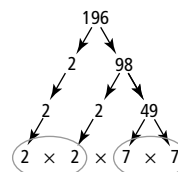


Chapter 4 Review

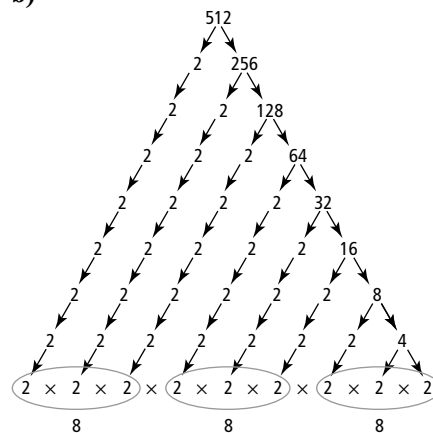
4.1 Square Roots and Cube Roots

1. a) perfect square b) perfect cube
 c) perfect square d) perfect cube
 e) perfect square f) both
2. a)



There is one group of 2 and one group of 7.
 Therefore, the square root of 196 is $(2)(7) = 14$.

b)



There are three equal groups of 2s.
 Therefore, the cube root of 512 is $(2)(2)(2) = 8$.

3. a) 16 b) 13
c) 30
4. 19 cm by 19 cm
5. a) Area of floor = 81 ft^2
Area of one tile: Convert from inches to feet: $6 \text{ in.} = 0.5 \text{ ft}$
Area of tile in feet: $(0.5)^2 = 0.25 \text{ ft}^2$
Divide the area of the floor by the area of the tile to determine the number of tiles needed:
 $\frac{\text{area of floor}}{\text{area of tile}} = \frac{81}{0.25} = 324$
She will need 324 tiles.
- b) $324 \times 1.38 = 447.12$ The tiles will cost \$447.12.

4.2 Integral Exponents

6. a) $\frac{1}{a^6}$ b) $(3.5)^7$
c) $\left(\frac{b^2}{b^{-5}}\right)^2 = \frac{b^{(2)(2)}}{b^{(-5)(2)}}$
 $= \frac{b^4}{b^{-10}}$
 $= b^4 - (-10)$
 $= b^4 + 10$
 $= b^{14}$
7. a) $\frac{1}{81}$ or 0.012 b) 2.097
c) 3933.798
8. a) approximately 11.56 g
b) approximately 0.045 g
c) approximately 11 840 g
9. a) 146 475 moose
b) 158 925 moose
c) 202 993 moose
10. a) approximately 331 177 moose
b) approximately 64 783 moose

4.3 Rational Exponents

11. a) As a fraction:
 $(5^{-0.5})^{\frac{3}{4}} = (5^{-\frac{1}{2}})^{\frac{3}{4}}$
 $= 5^{\left(-\frac{1}{2}\right)\left(\frac{3}{4}\right)}$
 $= 5^{-\frac{3}{8}}$
 $= \frac{1}{5^{\frac{3}{8}}}$

As a decimal:

$$\begin{aligned}(5^{-0.5})^{\frac{3}{4}} &= (5^{-0.5})^{0.75} \\ &= 5^{(-0.5)(0.75)} \\ &= 5^{-0.375} \\ &= \frac{1}{5^{0.375}}\end{aligned}$$

b) As a fraction:

$$\begin{aligned}\frac{2.8^{0.4}}{2.8^{-\frac{1}{2}}} &= \frac{2.8^{\frac{4}{10}}}{2.8^{-\frac{1}{2}}} \\ &= 2.8^{\frac{4}{10} - \frac{-1}{2}} \\ &= 2.8^{\frac{4}{10} + \frac{5}{10}} \\ &= 2.8^{\frac{9}{10}}\end{aligned}$$

As a decimal:

$$\begin{aligned}\frac{2.8^{0.4}}{2.8^{-\frac{1}{2}}} &= \frac{2.8^{0.4}}{2.8^{-0.5}} \\ &= 2.8^{0.4 - (-0.5)} \\ &= 2.8^{0.4 + 0.5} \\ &= 2.8^{0.9}\end{aligned}$$

$$\begin{aligned}\text{c) } (27x^{-2})^{\frac{-2}{3}} &= (27)^{\frac{-2}{3}} (x^{-2})^{\frac{-2}{3}} \\ &= \left(\frac{1}{27^{\frac{2}{3}}}\right) \left(x^{(-2)\left(\frac{-2}{3}\right)}\right) \\ &= \left(\frac{1}{\sqrt[3]{27^2}}\right) \left(x^{\frac{4}{3}}\right) \\ &= \left(\frac{1}{3^2}\right) \left(x^{\frac{4}{3}}\right) \\ &= \frac{x^{\frac{4}{3}}}{9}\end{aligned}$$

$$12. (27x)^{\frac{-1}{3}} (9x)^{\frac{1}{2}} = \frac{3x^{\frac{1}{2}}}{3x^{\frac{1}{3}}}, \text{ not } 243x^{\left(\frac{-1}{3} + \frac{1}{2}\right)}.$$

The correct answer is $x^{\frac{1}{6}}$.

$$\begin{aligned}13. \text{ a) } \frac{8^{\frac{5}{3}}}{4^2} &= \frac{(2^3)^{\frac{5}{3}}}{(2^2)^2} \\ &= \frac{2^{(3)\left(\frac{5}{3}\right)}}{2^{(2)(2)}} \\ &= \frac{2^5}{2^4} \\ &= 2^{5-4} \\ &= 2\end{aligned}$$

$$\begin{aligned}\text{b) } \frac{125^{\frac{2}{3}}}{5^{-1}} &= \frac{(5^3)^{\frac{2}{3}}}{5^{-1}} \\ &= \frac{5^{(3)(\frac{2}{3})}}{5^{-1}} \\ &= 5^{2-(-1)} \\ &= 5^3 \\ &= 125\end{aligned}$$

$$\begin{aligned}\text{c) } \frac{9^{\frac{3}{2}}}{27^{\frac{1}{3}}} &= \frac{(3^2)^{\frac{3}{2}}}{(3^3)^{\frac{1}{3}}} \\ &= \frac{3^3}{3} \\ &= 3^{3-1} \\ &= 3^2 \\ &= 9\end{aligned}$$

$$\begin{aligned}\text{d) } \frac{8^{\frac{2}{3}}}{32^{\frac{4}{5}}} &= \frac{(2^3)^{\frac{2}{3}}}{(2^5)^{\frac{4}{5}}} \\ &= \frac{2^{(3)(\frac{2}{3})}}{2^{(5)(\frac{4}{5})}} \\ &= \frac{2^2}{2^4} \\ &= 2^{2-4} \\ &= 2^{-2} \\ &= \frac{1}{2^2} \\ &= \frac{1}{4}\end{aligned}$$

14. a) 15.5816

b) 0.0917

c) 9.8821

d) 19.5313

15. \$1651.05

16. approximately \$525.28

17. 0.706 mg

21. a) $6\sqrt{7}$
c) $2\sqrt[4]{3}$

b) $4\sqrt[3]{6}$
d) $3\sqrt[3]{15}$

22. a) Irrational numbers: $\frac{4\sqrt{5}}{2}$; Order: $\sqrt[3]{216}$, $\frac{4\sqrt{5}}{2}$, $\sqrt{0.25}$, $0.2\bar{3}$

b) Irrational numbers: $\sqrt[3]{32}$; Order: $\frac{3\sqrt{25}}{4}$, $\sqrt[3]{32}$, $\sqrt{0.81}$, 0.49

23. a) approximately 68 607.17 cm³

b) approximately 4.5 cm

4.4 Irrational Numbers

18. a) $\sqrt[5]{x^2}$ b) $(\sqrt[5]{16s^3})^3$

c) $\left(\sqrt[4]{\frac{a^5}{7}}\right)^3$

d) $\sqrt[3]{\frac{1}{5a^4}}$

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

b) $5^{\frac{1}{2}}$

c) $4x^{\frac{3}{5}}$

d) $(4y)^{\frac{4}{3}}$

20. a) $\sqrt{112}$

b) $\sqrt{180}$

$$\begin{aligned}\text{c) } 3\sqrt[3]{2} &= \sqrt[3]{(3^3)\sqrt[3]{2}} \\ &= \sqrt[3]{(3^3)(2)} \\ &= \sqrt[3]{(27)(2)} \\ &= \sqrt[3]{54}\end{aligned}$$

d) $\sqrt[3]{-375}$