VARIANCE AND STANDARD DEVIATION

The deviations of the values in a distribution give an idea of how close they are to the mean. To obtain a single number which indicates the spread of a distribution, square the deviations so that they are all positive and add them.

In other words, mean absolute deviation give you a linear range of deviation about the mean of a distribution of values. So to get the area range of deviation/variation about the mean, we square the individual deviations from the mean and then sum them up. Then you divide the answer through with total numbers of records.

The mean of the squares of the deviations from the mean is called the variance. Variance is thus given as:

$$\sigma^2 = \frac{\Sigma(x-\bar{x})^2}{n} \quad or \quad \frac{\Sigma f(x-\bar{x})^2}{\Sigma f}$$

Example: Calculate the variance of the marks: 65, 62, 62, 61, 61, 60, 60, 59, 58, 52.

Solving

$$variance = \frac{\Sigma(x - \bar{x})^2}{n}$$

x	$x - \bar{x}$	$(x - \bar{x})^2$
65	5	25
62	2	4
62	2	4
61	1	1
61	1	1
60	0	0
60	0	0
59	-1	1
58	-2	4
52	-8	64
$\boldsymbol{\Sigma x = 600}$		$\boldsymbol{\Sigma(x - \bar{x})^2 = 104}$

$$\bar{x} = \frac{\Sigma x}{n} = \frac{600}{10} = \mathbf{60}$$

$$variance = \frac{\Sigma(x - \bar{x})^2}{n} = \frac{104}{10} = \mathbf{10.4}$$