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(Affiliated to CBSE up to +2 Level)

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## Statistics

### Median

If we arrange the numbers in an ascending or descending order then the middle number of the series will be median. If the number of series is even then the median will be the average of two middle numbers.

If  $n$  is odd then the median  $\left(\frac{n+1}{2}\right)^{\text{th}}$  is observation.

If the  $n$  is even then the median is the average  $\left(\frac{n}{2}\right)^{\text{th}}$  and  $\left(\frac{n+1}{2}\right)^{\text{th}}$  of observation.

### Median of Grouped Data

To find the median of a grouped data, we need to find the cumulative frequency and  $n/2$

Then we have to find the median class, which is the class of the cumulative frequency near or greater than the value of  $n/2$ .

**Cumulative Frequency** is calculated by adding the frequencies of all the classes preceding the given class.

Then substitute the values in the formula

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

where  $l$  = lower limit of median class

$n$  = no. of observations

$cf$  = cumulative frequency of the class preceding to the median class

$f$  = frequency of the median class

$h$  = size of class

## 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 = Class size

### Emperical Formula

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

$$\text{Median} = (\text{Mode} + 2\text{Mean}) / 3$$

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