Warm-ups from 5.1/5.2

Tuesday, February 11, 2020 11:36 AM

① Solve: $x^4 = 81$

$x = \pm\sqrt[4]{81}$

$x = \pm 3$

$x^3 = -64$

$x = \sqrt[3]{-64}$

$x = -4$

② Simplify: $\sqrt{4200}$, $\sqrt[3]{\dfrac{162a^2}{b^4}}$, $\dfrac{\sqrt[3]{32a^3b^4}}{\sqrt[3]{2ab^7}}$

$(a, b \geq 0)$

$$\begin{array}{l} 2 \,|\, 4200 \\ 2 \,|\, 2100 \\ 5 \,|\, 1050 \\ 3 \,|\, 210 \\ 5 \,|\, 70 \\ 2 \,|\, 14 \\ 7 \end{array}$$

$= \sqrt{2^3 \cdot 5^2 \cdot 3 \cdot 7}$

$= 2 \cdot 5\sqrt{2 \cdot 3 \cdot 7}$

$= 10\sqrt{42}$

$= \dfrac{\sqrt[3]{162} \cdot \sqrt[3]{a^2}}{\sqrt[3]{b^4}}$

$= \dfrac{\sqrt[3]{2 \cdot 3^4} \cdot \sqrt[3]{a^2}}{\sqrt[3]{b^3 \cdot b}} = \dfrac{3\sqrt[3]{6} \cdot \sqrt[3]{a^2}}{b\sqrt[3]{b}}$

$= \dfrac{3}{b} \cdot \sqrt[3]{\dfrac{6a^2}{b}}$

162 → 2, 81; 81 → 9, 9; 9 → 3, 3; 9 → 3, 3

$= \dfrac{2ab\sqrt[3]{4b}}{b^2\sqrt[3]{2ab}}$

$= \dfrac{2a}{b}\sqrt[3]{\dfrac{4b}{2ab}}$

$= \dfrac{2a}{b}\sqrt[3]{\dfrac{2}{a}} = \dfrac{2}{b}\sqrt{2a^2}$

③ Convert to Entire radical : $-\frac{x^3}{8}\sqrt[3]{y^2}$

$$=\sqrt[3]{\left(\frac{-x^3}{8}\right)^3 y^2} = \sqrt[3]{-\frac{x^9y^2}{512}}$$

④ Explain why $\sqrt{x^4y^2} = x^2 \cdot |y|$ needs an absolute value on y but not x

$$\sqrt{y^2} = |y| \quad b/c \quad \overset{y=-2}{\sqrt{(-2)^2}} = \sqrt{4} = 2$$

x^2 always (+)

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

$|x|^2 = x^2$ but $|y| \neq y$