Properties of Exponents and Roots

Property	Example
$\boldsymbol{a^m a^n = a^{m+n}}$	$(4xy^2)(3y^3x^3) = 12x^4y^5$
$\boldsymbol{\frac{a^m}{a^n} = a^{m-n}}$	$\frac{12p^7r^3}{4r^4p^5} = 3p^2r^{-1} = \frac{3p^2}{r}$
$\boldsymbol{(a^m)^n = a^{mn}}$	$\left(\frac{s^4}{t^2}\right)^3 = \frac{s^{12}}{t^6}$
$\boldsymbol{a^0 = 1}$	$\left(\frac{7^2a^3bc^{14}}{-7abc^8}\right)^0 = 1$
$\boldsymbol{a^{-m} = \frac{1}{a^m}}$	$\frac{12a^2}{3b^{-2}} = 4a^2b^2$
$\boldsymbol{a^{\frac{m}{n}} = \sqrt[n]{a^m}}$	$\sqrt{4^5} = 4^{\frac{5}{2}}$
$\boldsymbol{\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}}$	$\sqrt[3]{3x} \cdot \sqrt[3]{4x} = \sqrt[3]{12x^2}$
$\boldsymbol{\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}}$	$\sqrt[3]{\frac{24}{27}} = \frac{\sqrt[3]{24}}{\sqrt[3]{27}} = \frac{2\sqrt[3]{3}}{3}$
$\boldsymbol{a\sqrt[n]{c} + b\sqrt[n]{c} = (a+b)\sqrt[n]{c}}$	$2\sqrt[3]{3} - 5\sqrt[3]{3} = -3\sqrt[3]{3}$
$\boldsymbol{\sqrt[n]{a^n} = a}$	$\sqrt[4]{(82xy^2)^4} = 82xy^2$