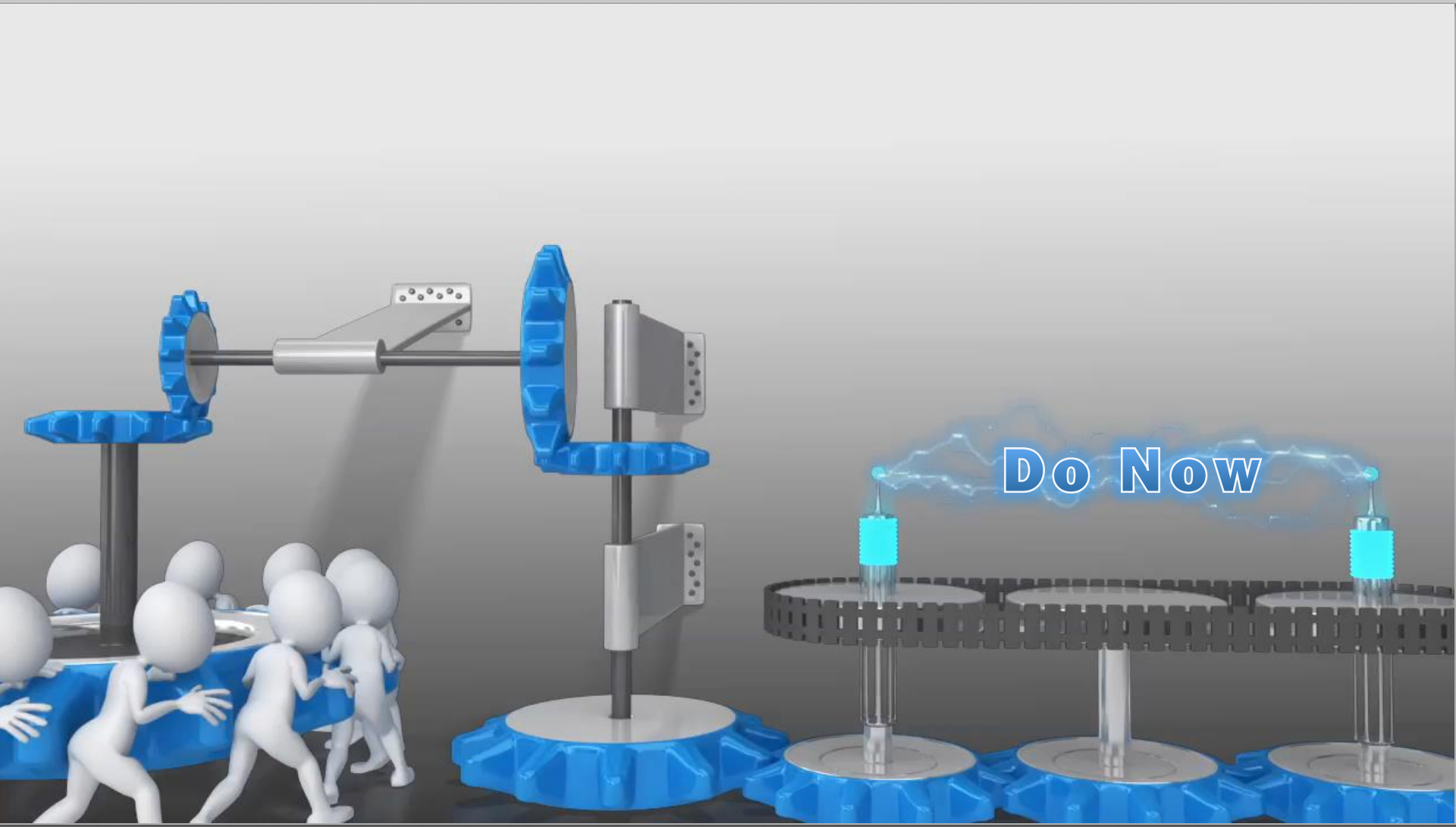
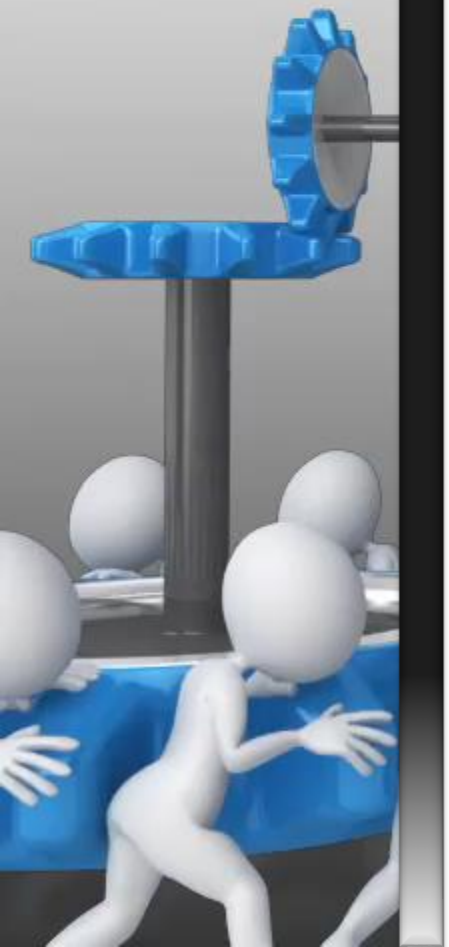
Exponents

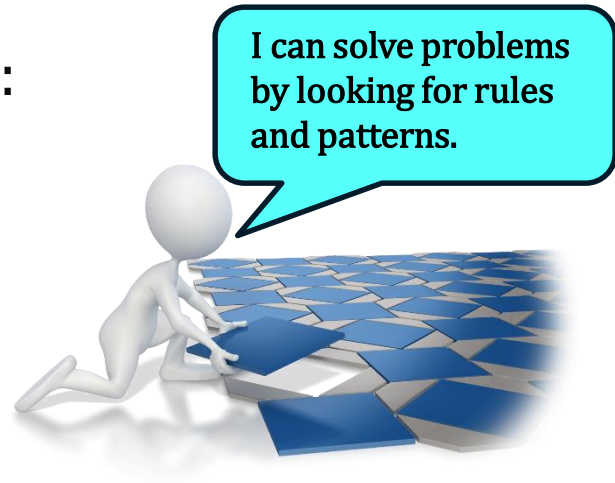
Please work quietly on your Do Now while I check your homework. Thanks!



Do Now



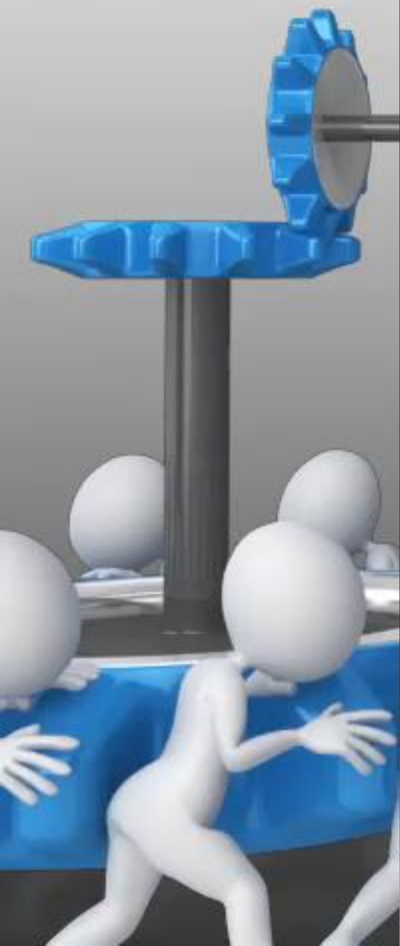
Simplify each of the following:



$2^2 =$ $3^2 =$ $10^2 =$

$2^3 =$ $3^3 =$ $10^3 =$

$2^4 =$ $3^4 =$ $10^4 =$



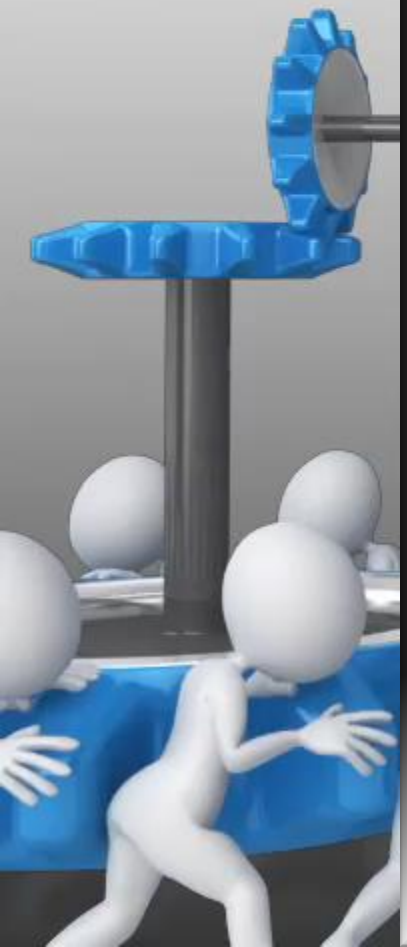
In 1997, the company Google was named when one of the founders misspelled the word “googol”.

A googol is a 1 with 100 zeros

10,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,00
0,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
,000,000,000

We use exponents to help us write very large numbers like this. A googol can be written as 10^{100}.

Exponents indicate repeated multiplication. 10^{100} means multiply 10 by 10, 100 times.

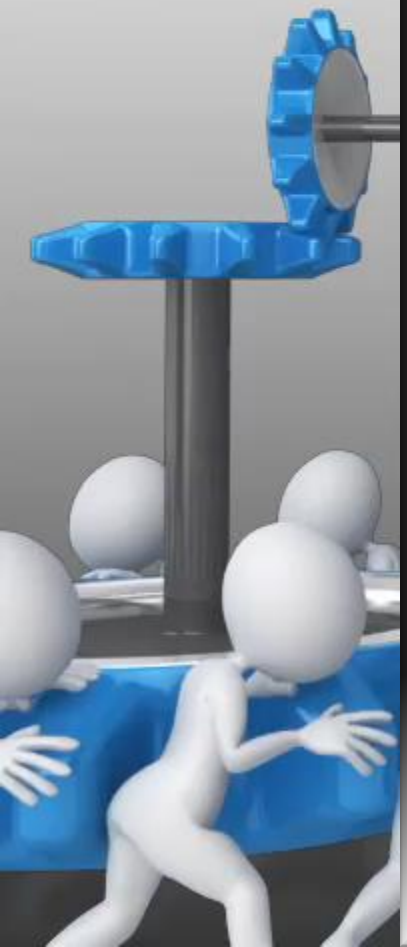


bases and exponents:

3^5

Exponent

Base number



1 as an exponent:

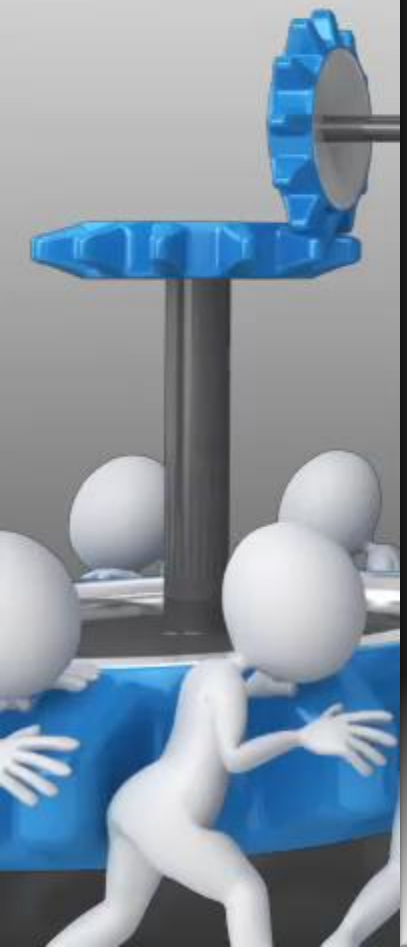
Any base number to the power of 1 is equal to the base number itself.

Examples: $2^1 = 2, 10^1 = 10$

0 as an exponent:

Any base number to the power of 0 is equal to 1.

Examples: $5^0 = 1, 8^0 = 1$



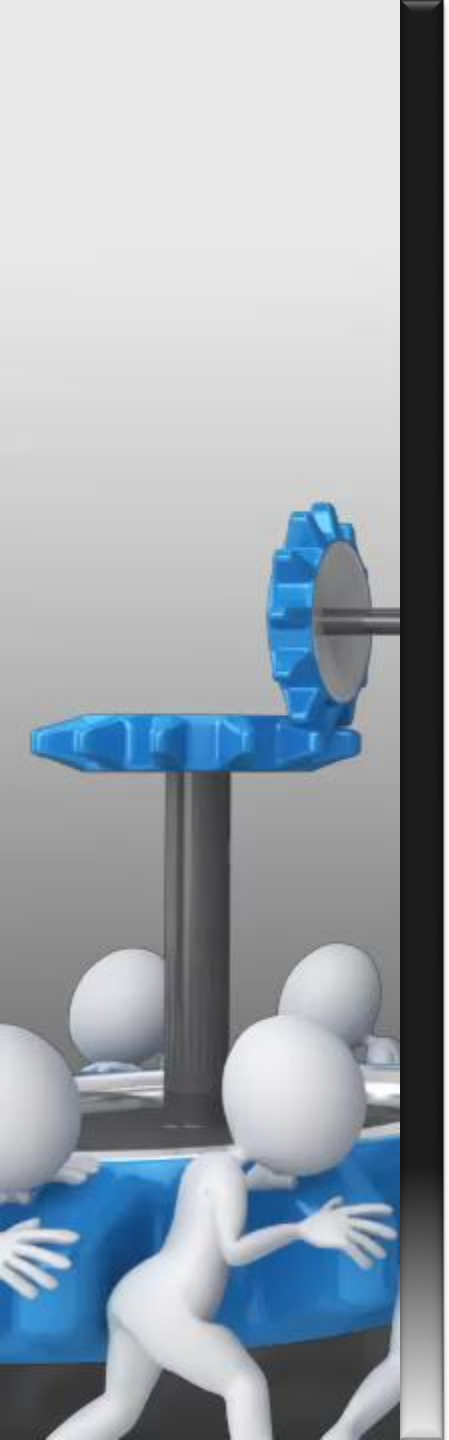
Negative exponents:

Any base number to a negative power equals its reciprocal to the positive power.

Examples:

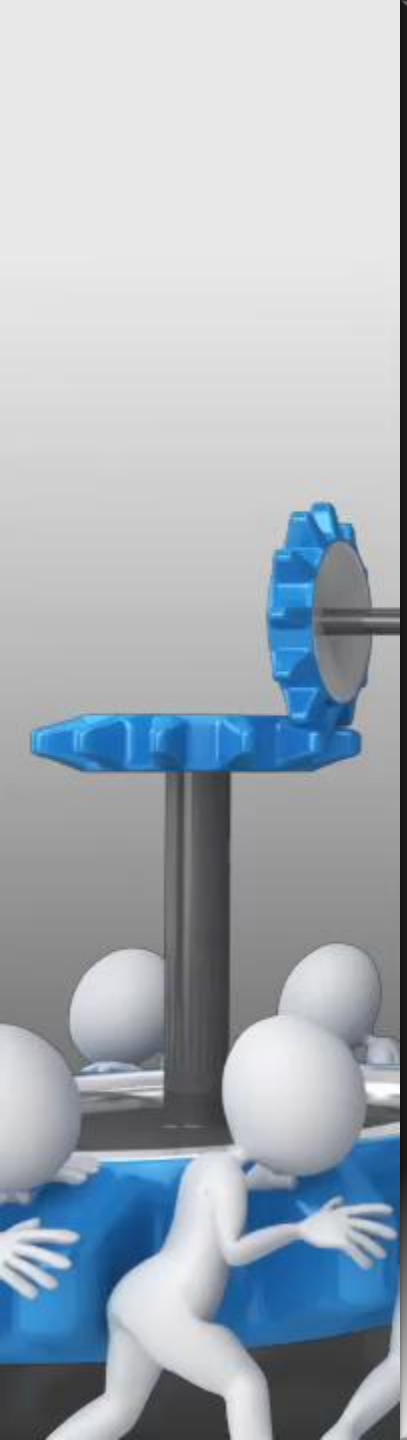
$$2^{-1} = \left(\frac{1}{2}\right)^{1} = \frac{1}{2}$$

$$3^{-2} = \left(\frac{1}{3}\right)^{2} = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$$



Simplify each of the following expressions.

$1,333^{1}$ 19^{0} 5^{-2}



Simplify each of the following expressions.

$(-2)^4$ $\quad -2^4$ $\quad -2^{-3}$

Integer Exponents Conceptually

0 is the additive identity, and the starting point for addition. When you go to the supermarket, before the cashier rings up any items, the register reads $0.

1 is the multiplicative identity, and the starting point for multiplication. Understanding this helps us to understand integer exponents.

2^3 can be thought of as 1 multiplied by 2, 3 times

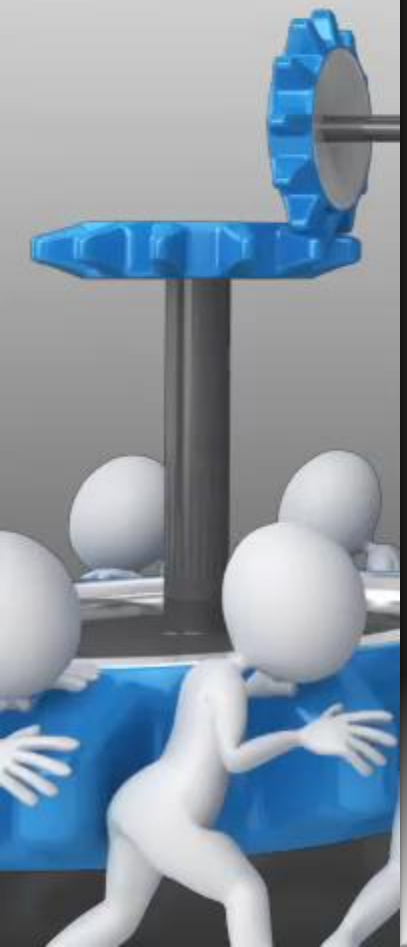
4^2 can be thought of as 1 multiplied by 4, 2 times

7^1 can be thought of as 1 multiplied by 7, 1 time

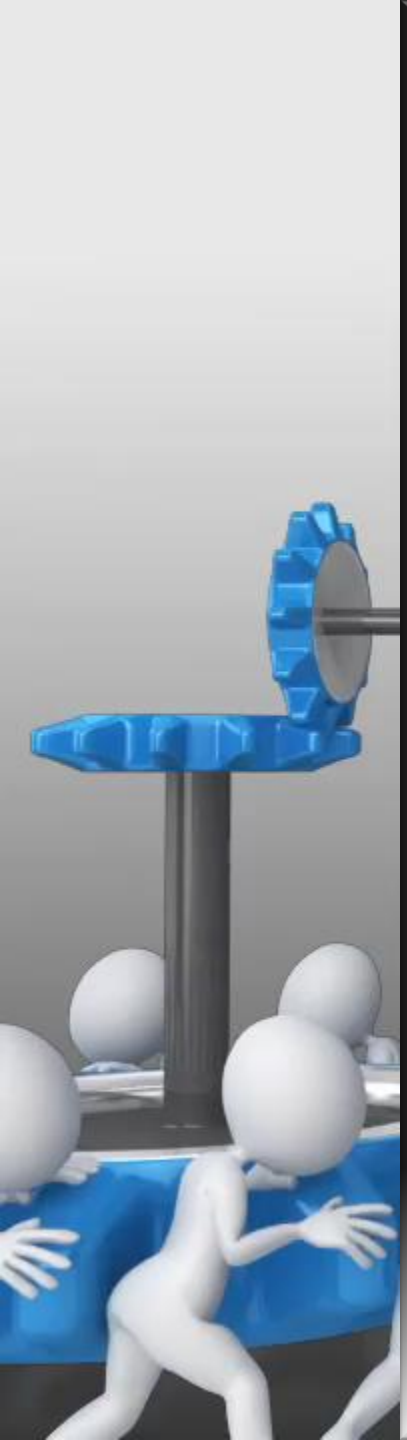
2^0 can be thought of as ____ _____ by ____, _____ times

3^{-1} can be thought of as ____ _____ by _____, _____ time.

5^{-2} can be thought of as ____ _____ by _____, _____ times



This dust mite has been magnified 1.5×10^5 times its actual size. The picture of the dust mite is how many times larger than the actual mite?



What is the value of this expression?

$$(1-4)^3 - 3 \acute{} \; 8 \, , \, 6$$