

# Flashback – Radicals

1. Where is  $\sqrt{6x^3}$  defined?

Square roots  $\rightarrow$  radicand must be positive  
 $\therefore \underset{+}{6} \cdot \underset{+}{x^3} \quad x^3 > 0 \quad \therefore x > 0$

2. Write as an entire radical  $\left(\frac{2}{3}\sqrt{24}\right)$

$$\frac{2}{3}\sqrt{24} \rightarrow \frac{\sqrt{4}}{\sqrt{9}} \cdot \sqrt{24} \rightarrow \sqrt{\frac{4 \cdot 24^8}{9^3}} \rightarrow \sqrt{\frac{32}{3}}$$

3. Simplify  $\sqrt{98}$

remove all perfect squares

$$\sqrt{98} \rightarrow \sqrt{49 \cdot 2} \rightarrow 7\sqrt{2}$$

4. Simplify:  $\frac{5\sqrt{2}}{\sqrt{6}} \rightarrow \frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \rightarrow \frac{5\sqrt{3}}{3}$

don't leave radicals in denominator

5. Simplify:  $\sqrt{\frac{63}{9}} - 2\sqrt{\frac{28}{4}} + 3\sqrt{5}$

$$3\sqrt{7} - 4\sqrt{7} + 3\sqrt{5}$$

$$-\sqrt{7} + 3\sqrt{5} \quad \text{or} \quad 3\sqrt{5} - \sqrt{7}$$

can only add like terms

6. Simplify:  $6\sqrt{5}(2 - 4\sqrt{10})$

same as  $6\sqrt{5}(2\sqrt{1} - 4\sqrt{10})$

$$12\sqrt{5} - 24\sqrt{50}$$

$$12\sqrt{5} - 120\sqrt{2}$$

7. Simplify:  $(\sqrt{7} - 2\sqrt{5})(3\sqrt{7} + \sqrt{20})$

FOIL

$$3\sqrt{49} + \sqrt{140} - 6\sqrt{35} - 2\sqrt{100}$$

$$21 + 2\sqrt{35} - 6\sqrt{35} - 20$$

$$-4\sqrt{35} + 1 \quad \text{or} \quad 1 - 4\sqrt{35}$$

8. Rationalize

$$\frac{4}{2\sqrt{5} + \sqrt{3}}$$

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

FOIL

$$8\sqrt{5} - 4\sqrt{3}$$

$$\frac{8\sqrt{5} - 4\sqrt{3}}{4\sqrt{25} - 2\sqrt{15} + 2\sqrt{15} - \sqrt{9}}$$

$$\frac{8\sqrt{5} - 4\sqrt{3}}{20 - 3}$$

$$\rightarrow \frac{8\sqrt{5} - 4\sqrt{3}}{17}$$

because the denominator is a binomial  $\rightarrow$  need to mult. by the conjugate

9. Solve:  $\sqrt{5x+2} - 8 = 2$

isolate radical first

$$(\sqrt{5x+2})^2 = (10)^2$$

$$5x+2 = 100$$

$$5x = 98$$

$$x = \frac{98}{5}$$

verify (always for  $\sqrt{\quad}$  eqns)

$$\sqrt{5\left(\frac{98}{5}\right)+2} - 8 = 2$$

$$\sqrt{98+2} - 8 = 2$$

$$\sqrt{100} - 8 = 2$$

$$10 - 8 = 2 \quad \checkmark$$

Solution is

$$x = 98/5$$

restriction:

$$\sqrt{5x+2} > 0$$

$$5x+2 > 0$$

$$5x > -2$$

$$x > -2/5$$