Radical Expressions
Multiplication

Multiplying Radical Expressions is the same as multiplying polynomials. You will use Exponent Rules & FOIL.

Examples:

$$\sqrt[3]{4} * \sqrt[3]{4} \xrightarrow{\;one\_way\;} \sqrt[3]{4*4} \to \sqrt[3]{2^4} \to \sqrt[3]{2^{3+1}} \to \sqrt[3]{2^3 2^1} \to 2\sqrt[3]{2^1} \to 2\sqrt[3]{2}$$

$$\sqrt{x} * \sqrt[4]{16y^2} \xrightarrow{\;one\_way\;} x^{\frac{1}{2}}\left(2^4 y^2\right)^{\frac{1}{4}} \xrightarrow{\;note\_2\_can\_be\_removed\;} 2x^{\frac{1}{2}}\left(y^2\right)^{\frac{1}{4}} \xrightarrow{\;rewrite \frac{1}{2} as \frac{2}{4}\;}$$

$$2x^{\frac{2}{4}}\left(y^2\right)^{\frac{1}{4}} \to 2\left(x^2\right)^{\frac{1}{4}}\left(y^2\right)^{\frac{1}{4}} \to 2\left(x^2 y^2\right)^{\frac{1}{4}} \to 2\sqrt[4]{x^2 y^2}$$

$$\left(\sqrt{x}+1\right)\left(\sqrt{2}-3\right)\xrightarrow{\;FOIL\;} \sqrt{x}*\sqrt{2}-3\sqrt{x}+1\sqrt{2}-3 \to \sqrt{2x}-3\sqrt{x}+1\sqrt{2}-3$$

$$\left(\sqrt[3]{x}-2\right)\left(\sqrt[3]{x}+2\right)\xrightarrow{\;FOIL\;} \sqrt[3]{x}*\sqrt[3]{x}+2\sqrt[3]{x}-2\sqrt[3]{x}-4 \to \sqrt[3]{x*x}-4 \to \sqrt[3]{x^2}-4$$

A Radical Expression is Simplified When:
   1.) The radicand contains no factor greater than 1 that is a perfect power of the index.
   2.) There is no fraction under the radical.
   3.) There is no radical in the denominator of an expression.
   4.) Any exponents under the radical & the index of the radical are relatively prime (no factors in common except 1)