

## Statistics

### Mean of Grouped Data

Mean is that value of central tendency which is the average of the observations.

There are three methods to find mean for a frequency distribution.

(i) Direct method

$$M = \frac{\sum fx}{\sum f}$$

where  $x$  is the mid-interval

$f$  is the frequency

$M$  is the mean

(ii) (ii) Assumed Mean method

$$M = A + \frac{\sum fd}{\sum f}$$

where  $A$  = assumed mean

$d = x - A$

(iii) (iii) Step-deviation method

$$M = A + i \frac{\sum ft}{\sum t}$$

where  $i$  = class size

$$t = \frac{d}{i}$$

### Mode of Grouped Data

Mode is that value among the observations which has the maximum frequency.

In a grouped frequency distribution, we locate the modal class and find the mode using the following formula.

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

$l$  - lower limit of the modal class

$h$  - size of the class interval

$f_1$  - frequency of the modal class

$f_0$  - frequency of the class preceding the modal class

$f_2$  - frequency of the class succeeding the modal class

### Median of Grouped Data

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

In a grouped frequency distribution, we locate the median class and find the median using the following formula.



$$\text{Median} = l + \left( \frac{\frac{N}{2} - c}{f} \right) \times h$$

$l$  - Lower limit of the median class

$c$  - Cumulative frequency preceding the median class frequency

$h$  - Width of the class interval

$N$  = Sum of the frequencies

### Working rule

**Step 1:** Prepare the table containing less than the cumulative frequency with the help of the given frequencies.

**Step 2:** Find out the cumulative frequency to which  $\frac{N}{2}$  belongs. Class interval of this cumulative frequency is the median class interval.

**Step 3:** Find out the frequency  $f$  and lower limit  $l$  of this median class.

**Step 4:** Find the width ' $h$ ' of the median class interval.

**Step 5:** Find the cumulative frequency  $c$  of the class preceding the median class.

**Step 6:** Apply the formula

$$\text{Median} = l + \left( \frac{\frac{N}{2} - c}{f} \right) \times h, \text{ to find the median.}$$

## Graphs in Statistics

### Graphical Representation of Cumulative Frequency Distribution

Cumulative frequency is obtained by adding the frequency of a class interval and the frequencies of the preceding intervals up to that class interval.

### Ogive (Cumulative Frequency Curve)

There are two ways of constructing an Ogive or cumulative frequency curve. (Ogive is pronounced as O-jive). The curve is usually of 'S' shape.

#### To Plot an Ogive:

- (i) We plot the points with coordinates having abscissae as actual limits and ordinates as the cumulative frequencies
- (ii) Join the plotted points by a smooth curve.
- (iii) An Ogive is connected to a point on the X-axis representing the actual lower limit of the first class.