

## Adding & Subtracting Radicals

You add and subtract radicals in much the same way we did with algebraic expressions. That is, for addition and subtraction, we combined like terms.

With radicals, combining like terms means we combine (add or subtract) radicals with the SAME **radicand** and **index**.

*If they don't have the same radicand and index, we can either not combine them or we can simplify them, then combine them.*

Example  $3\sqrt{5} + 4\sqrt{5}$

Example  $4\sqrt{11} - 9\sqrt{11}$

## Add/Subtract with Radicals – Same Radicand

1.  $4\sqrt{2} + 3\sqrt{2} + 10\sqrt{2} - 3\sqrt{2}$

2.  $6\sqrt{3} - 8\sqrt{3} + 7\sqrt{3}$

3.  $5\sqrt{6} - 10\sqrt{6} - 3\sqrt{6} - 11\sqrt{6} + \sqrt{6}$

4.  $2a\sqrt{x} + 3a\sqrt{x} - 7a\sqrt{x} + 10a\sqrt{x}$

5.  $a\sqrt{b} + c\sqrt{b} - m\sqrt{b}$

In this next example, we don't have the same radicands. So, we will try and rewrite them.

Example

$$\begin{aligned} & 3\sqrt{12} + 5\sqrt{20} - 8\sqrt{12} + 3\sqrt{20} \\ &= 3\sqrt{4 \cdot 3} + 5\sqrt{4 \cdot 5} - 8\sqrt{4 \cdot 3} + 3\sqrt{4 \cdot 5} \\ &= 6\sqrt{3} + 10\sqrt{5} - 16\sqrt{3} + 6\sqrt{5} \\ &= -10\sqrt{3} + 16\sqrt{5} \end{aligned}$$

**Perform the indicated operations**

**1.**  $3\sqrt{5} + 4\sqrt{5}$

**2.**  $4\sqrt{11} - 7\sqrt{11}$

**3.**  $4\sqrt{11} + 5\sqrt{2} - 7\sqrt{11} + 3\sqrt{2}$

**4.**  $3\sqrt{12} + 5\sqrt{20} - 8\sqrt{12} + 3\sqrt{20}$

**5.**  $3\sqrt{18} + 5\sqrt{90} - 8\sqrt{90} + 3\sqrt{8}$

**6.**  $2\sqrt{3} + 6\sqrt{27} - 5\sqrt{48} - 2\sqrt{12}$