Rules of Exponents

Rule	Example
$x^a x^b = x^{a+b}$	$x^2 x^3 = xx \cdot xxx = x^{2+3} = x^5$
$\frac{x^a}{x^b} = x^{a-b}$	$\frac{x^5}{x^3} = \frac{xxxxx}{xxx} = x^{5-3} = x^2$
$\left(x^a\right)^b = x^{ab}$	$\left(x^2\right)^3 = (xx)(xx)(xx) = x^{2\cdot 3} = x^6$
$(xy)^a = x^a y^a$	$(xy)^2 = (xy)(xy) = xxyy = x^2 y^2$
$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$	$\left(\frac{x}{y}\right)^2 = \left(\frac{x}{y}\right)\left(\frac{x}{y}\right) = \frac{xx}{yy} = \frac{x^2}{y^2}$
$x^{-a} = \frac{1}{x^a}$	$\frac{x^3}{x^5} = \frac{xxx}{xxxxx} = \frac{1}{x^2}$ and $\frac{x^3}{x^5} = x^{3-5} = x^{-2}$
$x^0 = 1$ if $x \neq 0$	$1 = \frac{x^2}{x^2} = x^{2-2} = x^0 = 1$
$x^{\frac{a}{b}} = \sqrt[b]{x^a} = \left(\sqrt[b]{x}\right)^a$	$x^{\frac{2}{3}} = \sqrt[3]{x^2} \rightarrow \left(x^{\frac{2}{3}}\right)^3 = \left(\sqrt[3]{x^2}\right)^3 \rightarrow x^2 = x^2$
	$8^{\frac{2}{3}} = \sqrt[3]{8^2} = \sqrt[3]{64} = 4$
	$8^{\frac{2}{3}} = \left(\sqrt[3]{8}\right)^2 = (2)^2 = 4$