

Properties of Radicals (Fractional Powers)	
Property	Example
$\sqrt[n]{ab} = \sqrt[n]{a}\sqrt[n]{b}$ $(ab)^{\frac{1}{n}} = a^{\frac{1}{n}}b^{\frac{1}{n}}$	$\sqrt[3]{96} = \sqrt[3]{8}\sqrt[3]{12} = 2\sqrt[3]{12}$ $96^{\frac{1}{3}} = 8^{\frac{1}{3}} \cdot 12^{\frac{1}{3}} = 2 \cdot 12^{\frac{1}{3}}$
$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ $\left(\frac{a}{b}\right)^{\frac{1}{n}} = \frac{a^{\frac{1}{n}}}{b^{\frac{1}{n}}}$	$\sqrt{\frac{121}{16}} = \frac{\sqrt{121}}{\sqrt{16}} = \frac{11}{4}$ $\left(\frac{121}{16}\right)^{\frac{1}{2}} = \frac{121^{\frac{1}{2}}}{16^{\frac{1}{2}}} = \frac{11}{4}$
$\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$ $\left(a^{\frac{1}{n}}\right)^{\frac{1}{m}} = a^{\frac{1}{nm}}$	$\sqrt[3]{\sqrt{4096}} = \sqrt[6]{4096} = 4$ $\left(4096^{\frac{1}{2}}\right)^{\frac{1}{3}} = 4096^{\frac{1}{6}} = 4$
$\sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$ $\left(a^m\right)^{\frac{1}{n}} = \left(a^{\frac{1}{n}}\right)^m = a^{\frac{m}{n}}$	$\sqrt[4]{81^3} = \left(\sqrt[4]{81}\right)^3 = 3^3 = 27$ $\left(81^3\right)^{\frac{1}{4}} = \left(81^{\frac{1}{4}}\right)^3 = 3^3 = 27$
$\left(\sqrt[n]{a}\right)^n = \sqrt[n]{a^n} = a$ if $a \geq 0$ $\left(a^{\frac{1}{n}}\right)^n = \left(a^n\right)^{\frac{1}{n}} = a$ if $a \geq 0$	$\left(\sqrt[5]{13}\right)^5 = \sqrt[5]{13^5} = 13$ $\left(13^{\frac{1}{5}}\right)^5 = \left(13^5\right)^{\frac{1}{5}} = 13$

