Powers

Property	Example	Property	Example
$x^n \cdot x^m = x^{n+m}$	$5^4 \cdot 5^3 = 5^7$	$x^n \cdot y^n = (x\,y)^n$	$5^3 \cdot 4^3 = 20^3$
$\frac{x^n}{x^m} = x^{n-m}$	$\frac{5^7}{5^3} = 5^4$	$\frac{x^n}{y^n} = \left(\frac{x}{y}\right)^n$	$\frac{20^3}{4^3} = 5^3$
$\left(x^n\right)^m = x^{n\,m}$	$\left(5^3\right)^4 = 5^{12}$	$x^0 = 1$	$5^0 = 1$
$\frac{1}{x^n} = x^{-n}$	$\frac{1}{5^3} = 5^{-3}$	$x^1 = x$	$5^1 = 5$

Roots

Property	Example	Property	Example
$\sqrt[n]{x} = x^{1/n}$	$\sqrt[3]{5} = 5^{1/3}$	$\sqrt[n]{x} \cdot \sqrt[n]{y} = \sqrt[n]{x\,y}$	$\sqrt[3]{5} \cdot \sqrt[3]{4} = \sqrt[3]{20}$
$\sqrt[n]{x^m} = x^{m/n}$	$\sqrt[3]{5^4} = 5^{4/3}$	$\frac{\sqrt[n]{x}}{\sqrt[n]{y}} = \sqrt[n]{\frac{x}{y}}$	$\frac{\sqrt[3]{20}}{\sqrt[3]{4}} = \sqrt[3]{5}$
$\sqrt[n]{\sqrt[m]{x}} = \sqrt[n\,m]{x}$	$\sqrt[3]{\sqrt[4]{5}} = \sqrt[12]{5}$	$\left(\sqrt[n]{x}\right)^m = \sqrt[n]{x^m}$	$\left(\sqrt[3]{5}\right)^2 = \sqrt[3]{5^2} = \sqrt[3]{25}$
$x \cdot \sqrt[n]{y} = \sqrt[n]{x^n y}$	$5 \cdot \sqrt[3]{2} = \sqrt[3]{5^3 \cdot 2} = \sqrt[3]{250}$	$\left(\sqrt[n]{x}\right)^n = x$	$\left(\sqrt[3]{5}\right)^3 = 5$

Logarithms

Property	Example	Property	Example
$\log x + \log y = \log(x\,y)$	$\log 5 + \log 4 = \log 20$	$\log_a(a^n) = n$	$\log_5(5^3) = 3$
$\log x - \log y = \log\left(\frac{x}{y}\right)$	$\log 20 - \log 4 = \log 5$	$\log_a x = \frac{\log_b x}{\log_b a}$	$\log_2 8 = \frac{\log_{10} 8}{\log_{10} 2}$
$\log(x^n) = n \log x$	$\log(2^3) = 3 \log 2$	$\log_a a = 1$	$\log_5 5 = 1$
$\log \sqrt[n]{x} = \frac{1}{n} \log x$	$\log \sqrt[3]{5} = \frac{1}{3} \log 5$	$\log 1 = 0$	