

b^m - exponent
base

*BASE MUST BE THE SAME

6.1 Properties of Exponents

Property	Symbols	Examples	Practice
Product of Powers	$b^m \cdot b^n = b^{m+n}$	$X^2 \cdot X^3 = X^{2+3} = X^5$ $2^2 \cdot 2^3 = 2^5 = 32$	$a^3 a^5 = a^8$ $y^4 y^7 = y^{11}$
Power of a Power	$(b^m)^n = b^{m \cdot n}$	$(y^2)^3 = y^{2 \cdot 3} = y^6$ $\rightarrow y^2 \cdot y^2 \cdot y^2 = y^{2+2+2}$	$(x^6)^2 = x^{12}$ $(y^2)^8 = y^{16}$
Power of a Product	$(ab)^m = a^m b^m$	$(xy)^2 = x^2 y^2$	$(ab)^4 = a^4 b^4$ $(x^2 y^3)^3 = x^6 y^9$ $\frac{x^9}{x^5} = x^4$
Quotient of Powers	$\frac{b^m}{b^n} = b^{m-n}$	$\frac{X^7}{X} = X^{7-1} = X^6$ $\rightarrow \frac{X \cdot X \cdot X \cdot X \cdot X \cdot X \cdot X}{X}$	$\frac{b^9}{b^3} = b^6$
Power of a Quotient	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	$\left(\frac{X}{Y}\right)^3 = \frac{X^3}{Y^3}$	$\left(\frac{a}{b}\right)^5 = \frac{a^5}{b^5}$ $\left(\frac{x}{y}\right)^4 = \frac{x^4}{y^4}$ $\frac{a^4}{a^4} = 1$
Zero Exponents	$b^0 = 1$	$X^0 = 1$	$\left(\frac{x^7 y^5}{x^7 y^5}\right)^0 = 1$
Negative Exponents	$b^{-m} = \frac{1}{b^m}$	$X^{-2} = \frac{1}{X^2}$ $\frac{1}{Y^3} = Y^{-3}$	$a^{-5} = \frac{1}{a^5}$ $\frac{1}{y^{-4}} = y^4$
Rational Exponents	$b^{\frac{p}{r}} = \sqrt[r]{b^p}$	$X^{\frac{1}{2}} = \sqrt{X}$ $X^{\frac{2}{3}} = \sqrt[3]{X^2}$	$y^{\frac{5}{4}} = \sqrt[4]{y^5}$ $b^{\frac{7}{3}} = \sqrt[3]{b^7}$