Exponent Laws

Exponent of 1 (Section 2.1)

Any number to the power of 1 equals the number

Example: $2^1 = 2$ $3^1 = 3$ $128^1 = 128$

Zero Exponent Law (Section 2.2)

Any number to the power of 0 equals 1

Examples: $2^0 = 1$

$(-2)^0 = 1$

$-2^0 = -1$

Product of Powers Law (Section 2.4)

Remember - Product means multiply!

When ***multiplying*** powers with the **same base**, keep the base and ***add*** exponents to form a single power.

$$a^m \times a^n = a^{m+n}$$

Ex. $2^3 \times 2^2 = 2^{3+2}$

$= 2^5$

$= 32$

Quotient of Powers Law (Section 2.4)

Remember - Quotient means divide!

When ***dividing*** powers with the **same base**, keep the base and ***subtract*** exponents to form a single power.

$$a^m \div a^n = a^{m-n}$$

Ex. $2^3 \div 2^2 = 2^{3-2}$

$= 2^1$

$= 2$

Power of a Power Law (Section 2.5)

When you have a ***power of a power***, keep the base and ***multiply*** exponents to form a single power.

$$(a^m)^n = a^{m \times n}$$

Ex. $(2^3)^2 = 2^{3 \times 2}$

$= 2^6$

$= 64$

Power of a Product Law (Section 2.5)

When you have an exponent on the *outside of brackets* containing a *multiplication*, apply the exponent to each base inside the brackets. This is just an application of the Power of a Power Law.

$$(a \times b)^m = (a^m \times b^m)$$

Ex. $(2 \times 3)^2 = (2^2 \times 3^2)$

$= (4 \times 9)$

$= 36$

Power of a Quotient Law (Section 2.5)

When you have an exponent on the *outside of brackets* containing a *division*, apply the exponent to each base inside the brackets. This is just an application of the Power of a Power Law.

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

Ex. $\left(\frac{4}{2}\right)^2 = \frac{4^2}{2^2}$

$= \frac{16}{4}$

$= 4$

******* Remember! There is no law that includes adding or subtracting powers!!!**

STOP! **Use order of operations instead!!!**

$$2^2 + 2^3$$

$$= 4 + 8$$

$$= 12$$

******* Remember! A negative sign that is not inside brackets is not part of the base!!!**

$(-2)^2 = 4$ **BUT** $-2^2 = -4$