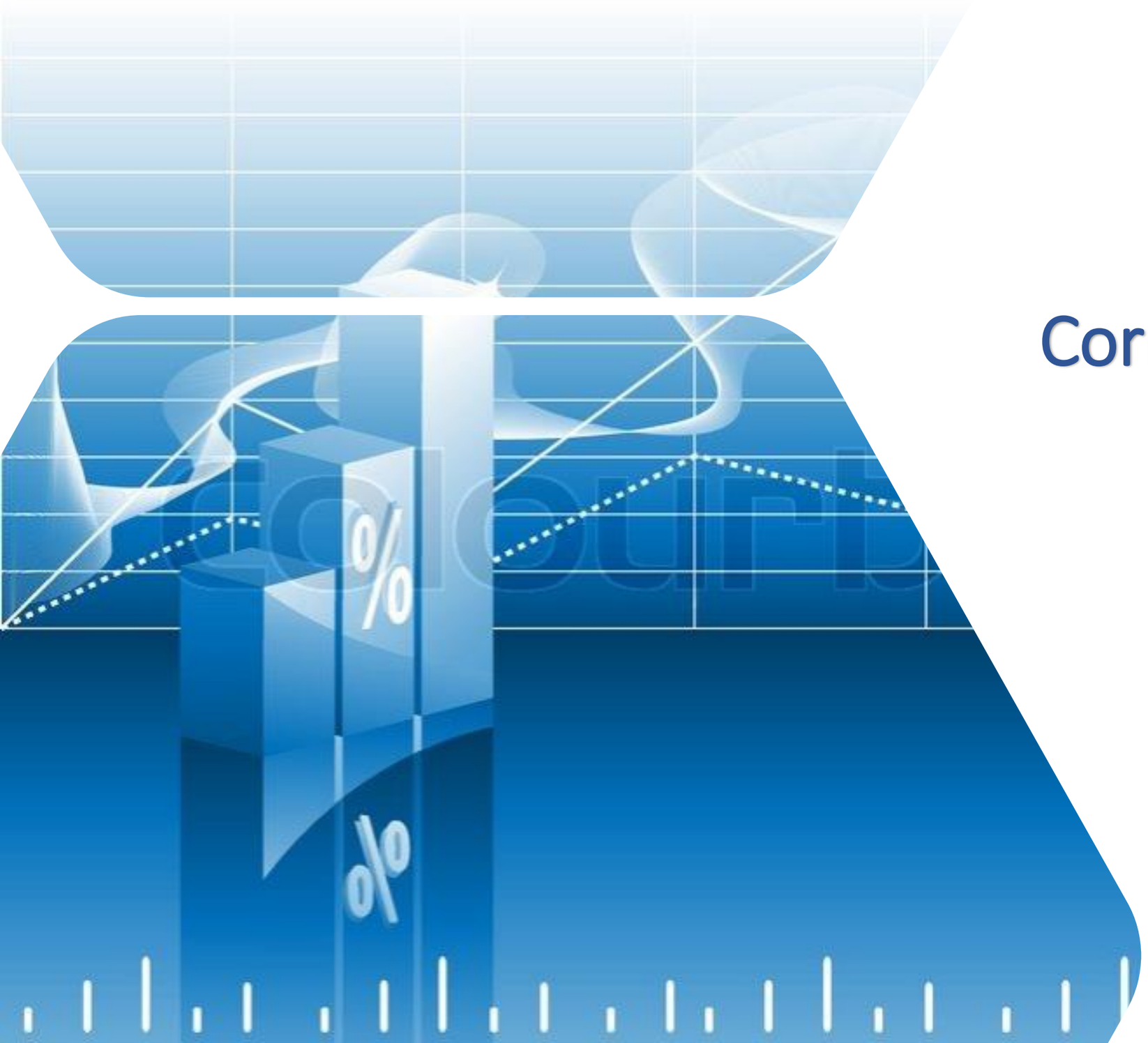


Correlation Analysis (part-1)

Learning Outcomes

- **Find out Whether there is any relation between or among of the variables.**
- **Strength of the relationship.**

OUTLINE

- ❑ **Define correlation**
- ❑ **Types of correlation & its interpretation**
- ❑ **Measuring correlation by drawing Scatter plot and interpretation.**

3

CORRELATION with Examples

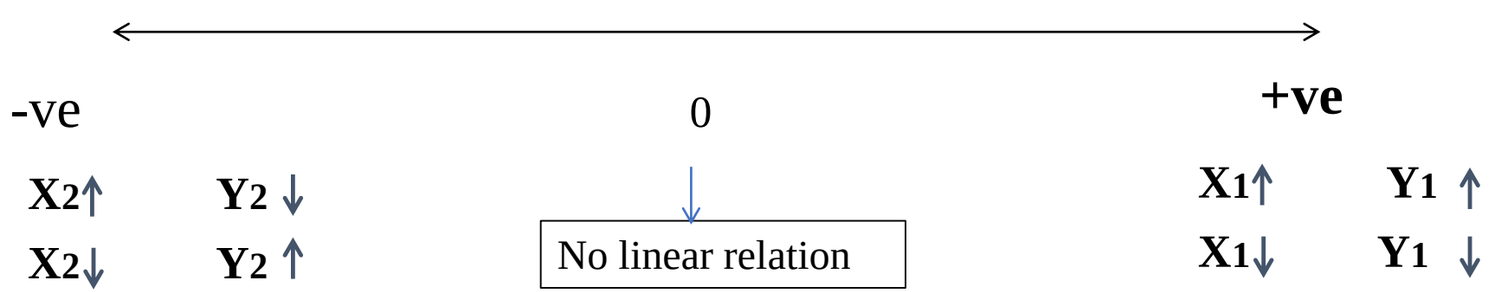
Correlation:

Correlation is a measure of relationship between two or more variables.

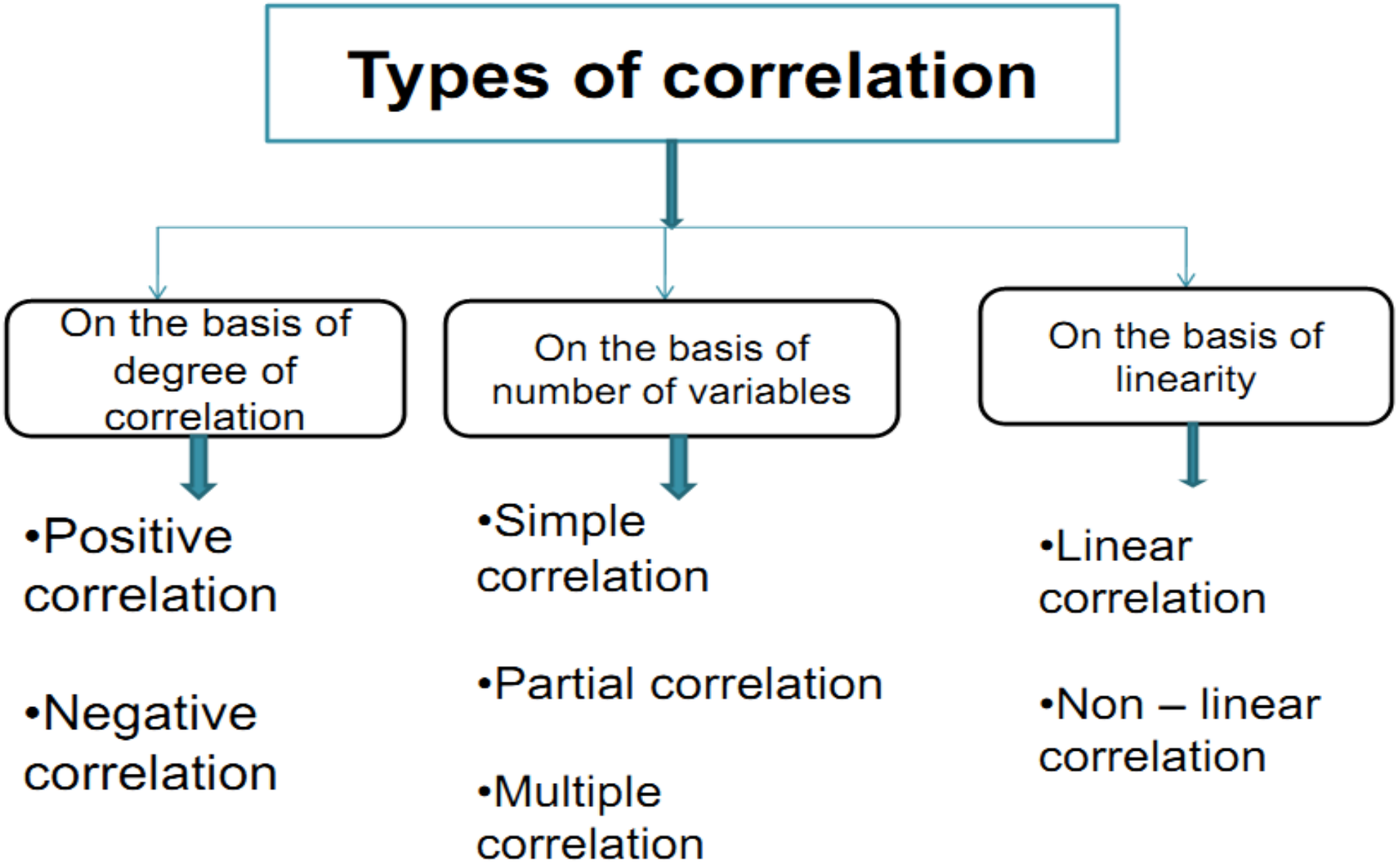
Example:

Advertisement	→	**X_1**
Sales	→	**Y_1**

Price	→	**X_2**
Demand	→	**Y_2**



TYPES OF CORRELATION



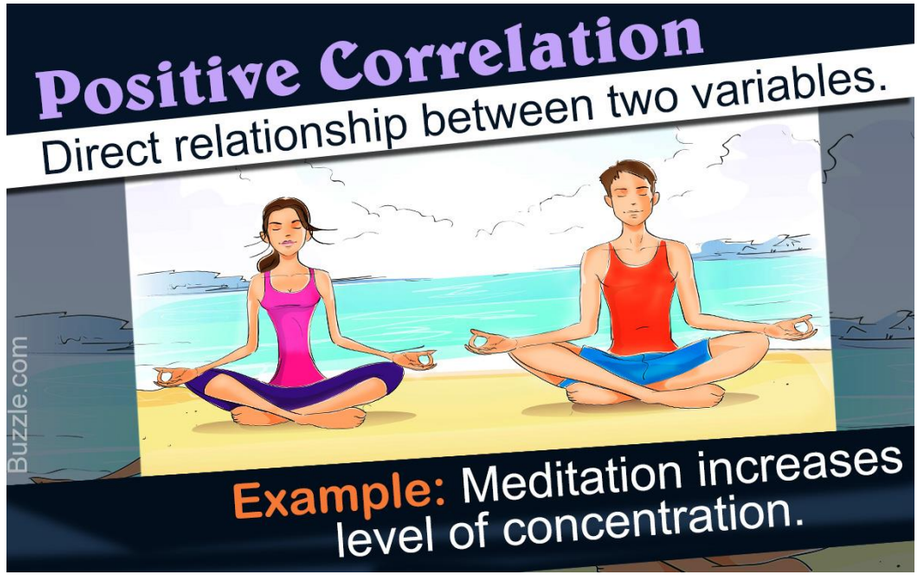
TYPES OF CORRELATION

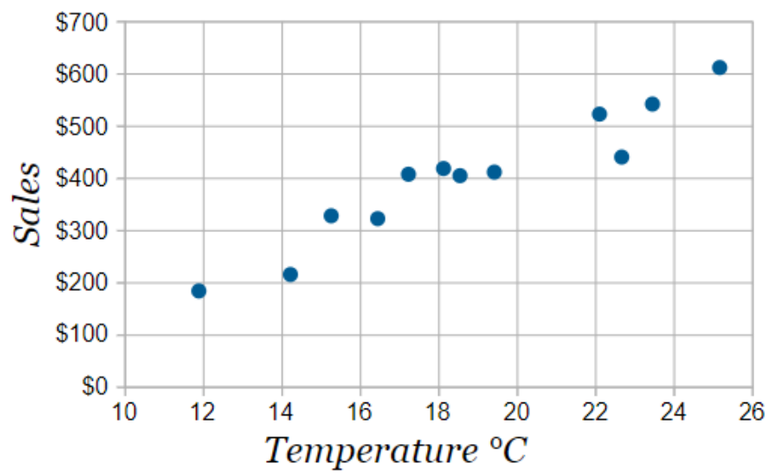
Correlation : On the basis of degree

- **Positive Correlation**

if one variable is increasing and with its impact on average other variable is also increasing that will be positive correlation.

Ice Cream Sales vs Temperature	
Temperature °C	**Ice Cream Sales**
14.2°	$215
16.4°	$325
11.9°	$185
15.2°	$332
18.5°	$406
22.1°	$522
19.4°	$412
25.1°	$614
23.4°	$544
18.1°	$421
22.6°	$445
17.2°	$408





TYPES OF CORRELATION

Examples of positive correlation in real life:

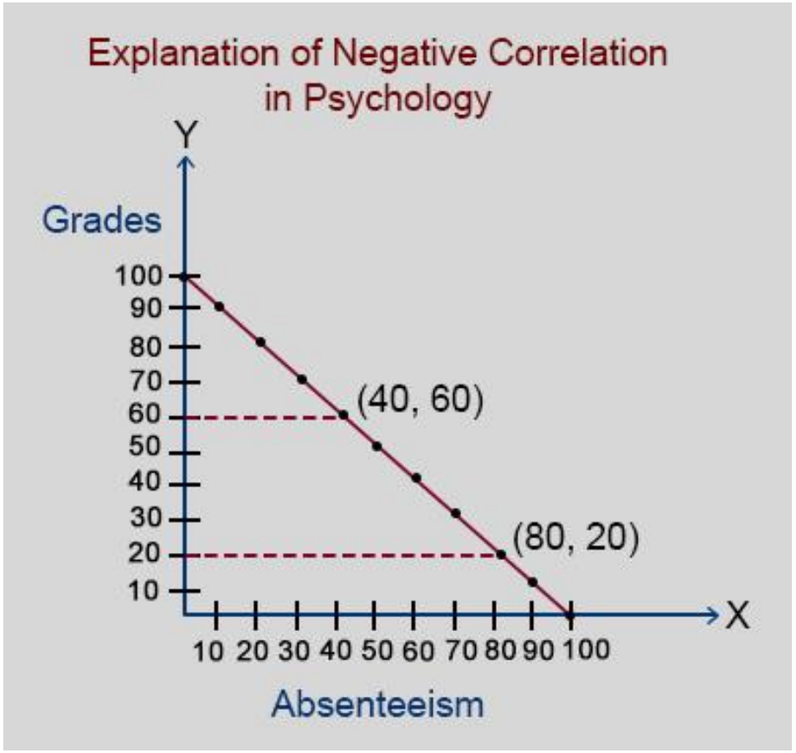
- With the growth of the company, the market value of company stocks increase.
- If I walk more, I will burn more calories.
- When demand increases, price of the product increases (at same supply level).
- When you study more, you score high in the exams.
- When you pay more to your employees, they're motivated to perform better.
- With increase in consumption of junk food, there is increase in obesity.
- When you meditate more, your concentration level increases.
- Couples who spend more time together have a healthier and long-lasting relationship.

TYPES OF CORRELATION

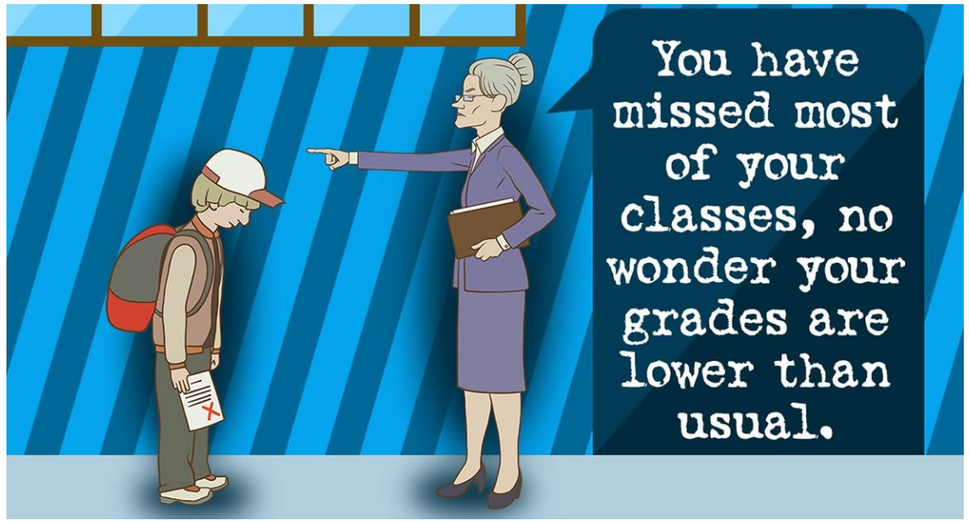
Correlation : On the basis of degree

- **Negative correlation**

if one variable is increasing and with its impact on average other variable is also decreasing that will be positive correlation.



Example:



TYPES OF CORRELATION

Examples of Negative correlation in real life:

- The weight of a car and miles per gallon.
- More absenteeism in school activities, less GPA.
- More vaccinations, less illness.
- More expenditure, less money.
- More time for fun, less grades.
- More time at work, less time at home.

TYPES OF CORRELATION

Correlation : On the basis of number of variables

- **Simple correlation**

Correlation is said to be simple when only two variables are analyzed.

For example :

Correlation is said to be simple when it is done between demand and supply or we can say income and expenditure etc.

TYPES OF CORRELATION

Correlation : On the basis of number of variables

- **Partial correlation** :

When three or more variables are considered for analysis but only two influencing variables are studied and rest influencing variables are kept constant.

For example :

Correlation analysis is done with demand, supply and income. Where income is kept constant.

For example, the researcher is interested in computing the correlation between anxiety and academic achievement controlled from intelligence

TYPES OF CORRELATION

Correlation : On the basis of number of variables

- **Multiple correlation** :

In case of multiple correlation three or more variables are studied simultaneously.

For example :

Rainfall, production of rice and price of rice are studied simultaneously will be known are multiple correlation.

Another examples:

- Relationship among Demand, Supply and Product quality.
- Relationship among Expenditure, Income and Family size.

TYPES OF CORRELATION

Correlation : On the basis of linearity

- **Linear correlation** :

If the change in amount of one variable tends to make changes in amount of other variable bearing constant changing ratio it is said to be linear correlation.

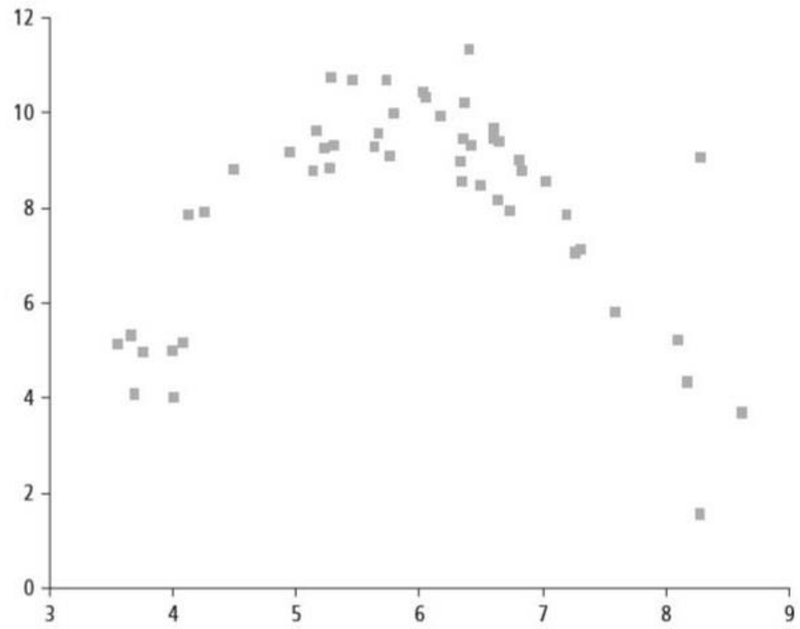
Product quantity(kg)	Price(tk)
1	20
2	40
3	60
4	80

TYPES OF CORRELATION

Correlation : On the basis of linearity

- **Non - Linear correlation :**

If the change in amount of one variable tends to make changes in amount of other variable but not bearing constant changing ratio it is said to be non - linear correlation.



Examples:

Nonlinear relationships also appear in real world situations, such as in the relationship between the value of a motorcycle and the amount of time you owned the motorcycle, or in the amount of time it takes to do a job in relation to the number of people there to help.

METHODS OF STUDYING CORRELATION

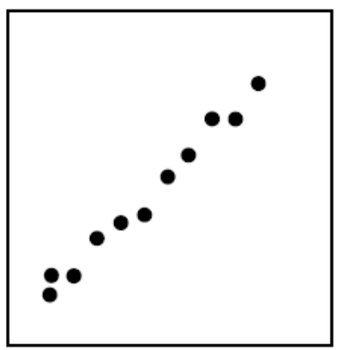
Correlation can be studied by the following methods:

1. **Scatter Diagram Method**
2. **Karl Pearson's Correlation Coefficient**
3. **Spearman's Rank Correlation Coefficient**
4. **Methods of Least Squares**

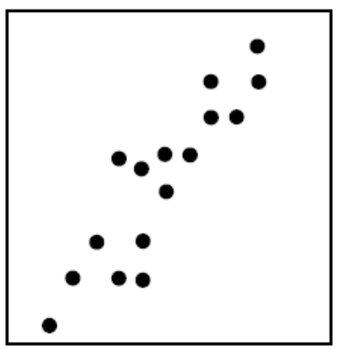
We will practice the maths of these two techniques.

Scatter Diagram Method

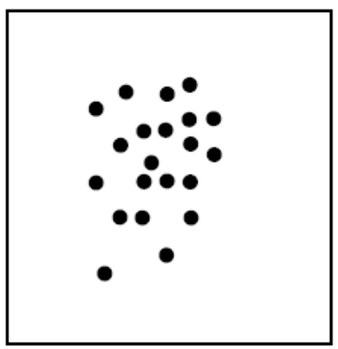
1. Scatter Diagram Method



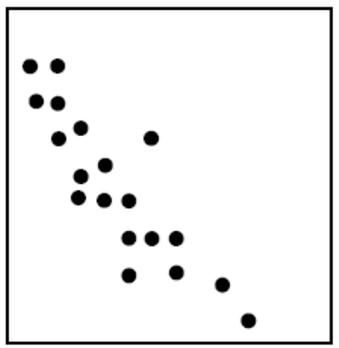
Strong positive correlation



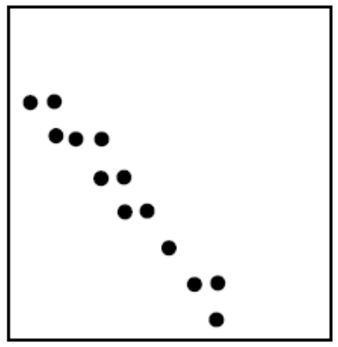
Moderate positive correlation



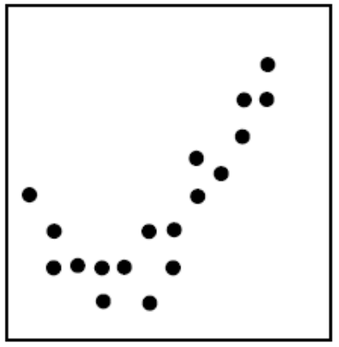
No correlation



Moderate negative correlation



Strong negative correlation



Curvilinear relationship

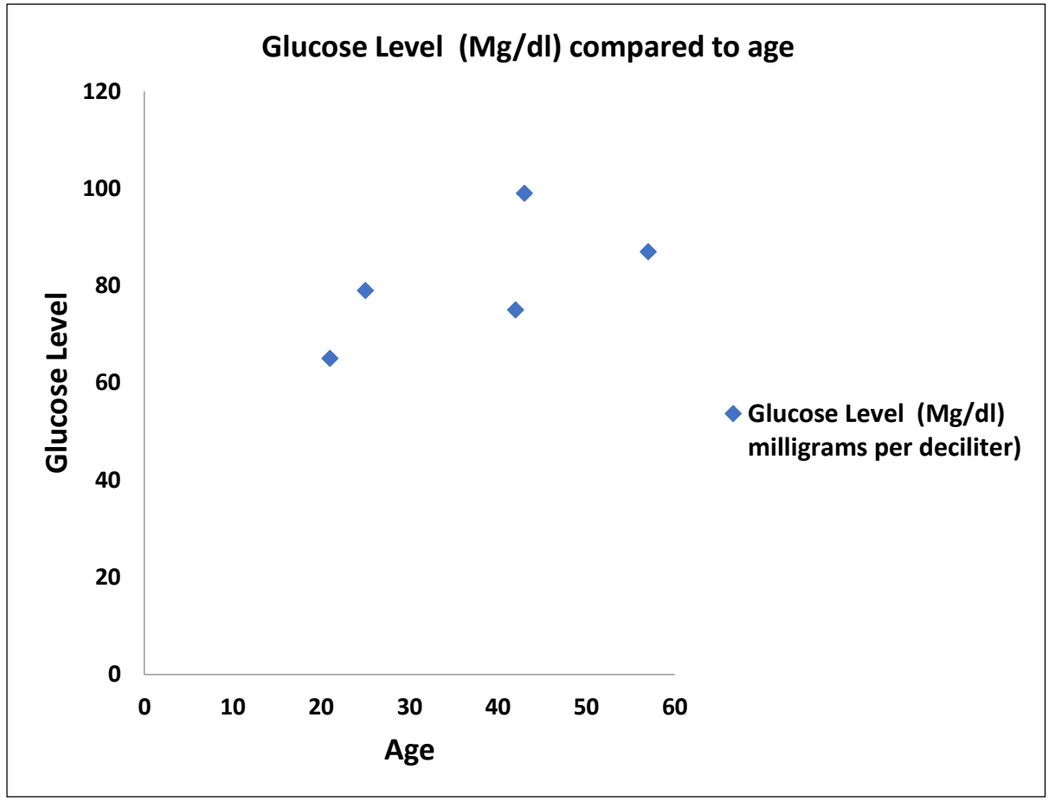
Procedure of drawing Scatter Diagram

Subject	Age	Glucose Level (Mg/dl) milligrams per deciliter)
1	43	99
2	21	65
3	25	79
4	42	75
5	57	87

- Draw Scatter diagram and comment on the correlation.

Steps to draw Scatter diagram:

- Considering one variable in X-axis and another variable in the Y-axis, find intersect points for each of the subjects.



Comment: With the increase of age, Glucose level is also increased, so there is a positive correlation between the variables.


Thank
you