Algebra – Rules of Exponents

Exponents represent repeated multiplication. For example: $4^3 = 4*4*4 = 64$

If there is no exponent shown then it is assumed to be 1. For example: 6 is the same as 6^1.

Multiplication Rule $A^n * A^m = A^{n+m}$
Notice that the base of the exponents is the same.
Example: $9^3 * 9^7 = 9^{10}$ but $2^3 * 5^6$ cannot be combined because the bases are different.

Power Rules $(A^n)^m = A^{n*m}$
                     $(A*B)^m = A^m * B^m$

Example: $(9^3)^7 = 9^{21}$ and $(2*5)^3 = 2^3 * 5^3$ and $(4^5 * 6^9)^2 = 4^{10} * 6^{18}$

Division Rule $\dfrac{A^n}{A^m} = A^{n-m}$
Notice the base of the exponents is the same.

Example: $\dfrac{12A^5 B^7 C^4}{8A^3 B^2 C} = \left(\dfrac{12}{8}\right)\left(\dfrac{A^5}{A^3}\right)\left(\dfrac{B^7}{B^2}\right)\left(\dfrac{C^4}{C}\right) = \left(\dfrac{3}{2}\right)(A^{5-3})(B^{7-2})(C^{4-1}) = \dfrac{3}{2}A^2 B^5 C^3$

Zero Rule $A^0 = 1$

Negative Rule $A^{-n} = \dfrac{1}{A^n}$

Example: $\dfrac{A^2}{A^5} = A^{2-5} = A^{-3} = \dfrac{1}{A^3}$

In general, Negative exponents produce fractions (not negative answers)