

# Section 7.4 - Operations on

Radicals → Square Roots only

## Adding and Subtracting Radicals

$$\sqrt{3} + \sqrt{x}$$

not like radicals

$$3 + x$$

not like terms

$$\underline{2\sqrt{x}} + \underline{3\sqrt{x}} = 5\sqrt{x}$$

$$20. \quad \underline{8\sqrt{7}} + \underline{2\sqrt{7}} = 10\sqrt{7}$$

$$\begin{aligned} 32. \quad & 2\sqrt{3} + \sqrt{12} + \sqrt{27} \\ & = 2\sqrt{3} + \sqrt{4}\sqrt{3} + \sqrt{9}\sqrt{3} \\ & = 2\sqrt{3} + 2\sqrt{3} + 3\sqrt{3} \\ & = 7\sqrt{3} \end{aligned}$$

↳ simplify  
look for  
perfect squares

$$\begin{aligned} 44. \quad & 9\sqrt{18} - 2\sqrt{8} \\ & = 9\sqrt{9}\sqrt{2} - 2\sqrt{4}\sqrt{2} \\ & = 9 \cdot 3\sqrt{2} - 2 \cdot 2\sqrt{2} \\ & = 27\sqrt{2} - 4\sqrt{2} \\ & = 23\sqrt{2} \end{aligned}$$

## Multiplication

$$88. (5 - \sqrt{5})(5 + \sqrt{5}) \quad \text{FOIL}$$

$$= 25 + \cancel{5\sqrt{5}} - \cancel{5\sqrt{5}} - \sqrt{25}$$

$$= 25 - 5$$

$$= 20$$

## Rationalizing the Denominator

$$98. \frac{1}{\sqrt{23}} \cdot \frac{\sqrt{23}}{\sqrt{23}} = \frac{\sqrt{23}}{\sqrt{23^2}}$$

$$= \frac{\sqrt{23}}{23}$$

get all radicals out of the denom.

$$100. \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2}$$

$$106. \frac{m^2 n}{2\sqrt{m^5}} = \frac{m^2 n}{2\sqrt{m^4} \sqrt{m}} = \frac{\cancel{m^2} n}{2\cancel{m^2} \sqrt{m}} = \frac{n}{2\sqrt{m}} \frac{\sqrt{m}}{\sqrt{m}}$$

*Simplify first*

*$m^2$  groups of 2  $m^2$  - 2 groups of 2 + 1 extra*

$$= \frac{n\sqrt{m}}{2m}$$

108.  $\frac{1}{(\sqrt{3}-2)} \frac{(\sqrt{3}+2)}{(\sqrt{3}+2)} \leftarrow \text{multiply by the conjugate}$

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

$$= \frac{\sqrt{3}+2}{\sqrt{9} - 4}$$

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

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

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

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