Lesson 4 Dividing Radicals

Rationalizing the Denominator (Monomials)
The process of changing the denominator from a radical (irrational number) to a rational number is called rationalizing the denominator. This does not change the value of the expression, only the form of the expression since when a fraction is multiplied by 1, its value does not change.

For example, $\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

The denominator is now a rational number and $\frac{2\sqrt{3}}{3}$ is considered in simplest form.

Examples
Express in simplest form.

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

2. $\frac{4}{2\sqrt{7}}$

3. $\frac{\sqrt{12}}{\sqrt{x}}$

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

5. $\dfrac{6\sqrt{2}-4\sqrt{3}}{\sqrt{18}}$

Rationalizing the Denominator (Binomials)

To rationalize a denominator containing a binomial we use a difference of squares. The expressions $(a + b)$ and $(a - b)$ are conjugates and have a product that is a difference of squares.
$\sqrt{3} + \sqrt{2}$ has a conjugate of $\sqrt{3} - \sqrt{2}$
$2\sqrt{3} - 3\sqrt{5}$ has a conjugate of $2\sqrt{3} + 3\sqrt{5}$

Examples

Simplify the following radicals

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

2. $\frac{\sqrt{2}+1}{\sqrt{2}-1}$