Properties of Exponents

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b^n is pronounced "b raised to the n^{th} power" or "b to the n" for short.
Don't pronounce b^n "b n", because "b n" is the pronunciation of b times n.

n^2 is pronounced "n squared";
n^3 is pronounced "n cubed".

n is the **exponent** or **power** or **index;** b is the **base**.

Examples

$5^3 = 5 \times 5 \times 5 = 125$

$y^6 = y \times y \times y \times y \times y \times y$

Property *	Examples
1. $b^m \times b^n = b^{m+n}$	$2^2\ 2^3 = 2^{2+3} = 2^5$
2. $\left(b^m\right)^n = b^{m \times n}$	$(2^2)^3 = 2^{2\times3} = 2^6$
$(b^m)^n = (b^n)^m$ Note: $(b^m)^n \neq b^{(m^n)}$	$\left(2^3\right)^5 = \left(2^5\right)^3$
3. $\frac{a^m}{a^n} = a^m \div a^n = a^{(m-n)}$	$\frac{x^7}{x^3} = x^{7-3} = x^4$
4. $(a\ b)^m = a^m \times b^m$	$(2x^2y)^3 = 8x^6y^3$
5. $a^{-n} = \frac{1}{a^n}$	$4^{-2} = \frac{1}{4^2} = \frac{1}{16}$
$\frac{1}{a^{-n}} = a^n$	$\frac{1}{4^{-2}} = 4^2 = 16$
$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$	$\left(\frac{2}{3}\right)^{-3} = \left(\frac{3}{2}\right)^3$
6. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	$\left(\frac{3}{2}\right)^3 = \frac{3^3}{2^3} = \frac{27}{8}$
7. $a^0 = 1$	$3\ (y^2)^0 = 3$
8. $\sqrt[n]{a} = a^{\frac{1}{n}}$	$\sqrt[3]{8} = 8^{\frac{1}{3}} = 2$
9. $\left(\sqrt[n]{a}\right)^m = \sqrt[n]{a^m} = a^{m/n}$	$27^{2/3} = (\sqrt[3]{27})^2 = 3^2 = 9$

* Some of these properties are not true for a or $b \leq 0$, but we will not consider this case.