

7.2 multiplying and Dividing Radical Expressions

Roots must be the same!

$$\textcircled{1} \quad \sqrt{3} \cdot \sqrt{12} = \sqrt{36} = 6$$

$$\textcircled{2} \quad \sqrt[3]{3} \cdot \sqrt[3]{-9} = \sqrt[3]{-27} = -3$$

$$\textcircled{3} \quad \sqrt[4]{4} \cdot \sqrt[4]{-4} = \sqrt[4]{-16} \text{ undefined}$$

$$\textcircled{4} \quad \sqrt[3]{80x^4y^5} = 2xy\sqrt[3]{10xy^2}$$

Handwritten work for problem 4: The radicand $80x^4y^5$ is broken down into $8 \cdot 10 \cdot x^3 \cdot x \cdot y^3 \cdot y^2$. The factors 8 , x^3 , and y^3 are circled, and their cube roots are shown as 2 , x , and y respectively. The remaining factors $10xy^2$ are left under the cube root. The final result is $2xy\sqrt[3]{10xy^2}$.

$$\textcircled{5} \quad 3\sqrt{7x^3} \cdot 2\sqrt{21x^3y^2}$$

$$6\sqrt{147x^6y^2}$$

Handwritten work for problem 5: The radicand $147x^6y^2$ is broken down into $7 \cdot 21 \cdot x^3 \cdot x^3 \cdot y^2$. The factors 7 , x^3 , and x^3 are circled, and their square roots are shown as 7 , x , and x respectively. The remaining factors $21y^2$ are left under the square root.

Handwritten work for problem 5: The factors 21 and y^2 are circled, and their square roots are shown as $\sqrt{21}$ and y respectively.

$$6 \cdot 7x^3y^1\sqrt{3} = \boxed{42x^3y\sqrt{3}}$$

$$\textcircled{6} \quad -\sqrt[3]{2x^2y^2} \cdot 2\sqrt[3]{40x^5y}$$

$$-2\sqrt[3]{80x^7y^3} = -2 \cdot 2x^2y\sqrt[3]{10x}$$

$\begin{matrix} 8 & 10 \\ 4\sqrt{2} & 2\sqrt{5} \\ 2\sqrt{2} & \end{matrix}$
 $\begin{matrix} \text{XXX} & \text{XXX} & \text{X} \\ \text{XXX} & \text{XXX} & \end{matrix}$
 $\begin{matrix} \text{XXX} & \text{XXX} & \text{XXX} & \text{XXX} \\ \text{XXX} & \text{XXX} & \end{matrix}$

$$= \boxed{-4x^2y\sqrt[3]{10x}}$$

Dividing

$$\textcircled{1} \quad \frac{\sqrt{243}}{\sqrt{27}} = \frac{\sqrt{9}}{\sqrt{1}} = \textcircled{3}$$

$$\textcircled{2} \quad \frac{\sqrt{12x^4}}{\sqrt{3x}} = \frac{\sqrt{4x^3}}{\sqrt{1}} = \textcircled{2x\sqrt{x}}$$

XXX

$$\textcircled{3} \quad \frac{\sqrt[4]{1024x^{15}}}{\sqrt[4]{4x}} = \sqrt[4]{256x^{14}} = 4x^3\sqrt[4]{x^2}$$

$\text{XXXX XXXX XXXX XXX}$

$$\begin{array}{r} 3 \\ 4 \overline{) 14} \\ \underline{12} \\ 2 \end{array}$$

Rationalizing the Denominator

$$\frac{\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{6}}{\sqrt{9}} = \boxed{\frac{\sqrt{6}}{3}}$$

↑
never allowed to leave a radical in the bottom of a fraction!
always try to reduce!

$$\begin{aligned}\sqrt{\frac{7}{5}} &= \frac{\sqrt{7}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} \\ &= \frac{\sqrt{35}}{\sqrt{25}} = \boxed{\frac{\sqrt{35}}{5}}\end{aligned}$$

$$\begin{aligned}\frac{\sqrt{2x^3}}{\sqrt{10xy}} &= \frac{\text{Reduce 1st}}{\sqrt{5y}} = \frac{x}{\sqrt{5y}} \cdot \frac{\sqrt{5y}}{\sqrt{5y}} \\ &= \boxed{\frac{x\sqrt{5y}}{5y}}\end{aligned}$$

$$\begin{aligned}\frac{\sqrt[3]{4}}{\sqrt[3]{6x}} &= \frac{\sqrt[3]{2}}{\sqrt[3]{3x}} \cdot \frac{\sqrt[3]{9x^2}}{\sqrt[3]{9x^2}} = \frac{\sqrt[3]{18x^2}}{\sqrt[3]{27x^3}} = \boxed{\frac{\sqrt[3]{18x^2}}{3x}} \\ &\quad \begin{matrix} 3 \cdot 3 \cdot x \cdot x \\ 3 \cdot 3 \cdot 3 \\ x \cdot x \cdot x \end{matrix}\end{aligned}$$

$$\frac{\sqrt[3]{4x^2}}{\sqrt[3]{x}} = \sqrt[3]{4x}$$

$$\frac{\sqrt[3]{18y^2}}{\sqrt[3]{12y}} = \frac{\sqrt[3]{3y}}{\sqrt[3]{2}} \cdot \frac{\sqrt[3]{4}}{\sqrt[3]{4}} = \frac{\sqrt[3]{12y}}{2}$$

$$\sqrt[3]{8}$$

p. 377 - 378 (2-54 even)
skip 36