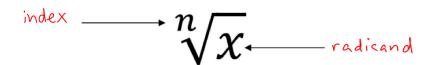
Lesson 1 Simplifying Radical Expressions

Recall:



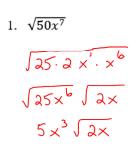
Recall: Multiplication Property of Radicals:

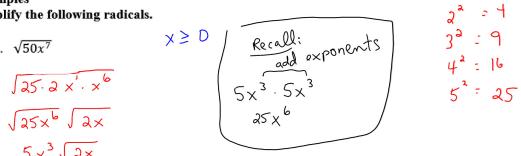
$$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b},$$

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

Examples

Simplify the following radicals.







2.
$$\sqrt[3]{24x^{10}y^3}$$
 exponents to be divisible by 3

 $\sqrt[3]{8\cdot 3} \times \sqrt[9]{\cdot x'} \times \sqrt[3]{3} = 8$
 $\sqrt[3]{8\cdot 3} \times \sqrt[9]{\cdot x'} \times \sqrt[3]{3} = 27$
 $\sqrt[3]{8 \times \sqrt[9]{3}} \times \sqrt[3]{3} \times \sqrt[3]{3$

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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:

$$\sqrt{\frac{16}{9}} = \sqrt{\frac{4}{3} \cdot \frac{4}{3}} \quad \text{and} \quad \frac{\sqrt{16}}{\sqrt{9}} = \frac{\sqrt{4 \cdot 4}}{\sqrt{3 \cdot 3}}$$
$$= \frac{4}{3} \qquad \qquad = \frac{4}{3}$$

A similar result is true for any index, n.

Division Property of Radicals:

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

Examples

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

$$\frac{3\sqrt{-40}}{3\sqrt{81}} \qquad \frac{\sqrt[3]{-8.5}}{\sqrt[3]{27.3}} \qquad -2\sqrt[3]{5} \qquad 3^3 = 27$$

$$\sqrt[3]{3\sqrt{81}} \qquad \sqrt[3]{3\sqrt{3}} \qquad \sqrt[3]{3} = 64$$

$$\frac{3}{3}\sqrt{\frac{3}{2}}$$

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

$$3\sqrt{\frac{2}{8\cdot3}}$$

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Examples

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