5.2b Operations with Radicals

* Rationalizing a denominator means removing the radicals (the irrational part) from the denominator.

Case 1: The denominator is of the form $a\sqrt{b}$. Only the $\sqrt{b}$ part needs "fixing".

ex. a) $\frac{5}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$$= \frac{5\sqrt{3}}{2(3)}$$

$$= \frac{5\sqrt{3}}{6}$$

b) $\frac{4\sqrt{11}}{3\sqrt[3]{6}} \cdot \left(\frac{\sqrt[3]{6}}{\sqrt[3]{6}}\right)^2$

$$= \frac{4\sqrt{11}\cdot\sqrt[3]{36}}{3\sqrt[3]{6}\cdot(\sqrt[3]{6})^2}$$

$$= \frac{\cancel{4}^{2}\sqrt{11}\cdot\sqrt[3]{36}}{3(\cancel{6})^{3}}$$

$$= \frac{2\sqrt{11}\cdot\sqrt[3]{36}}{9}$$

~~c)~~

$$\sqrt[3]{2}\cdot\sqrt[3]{2}\cdot\sqrt[3]{2} = \sqrt[3]{8} = 2$$

Case 2: The denominator is a binomial with radicals.

ex. $\frac{3}{5 - \sqrt{2}}$

Definition: two binomial factors are called conjugates if their product is the difference of two squares... (a + b) and (a - b) are conjugates

recall: $(a + b)(a - b) = a^2 - b^2$ ex// $(2+\sqrt{5})$ and $(2-\sqrt{5})$

* To simplify case 2 expressions. we must multiply both numerator and denominator by the conjugate of the denominator

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

$$= \frac{15+3\sqrt{2}}{25+\cancel{5\sqrt{2}}-\cancel{5\sqrt{2}}-2}$$

$$= \frac{15+3\sqrt{2}}{23}$$

ex. a) $\frac{5\sqrt{3}}{4-\sqrt{6}} \cdot \frac{4+\sqrt{6}}{4+\sqrt{6}}$

$$= \frac{20\sqrt{3}+5\sqrt{18}}{16+\cancel{4\sqrt{6}}-\cancel{4\sqrt{6}}-6}$$

$$= \frac{20\sqrt{3}+5\sqrt{9\cdot 2}}{16-6}$$

$$= \frac{\cancel{20}\sqrt{3}+\cancel{15}\sqrt{2}}{\cancel{10}}$$

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

b) $\frac{\sqrt{3}+\sqrt{13}}{\sqrt{3}-\sqrt{13}} \cdot \frac{\sqrt{3}+\sqrt{13}}{\sqrt{3}+\sqrt{13}}$

$$= \frac{3+\sqrt{39}+\sqrt{39}+13}{3+\cancel{\sqrt{39}}-\cancel{\sqrt{39}}-13}$$

$$= \left(\frac{16+2\sqrt{39}}{-10}\right)\frac{-1/2}{-1/2}$$

$$= \frac{-8-\sqrt{39}}{5}$$

Quiz Thursday
5.1-5.2

homefun: pg. 289 #8-14, 16-20, 22-25