

Investigate:

Given  $\frac{4}{5\sqrt{3}+1}$ , how would you rationalize the denominator?

$$\frac{4}{5\sqrt{3}+1} \cdot \frac{5\sqrt{3}-1}{5\sqrt{3}-1} = \frac{20\sqrt{3}-4}{75-1} = \frac{20\sqrt{3}-4}{74} = \frac{10\sqrt{3}-2}{37}$$

F O X L
 $\frac{3 \cdot 6 + 4 \cdot 2}{84}$

Rule? To Rationalize a binomial denominator...  
 Multiply the num & den by the den's conjugate  
 (opposite)

Examples.

a)  $\frac{3}{\sqrt{7}+2} \cdot \frac{(\sqrt{7}-2)}{(\sqrt{7}-2)} = \frac{3\sqrt{7}-6}{7-4} = \frac{\cancel{3}\sqrt{7}-\cancel{6}^2}{\cancel{3}1} = \sqrt{7}-2$

b)  $\frac{6}{\sqrt{3x}-2} \cdot \frac{(\sqrt{3x}+2)}{(\sqrt{3x}+2)} = \frac{6\sqrt{3x}+12}{3x-4}$

c)  $\frac{(\sqrt{2}+\sqrt{3})}{(\sqrt{5}+\sqrt{6})} \cdot \frac{(\sqrt{5}-\sqrt{6})}{(\sqrt{5}-\sqrt{6})} = \frac{\sqrt{10}-\sqrt{2}+\sqrt{15}-\sqrt{18}}{5-6}$

$= \frac{-(\sqrt{10}-2\sqrt{3}+\sqrt{15}-3\sqrt{2})}{+1}$   
 $= -\sqrt{10}+2\sqrt{3}-\sqrt{15}+3\sqrt{2}$

3 ÷ 0

$$= -\sqrt{10} + 2\sqrt{3} - \sqrt{15} + 3\sqrt{2}$$

• What is the restriction for....

a)  $\frac{3x\sqrt{17}}{\sqrt{4-2x}} \cdot \sqrt{4-2x}$

b)  $\frac{4}{r\sqrt{7}+2} \cdot \frac{(r\sqrt{7}-2)}{(r\sqrt{7}-2)}$

- Denominator  $\neq$  zero
- Radicand  $\neq$  negative  $\geq 0$

$$r\sqrt{7}+2 \neq 0$$

$$r\sqrt{7}-2 \neq 0$$

$$r\sqrt{7} \neq -2$$

$$r \neq \frac{-2}{\sqrt{7}} \neq \frac{2\sqrt{7}}{7}$$

$$\left. \begin{array}{l} r\sqrt{7} \neq 2 \\ r \neq \frac{2}{\sqrt{7}} \end{array} \right\} r \neq \frac{2\sqrt{7}}{7}$$

So, ...

$$4-2x > 0 \text{ ... and ... } 4x-2x \neq 0$$

$$\frac{4}{2} > \frac{2x}{2}$$

$$2 > x$$

$$x < 2$$

c) Identify the restrictions for  $x$ :

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

$$\boxed{\sqrt{x} \geq 0}$$

and

$$\sqrt{x} + 2 \neq 0$$

$$\sqrt{x} \neq -2$$

$$x \neq (-2)^2$$

$$\boxed{x \neq 4}$$

Assignment: page 290 # 9-11, 13, 14, 19, 17\*, 22\*