Solve each equation.

45.
$$3^x = 243$$

Example 5

Example 6

46.
$$12^x = 144$$

47.
$$16^x = 4$$

48.
$$27^x = 3$$

49.
$$9^x = 27$$

50.
$$32^x = 4$$

51.
$$2^{x-1} = 128$$

52.
$$4^{2x+1} = 1024$$

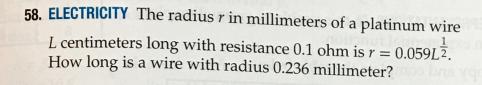
53.
$$6^{x-4} = 1296$$

54.
$$9^{2x+3} = 2187$$

55
$$4^{3x} = 512$$

56.
$$128^{3x} = 8$$

57. CONSERVATION Water collected in a rain barrel can be used to water plants and reduce city water use. Water flowing from an open rain barrel has velocity $v = 8h^{\frac{1}{2}}$, where v is in feet per second and h is the height of the water in feet. Find the height of the water if it is flowing at 16 feet per second.





Write each expression in radical form, or write each radical in exponential form.

59.
$$17^{\frac{1}{3}}$$

60.
$$q^{\frac{1}{4}}$$

61.
$$7b^{\frac{1}{3}}$$

62.
$$m^{\frac{2}{3}}$$

63.
$$\sqrt[3]{29}$$

64.
$$\sqrt[5]{h}$$

65.
$$2\sqrt[3]{a}$$

66.
$$\sqrt[3]{xy^2}$$

Simplify.

67.
$$\sqrt[3]{0.027}$$

68.
$$\sqrt[4]{\frac{n^4}{16}}$$

69.
$$a^{\frac{1}{3}} \cdot a^{\frac{2}{3}}$$

70.
$$c^{\frac{1}{2}} \cdot c^{\frac{3}{2}}$$

71.
$$(8^2)^{\frac{2}{3}}$$

72.
$$\left(y^{\frac{3}{4}}\right)^{\frac{1}{2}}$$

73.
$$9^{-\frac{1}{2}}$$

73.
$$9^{-\frac{1}{2}}$$
 74. $16^{-\frac{3}{2}}$

75.
$$(3^2)^{-\frac{3}{2}}$$

76.
$$\left(81^{\frac{1}{4}}\right)^{-2}$$

77.
$$k^{-\frac{1}{2}}$$

78.
$$\left(d^{\frac{4}{3}}\right)^0$$

Solve each equation.

79.
$$2^{5x} = 8^{2x} - 4$$

80.
$$81^{2x-3} = 9^{x+3}$$
 81. $2^{4x} = 32^{x+1}$

81.
$$2^{4x} = 32^{x+1}$$

82.
$$16^x = \frac{1}{2}$$

83.
$$25^x = \frac{1}{125}$$

84.
$$6^{8-x} = \frac{1}{216}$$