Simplifying Radical Expressions.

Monday, February 3, 2020 8:47 AM

Review: Simplify $\sqrt{80}$

$\sqrt{16}\cdot\sqrt{5}$

$4\sqrt{5}$

$\sqrt{80}$

$\sqrt{4}\cdot\sqrt{20}$

$2\sqrt{20}$

$2\cdot\sqrt{4}\cdot\sqrt{5}$

$2\cdot 2\sqrt{5}$

$4\sqrt{5}$

Write as an entire radical: $3\sqrt{5}$

$=\sqrt{3^2\cdot 5}$

$=\sqrt{45}$

Write in order from smallest to largest

$8\sqrt{2}$, $5\sqrt{6}$, $6\sqrt{3}$

$\sqrt{8^2\cdot 2}$, $\sqrt{5^2\cdot 6}$, $\sqrt{6^2\cdot 3}$

$\sqrt{128}$, $\sqrt{150}$, $\sqrt{108}$

$6\sqrt{3}$, $8\sqrt{2}$, $5\sqrt{6}$

$8\sqrt{3}$, $6\sqrt{3}$, $12\sqrt{3}$ just order coefficients

$6\sqrt{5}$, $4\sqrt[3]{10}$, $5\sqrt[4]{18}$ → evaluate with calculator

Simplify: $\sqrt[3]{\frac{-32}{135}} = \frac{\sqrt[3]{-32}}{\sqrt[3]{135}} = \frac{\sqrt[3]{-8}\cdot\sqrt[3]{4}}{\sqrt[3]{27}\cdot\sqrt[3]{5}}$

$\sqrt[3]{135}$ $\sqrt[3]{27}\sqrt[3]{5}$

$= \frac{-2}{3}\sqrt[3]{\frac{4}{5}}$

Write as an entire radical:

$-3\sqrt[4]{\frac{2}{3}} = -\sqrt[4]{\frac{3^4}{1}\frac{2}{3}} = -\sqrt[4]{54}$

Try Simplify: $\sqrt{\frac{8}{75}} = \frac{\sqrt{8}}{\sqrt{75}} = \frac{\sqrt{4}\cdot\sqrt{2}}{\sqrt{25}\sqrt{3}} = \frac{2}{5}\sqrt{\frac{2}{3}}$

Write as an entire radical: $-2\sqrt[3]{\frac{5}{2}}$

$-2\sqrt[3]{\frac{5}{2}} = \sqrt[3]{(-2)^3\cdot\frac{5}{2}} = \sqrt[3]{-8\cdot\frac{5}{2}} = \sqrt[3]{-20}$

$\sqrt{-25}$ undefined because $x^2 \neq -25$

$\sqrt[3]{-8}$ is defined because $(-2)^3 = -8$

$\sqrt{x}$ is defined for $x \geq 0$

$\sqrt[3]{x}$ is defined for $x \in R$

means "x is an element of the set of Real numbers"

For which values of the variables are the following defined?

a) $\sqrt{-27x^3}$ $x \leq 0$, $x \in R$

b) $\sqrt[3]{10x^4}$ $x \in R$

Simplify $\sqrt{32x^2}$ First: do restrictions

$x \in R$

$\sqrt{25} = 5$

$(-5)^2 = 25$

$\sqrt{32}\ \sqrt{x^2}$

$\sqrt{16} \cdot \sqrt{2} \cdot |x|$

$4\sqrt{2} \cdot |x| = 4|x|\sqrt{2}$

$\sqrt{27x^5}$ $x \geq 0$, $x \in R$

$\sqrt{27} \cdot \sqrt{x^5}$

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

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

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

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

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

$|x|\sqrt{x}$

$\sqrt{x^4} = x^2$

$\sqrt{x^4} = x^{\frac{4}{2}} = x^2$

$\sqrt{x^6} = x^{\frac{6}{2}} = x^3$

$\sqrt[3]{x^6} = x^{\frac{6}{3}} = x^2$

Try Simplify $\sqrt{-18a^7}$ $a \leq 0$, $a \in R$

$\sqrt{-18} \cdot \sqrt{a^7}$

$\sqrt{9} \cdot \sqrt{-2}\ \sqrt{a^6}\sqrt{a}$

$3\sqrt{-2}|a^3|\sqrt{a}$ $= 3|a^3|\sqrt{-2a}$

You need to use absolute value signs when

① you have an even root $\sqrt{\ }$, $\sqrt[4]{\ }$, ...

② your variable is not restricted from being negative i.e. $x \in \mathbb{R}$ or $x \leq 0$

③ Once you have taken the root of the variable term, its exponent is odd eg x, x^3, x^5, ...

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Quiz tomorrow (Th, Fri)