



Average

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Average

Defination: It is defined as sum of all the terms (or data) divided by total number of terms.

$$\text{Average} = \frac{\text{Sum of all terms}(S)}{\text{No. of terms}(N)}$$

Example 1: Find the average of given terms: 2, 3, 4, 5, 6, and 10

Solution:

Number of terms = 6

Sum of all terms = 2 + 3 + 4 + 5 + 6 + 10 = 30

So, Average = 30/6 = 5

Some Basic Formulas:

1. Sum of first 'n' natural numbers = $\frac{n(n+1)}{2}$

Average of first "n" natural numbers = $\frac{(n+1)}{2}$

2. Sum of first 'n' even numbers = $n(n+1)$

Average of first 'n' even numbers = $(n+1)$

3. Sum of first 'n' odd numbers = n^2

Average of first 'n' even numbers = n

4. Sum of squares of first 'n' natural numbers = $\frac{n(n+1)(2n+1)}{6}$

Average of sum squares of first 'n' natural numbers = $\frac{(n+1)(2n+1)}{6}$

5. Sum of cubes of first 'n' natural numbers = $\left[\frac{n(n+1)}{2}\right]^2$

Average of sum of cubes of first 'n' natural numbers = $\frac{n(n+1)^2}{4}$

6. Average of 'n' consecutive numbers = $(\text{First number} + \text{Last number})/2$

7. The average of n consecutive numbers is always the middle term of all the numbers when n is an odd number. And when n is an even number, the average of all consecutive numbers is always the mean of two middle terms.

Some special points:

1. The average of given observations always lies between the value of highest term and the value of lowest term.

2. If the value of each number is divided by the same value "a", then the average of all given numbers will also get divided by "a".

3. If the value of each number is multiplied by the same value "a", then the average of all numbers will also get multiplied by "a".

4. If the value of each number is decrease by the same value "a", then the average of all numbers will also get decrease by "a".

5. If the value of each number is increase by the same value "a", then the average of all numbers will also get increase by "a".

Some Direct Formulas:

1. If the average of "x" numbers is "p" and that of "y" numbers is "q", then the average of (x + y) numbers

$$= \frac{xp+yq}{x+y}$$

2. If the average of "x" numbers is "p" and that of "y" numbers taken out of "x" numbers is "q", then the average of rest of the numbers

$$= \frac{xp-yq}{x-y}$$

3. If the average of "n" quantities is equal to "p" when a particular quantity is removed, the average becomes "q". Then the value of quantity removed is = $[n(p - q) + q]$