7.2 Multiplying and Dividing Radical Expressions

Roots must be the same!

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

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

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

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

8 10

4 2 2 5

2 2

xxxx

yyyyy

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

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

7 21

7 3

xxxxxx

yy

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

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

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

$80 \to 8 \;\; 10$; $8 \to 4 \;\; 2$; $10 \to 2 \;\; 5$; $4 \to 2 \;\; 2$

xxx xxx x

yyy

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

Dividing

① $\dfrac{\sqrt{243}}{\sqrt{27}} = \sqrt{9} = 3$

② $\dfrac{\sqrt{12x^4}}{\sqrt{3x}} = \sqrt{4x^3} = 2x\sqrt{x}$

xx x

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

$\boxed{XXXX}\,\boxed{XXXX}\,\boxed{XXXX}\,XX$

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

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!

$$\sqrt{\frac{7}{5}} = \frac{\sqrt{7}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

$$= \frac{\sqrt{35}}{\sqrt{25}} = \boxed{\frac{\sqrt{35}}{5}}$$

Reduce 1st

$$\frac{\sqrt{2x^3}}{\sqrt{10xy}} = \frac{\sqrt{1x^2}}{\sqrt{5y}} = \frac{x}{\sqrt{5y}} \cdot \frac{\sqrt{5y}}{\sqrt{5y}}$$

$$= \boxed{\frac{x\sqrt{5y}}{5y}}$$

$$\frac{\sqrt[3]{4}}{\sqrt[3]{6x}} = \frac{\sqrt[3]{2}}{\sqrt[3]{\underline{3}\,\underline{x}}} \cdot \frac{\sqrt[3]{9x^2}}{\underset{3 \cdot 3xx}{\sqrt[3]{9x^2}}} = \frac{\sqrt[3]{18x^2}}{\underset{\substack{3 \cdot 3 \cdot 3\\ xxx}}{\sqrt[3]{27x^3}}} = \boxed{\frac{\sqrt[3]{18x^2}}{3x}}$$

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

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

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

p. 377-378 (2-54 even)

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