

2-1 Simplifying Radicals

Friday, October 18, 2019 12:23 PM



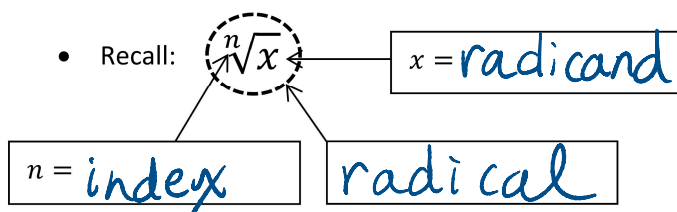
1-
Simplifying...



1-
Simplifying...

2.1 SIMPLIFYING RADICALS

Name: _____ Blk: _____



- Evaluate:

a. $\sqrt{144} =$

b. $\sqrt[3]{27} =$

c. $\sqrt[4]{16} =$

- Complete the table:

Expression	$x = 2$	$x = -2$
x^2		
$\sqrt{x^2}$		
x^3		
$\sqrt[3]{x^3}$		
x^4		
$\sqrt[4]{x^4}$		
x^5		
$\sqrt[5]{x^5}$		

→ How can you predict the sign of a radical expression?

- Recall: $(\sqrt[n]{x})(\sqrt[n]{y}) = \sqrt[n]{xy}$

Eg. $(\sqrt[3]{7})(\sqrt[3]{3}) =$

$$\frac{\sqrt[n]{x}}{\sqrt[n]{y}} = \sqrt[n]{\frac{x}{y}}$$

Eg. $(\frac{\sqrt{30}}{\sqrt{6}}) =$

- Recall: Whole/Entire Radical ↔ Mixed Radical

a. $\sqrt{24} =$

b. $4\sqrt[3]{2} =$

1. Change to a mixed radical:

- Option 1: Prime factorize
- Option 2: Factor squares, cubes, fourths, etc

a. $\sqrt[3]{\frac{-16}{135}}$

$$= \sqrt[3]{\frac{-8 \cdot 2}{27 \cdot 5}}$$

$$= \frac{-2}{3} \sqrt[3]{\frac{2}{5}}$$

b. $\sqrt[4]{m^7}$ $m^{\frac{7}{4}}$

$$= \sqrt[4]{m^4 \cdot m^3}$$

$$= m \sqrt[4]{m^3}$$

c. $\sqrt{63n^7p^4}$ $\sqrt{n^6} = n^{\frac{6}{2}} = n^3$

$$= \sqrt{9 \cdot 7 \cdot n^6 \cdot n \cdot p^4}$$

$$= 3n^3 p^2 \sqrt{7n}$$

2. Change to an entire radical

- Move the constant on the outside of the radical into the radical and write it as a power with an exponent equivalent to the index of the radical

a. $-3 \sqrt[4]{\frac{2}{27}}$ (3^4)

$$= -\sqrt[4]{3^4 \cdot \frac{2}{27}}$$

$$= -\sqrt[4]{\frac{16 \cdot 2}{27}}$$

$$= -\sqrt[4]{\frac{32}{27}}$$

$$= -\sqrt[4]{\frac{32}{27}}$$

b. $x^3 \sqrt{x}$

$$= \sqrt[3]{x^3 \cdot x}$$

$$= \sqrt[3]{x^4}$$

c. $2k^2 (\sqrt[3]{4k})$

$$= \sqrt[3]{(2k^2)^3 4k}$$

$$= \sqrt[3]{8k^6 4k}$$

$$= \sqrt[3]{32k^7}$$

3. Arrange from greatest to least:

- Option 1: change all your radicals to decimals and compare
- Option 2: change all radicals into ~~mixed~~ ^{entire} radicals with the same index and compare

a. $5, 3\sqrt{3}, 2\sqrt{6}, \sqrt{23}$ \rightarrow change to entire radicals.

$\sqrt[3]{75}, \sqrt[3]{27}, \sqrt[3]{24}, \sqrt{23}$ \rightarrow all $\sqrt{\quad}$

* Final answer should be in its original form

$$3\sqrt{3}, 5, 2\sqrt{6}, \sqrt{23}$$

b. $9\sqrt[3]{2}, 11\sqrt[3]{2}, 8\sqrt[3]{2}$

$11\sqrt[3]{2}, 9\sqrt[3]{2}, 8\sqrt[3]{2}$

• same radicand AND index
• just look & rearrange.

c. $3\sqrt[4]{8}, 4\sqrt[4]{2}, 3\sqrt[4]{5}$

$4\sqrt[4]{2}, 3\sqrt[4]{5}, 3\sqrt[4]{8}$

• use your calc. → change to a decimal.

Defining your variable

- When you have to simplify radicals with variables, you must DEFINE your variables or state your RESTRICTIONS
- If the index is EVEN, the radicand must be NON-NEGATIVE (≥ 0), or the radical is undefined (impossible!)
 - In order to indicate that we won't let this happen, we have to set the restrictions for the expression
- Odd index radicals have no restrictions
- Eg. For which values of the variable is each radical defined? (In other words, what values of x (or whatever the variable is) could we substitute into the following radicals to ensure that we would get an actual answer?) Simplify the radical if possible.

a. $\sqrt{27x^2} \quad x \in \mathbb{R}$

$= \sqrt{9 \cdot 3 \cdot x^2}$ e.g. $\sqrt{27x^4} \quad x \in \mathbb{R}$

$= 3|x|\sqrt{3}$ $= \sqrt{9 \cdot 3x^4}$

$= 3x^2\sqrt{3}$

b. $\sqrt[3]{24y^5} \quad y \in \mathbb{R}$

$= \sqrt[3]{8 \cdot 3y^3 \cdot y^2}$

$= 2y\sqrt[3]{3y^2}$

c. $\sqrt[4]{-12x^3} \quad x \leq 0$

cannot simplify

d. $\sqrt{45b^2} \quad a \in \mathbb{R}$

$= \sqrt{9 \cdot 5 \cdot a^2}$

$= 3|a|\sqrt{5}$

$$\sqrt{x^2} = |x|$$

*Use absolute value notation if the variable can be any real number but the radicand must be positive (index is even)

Assignment:

+ WB pg's #5-7, 10-14, 16
95-101

Finish all collection.

10-101



Finish self reflection.