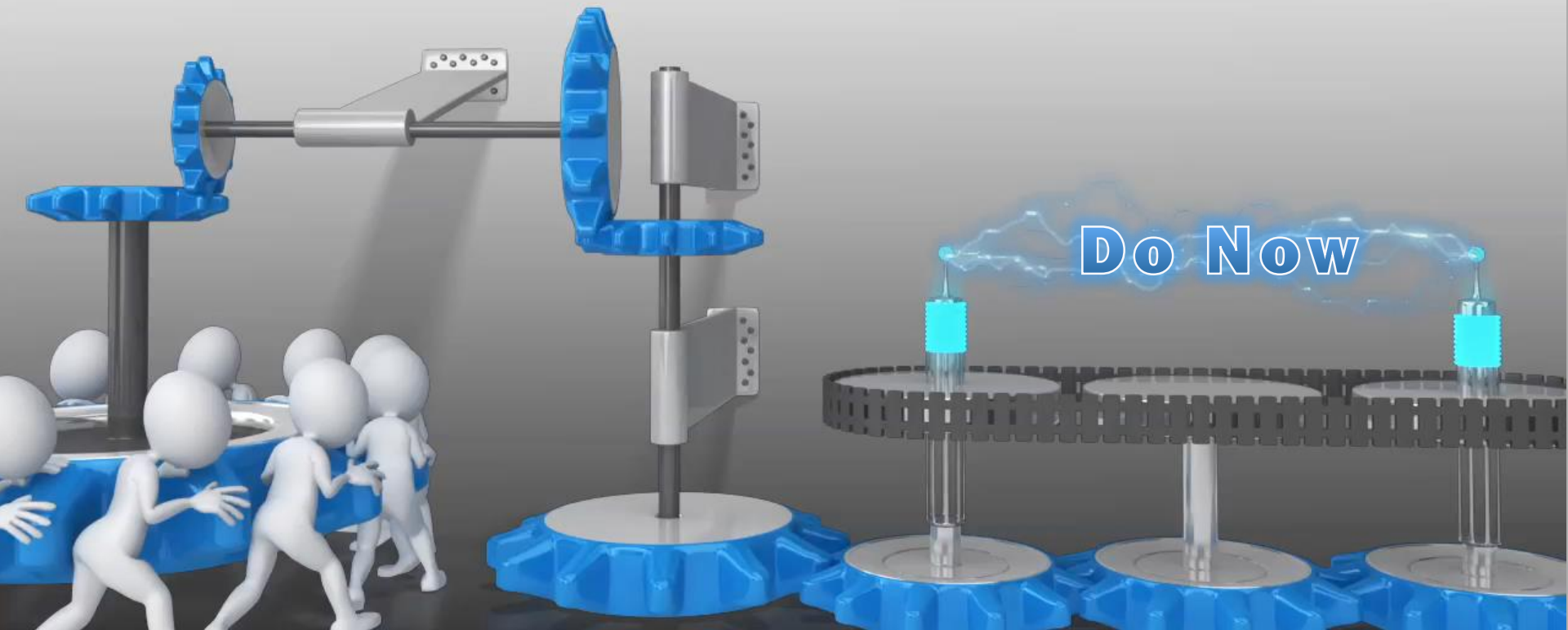


Exponents

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



Do Now

Simplify each of the following:

I can solve problems by looking for rules and patterns.



$$2^2 =$$

$$3^2 =$$

$$10^2 =$$

$$2^3 =$$

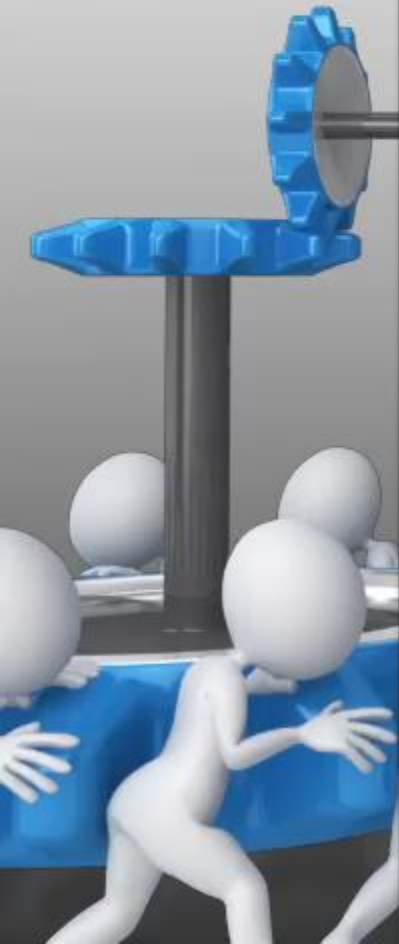
$$3^3 =$$

$$10^3 =$$

$$2^4 =$$

$$3^4 =$$

$$10^4 =$$



An illustration on the left side of the slide depicts a blue mechanical device with gears and a vertical shaft. Several white, egg-shaped figures are shown interacting with the device, some appearing to be pushing or pulling on a blue horizontal bar. The background is a light gray gradient.

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

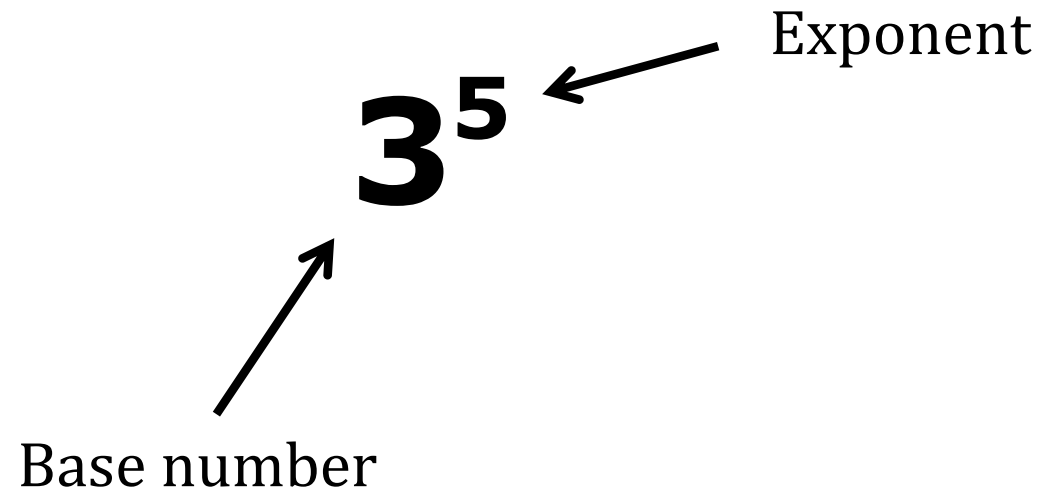
A googol is a 1 with 100 zeros

10,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,
0,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,
,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.

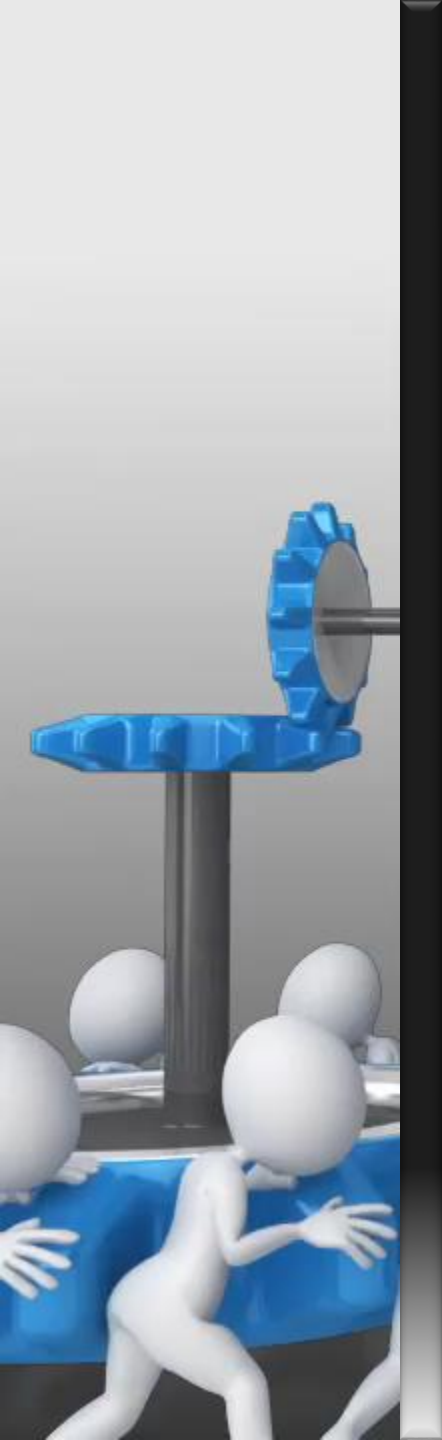
bases and exponents:



The diagram shows the mathematical expression 3^5 . An arrow points from the text "Base number" to the number 3. Another arrow points from the text "Exponent" to the number 5.

Base number

Exponent



1 as an exponent:

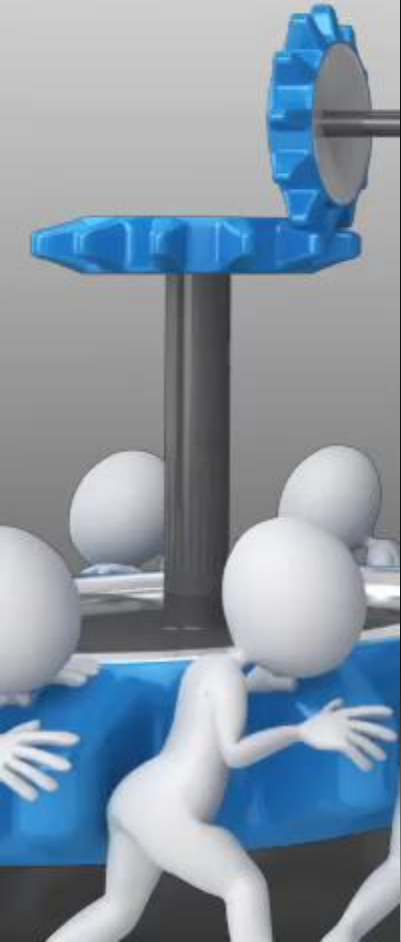
Any base number to the power of 1 is equal to the base number itself.

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

0 as an exponent:

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

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



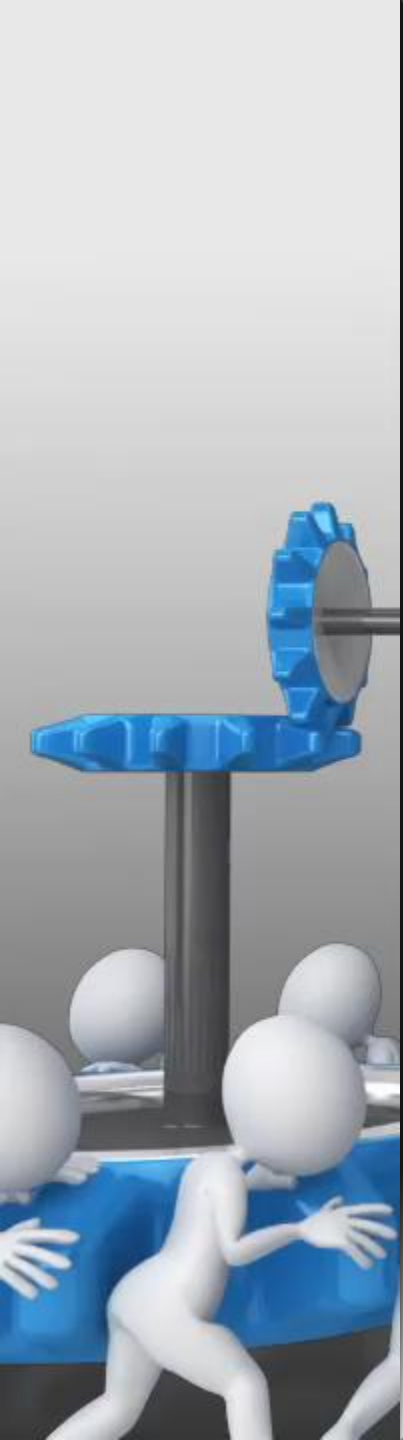
Negative exponents:

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

Examples:

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

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

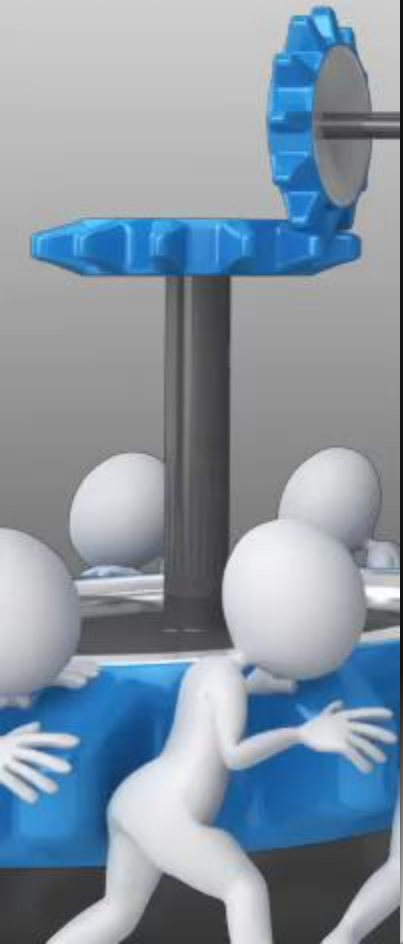


Simplify each of the following expressions.

$$1,333^1$$

$$19^0$$

$$5^{-2}$$

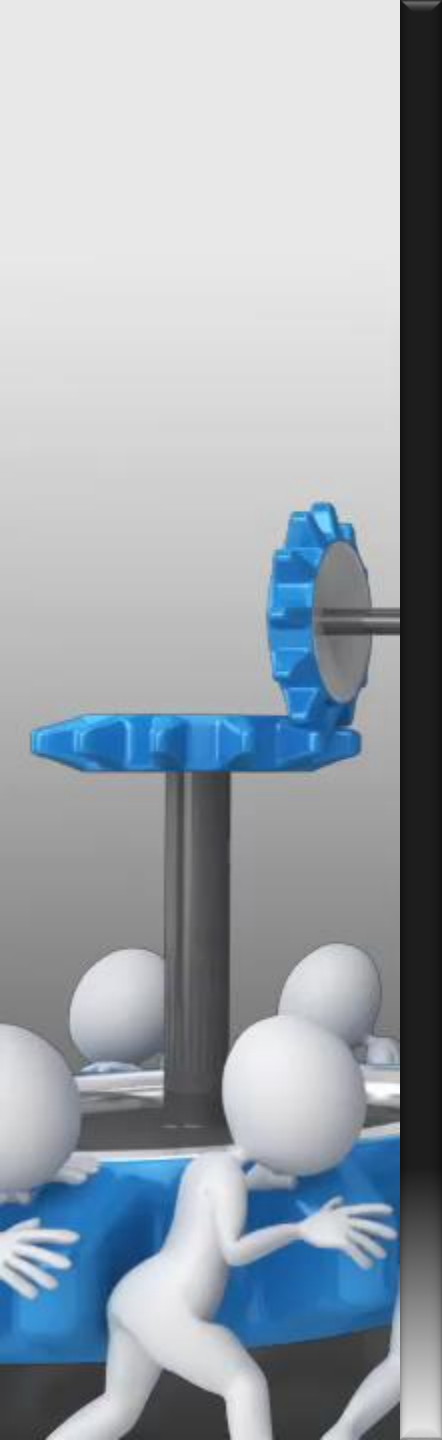


Simplify each of the following expressions.

$$(-2)^4$$

$$-2^4$$

$$-2^{-3}$$



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

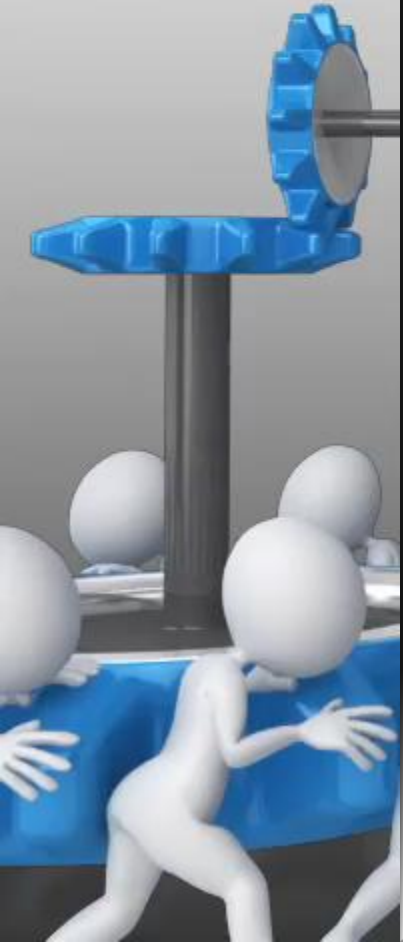
2^0 can be thought of as _____ by _____, _____ times

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?

$$(1 - 4)^3 - 3 \cdot 8 \div 6$$

