

1. Define scientific notation.

A number written in scientific notation written as:

$$a \times 10^n, \text{ where } 1 \leq a < 10 \text{ and } n \in \mathbb{Z}$$

Here a is called the coefficient or base number.

Note:

- If the number is greater than 1, then n is positive.
- If the number is less than 1, then n is negative.

2. What is the logarithm of a real number?

The logarithm of a real number tells us how many times one number must be multiplied by itself to get another number.

The general form of a logarithm is: $\log_b x = y$. Where

- b is the base,
- x is the result or the number whose logarithm is being taken, and
- y is the exponent or the logarithm of x to the base b .

This means that $b^y = x$.

OR

The logarithm of x to the base b is y , means that when b is raised to the power y , it equals x . The relationship between logarithmic form and exponential form is given below:

$$\log_b x = y \Leftrightarrow b^y = x \quad \text{where } b > 0, x > 0 \text{ and } b \neq 1$$

3. Define common logarithm or Brigg's logarithm.

If the base of logarithm is taken as 10 then logarithm is called common logarithm or Brigg's logarithm. It is written as \log_{10} or simply as \log (when no base is mentioned, it is usually assumed to be base 10).

4. Define Natural logarithm.

Logarithm having base e is called Napier logarithm or Natural logarithm.

$$\begin{aligned} \ln(0) &= \text{undefined} \\ \ln(1) &= 0 \\ \ln(e) &= 1 \end{aligned}$$

5. Differentiate between characteristic and mantissa.

The integral part of the logarithm of any number is called the **characteristic** and the decimal part of the logarithm of a number is called the **mantissa** and is always positive.

For example, if $\log 278.23 = 2.4443$ then characteristic is 2 and mantissa is 0.4443

6. Define antilog.

The number whose logarithm is given is called antilogarithm. *i. e.* if $\log y = x$, then y is the antilogarithm of x , or $y = \text{Anti } \log x$

In other words, **antilog is the inverse of a logarithm.**

7. What is the difference between Common and Natural Logarithms?

Common Logarithm	Natural Logarithm
The base of a common logarithm is 10 .	The base of a natural logarithm is e .
It is written as $\log_{10}(x)$ or simply $\log(x)$ when no base is specified.	It is written as $\ln(x)$.
Common logarithms are widely used in everyday calculations, especially in scientific and engineering applications.	Natural logarithms are commonly used in higher-level mathematics, particularly calculus and applications involving growth/decay processes.