

ULTIMATE PROPERTIES OF EXPONENTS FORMULA SHEET

Property of Exponents	Algebraic Formula	Algebraic Example	Numerical Example
1. Product of Powers	$x^m \cdot x^n = x^{m+n}$	$x^3 \cdot x^2 = x^{3+2} = x^6$	$2^3 \cdot 2^2 = 2^{3+2} = 2^5 = 32$
2. Power of a product	$(xy)^m = x^m y^m$	$(xy)^3 = x^3 y^3$	$(3 \cdot 2)^3 = 3^3 \cdot 2^3 = 27 \cdot 8 = 216$
3. Power of a Power	$(x^m)^n = x^{mn}$	$(x^3)^2 = x^{3 \cdot 2} = x^6$	$(3^3)^2 = 3^{3 \cdot 2} = 3^6 = 729$
4. Quotient of powers	$\frac{x^m}{x^n} = x^{m-n}$	$\frac{x^3}{x^2} = x^{3-2} = x$	$\frac{3^3}{3^2} = 3^{3-2} = 3^1 = 3$
5. Power of a Quotient	$\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$	$\left(\frac{x}{y}\right)^3 = \frac{x^3}{y^3}$	$\left(\frac{3}{2}\right)^2 = \frac{3^2}{2^2} = \frac{9}{4}$
6. Zero Property	$x^0 = 1$	$y^0 = 1$	$3^0 = 1$
7. Negative (Reciprocal) Power	$x^{-m} = \frac{1}{x^m}$	$x^{-3} = \frac{1}{x^3}$	$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$
8. Nth root	$x^{\frac{1}{m}} = \sqrt[m]{x}$	$x^{\frac{1}{3}} = \sqrt[3]{x}$	$27^{\frac{1}{3}} = \sqrt[3]{27} = 3$
9. Special Case of the nth root	$x^{\frac{1}{2}} = \sqrt{x}$	$x^{\frac{1}{2}} = \sqrt{x}$	$9^{\frac{1}{2}} = \sqrt{9} = 3$
10. Fractional Exponent	$x^{\frac{m}{n}} = \sqrt[n]{x^m} = (\sqrt[n]{x})^m$	$x^{\frac{4}{3}} = \sqrt[3]{x^4} = (\sqrt[3]{x})^4$	$8^{\frac{2}{3}} = \sqrt[3]{8^2} = (\sqrt[3]{8})^2 = 2^2 = 4$
11. Root of the same Power	$\sqrt[n]{x^n} = \begin{cases} x & \text{if } n \text{ is even} \\ x & \text{if } n \text{ is odd} \end{cases}$	$\sqrt{x^2} = x $	$\sqrt{(-2)^2} = -2 = 2$