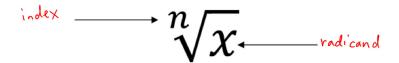
Pre-Calculus 11 Radicals

Lesson1 Simplifying Radical Expressions



Recall:

Perfect Squares	Square Roots	Cube Roots
2 ² = 4	$\sqrt{4} = \lambda$	³ √8 = ∠
3 ² = 9	$\sqrt{9} = 3$	³ √27 = 3
$5^2 = 25$	√16 = 	³ √64 = 4
$10^2 = 100$	$\sqrt{100} = 0$	$\sqrt[3]{1000} = 10$

Steps to Simplifying Radicals

- 1. Find largest perfect square that will divide evenly into the number under your radical sign.
- 2. Write the number under the radical as a product, including the perfect square as one factor.
- 3. Separate each number with its own radical sign.
- 4. Simplify.

Note:

- If you cannot find a perfect square that divides evenly then it is already in simplest form.
- If you do not choose the *largest* perfect square, you will need to repeat the process.

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

Pre-Calculus 11 Radicals

Examples – Simplify the following radicals

1.
$$\sqrt{50} = \sqrt{25.2}$$

complex
radical

5/2

simple radical

mixed radical

2.
$$\sqrt[3]{54} = \sqrt[3]{2 \cdot 2}$$

$$\sqrt[3]{2} \sqrt[3]{2}$$

$$\sqrt[3]{3} \sqrt[3]{2}$$

Examples - Arrange in order from least to greatest

3.
$$9\sqrt{2}$$
, $2\sqrt{6}$, $8\sqrt{3}$

$$\sqrt{9^2 \cdot 2} \qquad \sqrt{2^2 \cdot 6} \qquad \sqrt{8^2 \cdot 3}$$

$$\sqrt{162} \qquad \sqrt{24} \qquad \sqrt{192}$$

$$\sqrt{162} \qquad \sqrt{34} \qquad \sqrt{162}, \sqrt{192}$$

$$\sqrt{6} \qquad 2\sqrt{6}, 9\sqrt{2}, 8\sqrt{3}$$
4. $7\sqrt[3]{3}$, $3\sqrt[3]{3}$, $8\sqrt[3]{3}$

33/3,73/3,83/3

 $7\sqrt[3]{3}$, $3\sqrt[3]{3}$, $8\sqrt[3]{3}$ like radicals

5.
$$7\sqrt[3]{2}$$
, $6\sqrt[4]{5}$, $4\sqrt{5}$ if use est 8.819, 8.972, 8.944 8 and 9

Pre-Calculus 11 Radicals

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

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

$$\frac{\sqrt[3]{-40}}{\sqrt[3]{81}} \qquad \frac{\sqrt[3]{-8.5}}{\sqrt[3]{27.3}} \qquad \frac{\sqrt[3]{-8.3}\sqrt{5}}{\sqrt[3]{27.3}\sqrt{5}} \qquad \frac{-2\sqrt[3]{5}}{\sqrt[3]{3}\sqrt{3}} \qquad \sqrt{-2\sqrt[3]{5}\sqrt{5}}$$

7. Write $-2\frac{3}{4} \frac{3}{4}$ as an entire radical

$$3\sqrt{-2}\left(\frac{3}{4}\right)$$

$$3\sqrt{-8}\left(\frac{3}{4}\right)$$

$$3\sqrt{-6}$$

Pre-Calculus 11 Radicals

Examples - Simplifying and defining radicals

9.
$$\sqrt{-27b^8}$$

if b^{70}

cannot square root a negative

 $\sqrt{-9.3b^4.b}$
 $\sqrt{9}\sqrt{-3}\sqrt{5}$
 $\sqrt{5}$
 $\sqrt{7}$
 $\sqrt{7}$
 $\sqrt{7}$
 $\sqrt{7}$
 $\sqrt{7}$
 $\sqrt{7}$
 $\sqrt{7}$

olready in simplified form

Assignment: Pg. 100; #3a,c, 4a, c, 5b, 6a, d, 7b, 8a, 10a,b, 11a, 12, 14a,c