Lesson 38 Sections 7.5

<u>When two radicals have the same indices (plural of index) and same radicands, they are said to be 'like radicals'. They can be combined the same as 'like terms'.</u>

Like Radicals: $3\sqrt{r}, \quad -\sqrt{r}, \quad 4\sqrt{r}$

$2\sqrt[3]{5m}, \quad -3x\sqrt[3]{5m}, \quad 12\sqrt[3]{5m}$

$5\sqrt[4]{5}, \quad 10\sqrt[4]{5}, \quad -2\sqrt[4]{5}$

Unlike Radicals: $4\sqrt{x}, \quad 2\sqrt[3]{x}$

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

Add like terms: $2x + 3y - 10x - 12y = -8x - 9y$

Add like radicals: $2\sqrt{2} + 3\sqrt[3]{4} - 10\sqrt{2} - 12\sqrt[3]{4} = -8\sqrt{2} - 9\sqrt[3]{4}$

Like radicals can be combined must like 'like terms'; add the coefficients of the radicals and keep the 'like' radical.

Simplify by combining 'like radicals'.

1) $7\sqrt[3]{7} + 8\sqrt[3]{7} - 5\sqrt[3]{7} =$

2) $5\sqrt{2} - 7\sqrt{3} + 8\sqrt{3} - 10\sqrt{2} =$

3) $9\sqrt[3]{3} - \sqrt{3} + 4\sqrt[3]{3} + 2\sqrt{3} =$

Sometimes radicals must be simplified **<u>before</u>** <u>combining</u>.

4) $9\sqrt{50} - 4\sqrt{8} =$

5) $4\sqrt{3x^3} - \sqrt{12x} =$

6) $2\sqrt[3]{81} + 5\sqrt[3]{54} =$

7) $5\sqrt{98} - 3\sqrt{32} - 4\sqrt{128} + \sqrt{18} =$

Multiply the following radicals:

$(2\sqrt{3})(4\sqrt{2})(8\sqrt{5}) = (2 \cdot 4 \cdot 8)(\sqrt{3} \cdot \sqrt{2} \cdot \sqrt{5})$

Remember that the product rule for radicals says radicands can be multiplied as long as the indices are the same.

$= 64\sqrt{30}$

Multiply using either the distributive property or FOIL.

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

9) $\sqrt{3}(2\sqrt{6} - 2\sqrt{3}) =$

10) $(4 - \sqrt{5})(2 + \sqrt{5}) =$

11) $(2\sqrt{7} - \sqrt{2})(\sqrt{5} + 3\sqrt{2}) =$

12) $(3 + \sqrt{6})^2 =$

13) $(\sqrt{3x}-\sqrt{2})^2 =$

The following binomials are called **conjugates.** With conjugates only do the F and L of FOIL. The 'inner' and 'outer' terms will be eliminated. Remember the pattern:
$(a+b)(a-b)=a^2-b^2$

14) $(2-4\sqrt{3})(2+4\sqrt{3}) =$

15) $(\sqrt{5}+\sqrt{3})(\sqrt{5}-\sqrt{3}) =$