

MEASURES OF LOCATION & SPREAD

KEY WORDS & DEFINITIONS

1. Measure of Location

A single value which describes a position in a data set.

2. Measure of Central Tendency

A measure of location which describes the central position in a data set.

3. Measure of Spread or Dispersion

A value which describes how spread out the data is.

4. Mean

The sum of all the data divided by how many pieces of data there are. Includes all pieces of data. Affected by outliers.

5. Median Q_2

The middle value when the data values are put in order. Does not include all pieces of data. Not affected by outliers.

6. Mode

The value that occurs most often in the data. Good for non-numerical data.

7. Modal class

The class that has the highest frequency in grouped data.

8. Lower Quartile Q_1

A measure of location that is one quarter of the way through the data set.

9. Upper Quartile Q_3

A measure of location that is three-quarters of the way through the data set.

10. Percentile

A measure of location that is the specified percentage of the way through the data set.

11. Range

The difference between the largest and smallest values in a data set. Affected by outliers.

12. Inter-quartile Range

The difference between the upper and lower quartiles in a data set. $Q_3 - Q_1$. Not affected by outliers.

IMPORTANT FORMULAE

Mean: $\bar{x} = \frac{\sum x}{n}$

Mean from Frequency Table: $\bar{x} = \frac{\sum fx}{\sum f}$

Variance σ^2 :

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

Standard Deviation $\sigma = \sqrt{\text{Variance}}$

CODING

If data is coded using $y = \frac{x - a}{b}$

Mean of coded data = $\bar{y} = \frac{\bar{x} - a}{b}$

s.d. of coded data = $\sigma_y = \frac{\sigma_x}{b}$

To find mean & s.d. of original data use:

$$\bar{x} = b\bar{y} + a$$

$$\sigma_x = b\sigma_y$$

INTERPOLATION

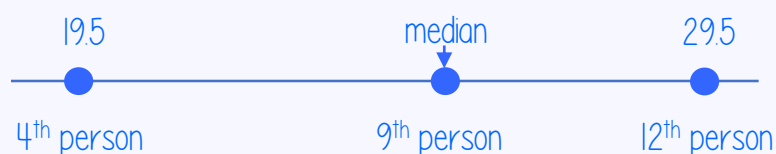
Assume data values are evenly distributed within each class then estimate median or percentile values using proportional reasoning.

Age	10 – 19	20 – 29	30 - 39
Frequency	4	8	5
Cumulative Freq	4	12	17

17 people $\therefore$ median is 9th person

9th person is in 20 – 29 group

Take boundaries to be 19.5 & 29.5



$$\frac{m - 19.5}{29.5 - 19.5} = \frac{9 - 4}{12 - 4}$$

$$m = 25.75$$