Name______________________________ Class ____________ Date____________

Extra Practice

Chapter 6

Lesson 6-1

Simplify each radical expression. Use absolute value symbols as needed.

1. $\sqrt{36x^4}$ **2.** $\sqrt{c^{80}d^{50}}$ **3.** $\sqrt[4]{81x^{12}}$

4. $\sqrt[3]{-64}$ **5.** $\sqrt[5]{-32k^5}$ **6.** $\sqrt[4]{\frac{1}{16}w^{12}}$

7. $\sqrt[4]{m^{18}n^8}$ **8.** $\sqrt[3]{27y^{15}}$ **9.** $\sqrt[5]{-243r^{20}}$

10. You can use the expression $D = 1.2\sqrt{h}$ to approximate the visibility range D, in miles, from a height of h feet above ground.

a. Estimate the visibility from a height of 900 feet.

b. How far above ground is an observer whose visibility range is 84 miles?

11. You can approximate the speed of a falling object as $v = 8\sqrt{d}$, where v is the speed in feet per second and d is the distance, in feet, the object has fallen. Express d in terms of v.

Lesson 6-2

Multiply or divide and simplify. Assume that all variables are positive.

12. $\sqrt{3x^4}.\sqrt{24x^3}$ **13.** $\sqrt[3]{4}.\sqrt[3]{18}$ **14.** $\sqrt{5a^3}.\sqrt{20a}$

15. $\dfrac{\sqrt{80}}{\sqrt{5}}$ **16.** $\dfrac{\sqrt{18x^5y}}{\sqrt{2x}}$ **17.** $\dfrac{\sqrt[3]{640w^3z^8}}{\sqrt[3]{5wz^4}}$

18. The time T it takes a pendulum to make a full swing in each direction and return to its original position is called the period of the pendulum. The equation $T = 2\pi\sqrt{\dfrac{\quad}{32}}$ relates the length of the pendulum , in feet, to its period T, in seconds. How long is a pendulum if its period is 3 seconds? Round the answer to the nearest tenth.

Lesson 6-3

Simplify.

19. $2\sqrt{7} + 3\sqrt{7}$ **20.** $\sqrt{32} + \sqrt{8}$ **21.** $\sqrt{7x} + \sqrt{28x}$

22. $3\sqrt{18} + 2\sqrt{72}$ **23.** $\sqrt{27} + \sqrt{48}$ **24.** $8\sqrt{45} - 3\sqrt{80}$

25. $\left(2+\sqrt{5}\right)\left(3+\sqrt{5}\right)$ **26.** $\left(6-\sqrt{7}\right)\left(1-\sqrt{7}\right)$ **27.** $\left(\sqrt{10}+3\right)^2$

28. $\left(3\sqrt{5}-2\right)\left(3\sqrt{5}+2\right)$ **29.** $\dfrac{5}{2-\sqrt{3}}$ **30.** $\dfrac{4-3\sqrt{7}}{1+2\sqrt{7}}$

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Extra Practice (continued)

Chapter 6

Lesson 6-4

Write each expression in simplest form. Assume that all variables are positive.

31. $81^{\frac{1}{2}}$

32. $36^{\frac{1}{4}} \cdot 36^{\frac{1}{4}}$

33. $\left(x^{-\frac{4}{3}}y^{\frac{3}{5}}\right)^{15}$

34. $\left(x^{\frac{1}{4}}y^{-\frac{3}{8}}\right)^{16}$

35. $\left(8x^{15}y-9\right)^{-\frac{1}{3}}$

36. $\left(-27x^{-9}y^{6}\right)^{\frac{1}{3}}$

37. $\left(-32x^{-10}y^{15}\right)^{\frac{1}{5}}$

38. $\left(32x^{20}y^{-10}\right)^{-\frac{1}{5}}$

39. $\left(\dfrac{81y^{16}}{16x^{12}}\right)^{\frac{1}{4}}$

40. $\left(\dfrac{16x^{14}}{81y^{18}}\right)^{\frac{1}{2}}$

41. $\sqrt{5} \cdot \sqrt[3]{5}$

42. $\dfrac{\sqrt[6]{x^2}}{\sqrt[3]{x^5}}$

Lesson 6-5

Solve. Check for extraneous solutions.

43. $\sqrt{13x-10} = 3x$

44. $\sqrt{x+20} = x$

45. $\left(4x-12\right)^{\frac{1}{2}} + 3 = x$

46. $\left(7x\right)^{\frac{1}{3}} = \left(5x+2\right)^{\frac{1}{3}}$

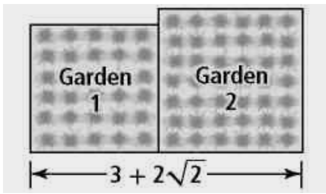
47. $\sqrt{x-2} - \sqrt{2x+3} = -2$

48. $\sqrt{10x} - 2\sqrt{5x-25} = 0$

49. A community garden offers two different square-shaped plots of growing space as shown. The larger plot measures one square meter greater than the smaller one. The combined lengths of the two gardens is $3 + 2\sqrt{2}$ meters.

a. What is the area of Garden 1?

b. What is the length of Garden 2?



Lesson 6-6

Let $f(x) = 3x^2$ and $g(x) = 2 - 5x$. Perform each function operation.

50. $f(x) - g(x)$

51. $f(x) \bullet g(x)$

52. $\dfrac{f(x)}{g(x)}$

53. $(f + g)(x)$

54. $(f \bullet g)(x)$

55. $\dfrac{g}{f}(x)$

Let $f(x) = x^2$ and $g(x) = 3x + 1$. Evaluate each expression.

56. $(f \circ g)(0)$

57. $(f \circ g)(2)$

58. $(f \circ g)(23)$

59. $(f \circ g)(5)$

60. $(g \circ f)(0)$

61. $(g \circ f)(1)$

62. $(g \circ f)(-1)$

63. $(f \circ f)(3)$

64. $(g \circ g)(4)$

Extra Practice (continued)

Chapter 6

65. Halina works in a department store. Three times per year she is allowed to combine her employee discount with special sale prices. Let x be the retail price of a blouse.

a. Halina's employee discount is 20%. Write a function $E(x)$ that represents the cost of the blouse after the discount.

b. Due to a manufacturer's incentive, the blouse is marked down 25%. Write a function $M(x)$ that represents the sale price.

c. The sales tax on clothing is 6%. Write a function $T(x)$ that describes the cost of a clothing item with sales tax included.

d. Halina found a blouse to which the discounts apply. Use the function composition $f = T \circ E \circ M$ to write the function $f(x)$ that represents the price Halina will pay for the blouse.

66. You invest p dollars in an account that earns a simple interest of 6%. The function that represents the account balance at the end of the year is $f(p) = 1.06p$.

a. Suppose that at the end of the year you deposit $500 in the account. Write a new function $g(p)$ that shows the balance that will earn interest in the second year.

b. At the end of every year you add $500 to the account. The interest rate remains 6%. Write a composition of functions f and g to find the account balance at the end of the third year, before adding the $500. Find that balance for an initial investment of $1000.

Lesson 6-7

For each function f, find f^{-1} and the domain and range of f and f^{-1}. Determine whether f^{-1} is a function.

67. $f(x) = 6x + 1$

68. $f(x) = \sqrt{x+4}$

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

70. $f(x) = \sqrt{-5x+2}$

71. $f(x) = 3x^2 + 1$

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

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Extra Practice (continued)

Chapter 6

73. You can use the function $f(x) = 331.4 + 0.6x$ to approximate the speed of sound in dry air, where x is the temperature in degrees Celsius.

a. Write an algebraic expression for the inverse function $f^{-1}(x)$.

b. Evaluate $f^{-1}(x)$ for x 5 350. Round the result to the nearest whole number. Explain what your result represents.

Lesson 6-8

Graph each function.

74. $y = \sqrt{x}$

75. $y = \sqrt{x} - 1$

76. $y = \sqrt{x} + 3$

77. $y = \sqrt{x + 3}$

78. $y = 4\sqrt{x}$

79. $y = \dfrac{3}{4}\sqrt{x}$

80. $y = 2\sqrt{x - 5} + 2$

81. $y = \sqrt[3]{x + 1}$

82. $y = \sqrt[3]{x - 2} - 3$