1.4 Multiply and Divide Radicals

***Same index #

Multiply the following radicals

Remember to simplify

$\sqrt{2}\cdot\sqrt{3}=\sqrt{6}$

$\sqrt[3]{5}\cdot\sqrt[3]{5}=\sqrt[3]{25}$

$5\sqrt{2}\cdot 3\sqrt{6}=15\sqrt{12}$

$\cancel{x}\cdot 3$

$2\cdot 15\sqrt{3}$

$30\sqrt{3}$

$5\sqrt[3]{x^2}\cdot\sqrt[3]{x^6}=$

$5\sqrt[3]{x^8}$

$x\cdot x\cdot x\ x\cdot x\cdot x\ x\cdot x$

$5x^2\sqrt[3]{x^2}$

$5x^2\sqrt[3]{x^2}$

Distributive Property

Remember to simplify

$2(\sqrt{3} + \sqrt{5}) =$

$2\sqrt{3} + 2\sqrt{5}$

$3(2\sqrt{7} + 5\sqrt{6}) =$

$6\sqrt{7} + 15\sqrt{6}$

Remember to simplify

$\sqrt{3}(\sqrt{7} + 5\sqrt{6}) =$

$\sqrt{21} + 5\sqrt{18}$

$\cancel{9} \cdot 2$

$\sqrt{21} + 3 \cdot 5\sqrt{2}$

$\sqrt{21} + 15\sqrt{2}$

$4\sqrt{5}(2\sqrt{3} - 1\sqrt{5}) =$

$8\sqrt{15} - 4\sqrt{25}$

$8\sqrt{15} - 20$

Remember to simplify

$$4(3\sqrt{6} - 2\sqrt{5}) =$$

$12\sqrt{6} - 8\sqrt{5}$

$$(\sqrt{3} + 5)(\sqrt{3} - 5) =$$

$(a+b)(c+d)$

$ac + ad + bc + bd$

$\sqrt{9} - \cancel{5\sqrt{3}} + \cancel{5\sqrt{3}} - 25$

$3 - 25$

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Remember to simplify

$$(\sqrt{6} + \sqrt{2})(\sqrt{6} - \sqrt{2}) =$$

$\sqrt{36} - \cancel{\sqrt{12}} + \cancel{\sqrt{12}} - \sqrt{4}$

$6 - 2 = 4$

$$(\square + 2)(4\sqrt{6} - 7\sqrt{5}) =$$

$4\sqrt{\underset{9\cdot 2}{18}} - 7\sqrt{15} + 8\sqrt{6} - 14\sqrt{5} =$

$12\sqrt{2} - 7\sqrt{15} + 8\sqrt{6} - 14\sqrt{5}$

What if the index numbers are different?

$$\sqrt{6} \cdot \sqrt[3]{7} = 6^{\frac{1}{2}} \cdot 7^{\frac{1}{3}} = \text{Not Possible}$$

VS

$$\sqrt{6} \cdot \sqrt[3]{6} = 6^{\frac{1}{2}} \cdot 6^{\frac{1}{3}} = 6^{5/6}$$

Divide the radicals

(rationalize denominator)

$$\sqrt{\frac{36}{144}} = \frac{\sqrt{36}}{\sqrt{144}} = \frac{6}{12} = \frac{1}{2}$$

$$\sqrt{\frac{36}{144}} = \sqrt{\frac{1}{4}} = \frac{\sqrt{1}}{\sqrt{4}} = \frac{1}{2}$$

$$\sqrt{\frac{\cancel{3}^{1}}{\cancel{12}_{4}}} = \sqrt{\frac{1}{4}} = \frac{\sqrt{1}}{\sqrt{4}} = \frac{1}{2}$$

$$\sqrt{\frac{10}{5}} = \frac{\sqrt{10}}{\sqrt{5}} = \sqrt{2}$$

(rationalize denominator)

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

$$\frac{\sqrt{\cancel{3}_1}}{\sqrt{\cancel{6}_2}} = = \frac{1}{\sqrt{2}}\left(\frac{\sqrt{2}}{\boxed{\sqrt{2}}}\right) = \frac{\sqrt{2}}{2}$$

$$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

(rationalize denominator)

Reduce fraction or simplify the 9 first?

$$\sqrt{\frac{\cancel{3}_1}{\cancel{9}_3}} = \frac{\sqrt{3}}{\sqrt{9}} = \frac{\sqrt{3}}{3}$$

$$= \frac{1}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right) = \frac{\sqrt{3}}{3}$$

(rationalize denominator)

$$\frac{8}{\sqrt{2}} =$$

$$\frac{8}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right) = \frac{\cancel{8}\sqrt{2}}{\cancel{2}}$$

$$= 4\sqrt{2}$$

$$\frac{\sqrt{40}}{\sqrt{75}} = \frac{\sqrt{8}}{\sqrt{15}}$$

$$= \frac{2\sqrt{2}}{\sqrt{15}}\left(\frac{\sqrt{15}}{\sqrt{15}}\right) = \frac{2\sqrt{30}}{15}$$

$$\sqrt[3]{\frac{x^4}{x^1}} =$$

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

$$\frac{\sqrt{9m}}{18} = \frac{\cancel{3}^{1}\sqrt{m}}{\cancel{18}_{6}} = \frac{\sqrt{m}}{6}$$

$$\frac{\sqrt{x^2}}{3\sqrt{5}} = \frac{x}{3\sqrt{5}}\left(\frac{\sqrt{5}}{\sqrt{5}}\right) =$$

$$\frac{x\sqrt{5}}{3\cdot 5} = \frac{x\sqrt{5}}{15}$$

$$\frac{\sqrt[3]{5}}{\sqrt[3]{9}}\,\frac{\sqrt[3]{3}}{\sqrt[3]{3}} = \frac{\sqrt[3]{15}}{3}$$

$3\cdot 3$