Radical Expressions
Addition and Subtraction

Like radical terms are terms that the index of the radical and the simplified radicand are the same.

Examples:

$3\sqrt{2}$ & $4x\sqrt{2}$ are like radicals

$2x\sqrt{3y}$ & $2x\sqrt[3]{3y}$ are not like radicals

Addition & Subtraction

To add or subtract radical expressions, the type of radical (index) & everything under the radical (the radicand) must be identical, that is you can only combine like radical terms. $\sqrt{3x}$ & $4\sqrt{3x}$ are like terms, but $\sqrt[4]{3x^3}$ & $\sqrt[3]{3x^3}$ are not like terms.

Examples:

$$2s^2\sqrt[3]{s^2t^6} + 3t^2\sqrt[3]{8s^8} \xrightarrow{exponent\_rules} 2s^2\sqrt[3]{s^2t^{2*3}} + 3t^2\sqrt[3]{2^3s^{2*3+2}} \xrightarrow{rewrite}$$

$$2s^2\sqrt[3]{s^2\left(t^2\right)^3} + 3t^2\sqrt[3]{2^3s^{2*3}s^2} \rightarrow 2s^2\sqrt[3]{s^2\left(t^2\right)^3} + 3t^2\sqrt[3]{2^3\left(s^2\right)^3s^2} \xrightarrow{"pull\_out"\_cubes}$$

$$2s^2t^2\sqrt[3]{s^2} + 2*3s^2t^2\sqrt[3]{s^2} \rightarrow 2s^2t^2\sqrt[3]{s^2} + 6s^2t^2\sqrt[3]{s^2} \xrightarrow{combine\_like\_terms} 8s^2t^2\sqrt[3]{s^2}$$

$$5\sqrt{2x} - \sqrt{32x} - 7\sqrt{50x} \xrightarrow{factor\_radicands} 5\sqrt{2x} - \sqrt{16*2x} - 7\sqrt{25*2x} \xrightarrow{rewrite\_squares}$$

$$5\sqrt{2x} - \sqrt{4^2*2x} - 7\sqrt{5^2*2x} \xrightarrow{"pull\_out"\_squares} 5\sqrt{2x} - 4\sqrt{2x} - 5*7\sqrt{2x} \rightarrow$$

$$5\sqrt{2x} - 4\sqrt{2x} - 35\sqrt{2x} \xrightarrow{combine\_like\_radicals} -34\sqrt{2x}$$

Note: You can also factor out the GCF, which would be the like radicals, then add or subtract. This is sometimes easier.

$$28\sqrt[3]{4} - 7\sqrt[3]{4} \xrightarrow{GCF=\sqrt[3]{4}} (28-7)\sqrt[3]{4} \rightarrow 21\sqrt[3]{4}$$

$$5\sqrt{2} - \sqrt{32} \xrightarrow{factor\_radicands} 5\sqrt{2} - \sqrt{16*2} \xrightarrow{rewrite\_squares}$$

$$5\sqrt{2} - \sqrt{4^2*2} \xrightarrow{"pull\_out"\_squares} 5\sqrt{2} - 4\sqrt{2} \xrightarrow{combine\_like\_radicals} \sqrt{2}$$