

Different Indices

To multiply radicals with different indices, convert the radicals into exponential notation then multiply (work with the exponents). Convert the answer back into a radical if desired.

$$\sqrt{7} \cdot \sqrt[4]{7} = 7^{\frac{1}{2}} 7^{\frac{1}{4}} = 7^{\frac{2}{4}} 7^{\frac{1}{4}} = 7^{\frac{2+1}{4}} = 7^{\frac{3}{4}} = \sqrt[4]{7^3} = \sqrt[4]{343}$$

$$\sqrt[4]{x} \cdot \sqrt[5]{x^2} = x^{\frac{1}{4}} x^{\frac{2}{5}} = x^{\frac{1}{4} + \frac{2}{5}} = x^{\frac{5}{20} + \frac{8}{20}} = x^{\frac{13}{20}} = \sqrt[20]{x^{13}}$$

TRY:

$$\sqrt{3} \cdot \sqrt[4]{3}$$

$$\sqrt[3]{2} \cdot \sqrt[5]{2}$$

$$\sqrt[3]{3} \cdot \sqrt[4]{2}$$

$$\sqrt[3]{y^2} \cdot \sqrt[5]{y}$$