

## 10.4

## Rational Exponents and Radicals

What is the value of each expression?

1.  $\sqrt[3]{64}$

2.  $\sqrt[3]{125}$

3.  $\sqrt[5]{32}$

4.  $\sqrt{100}$

5.  $\sqrt[4]{1}$

6.  $\sqrt{225}$

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

8.  $\sqrt{289}$

9.  $\sqrt[3]{243}$

Write each expression in radical form.

10.  $b^{\frac{3}{2}}$

11.  $(36x)^{\frac{1}{2}}$

12.  $25y^{\frac{1}{2}}$

13.  $81s^{\frac{2}{3}}$

14.  $(72b)^{\frac{1}{2}}$

15.  $(125a)^{\frac{2}{3}}$

16.  $(40x)^{\frac{1}{3}}$

17.  $36t^{\frac{1}{4}}$

18.  $(99r)^{\frac{1}{2}}$

Write each expression in exponential form.

19.  $\sqrt[3]{b^4}$

20.  $\sqrt{(3x)^4}$

21.  $\sqrt[3]{125d^4}$

22.  $\sqrt{49a}$

23.  $\sqrt[3]{(64b)^2}$

24.  $\sqrt[4]{256b^5}$

25.  $\sqrt{144d^4}$

26.  $\sqrt[3]{(27x)^2}$

27.  $\sqrt{625a^5}$

28. You can use the formula  $S = 10m^{\frac{2}{3}}$  to approximate the surface area  $S$ , in square centimeters, of a horse with mass  $m$ , in grams. What is the surface area of a horse with a mass of  $4.5 \times 10^5$  grams? Round your answer to the nearest whole square centimeter.

expression in radical form.

29.  $\left(a^{\frac{2}{3}}\right)\left(a^{\frac{2}{3}}\right)$

30.  $b^{\frac{1}{3}}(ab)^{\frac{1}{2}}$

31.  $(2x^3)\left(4x^{\frac{1}{3}}\right)$

32.  $(27y)^{\frac{1}{3}}(64y)^{\frac{1}{3}}$

33.  $(25x)^{\frac{1}{2}}\left(x^{\frac{1}{2}}\right)$

34.  $(81s)^{\frac{1}{3}}s^{\frac{5}{6}}$

Write each expression in exponential form. Simplify when possible.

35.  $\sqrt[3]{a^5} + \sqrt[3]{a}$

36.  $5\sqrt[3]{b^4} - \sqrt[3]{b^4}$

37.  $\sqrt[4]{81d^3} - \sqrt[3]{125d^4}$

38.  $\sqrt[3]{(27x)^2} + \sqrt[4]{256x^2}$

39. To estimate the age of an organism, archaeologists measure the amount of carbon-14 left in its remains. The approximate amount of carbon-14 remaining after 5000 years can be found using the formula  $A = A_0 (2.7)^{-\frac{3}{5}}$ , where  $A_0$  is the initial amount of carbon-14 in the sample that is tested. How much carbon-14 is left in a sample that is 5000 years old and originally contained  $5.0 \times 10^{-3}$  grams of carbon-14? Write your answer in scientific notation.
40. Remember that the radius  $r$  of a sphere that has volume  $V$  is  $r = \sqrt[3]{\frac{3V}{4\pi}}$ . A ping-pong ball has a volume of about  $2.045 \text{ in.}^3$ . What is the approximate radius of a ping-pong ball? Use 3.14 for  $\pi$ . Round your answer to the nearest tenth.
41. **Reasoning** Show that  $\sqrt[4]{a^2} = \sqrt{a}$  by rewriting  $\sqrt[4]{a^2}$  in exponential form.