To Add Radicals

1. Factor the radicands if possible
2. Use the product property to isolate the perfect "squares"
3. Combine LIKE radicals

like radicals: same index and same radicand

$\sqrt{3}$ $\sqrt[3]{3}$ $\sqrt[4]{5}$ $\sqrt[4]{10}$

$\sqrt{x}$ $\sqrt{x}$ $2\sqrt[3]{5a}$ $3\sqrt[3]{5a}$

SIMPLIFY radicals before looking for like terms

Example: Simplify

$$3\sqrt{45} - 5\sqrt{80} + 4\sqrt{20}$$

Example: Simplify

$$\sqrt[3]{128} + 5\sqrt[3]{16}$$

More Multiply Radicals

Now that you can add and subtract radicals, you can multiply polynomials with radicals

Example: Simplify

$$(2+\sqrt{3})(5-\sqrt{7})$$

Example: Simplify

$$(2\sqrt{3}+3\sqrt{5})(3-\sqrt{3})$$

Using a Conjugate to Rationalize Denominators

If a polynomial with a radical is in the denominator, you must use a CONGUGATE to rationalize

Conjugate is a binomial switching the operations
example: if the denominator is $(2+\sqrt{3})$

the conjugate is $(2-\sqrt{3})$

Using the conjugate eliminates the $\sqrt{}$ in the denominator !!

Example: Simplify $\dfrac{2+\sqrt{3}}{4-\sqrt{3}}$

Example: Simplify $\dfrac{2+\sqrt{5}}{5-\sqrt{x}}$