

2.3 Rationalizing the Denominator

**Radicals are not allowed in the denominator. So when we have one, we must rationalize it.

Ex 1) Simplify.

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

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

$$\begin{array}{r} 18 \\ \diagdown \quad \diagup \\ 9 \quad 2 \\ \diagdown \quad \diagup \\ 3 \quad 3 \quad 3\sqrt{2} \end{array}$$

$$\frac{8}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{3 \cdot 2} = \frac{8\sqrt{2}}{6} = \frac{4\sqrt{2}}{3}$$

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

$$\frac{\sqrt{15}}{5\sqrt{20}} \cdot \frac{\sqrt{20}}{\sqrt{20}} = \frac{\sqrt{300}}{5 \cdot 20} = \frac{\sqrt{300}}{100} = \frac{10\sqrt{3}}{100} = \frac{\sqrt{3}}{10}$$

$$\frac{\sqrt{3-9}}{2\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{\sqrt{18} - 9\sqrt{6}}{2 \cdot 6} = \frac{\sqrt{18} - 9\sqrt{6}}{12} = \frac{3\sqrt{2} - 9\sqrt{6}}{12} = \frac{\sqrt{2} - 3\sqrt{6}}{4}$$

$$\frac{1}{1+\sqrt{2}} \cdot \frac{(1-\sqrt{2})}{(1-\sqrt{2})} = \frac{1-\sqrt{2}}{1-\sqrt{2}+\sqrt{2}-2} = \frac{1-\sqrt{2}}{-1} = -1+\sqrt{2}$$

$$\frac{(2+\sqrt{6})(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})} = \frac{4-2\sqrt{3}+2\sqrt{6}-\sqrt{18}}{4-2\sqrt{3}+2\sqrt{3}-3} = \frac{4-2\sqrt{3}+2\sqrt{6}-\sqrt{18}}{1} = 4-2\sqrt{3}+2\sqrt{6}-\sqrt{18} = 4-2\sqrt{3}+2\sqrt{6}-3\sqrt{2}$$

$$\frac{4}{\sqrt{2}-2} \cdot \frac{(-\sqrt{2}-2)}{(-\sqrt{2}-2)} = \frac{-4\sqrt{2}-8}{-2-2\sqrt{2}+2\sqrt{2}+4} = \frac{-4\sqrt{2}-8}{2} = -2\sqrt{2}-4$$