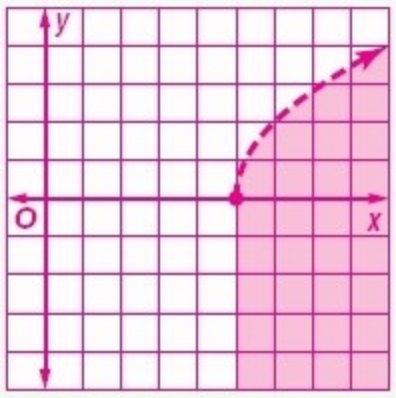
ANSWER:



Study Guide and Review - Chapter 6

40. $y < 2\sqrt{x-5}$

ANSWER:



Simplify.

41. $\pm\sqrt{121}$

ANSWER:

± 11

42. $\sqrt[3]{-125}$

ANSWER:

-5

43. $\sqrt{(-6)^2}$

ANSWER:

6

44. $\sqrt{-(x+3)^4}$

ANSWER:

$i(x+3)^2$

45. $\sqrt[6]{(x^2+2)^{18}}$

ANSWER:

$(x^2+2)^3$

46. $\sqrt[3]{27(x+3)^3}$

ANSWER:

$3(x+3)$

47. $\sqrt[4]{a^8b^{12}}$

ANSWER:

$a^2|b^3|$

48. $\sqrt[5]{243x^{10}y^{25}}$

ANSWER:

$3x^2y^5$

49. **PHYSICS** The velocity v of an object can be

defined as $v = \sqrt{\frac{2K}{m}}$, where m is the mass of an

object and K is the kinetic energy in joules. Find the velocity in meters per second of an object with a mass of 17 grams and a kinetic energy of 850 joules.

ANSWER:

10 m/s

Simplify.

50. $\sqrt[3]{54}$

ANSWER:

$3\sqrt[3]{2}$

Study Guide and Review - Chapter 6

51. $\sqrt{144a^3b^5}$

ANSWER:

$$12ab^2\sqrt{ab}$$

52. $4\sqrt{6y} \cdot 3\sqrt{7x^2y}$

ANSWER:

$$12|x|y\sqrt{42}$$

53. $6\sqrt{72} + 7\sqrt{98} - \sqrt{50}$

ANSWER:

$$80\sqrt{2}$$

54. $(6\sqrt{5} - 2\sqrt{2})(3\sqrt{5} + 4\sqrt{2})$

ANSWER:

$$74 + 18\sqrt{10}$$

55. $\frac{\sqrt{6m^5}}{\sqrt{p^{11}}}$

ANSWER:

$$\frac{m^2\sqrt{6mp}}{p^6}$$

56. $\frac{3}{5+\sqrt{2}}$

ANSWER:

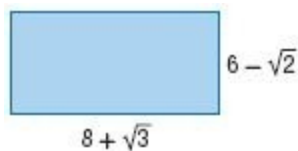
$$\frac{15-3\sqrt{2}}{23}$$

57. $\frac{\sqrt{3}}{\sqrt{5}-\sqrt{6}}$

ANSWER:

$$-\sqrt{15} - 3\sqrt{2}$$

58. **GEOMETRY** What are the perimeter and the area of the rectangle?



ANSWER:

$$\text{perimeter} = 28 + 2\sqrt{3} - 2\sqrt{2} \text{ units};$$

$$\text{area} = 48 + 6\sqrt{3} - 8\sqrt{2} - \sqrt{6} \text{ units}^2$$

Simplify each expression.

59. $x^{\frac{1}{2}} \cdot x^{\frac{2}{3}}$

ANSWER:

$$x^{\frac{7}{6}}$$

Study Guide and Review - Chapter 6

60. $m^{-\frac{3}{4}}$

ANSWER:

$$\frac{1}{m^{\frac{3}{4}}}$$

61. $\frac{d^{\frac{1}{3}}}{d^4}$

ANSWER:

$$\frac{1}{d^{\frac{11}{3}}}$$

Simplify each expression.

62. $\frac{1}{y^{\frac{1}{4}}}$

ANSWER:

$$\frac{1}{y^{\frac{1}{4}}}$$

63. $\sqrt[3]{\sqrt{729}}$

ANSWER:

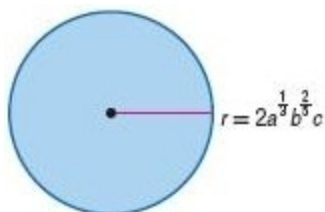
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64. $\frac{x^{\frac{2}{3}} - x^{\frac{1}{3}}y^{\frac{2}{3}}}{x^{\frac{1}{3}}}$

ANSWER:

$$x^{\frac{1}{3}} - y^{\frac{2}{3}}$$

65. **GEOMETRY** What is the area of the circle?



ANSWER:

$$4a^{\frac{2}{3}}b^{\frac{4}{3}}c^2\pi \text{ units}^2$$

Solve each equation.

66. $\sqrt{x-3} + 5 = 15$

ANSWER:

103

67. $-\sqrt{x-11} = 3 - \sqrt{x}$

ANSWER:

$$\frac{100}{9}$$

Study Guide and Review - Chapter 6

68. $4 + \sqrt{3x-1} = 8$

ANSWER:

$$\frac{17}{3}$$

69. $\sqrt{m+3} = \sqrt{2m+1}$

ANSWER:

$$2$$

70. $\sqrt{2x+3} = 3$

ANSWER:

$$3$$

71. $(x+1)^{\frac{1}{4}} = -3$

ANSWER:

no solution

72. $a^{\frac{1}{3}} - 4 = 0$

ANSWER:

$$64$$

73. $3(3x-1)^{\frac{1}{3}} - 6 = 0$

ANSWER:

$$3$$

74. **PHYSICS** The formula $t = 2\pi\sqrt{\frac{\ell}{32}}$ represents the swing of a pendulum, where t is the time in seconds for the pendulum to swing back and forth and ℓ is the length of the pendulum in feet. Find the length of a pendulum that makes one swing in 2.75 seconds.

ANSWER:

about 6.13 ft

Solve each inequality.

75. $2 + \sqrt{3x-1} < 5$

ANSWER:

$$\frac{1}{3} \leq x < \frac{10}{3}$$

76. $\sqrt{3x+13} - 5 \geq 5$

ANSWER:

$$x \geq 29$$

77. $6 - \sqrt{3x+5} \leq 3$

ANSWER:

$$x \geq \frac{4}{3}$$

78. $\sqrt{-3x+4} - 5 \geq 3$

ANSWER:

$$x \leq -20$$

79. $5 + \sqrt{2y-7} < 5$

ANSWER:

no solution

Study Guide and Review - Chapter 6

80. $3 + \sqrt{2x - 3} \geq 3$

ANSWER:

$$x \geq \frac{3}{2}$$

81. $\sqrt{3x+1} - \sqrt{6+x} > 0$

ANSWER:

$$x > \frac{5}{2}$$