Variance.

The square of standard deviation is called the variance.

Coefficient of standard deviation and variance: The coefficient of standard deviation is the ratio of the S.D. to A.M. i.e., $\frac{\sigma}{x}$. Coefficient of variance = coefficient of S.D. $\times 100 = \frac{\sigma}{\overline{x}} \times 100$.

Variance of the combined series: If $n_1; n_2$ are the sizes, $\overline{x}_1; \overline{x}_2$ the means and $\sigma_1; \sigma_2$ the standard deviation of two series, then $\sigma^2 = \frac{1}{n_1 + n_2}[n_1(\sigma_1^2 + d_1^2) + n_2(\sigma_2^2 + d_2^2)]$

Where, $d_1 = \overline{x}_1 - \overline{x}$, $d_2 = \overline{x}_2 - \overline{x}$ and $\overline{x} = \frac{n_1\overline{x}_1 + n_2\overline{x}_2}{n_1 + n_2}$.

Important Tips

- Range is widely used in statistical series relating to quality control in production.
- Standard deviation ≤ Range i.e., variance ≤ (Range)^2.
- Empirical relations between measures of dispersion
  - Mean deviation $= \frac{4}{5}$ (standard deviation)
  - Semi interquartile range $= \frac{2}{3}$ (standard deviation)
- Semi interquartile range $= \frac{5}{6}$ (mean deviation)
- For a symmetrical distribution, the following area relationship holds good

$\overline{X} \pm \sigma$ covers 68.27% items

$\overline{X} \pm 2\sigma$ covers 95.45% items

$\overline{X} \pm 3\sigma$ covers 99.74% items

- S.D. of first n natural numbers is $\sqrt{\frac{n^2 - 1}{12}}$.
- Range is not the measure of central tendency.