Radicals

Radicals are expressions that involve a root sign.

$$\sqrt{n}$$ is called a radical.

radical sign $$\sqrt{n}$$ radicand
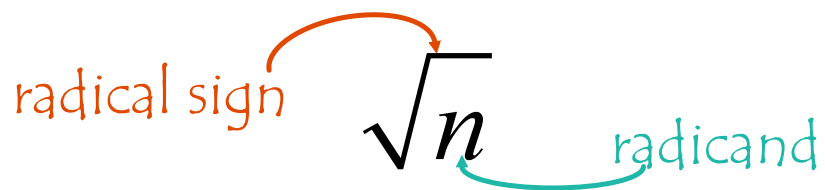
Addition and Subtraction

Adding and subtracting radicals is like algebra - they have to be "like terms"; that is, <u>the radicals must match</u>.

Examples: $6\sqrt{7} - 4\sqrt{7} = 2\sqrt{7}$

$5\sqrt{2} + 3\sqrt{2} = 8\sqrt{2}$

$\sqrt{3} + 2\sqrt{5} + 10\sqrt{5} = \sqrt{3} + 12\sqrt{5}$

Multiplication and Division

Properties: 1) $\sqrt{m} \times \sqrt{n} \Leftrightarrow \sqrt{m \times n}$ 2) $\dfrac{\sqrt{m}}{\sqrt{n}} \Leftrightarrow \sqrt{\dfrac{m}{n}}$

Example: $4\sqrt{2} \times 3\sqrt{6}$

Multiply/divide the coefficients and multiply/divide the radicands. Like terms are <u>not</u> necessary.

$$4\sqrt{2} \times 3\sqrt{6} = (4 \times 3)\sqrt{2 \times 6}$$
$$= 12\sqrt{12}$$

Examples:

$$5\sqrt{20} \div 3\sqrt{10} = (5 \div 3)\sqrt{20 \div 10}$$

$$= \frac{5}{3}\sqrt{2} \quad \text{or} \quad 1.\overline{6}\sqrt{2}$$

$$2\sqrt{3} \times 6\sqrt{8} \div 4\sqrt{12} = 3\sqrt{2}$$

$$12\sqrt{24} \div 4\sqrt{12}$$