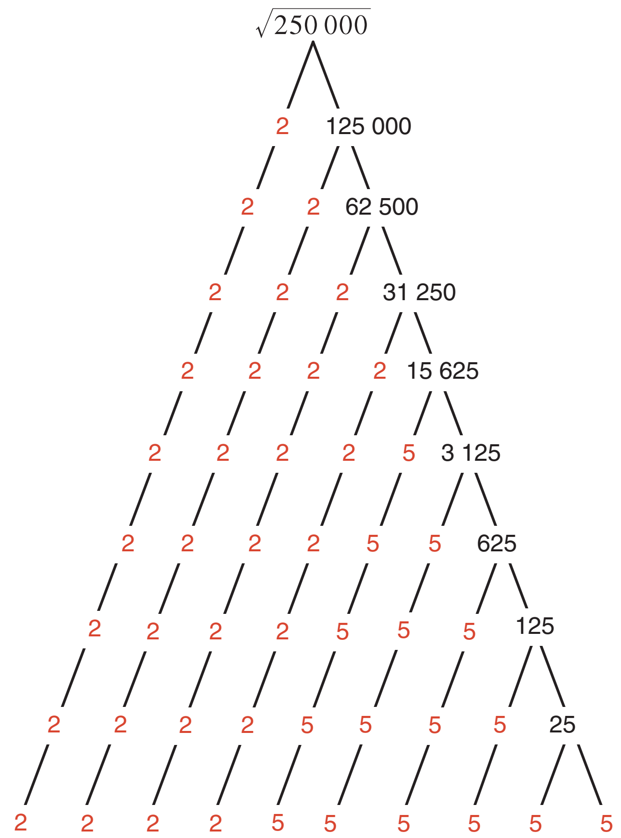
Lesson 4.2: Mixed and Entire Radicals

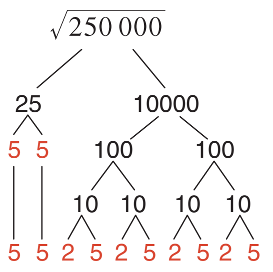
Practice – II

1. Without the use of a calculator, evaluate $\sqrt{250\,000}$.

Prime factorization can be used in a couple of ways.



or



$$\begin{aligned}\sqrt{250\,000} &= \sqrt{2^2 \times 2^2 \times 5^2 \times 5^2 \times 5^2} \\ &= \sqrt{2^2} \times \sqrt{2^2} \times \sqrt{5^2} \times \sqrt{5^2} \times \sqrt{5^2} \\ &= 2 \times 2 \times 5 \times 5 \times 5 \\ &= (2 \times 5) \times (2 \times 5) \times 5 \\ &= 10 \times 10 \times 5 \\ &= 500\end{aligned}$$

2. Evaluate the following.

   a. $-\sqrt[3]{27}$

   $$\begin{aligned}-\sqrt[3]{27} &= -1 \times \sqrt[3]{27}\\ &= -1 \times \sqrt[3]{3^3}\\ &= -1 \times 3\\ &= -3\end{aligned}$$

   b. $\sqrt[3]{\frac{125}{512}}$

   $$\begin{aligned}\sqrt[3]{\frac{125}{512}} &= \frac{\sqrt[3]{125}}{\sqrt[3]{512}}\\ &= \frac{\sqrt[3]{5^3}}{\sqrt[3]{8^3}}\\ &= \frac{5}{8}\end{aligned}$$

3. Simplify.

   a. $\sqrt{72}$

   $$\begin{aligned}\sqrt{72} &= \sqrt{36 \times 2}\\ &= \sqrt{36} \times \sqrt{2}\\ &= \sqrt{6^2} \times \sqrt{2}\\ &= 6\sqrt{2}\end{aligned}$$

   b. $\sqrt[3]{24}$

   $$\begin{aligned}\sqrt[3]{24} &= \sqrt[3]{8 \times 3}\\ &= \sqrt[3]{8} \times \sqrt[3]{3}\\ &= \sqrt[3]{2^3} \times \sqrt[3]{3}\\ &= 2\sqrt[3]{3}\end{aligned}$$

4. Express each of the mixed radicals as an entire radical.

a. $5\sqrt{2}$

$$\begin{aligned} 5\sqrt{2} &= \sqrt{5^2 \times 2} \\ &= \sqrt{25 \times 2} \\ &= \sqrt{50} \end{aligned}$$

b. $2\sqrt[3]{9}$

$$\begin{aligned} 2\sqrt[3]{9} &= \sqrt[3]{2^3} \times \sqrt[3]{9} \\ &= \sqrt[3]{2^3 \times 9} \\ &= \sqrt[3]{8 \times 9} \\ &= \sqrt[3]{72} \end{aligned}$$

Please complete *Lesson 4.2 Explore Your Understanding Assignment* located in *Workbook 4.2* before proceeding to *Lesson 4.3*.

Lesson 4.3: The Irrational Number System

Practice – III

1. What is the difference between Rational, Irrational, and Real Numbers?
Rational Numbers can be written as fractions and as repeating or terminating decimals. Irrational Numbers are non-terminating and non-repeating decimals. The Real Number system comprises both Rational and Irrational Numbers.

2. Using benchmarks, what is the approximate value of $\sqrt[3]{2\,185}$?

$$\sqrt[3]{1\,728} < \sqrt[3]{2\,185} < \sqrt[3]{2\,197}$$
$$\sqrt[3]{12^3} < \sqrt[3]{2\,185} < \sqrt[3]{13^3}$$
$$12 < \sqrt[3]{2\,185} < 13$$
$$\sqrt[3]{2\,185} \doteq 12.9$$