

Chapter 4 Review

4.1 Square Roots and Cube Roots

1. Which of the following numbers are perfect squares, perfect cubes, or both?

a) 49 b) 343
c) 484 d) 1728
e) 1024 f) 15 625

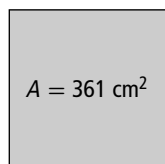
2. Use prime factorization to evaluate

★a) $\sqrt{196}$ b) $\sqrt[3]{512}$

3. Calculate.

a) $\sqrt{256}$ b) $\sqrt[3]{2197}$
c) $\sqrt[3]{27\,000}$

4. What are the dimensions of the square?



- ★5. Christina wants to replace the flooring in her bedroom with square tiles. Each tile measures 6 in. by 6 in. The area of the floor is 9 ft by 9 ft.

a) How many tiles does Christina need?
b) Each tile costs \$1.38 including taxes. How much will the tiles cost?

4.2 Integral Exponents

6. Write as a power with a positive exponent.

a) $(a^3)^{-2}$

b) $\frac{(3.5)^3}{(3.5)^{-4}}$

★c) $\left(\frac{b^2}{b^{-5}}\right)^2$

7. Evaluate each expression. Express the answer to three decimal places, if necessary.

a) $(3^2)^{-2}$

b) $\left[\frac{5^2}{(2.5)^3(1.25)}\right]^3$

c) $(0.5^2)^{-3}(2.8^2)^2$

8. A radioactive element has a half-life of one month. The formula for the amount of the element remaining is $A = m\left(\frac{1}{2}\right)^n$, where m is the mass of the element, in grams, and n is the number of months. How much of a 740-g sample of the element

a) remains after 6 months? Express your answer to two decimal places.

b) remains after 14 months? Express your answer to three decimal places.

c) was there 4 months ago? Express your answer to the nearest gram.

9. Newfoundland has the highest population density of moose in North America. In 2009, there were approximately 135 000 moose on the island. Assuming a growth rate of 8.5%, this situation can be modelled using the formula $P = 135\,000(1.085)^n$, where P is the estimated moose population and n is the number of years since 2009. If the growth rate remains constant, how many moose will there be after

a) 1 year?

b) 2 years?

c) 5 years?

10. a) Using the information in #9, how many moose will there be in 2020?

b) Assume that the growth rate was the same before 2009. How many moose were there at the beginning of 2000?

4.3 Rational Exponents

- ★11. Simplify each expression. Express each answer with a positive exponent.

a) $(5^{-0.5})^{\frac{3}{4}}$

b) $\frac{2.8^{0.4}}{2.8^{\frac{-1}{2}}}$

c) $(27x^{-2})^{\frac{-2}{3}}$

12. Without using a calculator, Victoria incorrectly simplified the following expression. What errors did she make? Determine the correct answer.

$$(27x)^{\frac{-1}{3}}(9x)^{\frac{1}{2}} = (243x)^{\left(\frac{-1}{3} + \frac{1}{2}\right)} \\ = (243x)^{\frac{1}{6}}$$

- ★13. Without using a calculator, evaluate each expression.

a) $\frac{8^{\frac{5}{3}}}{4^2}$

b) $\frac{125^{\frac{2}{3}}}{5^{-1}}$

c) $\frac{9^{\frac{3}{2}}}{27^{\frac{1}{3}}}$

d) $\frac{8^{\frac{2}{3}}}{32^{\frac{4}{5}}}$

14. Evaluate each expression. Express each answer to four decimal places, if necessary.

a) $(20^{\frac{1}{4}})(20^{\frac{2}{3}})$

b) $(6^{-4})^{\frac{1}{3}}$

c) $\left(\frac{2.5^{\frac{3}{4}}}{2.5^{-0.5}}\right)^2$

d) $\frac{(2^5)}{(2^3)(10^2)}$

15. Jessica invested \$1500 in an account that increases in value at a rate of 3.25% annually. The value of the account can be determined using the formula $A = 1500(1.0325)^t$, where A is the total value of the investment and t is the number of years. What is the value of Jessica's account at the end of three years?

16. The students in a grade 10 class are making T-shirts for a fundraiser. The cost of the ink needed to print T-shirts can be determined using the equation $C = 5.75n^{\frac{3}{4}} + 60$, where n is the number of T-shirts. Determine the cost of the ink needed to print 350 T-shirts.

17. Iodine-131 has a half-life of 8 days.

Iodine-131 has medical uses such as treating people with an overactive thyroid. A patient is given 9.5 mg of iodine-131. How much would remain in the patient's body after 30 days? Use the formula $A = 9.5(0.5)^{\frac{t}{8}}$, where A is the amount remaining in the patient's body and t is the time, in days. Express the answer to the nearest thousandth of a milligram.

4.4 Irrational Numbers

18. Write each power as an equivalent radical.

a) $x^{\frac{2}{5}}$

b) $(16s^3)^{\frac{3}{5}}$

c) $\left(\frac{a^5}{7}\right)^{0.75}$

d) $(5a^4)^{\frac{-1}{3}}$

19. Express each radical as a power.

a) $\sqrt{x^5}$

b) $\sqrt[4]{5^2}$

c) $4\sqrt[5]{x^3}$

d) $\sqrt[3]{(4y)^4}$

20. Convert each mixed radical to an equivalent entire radical.

a) $4\sqrt{7}$

b) $6\sqrt{5}$

★c) $3\sqrt[3]{2}$

d) $-5\sqrt[3]{3}$

21. Express each entire radical as an equivalent mixed radical.

a) $\sqrt{252}$

b) $\sqrt[3]{384}$

c) $\sqrt[4]{48}$

d) $\sqrt[3]{405}$

22. Identify the irrational numbers in each set. Then, arrange the numbers from greatest to least.

a) $\sqrt[3]{216}$ $0.2\bar{3}$ $\frac{4\sqrt{5}}{2}$ $\sqrt{0.25}$

b) $\sqrt{0.81}$ $\sqrt[3]{32}$ $\frac{3\sqrt{25}}{4}$ $0.4\bar{9}$

23. The volume of a sphere is given by the formula $V = \frac{4\pi r^3}{3}$, where r is the radius of the sphere.

a) What is the volume of a sphere with a radius of 25.4 cm? Express the answer to two decimal places.

b) Determine the radius of a sphere with a volume of 384.66 cm³. Express the answer to one decimal place.