- Copy in to your "Dividing Radicals" Tab
- Complete Practice Problems (in your packet) with your elbow partner
- Turn this paper back in to the yellow bin

Rationalizing Binomial Denominators

Given $\frac{\sqrt{5}}{3-\sqrt{2}}$, we cannot simply multiply by the radical. Look what happens:

$$\frac{\sqrt{5}}{3-\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{5}\ \cdot\ \sqrt{2}}{\left(3-\sqrt{2}\right)\cdot\sqrt{2}} = \frac{\sqrt{10}}{3\sqrt{2}-\sqrt{4}} = \frac{\sqrt{10}}{3\sqrt{2}-2}$$

The radical is still in the denominator – it is still irrational!!

When there is a binomial in the denominator that we need to rationalize, we must multiply the top and bottom by the **CONJUGATE.**

Conjugate: Binomials with opposite signs
Ex: $3\sqrt{5}+2\sqrt{2}$ and $3\sqrt{5}-2\sqrt{2}$ are conjugates

Let's go back to $\frac{\sqrt{5}}{3-\sqrt{2}}$

$$\frac{\sqrt{5}}{3-\sqrt{2}} \cdot \frac{3+\sqrt{2}}{3+\sqrt{2}} = \frac{\sqrt{5}\ \cdot(3+\sqrt{2})}{\left(3-\sqrt{2}\right)\cdot(3+\sqrt{2})} = \frac{\sqrt{10}}{3\sqrt{2}-\sqrt{4}} = \frac{\sqrt{10}}{3\sqrt{2}-2}$$

	3	$-\sqrt{\mathbf{2}}$
3	9	$3-\sqrt{2}$
$\sqrt{\mathbf{2}}$	$3+\sqrt{2}$	$-\sqrt{4}$

$$= 9+3\sqrt{2}-3\sqrt{2}-2 = 9-2 = 7$$

Another example:

$$\frac{3\sqrt{6}-4\sqrt{3}}{4\sqrt{6}-2\sqrt{3}} \cdot \frac{4\sqrt{6}+2\sqrt{3}}{4\sqrt{6}+2\sqrt{3}} = \frac{12\sqrt{36}+6\sqrt{18}-16\sqrt{18}-8\sqrt{9}}{16\sqrt{36}+8\sqrt{18}-8\sqrt{18}-4\sqrt{9}} = \frac{12\sqrt{36}-10\sqrt{18}-8\sqrt{9}}{16\sqrt{36}-4\sqrt{9}}$$

$$= \frac{12(6)-10(3\sqrt{2})-8(3)}{16(6)-4(3)} = \frac{72-30\sqrt{2}-24}{96-12} = \frac{48-30\sqrt{2}}{84} = \frac{8-5\sqrt{2}}{14}$$

Practice:

1. $\frac{3}{4+4\sqrt{5}}$ 2. $\frac{5}{-5-3\sqrt{3}}$ 3. $\frac{3-4\sqrt{3}}{4\sqrt{5}+3\sqrt{2}}$ 4. $\frac{\sqrt{5}+3}{4-\sqrt{5}}$