

# Logarithms

*A logarithm is the power to which a number must be raised in order to get some other number*

For example, the base ten logarithm of 100 is 2, because ten raised to the power of two is 100:

$$\log 100 = 2$$

Because

$$10^2 = 100$$

This is an example of a base-ten logarithm. We call it a base ten logarithm because *ten is the number that is raised to a power.*

The base unit is the number being raised to a power.

There are logarithms using different base units. If you wanted, you could use two as a base unit.

ex. the base two logarithm of eight is three, because two raised to the power of three equals eight:

$$\log_2 8 = 3$$

Because

$$2^3 = 8$$

In general, you write log followed by the base number as a subscript. The most common logarithms are base 10 logarithms and natural logarithms

A base ten log is written *log*  
and is usually written in the form:  
 $\log a = r$

A natural logarithm is written *ln*  
and is usually written in the form:  
 $\ln a = r$

So, when you see log by itself, it means base ten log.

**LOGS CANNOT BE NEGATIVE**

## Natural Logarithms

Logarithms with a base of 'e' are called natural logarithms.

*What is 'e'?*

'e' is a very special number approximately equal to 2.718 and a little bit like pi in that it is the result of an equation and it's a big long number that never ends.

It is derivative of itself

Most scientific calculators have an 'e' button and an 'ln' button, so you don't need to memorize the value of 'e'.