TSC | WILLIAM D. LAW, JR. LEARNING COMMONS

Basic Exponents

Writing a number in exponential form means to use a "shorthand" method to tell how many times a factor is being multiplied by itself. For example, 2^4 means that the base, 2, is being multiplied by itself 4 times.

$$2^4 = 2 * 2 * 2 * 2$$

More examples:

$$2^2 = 2 * 2 = 4$$

$$2^3 = 2 * 2 * 2 = 8$$

$$2^5 = 2 * 2 * 2 * 2 * 2 = 32 \qquad a^5 = a * a * a * a * a$$

There is an important difference between $(-4)^2$ and -4^2. The difference is the parentheses. In $(-4)^2$ the base is -4. We would read this as "negative four squared" or "the square of negative four." is positive 16

$$(-4)^2 = -4 * -4 = 16$$

$(-4)^3 = -4 * -4 * -4 = -64$ "The cube of negative 4 is -64"

In -4^2, the base is positive four. We could read this as "the negative of four squared" or "the opposite of the square of four."

$-4^2 = -(4 * 4) = -16$ "The opposite of the square of 4 is -16."

$-4^3 = -(4 * 4 * 4 * 4) = -64$ "The opposite of the cube of 4 is -64."

NOTICE that when the base is a negative number (inside parentheses) that the answer will be positive if the exponent is <u>even</u> and negative if the exponent is <u>odd</u>. However, when the base is a positive number with a negative sign in front, the answer is <u>always</u> negative.

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

$$(-2)^3 = -2 * -2 * -2 = -8$$

$$(-2)^4 = -2 * -2 * -2 * -2 = 16$$

$(-2)^5 = -2 * -2 * -2 * -2 * -2 = -32$

$-2^2 = -(2 * 2 * 2 * 2 * 2 = -32$

Sometimes we have a problem which has more than one base. When that occurs we must simplify each base separately and then do the operation.

EXAMPLE (1)

$(-2)^3\,(5)^2 = (-2)(-2)(-2)(5)(5) = -8 * 25 = -200$

EXAMPLE (2)

$4^5 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 1024$

EXERCISES: Evaluate .

1. 2^6
2. $(-2)^2 * \frac{1}{4}$
3. $-(4)^3 * (5)^2$
4. $(-5)^2 * (4)^3$
5. $5^3 * 3^5$
6. $\frac{1}{16} * 4^4$

Answers

1. 64
2. 1
3. -64*25= -1600
4. 25*64= 1600
5. 16