Dividing Radicals
Rationalizing the Denominator

When you have a single radical in the denominator, you multiply the expression by 1 in the form of that radical. That works because we know that $\sqrt[n]{x^n} = x$. That gets rid of the radical.

Example **Rationalize the denominator** $\frac{2}{\sqrt{3}}$

To get rid of the radical, I will multiply that expression by 1 in the form of $\frac{\sqrt{3}}{\sqrt{3}}$**.**

$$\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{\sqrt{9}} = \frac{2\sqrt{3}}{3}$$

What happens if you don't have a single factor in the denominator which is a radical?

Well, to continue to do these successfully, you do need to know your special products –

Specifically the Difference of 2 Squares.

$$(a - b)(a + b) = a^2 - b^2$$

Knowing that special products means we square the first and last terms and the middle terms that would have radicals will subtract out.

$$\left(\sqrt{3} + 5\right)\left(\sqrt{3} - 5\right) = 3 - 25 = -22$$

Procedure

1. **Multiply the expression by ONE to get rid of the radical in the denominator.**

   a) **if the denominator is a single radical, multiply by ONE in fractional form using a single radical so the index matches the exponent –** $\sqrt[n]{x^n}$

   b) **if the denominator is a binomial, multiply by ONE in fractional form using the conjugate.**

Simplify the following.

1. $\frac{4}{\sqrt{3}}$

2. $\frac{5}{\sqrt{2}}$

3. $\frac{1}{\sqrt{3}}$

4. $\frac{1}{\sqrt{2}}$

5. $\dfrac{1}{\sqrt{3}+2}$

6. $\dfrac{1}{\sqrt{5}-1}$

7. $\dfrac{3}{\sqrt{5}+4}$

8. $\dfrac{2}{\sqrt{5}-3}$