

7.3 BINOMIAL RADICAL EXPRESSIONS

CONSIDER

$$2x + 5x = 7x$$

$$2\sqrt{3} + 5\sqrt{3} = 7\sqrt{3}$$

$$4\sqrt{2x} - 10\sqrt{2x} = -6\sqrt{2x}$$

$$5\sqrt[3]{x} - 2\sqrt[4]{x} \quad \text{CANNOT COMBINE}$$

Ex: $\sqrt{50} - 4\sqrt{18} + \sqrt{2}$

$$\begin{aligned} &\sqrt{25}\sqrt{2} - 4\sqrt{9}\sqrt{2} + \sqrt{2} \\ &5\sqrt{2} - 4 \cdot 3\sqrt{2} + \sqrt{2} \\ &5\sqrt{2} - 12\sqrt{2} + \sqrt{2} \\ &\quad -6\sqrt{2} \end{aligned}$$

Ex: MULTIPLY $(4 - \sqrt{3})(1 + 2\sqrt{3})$

FOIL

$$\begin{aligned} &= 4 + 8\sqrt{3} - \sqrt{3} - 2\sqrt{9} \\ &= 4 + 7\sqrt{3} - 6 = -2 + 7\sqrt{3} \end{aligned}$$

Ex: $(\sqrt{3} - \sqrt{5})^2$

$$\begin{aligned} (\sqrt{3} - \sqrt{5})(\sqrt{3} - \sqrt{5}) &= \sqrt{9} - \sqrt{15} - \sqrt{15} + \sqrt{25} \\ &= 3 - 2\sqrt{15} + 5 \\ &= 8 - 2\sqrt{15} \end{aligned}$$

Ex: Simplify

$$\frac{3 + \sqrt{5}}{1 - \sqrt{2}}$$

MULTIPLY BY THE
CONJUGATE OF THE
DENOMINATOR

$$\frac{3 + \sqrt{5}}{1 - \sqrt{2}} \cdot \frac{1 + \sqrt{2}}{1 + \sqrt{2}}$$

$$= \frac{3 + 3\sqrt{2} + \sqrt{5} + \sqrt{10}}{1 + \sqrt{2} - \sqrt{2} - 2}$$

$$= \frac{3 + 3\sqrt{2} + \sqrt{5} + \sqrt{10}}{-1}$$

$$= -3 - 3\sqrt{2} - \sqrt{5} - \sqrt{10}$$