Algebra II – Radicals Name _____

Division with Radicals

Rule 1 - If the radical terms have a factor in common, combine them as one big radical and reduce.

Ex 1 - $\frac{\sqrt{10}}{\sqrt{2}} = \sqrt{\frac{10}{2}} = \sqrt{5}$

Ex 2 - $\frac{\sqrt{12}}{\sqrt{3}} = \sqrt{\frac{12}{3}} = \sqrt{4} = 2$

Rule 2 – If the radicals do not have a factor in common, "rationalize the denominator." This means, turn the denominator into a rational number. (make denominator an integer)

Ex 3 - $\frac{1}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \boxed{\frac{\sqrt{5}}{5}}$

Ex 4 - $\frac{3}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{3\sqrt{6}}{6} = \boxed{\frac{\sqrt{6}}{2}}$

Ex 5 - $\frac{12}{\sqrt[3]{3}} \cdot \frac{\sqrt[3]{3}}{\sqrt[3]{3}} \cdot \frac{\sqrt[3]{3}}{\sqrt[3]{3}} = \frac{12\sqrt[3]{9}}{3} = \boxed{4\sqrt[3]{9}}$

Ex 6 - $\frac{15}{\sqrt[3]{25}} \cdot \frac{\sqrt[3]{25}}{\sqrt[3]{25}} \cdot \frac{\sqrt[3]{25}}{\sqrt[3]{25}} = \frac{15\sqrt[3]{5\cdot5\cdot5\cdot5}}{25} = \frac{15\cdot5\sqrt[3]{5}}{25\cdot5} = \boxed{3\sqrt[3]{5}}$

$\frac{15}{\sqrt[3]{5\cdot5}} \cdot \frac{\sqrt[3]{5}}{\sqrt[3]{5}} = \frac{15\sqrt[3]{5}}{5} = \longrightarrow$

Ex 7 - $\frac{2x}{\sqrt[5]{x^3}} \cdot \frac{\sqrt[5]{x^2}}{\sqrt[5]{x^2}} = \frac{2x\sqrt[5]{x^2}}{\sqrt[5]{x^5}} = \frac{2x\sqrt[5]{x^2}}{x} = \boxed{2\sqrt[5]{x^2}}$

Ex 7B - $\frac{2x}{\sqrt{5x}} \cdot \frac{\sqrt{5x}}{\sqrt{5x}} = \frac{2x\sqrt{5x}}{5x} = \frac{2\sqrt{5x}}{5}$

Rule 3 – If there is a ***sum*** or ***difference*** in the denominator, rationalize the denominator by multiplying by the conjugate.

Ex 8 - $\frac{1}{(2+\sqrt{3})} \cdot \frac{(2-\sqrt{3})}{(2-\sqrt{3})}$

$= \frac{2-\sqrt{3}}{4-2\sqrt{3}+2\sqrt{3}-3} = \frac{2-\sqrt{3}}{4-3} = \boxed{2-\sqrt{3}}$

Ex 9 - $\frac{6}{(\sqrt{5}-\sqrt{7})} \cdot \frac{(\sqrt{5}+\sqrt{7})}{(\sqrt{5}+\sqrt{7})}$

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

Ex 10 – Find two pairs of conjugates with a product of three.

$(3+\sqrt{6})(3-\sqrt{6})$

$= 9-6 = 3$ ✓

$(\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2})$

$5-2 = 3$ ✓

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