Rules of Exponents

$3x^{7}$ ← exponent, ← base, ↑ coefficient

7^{5} ← exponent, ← base

Rule #1: $a^m \cdot a^n = a^{m+n}$

$x^3 \cdot x^7 = x^{10}$

$(a^3 b^5 c^4)(a^3 b^7 c^9)$

$= a^6 b^{12} c^{13}$

$7^2 \cdot 7^9 = 7^{11}$

NEVER CHANGE THE BASE!

$(2^5 \cdot 3^2)(2^2 \cdot 3^3)$

$2^7 \cdot 3^5$

$= 128 \cdot 243 = 31,104$

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Rule #2 $= (a^m)^n = a^{m \cdot n}$

$(K^3)^5 = K^{15}$

$K^3 \cdot K^3 \cdot K^3 \cdot K^3 \cdot K^3$

$(2^1 p^3 q^5)^6 = 2^6 p^{18} q^{30}$

$= 64 p^{18} q^{30}$

Rule #3: $\frac{a^m}{a^n} = a^{m-n}$

$\frac{x^6}{x^4} = x^{6-4} = x^2$

$\frac{f^3}{f^8} = f^{-5} = \frac{1}{f^5}$

Rule #4: $a^{-m} = \frac{1}{a^m}$

$\frac{1}{a^{-m}} = a^m$

$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

$\frac{1}{7^{-3}} = 7^3 = 343$

$\frac{K^{6+3} h^{-7} m^{-1} p^{9-7}}{K^5 h^{8+2} m^{-1+4} p^1}$

$= \frac{K^9 p^2}{h^{10} m^3}$

Rule #5: $a^0 = 1$

$$\frac{f^{7-7}}{f^7} = 1 = f^0$$

$$2(xy^3)^0 + 5^0$$

$$2(1) + 1$$

$$= 2 + 1$$

$$= 3$$

$$\left(\frac{x^3}{y^2}\right)^{-4}$$

Shortcut: Flip fraction & change to positive exponent.

$$= \left(\frac{y^2}{x^3}\right)^4$$

$$= \frac{y^8}{x^{12}}$$

$$\frac{(2a^7b^3c^{-2})^3 \cdot (2a^{-4}b^{-1}c^5)^{-2}}{(2a^{-7}b^{11}c^{-5})^2 \cdot (2a^{41}b^{33}c^{105})^0}$$

$$(2a^7b^3c^{-2})^3$$

$$\frac{(2^1a^{-7}b^{11}c^{-5})^2(2a^{-4}b^{-1}c^5)^2}{2^3a^{21}b^9c^{-6}}$$

$$\frac{(2^2a^{-14}b^{22}c^{-10})(2^2a^{-8}b^{-2}c^{10})}{2^{4-3}a^{21+22}b^{9}c^{-4}}$$

$$= \frac{a^{43}}{2^1b^{11}c^6}$$

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Scientific Notation

$243{,}000{,}000 = 2.43 \times 10^{8}$

$0.00056 = 5.6 \times 10^{-4}$

$4.69 \times 10^{-3} = 0.00469$

$(2.3 \cdot 10^{6})(4.7 \times 10^{3})$

$= 10.81 \times 10^{9+1}$

$= 1.081 \times 10^{10}$

$\frac{1.7 \times 10^{5-12}}{3.4 \times 10^{12}}$

$\frac{1.7}{3.4}$

$0.5 \times 10^{-7-1}$

5×10^{-8}