Exponent Properties

1. Product of like bases: $\qquad\qquad\qquad a^m a^n = a^{m+n}$

To multiply powers with the same base, add the exponents and keep the common base.

Example: $x^5 x^3 = x^{5+3} = x^8$

2. Quotient of like bases: $\qquad \dfrac{a^m}{a^n} = a^{m-n}$

To divide powers with the same base, subtract the exponents and keep the common base.

Example: $\dfrac{x^5}{x^3} = x^{5-3} = x^2$

3. Power to a power: $\qquad\qquad\qquad (a^m)^n = a^{mn}$

To raise a power to a power, keep the base and multiply the exponents.

Example: $\left(x^5\right)^3 = x^{5*3} = x^{15}$

4. Product to a power: $\qquad\qquad\qquad (ab)^m = a^m b^m$

To raise a product to a power, raise each factor to the power.

Example: $\left(x^4 y^5\right)^3 = x^{12} y^{15}$

5. Quotient to a power $\qquad\qquad\qquad \left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$

To raise a quotient to a power, raise the numerator and the denominator to the power.

Example: $\left(\dfrac{x^3}{y^2}\right)^4 = \dfrac{x^{12}}{y^8}$

6. Zero Exponent: $\qquad\qquad\qquad a^0 = 1$

Any number raised to the zero power is equal to "1".

Example: $(8x^4)^0 = 1$

7. Negative exponent: $\qquad\qquad\qquad a^{-n} = \dfrac{1}{a^n} \qquad$ or $\qquad \dfrac{1}{a^{-n}} = a^n$

Negative exponents indicate reciprocation, with the exponent of the reciprocal becoming positive. You may want to think of it this way: unhappy (negative) exponents will become happy (positive) by having the base/exponent pair "switch floors"!

Example: $8^{-2} = \dfrac{1}{8^2} = \dfrac{1}{64} \qquad\qquad$ or $\qquad\qquad \dfrac{4}{x^{-3}} = 4x^3$