

Exponent Properties

For all real numbers a and b , and integers m , n , and p . Assuming no denominators are equal to zero:

1. $a^0 = 1$ Ex. $6^0 = 1$

2. $a^m \cdot a^n = a^{m+n}$ Ex. $(x^3)(x^5)(x) = x^9$

3. $(a^m)^n = a^{mn}$ Ex. $(x^5)^3 = x^{15}$

4. $(ab)^m = a^m b^m$ Ex. $(7xy)^2 = 7^2 x^2 y^2 = 49x^2 y^2$

5. $(a^m b^n)^p = a^{mp} b^{np}$ Ex. $(x^2 y^4)^3 = x^6 y^{12}$

6. $\frac{a^m}{a^n} = a^{m-n}$ Ex. $\frac{x^8}{x^3} = x^5$

7. $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$ Ex. $\left(\frac{x}{3}\right)^3 = \frac{x^3}{3^3} = \frac{x^3}{27}$

8. $\left(\frac{a^m}{b^n}\right)^p = \frac{a^{mp}}{b^{np}}$ Ex. $\left(\frac{2x^2}{y^5}\right)^4 = \frac{2^4 x^8}{y^{20}} = \frac{16x^8}{y^{20}}$

9. $a^{-n} = \frac{1}{a^n}$ Ex. $x^2 y^{-3} = \frac{x^2}{y^3}$

OR

$\frac{1}{a^{-n}} = a^n$ Ex. $\frac{x^2}{y^{-3}} = x^2 y^3$

10. $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$ Ex. $\left(\frac{x^2}{y^5}\right)^{-3} = \left(\frac{y^5}{x^2}\right)^3$