Logarithms

Related terms

1. Let a,b,c are three numbers and they are related so that $a^b = c$; then exponent, 'b' is called the logarithm of number, 'c' to the base 'a', and $\log_a c = b$
2. Definition of logarithm: Thus, logarithm of any number to a given base is equal to the index to which the base should be raised to get the given number.

Important concepts

1. The exponential form: $a^b = c$
2. Logarithmic form: $\log_a c = b$
3. $x^0 = 1 \Rightarrow \log_x 1 = 0$
4. Logarithm of 1 to any base is zero.
5. $\text{Since}, a^1 = a, \log_a a = 1$
6. Logarithms to the base 10 are known as common logarithms.
7. If no base is given, the base is always taken as 10.

Laws of Logarithms

1. First law (product law): The logarithm of a product is equal to the sum of the logarithms of its factors.
   $\log_a (m \times n) = \log_a m + \log_a n$
2. Second law (quotient law): The logarithm of fraction is equal to the difference between the logarithm of the numerator and the logarithm of the denominator.
   $\log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$
3. Third law (power law): The logarithm of a power of a number is equal to the logarithm of the number multiplied by the power.
   $\log_a m^n = n \log_a m$