Add or Subtract Radical Expressions

To be considered **like radicals** they have to be the same root and have the same number inside the house (called the radicand). For example,

$2\sqrt{3}$ and $5\sqrt{3}$ are like radicals

$\sqrt{2}$ and $\sqrt{5}$ are not like radicals – they have different radicands

To add or subtract radical expressions, the radicands must be alike in the same way that monomial terms must be alike to add or subtract.

Monomials	Radical
4x + 2x = ______	$\sqrt{5} + 2\sqrt{5}$ = (__ + __)$\sqrt{5}$ = __$\sqrt{5}$
9y – 7y = _______	$9\sqrt{3} - 7\sqrt{3}$ = (__ − __)$\sqrt{3}$ = ___$\sqrt{3}$

You try!!

$a.\, 2\sqrt{5} + 7\sqrt{5}$

b. $9\sqrt{7} - \sqrt{7}$

c. $5\sqrt{3} - 2\sqrt{3} + \sqrt{3}$

d. $10\sqrt{6} + 4\sqrt{6} - 5\sqrt{2}$

If a sum or difference involves terms that are not like radicals, we may be able to combine terms after simplifying the radicals according to our earlier methods.

Simplify each expression

$3\sqrt{2}+\sqrt{8}$

we don't have like radicals, **but** we can simplify $\sqrt{8}$. Remember ... $\sqrt{8}$ = ____

$5\sqrt{3}-\sqrt{12}$

we don't have like radicals, **but** we can simplify $\sqrt{12}$. Remember … $\sqrt{12}$= ___

a. $\sqrt{2}+\sqrt{18}$

b. $5\sqrt{3}-\sqrt{27}$

Simplifying Expressions Involving Variables

$5\sqrt{3x}-2\sqrt{3x} \quad = \quad (5-2)\sqrt{3x} \quad = \quad 3\sqrt{3x}$

$2\sqrt{3a^3}+5a\sqrt{3a}$ = _____$\sqrt{____}$ + $5a\sqrt{3a}$ = (_____ + 5a) $\sqrt{3a}$ = _____$\sqrt{3a}$

a. $2\sqrt{7y}+3\sqrt{7y}$

b. $\sqrt{20a^2}-a\sqrt{45}$

Multiplying Radicals

$$\sqrt{a} \cdot \sqrt{b} = \sqrt{a \cdot b} = \sqrt{ab}$$

The product of square roots is equal to the square root of the product of the radicands

Example: $\sqrt{3} \cdot \sqrt{5} = \sqrt{\quad\quad} = \sqrt{\quad\quad}$

After we multiply, it's possible that we will have to simplify the radicand.

a. $\sqrt{5} \cdot \sqrt{10}$

b. $\sqrt{12} \cdot \sqrt{6}$

c. $\sqrt{10x} \cdot \sqrt{2x}$

a. $\sqrt{3} \cdot \sqrt{6}$

b. $\sqrt{3} \cdot \sqrt{18}$

c. $\sqrt{8a} \cdot \sqrt{3a}$

a. $(3\sqrt{3})(5\sqrt{7})$

b. $(5\sqrt{7})(2\sqrt{14})$

c. $(\sqrt{5x})(3\sqrt{15x})$