

Lesson 1 Simplifying Radical Expressions

Recall:

$$\longrightarrow \sqrt[n]{x} \longleftarrow$$

Recall: Multiplication Property of Radicals:

$$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b},$$

Where n is a natural number, and a and b are real numbers

Examples

Simplify the following radicals.

1. $\sqrt{50x^7}$

2. $\sqrt[3]{24x^{10}y^3}$

Similarly to the Multiplication Property of Radicals, we can simplify radicals using the division property of radicals.

Equivalent expressions for any number have the same value.

• $\sqrt{\frac{16}{9}}$ is equivalent to $\frac{\sqrt{16}}{\sqrt{9}}$ because:

$$\begin{aligned} \sqrt{\frac{16}{9}} &= \sqrt{\frac{4}{3} \cdot \frac{4}{3}} & \text{and} & \quad \frac{\sqrt{16}}{\sqrt{9}} = \frac{\sqrt{4 \cdot 4}}{\sqrt{3 \cdot 3}} \\ &= \frac{4}{3} & & \quad = \frac{4}{3} \end{aligned}$$

A similar result is true for any index, n .

Division Property of Radicals:

$$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}, \text{ where } n \in \mathbb{N} \text{ and } a, b, \sqrt[n]{a}, \sqrt[n]{b} \in \mathbb{R}, b \neq 0$$

Examples

3. Write $\sqrt[3]{-\frac{40}{81}}$ as a mixed radical.

4. Write $-2\sqrt[3]{\frac{3}{4}}$ as an entire radical

Examples

Simply, if possible. State the permissible values of the variable.

5. $\sqrt{5a^2}$

6. $\sqrt{-27b^5}$

7. $\sqrt[4]{7z}$

8. $\sqrt[3]{24x^7}$