

## Educational Measurement & Assessment - Measures of Central Tendency

Two Particularly important characteristics of a distribution of scores are the typical or average score and the amount of dispersion or variability of the scores.

As the center lies in between the higher and lower scores in the distribution, the score at the center of a distribution is considered the most suitable value to represent that distribution.

There are three common measures of central tendency. They are

1. Mode
2. Median
3. Arithmetic mean or mean

### Mode

Mode is the most frequently occurring score, in a distribution. It can be defined as the score occurring with the greatest frequency.

It may have more than one score.

Eg: Group A    32, 35, 38, 42, 35, 47, 35, 58, 25, 40

Group B    45, 47, 53, 54, 53, 77, 82, 90, 82

23, 26, 27, 21, 45, 28, 83, 29, 83, 19, 83

### Mode of a grouped frequency distribution

In a grouped frequency distribution the mode is the mid-point or the mid value of the class interval, having the largest frequency.

There can be more than one mode in a distribution. (bimodal, multimodal)

### Median

The median is the score above which and below which exactly half of the scores are found when the scores are arranged in ascending or descending order. The distribution is divided into two equal parts by the median.

- In an ungrouped frequency distribution, firstly, scores should be arranged in ascending or descending order.
- If the distribution contains an odd number of scores, the median can be identified easily.
- If the distribution contains an even number of scores, the median is the average of the two middle scores.

Eg: A    18, 38, 72, 83, 58, 76, 65

18 38 58 **65** 72 76 83

B    81, 57, 28, 42, 82, 65, 56, 73

28 42 56 **57 65** 73 81 82 **61**

### Median of a grouped frequency distribution

When scores are grouped in a frequency distribution the calculation of the median requires the determination of a point above and below which 50 percent of the scores or cases lie. (Median =  $P_{50}$ )

The following formula can be used to calculate the Median

$$Md = L + \left( \frac{\frac{N}{2} - F}{f} \right) C i$$

L = lower real limit of the class interval within which median falls (median class)

N = number of total scores

F = Cumulative frequency of the class below the median class

f = Frequency of the median class

Ci = Size of the class interval

C I	F	C F	C P %
70-74	5	50	100
65-69	3	45	90
60-64	2	42	84
55-59	4	40	80
50-54	10	36	72
45-49	8	26	52
40-44	7	18	36
35-39	5	11	22
30-34	3	6	12
25-29	2	3	6
20-24	1	1	2

### Mean ( $\bar{X}$ )

The arithmetic mean is obtained by adding all the scores and dividing it by the number of scores (Average value)

$$\bar{X} = \frac{\sum X}{N}$$

$\bar{X}$  = mean

n = Number of scores

$\sum X$  = Total sum of the values in the distribution

### Mean of a grouped frequency distribution

Mean of a grouped frequency distribution can be calculated by using the following formula.

$$\bar{X} = A + \left( \frac{\sum fd}{n} \right) i$$

A = Assumed mean

$i$  = Class size

$d$  = Deviations from the assumed mean

$n$  = Number of scores