Notes - Simplifying Radicals

Remember: radicals undo exponents $\cancel{\sqrt{x^{2}}} = x$ $\quad \sqrt{4} = \cancel{\sqrt{2^2}} = 2$

$\sqrt[3]{x^3} = x \quad \sqrt[3]{8} = \sqrt[3]{2^3} = 2$

Properties: $\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$

Ex: $\sqrt{8} = \sqrt{4 \cdot 2} = \sqrt{4}\sqrt{2}$

$2\sqrt{2}$

$\sqrt{a+b} \neq \sqrt{a} + \sqrt{b}$

Ex: $\sqrt{8} \neq \sqrt{6+2}$

Gah! No! :(

- To simplify roots you can use factor trees or find the perfect squares (or cubes)

Ex 1: Simplify $\sqrt{20}$

20

2 10

2 5

$\sqrt{2^2 \cdot 5}$

$\sqrt{2^2}\sqrt{5}$

$2\sqrt{5}$

20

*$\boxed{4}$ 5

$\sqrt{4 \cdot 5}$

$\sqrt{4}\sqrt{5}$

$2\sqrt{5}$

Ex 2: $\sqrt{48}$

48

6 8

2 3 2 *$\boxed{4}$

$\sqrt{2^2 \cdot 3 \cdot 4}$

$\sqrt{2^2}\sqrt{3}\sqrt{4}$

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

$4\sqrt{3}$

48

*$\boxed{16}$ 3

$\sqrt{16}\sqrt{3}$

$4\sqrt{3}$

Ex 3: $\sqrt{10}$

When there are no factors that are squared (or more), you're done

$$\begin{array}{c} 10 \\ \wedge \\ 2 \quad 5 \end{array}$$

Ex 4: $\sqrt{c^5} = \sqrt{c^2 c^2 c}$

$= \sqrt{c^2}\sqrt{c^2}\sqrt{c}$

$c \cdot c\sqrt{c} = c^2\sqrt{c}$

Ex 5: $4\sqrt{75p^3}$

$$\begin{array}{cc} 75 & p^3 \\ \wedge & \wedge \\ {}^*\boxed{25}\ 3 & {}^*\boxed{p^2}\ p \end{array}$$

$= 4\,\cancel{\sqrt{25}}^{\,5}\sqrt{3}\,\cancel{\sqrt{p^2}}^{\,p}\sqrt{p}$

$4 \cdot 5p\sqrt{3 \cdot p}$

$20p\sqrt{3p}$