

# CBSE Class 10 Maths Notes Chapter 13 Statistics

**MEAN (AVERAGE):** Mean [Ungrouped Data] – Mean of  $n$  observations,  $x_1, x_2, x_3 \dots x_n$ , is

$$\bar{X} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} = \frac{1}{n} \sum x \quad \therefore \quad \bar{X} = \frac{\sum x}{n}$$

**MEAN [Grouped Data]:** The mean for grouped data can be found by the following three methods:

**(i) Direct Mean Method:**

$$\bar{X} = \frac{\sum f_i x_i}{\sum f_i}$$

$$\text{Class Mark} = \frac{\text{Upper Class Limit} + \text{Lower Class Limit}}{2}$$

Note: Frequency of a class is centred at its mid-point called class mark.

**(ii) Assumed Mean Method:** In this, an arbitrary mean 'a' is chosen which is called, 'assumed mean', somewhere in the middle of all the values of  $x$ .

$$\bar{X} = a + \frac{\sum f_i d_i}{\sum f_i}$$

...[where  $d_i = (x_i - a)$ ]

**(iii) Step Deviation Method:**

$$\bar{X} = a + \left[ \frac{\sum f_i u_i}{\sum f_i} \right] \times h$$

.... [where  $u_i = \frac{d_i}{h}$ , where  $h$  is a common divisor of  $d_i$ ]

**MEDIAN:** Median is a measure of central tendency which gives the value of the middle-most observation in the data.

**(i) Ungrouped data:** If  $n$  is odd  $\rightarrow$  Median =  $\left(\frac{n+1}{2}\right)^{th}$  observation

If  $n$  is even  $\rightarrow$  Median =  $\frac{\left(\frac{n}{2}\right)^{th} \text{ observation} + \left(\frac{n}{2} + 1\right)^{th} \text{ observation}}{2}$

**Remember!** For ungrouped data, first arrange the observations in ascending order or descending order.

**(ii) Median (Grouped Data):** Median =  $l + \left(\frac{\frac{n}{2} - c.f.}{f}\right) \times h$

...where  $l$  = Lower limit of median class;  $n$  = Number of observations;  $f$  = Frequency of median class; c.f. = Cumulative frequency of preceding class;  $h$  = Class size]

(iii) Representing a cumulative frequency distribution graphically as a cumulative frequency curve, or an ogive of the less than type and of the more than type. The median of grouped data can be obtained graphically as the x-coordinate of the point of intersection of the two ogives for this data.

### Mode:

(i) Ungrouped Data: The value of the observation having maximum frequency is the mode.

(ii) Grouped Data:

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

...where  $l$  = Lower limit of modal class;  $f_1$  = Frequency of modal class;  $f_0$  = Frequency of the class preceding the modal class;  $f_2$  = Frequency of the class succeeding the modal class;  $h$  = Size of class interval. c.f. = Cumulative frequency of preceding class;  $h$  = Class size]

$$\text{Mode} = 3 \text{ Median} - 2 \text{ Mean}$$

$$\text{Median} = \frac{\text{Mode} + 2\text{Mean}}{3}$$

$$\text{Mean} = \frac{3\text{Median} - \text{Mode}}{2}$$