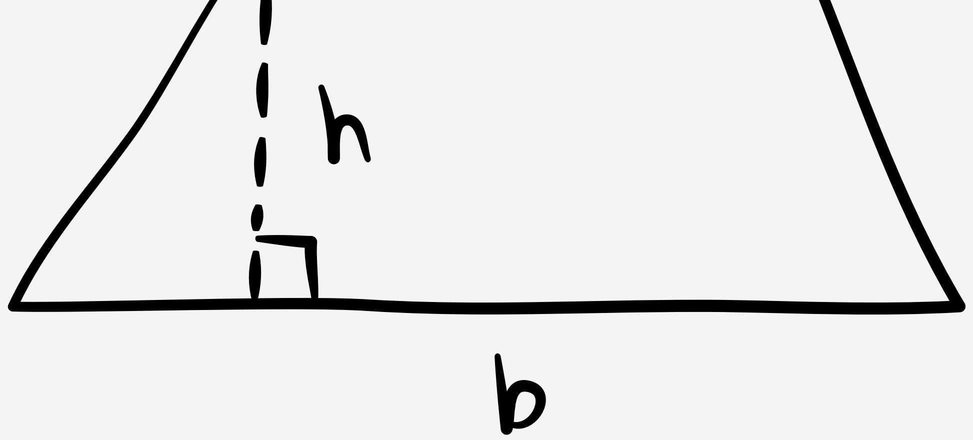
MATH PROJECT

LOGARITHM

A logarithm is a mathematical function that determines the exponent to which a positive base must be raised to obtain a given number. It is generally expressed as:

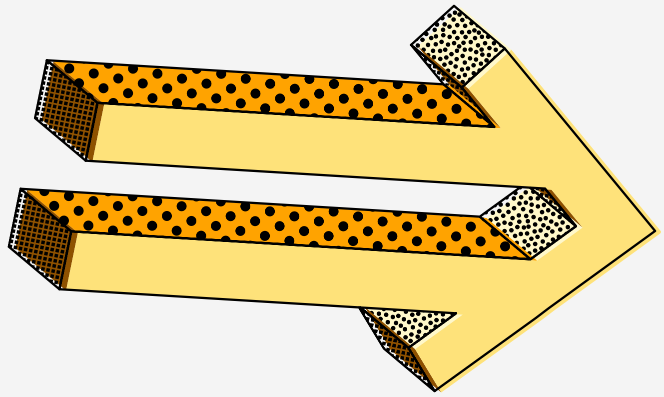
$$\log_b(a) = c$$

This means that bc=a, where b is the base of the logarithm, aa is the argument, and cc is the logarithm sought.



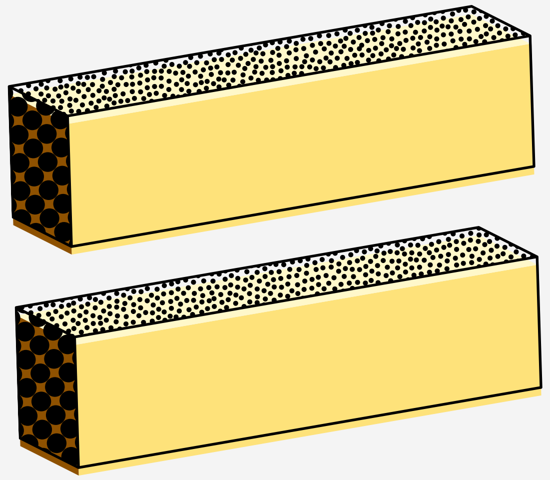
DID YOU KNOW THAT...?

$$A = \frac{a+b}{2}h$$

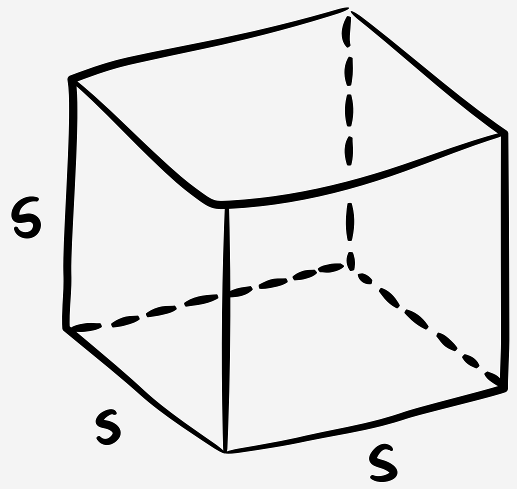


A fun fact about logarithms is that they were introduced by Scottish mathematician John Napier in the 17th century as a tool to simplify complex calculations, especially multiplication and division. Napier realized that by converting these operations into addition and subtraction, mathematical work could be greatly facilitated, especially in an age without calculators.Furthermore, logarithm tables were widely used for centuries before the advent of computers and calculators, demonstrating their historical importance in the development of mathematics and science.

APPLICATIONS OF A LOGARITHM



- Logarithmic Scales: Richter Scale: Measures the magnitude of earthquakes.
- Decibels: Measures the intensity of sound.
- Data Science and Statistics: Facilitates data visualization and the transformation of distributions.
- Mathematics and Calculus: Used in derivatives and optimization, especially the natural logarithm.
- Technology and Algorithms: Used in Google's PageRank algorithm to measure the relevance of web pages.
- Modeling of Natural Phenomena: Applied to population growth and physical and biological processes.
- These applications underscore the importance of logarithms in various disciplines.



HOW IS IT RESOLVED?

Solving a logarithm involves finding the exponent to which a base must be raised to obtain a given number. Here I show you how to solve logarithms step by step:

Identifying the Form of the Logarithm

The general form of a logarithm is:

$$\log_b(a) = c$$

This means that: $b^c = a.$

Rewrite the equation exponentially

To solve the logarithm, rewrite the equation in exponential form:

$$b^c = a$$

Practical example

Suppose we want to solve:

$$\log_2(8) = c$$

Step 1: We identify that the base is 2 and the argument is 8.

Step 2: We rewrite in exponential form:

$$2^c = 8$$

Step 3: We know that 8 is equal to 2^3, so:

$$2^c = 2^3$$

Step 4: We equalize the exponents:

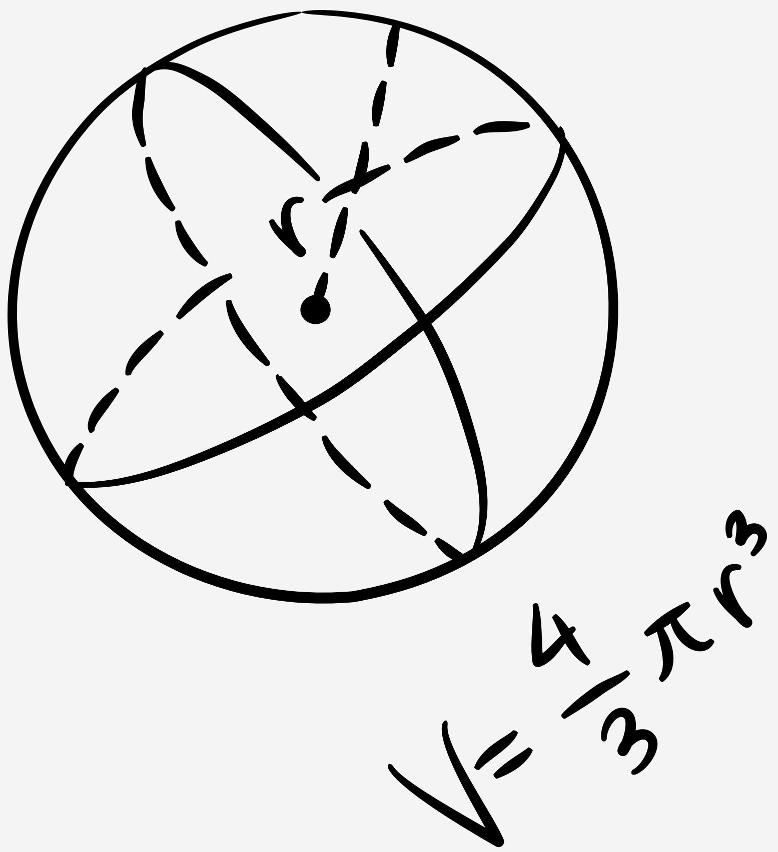
c=3

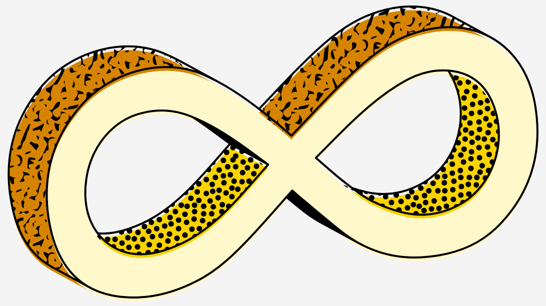
therefore, $\log_2(8) = 3.$

Useful Properties

Use the properties of logarithms to simplify calculations:

- Logarithm of a product :$\log_b(xy) = \log_b(x) + \log_b(\mathit{and})$
- Logarithm of a quotient :$\log_b\left(\frac{x}{\mathit{and}}\right) = \log_b(x) - \log_b(\mathit{and})$
- Logarithm of a power :$\log_b(x^a) = a \cdot \log_b(x)$





Using Calculators

For logarithms that are not easy to solve mentally, you can use a scientific calculator that has logarithm functions, such as:

- Natural logarithm :$\ln(x)$
- Decimal logarithm :$\log_{10}(x)$

EXAMPLES

Exercise 1: Simple Logarithm

Calculate :$\log_2(8)$

Solution :

We know that$2^3 = 8$, therefore:

$$\log_2(8) = 3$$

Exercise 2: Logarithm of a Product

Calculate :$\log_{10}(1000) + \log_{10}(10)$

Solution :

Using the property of logarithms:

$$\log_{10}(1000) + \log_{10}(10) = \log_{10}(1000 \times 10) = \log_{10}(10000)$$

We know that$10^4 = 10000$, so:

$$\log_{10}(10000) = 4$$

Exercise 3: Logarithm of a Quotient

Calculate :$\log_5(125) - \log_5(5)$

Solution :

Using the property of logarithms:

$$\log_5(125) - \log_5(5) = \log_5\left(\frac{125}{5}\right) = \log_5(25)$$

We know that$5^2 = 25$, therefore:

$$\log_5(25) = 2$$

Exercise 4: Logarithmic Equation

Resolve :$\log_3(x) = 4$

Solution :

We rewrite in exponential form:

$$3^4 = x$$

We calculate:

$$x = 81$$

THANKS FOR YOUR ATTENTION

$a + b = b + a$

$V = \pi r^2 h$

$A = bh$

$ax^2 + bx + c = 0$