Exponent.

Exponentiation is a mathematical operation, written as a^n, involving two numbers, the base *a* and the exponent *n*. When *n* is a positive integer, exponentiation corresponds to repeated multiplication of the base: that is, a^n is the product of multiplying *n* bases:

$$a^n = \underbrace{a \cdot a \cdot a \ldots \cdot a}_{n\ times}$$

In that case, a^n is called the *n*-th power of *a*, or *a* raised to the power *n*.
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The exponent indicates how many copies of the base are multiplied together. For example, $3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 243$. The base 3 appears 5 times in the repeated multiplication, because the exponent is 5. Here, 3 is the *base*, 5 is the *exponent*, and 243 is the *power* or, more specifically, *the fifth power of 3*, *3 raised to the fifth power*, or *3 to the power of 5*.

In order to have the set of properties of exponent consistent, $a^0 = 1$ for any number *a,* but 0.

Also, if there are two numbers *a* and *b*:

$$(a \cdot b)^{10} = \underbrace{(a \cdot b) \cdot \ldots \cdot (a \cdot b)}_{10\ times} = \underbrace{a \cdot \ldots \cdot a}_{10\ times} \cdot \underbrace{b \cdot \ldots \cdot b}_{10\ times} = a^{10} \cdot b^{10}$$

- A positive number raised into any power will result a positive number.
- A negative number, raised in a power, represented by an even number is positive, represented by an odd number is negative.

Homework:

1. Evaluate:

$$a.\ 2^5; \quad b.\ (-2)^5; \quad c.-2^5; \quad d.\ (4\cdot 2)^3; \quad e.\ \left(\frac{1}{6}\right)^2$$

2. A toy making company had a huge success launching their new plushies. At the end of the first month they sold a 1000 of them. Each next month their sales were growing by a factor of two (double). How many plushies in total they sold after 3 month?

3. Houses of Winnie the Pooh and Piglet are on the same street, 600 meters apart. At the same time, they started moving in opposite directions. Pooh was walking with a speed of 3 km/h, and Piglet was running with a speed of 6 km/h. How far from each other will they be in 20 minutes?

4. Represent numbers as a power of 10:
   Example: $1000^3 = (10^3)^3 = 10^{3\cdot 3} = 10^9$

$$100^2; \quad 100^3; \quad 100^4;$$