# SCIENTIFIC WRITING AND PRESENTATION ENT-402

Dr. Muhammad Arshad

Department of Entomology

College of Agriculture, University of Sargodha

[makuaf@gmail.com](mailto:makuaf@gmail.com)

# TABULATION OF DATA

Scientific Writing

"*Science is organized knowledge...*

*Wisdom is organized life...*

*Immanuel Kant*

# *Learning objectives:*

- What is Data or Variable?

- Why data is called variable in statistics

- What are the importance of **Data Presentation**?

- What are the methods of **Data Presentation**?

- What is meant by **Graphical Representation of Data**?

- What is '**tabulation**'?

- Understand the concept of 'data **table**'

- Things to remember when creating a table

# Tabulation Meaning

- Tabulation is a systematic & logical presentation of numeric data in rows and columns, to facilitate comparison and statistical analysis.

- It facilitates comparison by bringing related information close to each other

- To put it in other words, the method of placing organized data into a tabular form is called as tabulation.

- It may be complex, double or simple depending upon the nature of categorization.

# Major Objectives Of Tabulation

**(1) To Simplify the Complex Data**

- It reduces the bulk of information i.e. raw data in a simplified and meaningful form so that it could be easily by a common man in less time.

**(2) To Bring Out Essential Features of the Data**

- It brings out the chief/main characteristics of data.

- It presents facts clearly and precisely without textual explanation.

**(3) To Facilitate Comparison**

- Presentation of data in row & column is helpful in simultaneous detailed comparison on the basis of several parameters.

**(4) To Facilitate Statistical Analysis**

- Tables serve as the best source of organized data for further statistical analysis.

- The task of computing average, dispersion, correlation, etc. becomes much easier if data is presented in the form of a table.

**(5) Saving of Space**

- A table presents facts in a better way than the textual form.

- It saves space without sacrificing the quality and quantity of data.

# GRAPHICAL REPRESENTATION OF DATA

## Data Representation Methods

- Data presentation (representation): **'for the maximum utilization of data and its correct interpretation, it should be presented in an appropriate way'**

- Different types of data representations:

  1. **Tables**

  2. **Graphs / Charts**

  3. **Combination of tables and graphs**

blue, red, blue, white, blue, pink, yellow, blue, red, pink, yellow, red, pink, pink, yellow, blue, white, blue, pink, blue, blue, pink, red, blue, red

*Raw data*
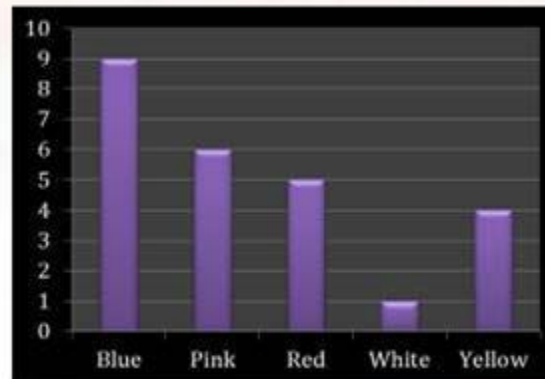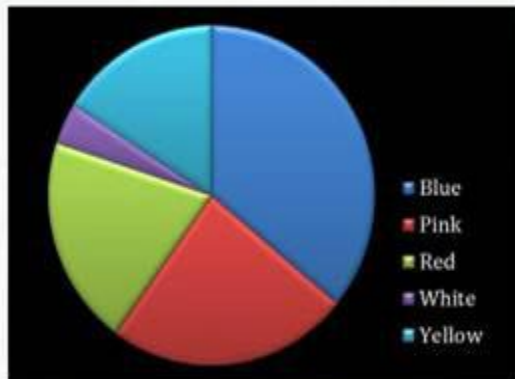


*Graphical Representation of Data*

| Colour | Number |
|--------|--------|
| Blue | 9 |
| Pink | 6 |
| Red | 5 |
| White | 1 |
| Yellow | 4 |
| | Total: 25 |

*Tabulated data*

# GRAPHICAL REPRESENTATION OF DATA

## (1). Table (Tabulation of data)

- Table: *'a set of facts or figures systematically displayed, especially in rows and columns'*

- Collected data are classified and presented it as table

| Pass Percentage of BA and B.Sc. (2014-15) | | |
|---|---|---|
| | No. of Students Appeared in the Annual Examination | Passed | Pass Percentage (%) |
| Botany | 29 | 24 | 82.76 |
| Chemistry | 30 | 25 | 83.33 |
| History | 40 | 34 | 85.00 |
| Malayalam | 38 | 37 | 97.37 |
| Mathematics | 32 | 28 | 87.50 |
| Physics | 28 | 17 | 60.71 |
| Zoology | 30 | 23 | 76.67 |

# GRAPHICAL REPRESENTATION OF DATA

## (1). Table (Tabulation of data)

- Tabulation: *"The process of presenting the classified data in a scientific manner and in an orderly sequence"*

- Tabulation involves systematic arrangement of data (information) in rows and columns

- Objective of tabulation: *"to present and interpret complex information in a simple and systematic way"*

- Importance of data tabulation:

  ➤ **Simplify presentation**

  ➤ **Facilitate comparison**

# GRAPHICAL REPRESENTATION OF DATA

*General rules of tabulation*

1. Table should have **table number**

2. Should have proper **title**

3. Table should fit the **size of paper**

4. Number of rows and columns should **not** be too small or too large

5. Each column and row should have specific and **self explanatory titles**

6. As far as possible, figures should be approximated before tabulation

7. Items should be arranged in a specific way (alphabetical, chronological, size, geography etc.)

# GRAPHICAL REPRESENTATION OF DATA

*General rules of tabulation*

- **Units of measurements** of each heading and sub-heading should be indicated

- **Foot note(s)** can be given if necessary

- As far as possible, values to be compared should be kept in adjacent columns or rows

- If data is secondary, **source** of data should be mentioned

# GRAPHICAL REPRESENTATION OF DATA

*Model of a TABLE (tabulated data)*

Table No.

Table Title

| Table 21.3 Fertility and Mortality Indicators: India – Crude Death Rates* | | | |
|---|---|---|---|
| Year | Rural | Urban | Combined |
| 1984 | 13.8 | 8.6 | 12.6 |
| 1985 | 12.9 | 7.6 | 11.7 |
| 1986 | 12.1 | 7.6 | 11.1 |
| 1987 | 12.0 | 7.4 | 10.9 |
| 1988 | 12.0 | 7.7 | 11.0 |
| 1989 | 11.1 | 7.2 | 10.3 |
| 1990 | 10.5 | 6.8 | 9.7 |
| 1991 | 10.5 | 7.0 | 9.8 |

Table Body

Foot note

*Death/1000 births

Source: 1. Govt. of India, Family Welfare Programme in India year Book 1986-87

2. Sample Registration Bulletin, December 1987 and December 1992

# Types of Graphs

# Line Graph

- A line chart graphically displays data that changes continuously over time.

- Each line graph consists of points that connect data to show a trend

- Line graphs have an x-axis and a y-axis. In the most cases, time is distributed on the horizontal axis.

❑ **Uses of line graphs**

- When you want to show trends. For example, how house prices have increased over time.

- When comparing two or more different variables, situations, and information over a given period of time.

## Example

- The following line graph shows annual sales of a particular business company for the period of six consecutive years
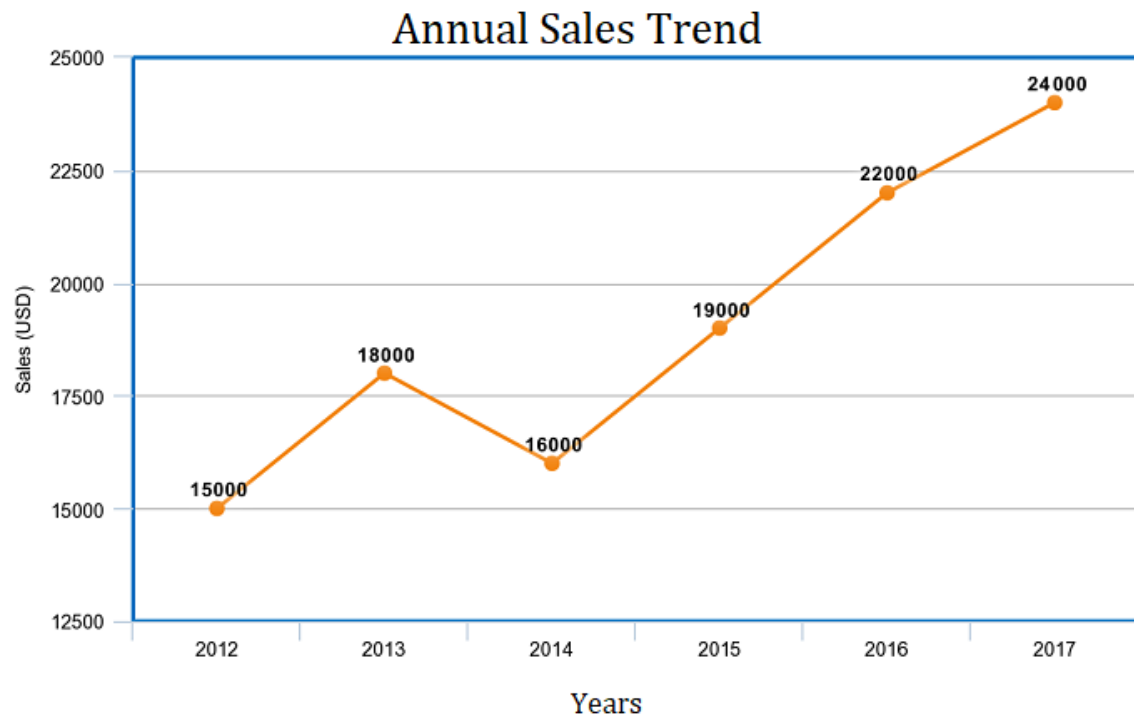
# Bar Graph

- Bar charts represent categorical data with rectangular bars.

- Each rectangular bar has length and height proportional to the values that they represent.

❑ **Bar Charts Uses**

- When you want to display data that are grouped into <span style="color:red">nominal or ordinal categories</span>

- <span style="color:red">To compare data</span> among different categories.

- Bar charts can also show <span style="color:red">large data changes over time</span>.

- Bar charts are ideal for visualizing the distribution of data when we have more than three categories.

## Example

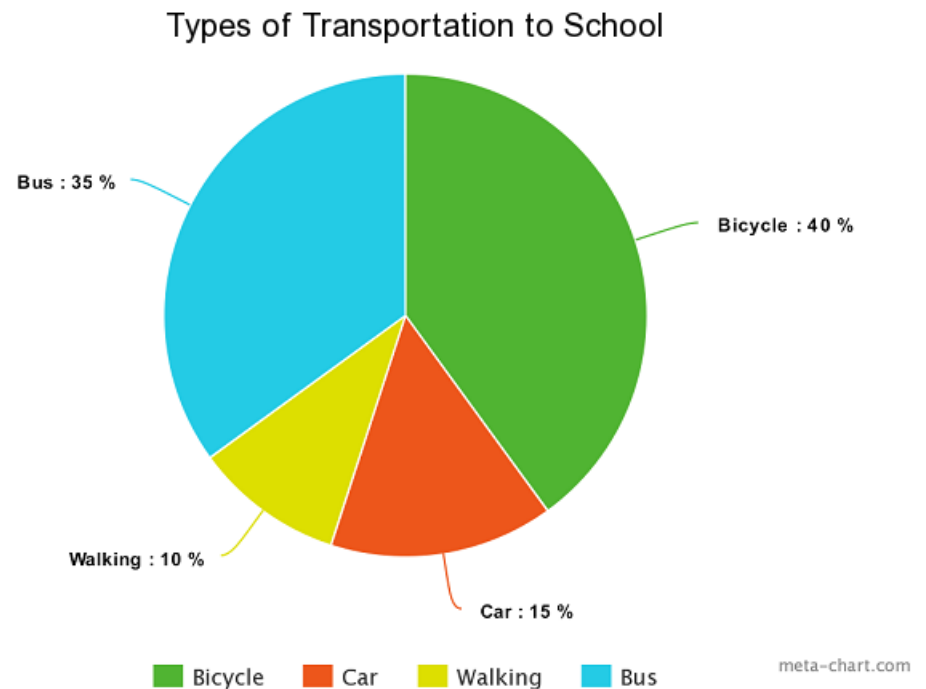- The bar chart below represents the total sum of sales for Product A and Product B over three years.



Sales of Product A and Product B
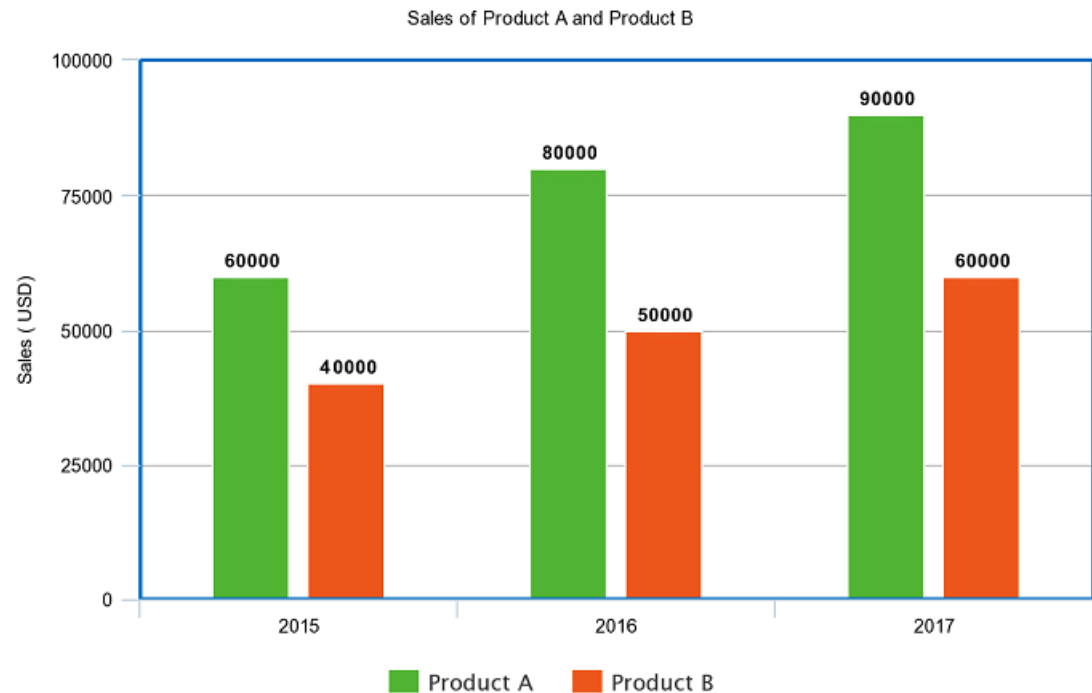
# Pie Chart

- Sometimes called a circle graph, pie charts represent the parts of a whole.

- Each 'section' or 'slice of the pie is a data percentage.

- From biggest to smallest, segments are arranged in a clockwise formation.

❑ **Pie Chart Uses**

- To show percentage or proportional data.

- When comparing areas of growth within a business such as profit.

- Pie charts work best for displaying data for 3 to 7 categories.

## Example

- The pie chart below represents the proportion of types of transportation used by 1000 students to go to their school.



Types of Transportation to School

Bus : 35 %

Bicycle : 40 %

Walking : 10 %

Car : 15 %

Bicycle    Car    Walking    Bus

meta-chart.com

# Histogram

- A histogram shows continuous data in ordered rectangular columns .

- Usually, there are no gaps between the columns.

- At first glance, histograms look alike to bar graphs. However, there is a key difference between them.

- Bar Chart represents categorical data and histogram represent continuous data.

❑ **Histogram Uses**

- When the data is continuous

- To summarize large data sets graphically.

- To communicate the data distribution quickly to others.

**Example**

- The histogram below represents per capita income for five age groups.



Per capita income for five age groups
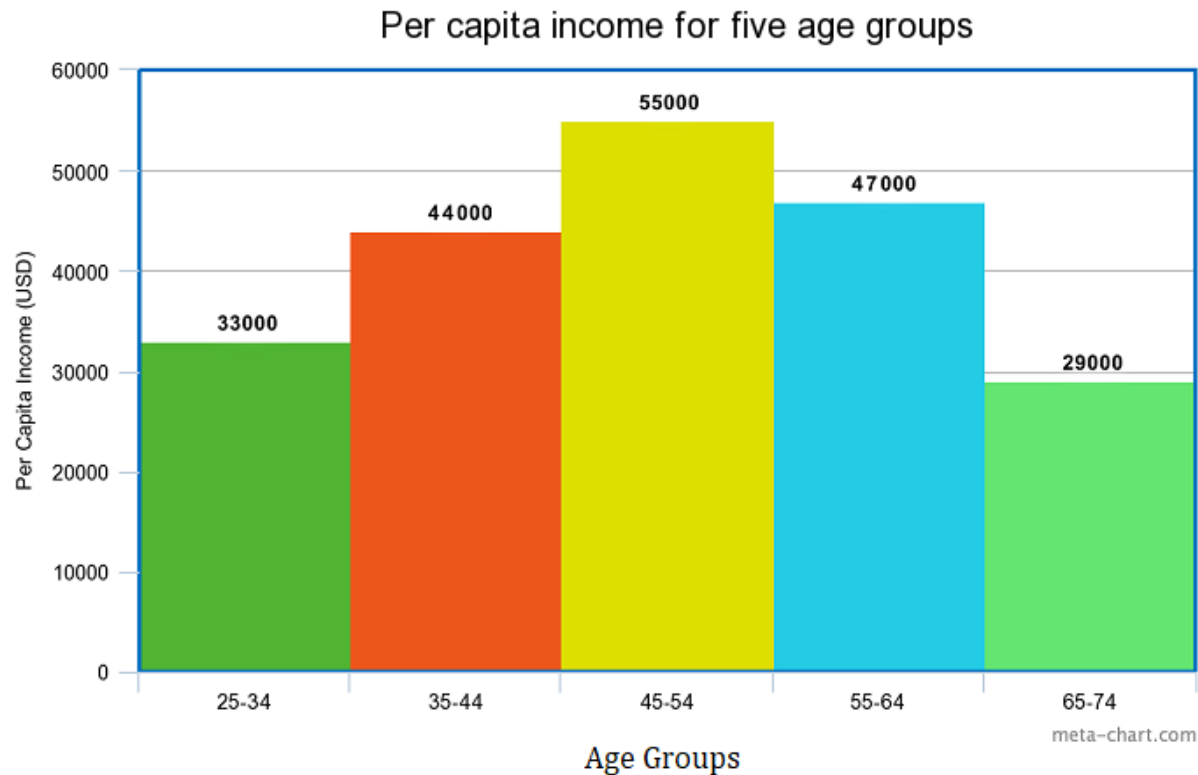
# Scatter Plot

- The scatter plot is an X-Y diagram that shows a relationship between two variables.

- It is used to plot data points on a vertical and a horizontal axis.

- The purpose is to show how much one variable affects another.

- Usually, when there is a relationship between 2 variables, the first one is called independent. The second variable is called dependent because its values depend on the first variable

- Scatter plots also help you predict the behavior of one variable (dependent) based on the measure of the other variable (independent).

❑ **Scatter plot uses**

- The tools for statistics called <span style="color:red">correlation</span> and <span style="color:red">regression</span> are then used for showing trends on this type of graph

- When trying to find out whether there is a <span style="color:red">relationship between 2 variables.</span>

- <span style="color:red">To predict</span> the behavior of dependent variable based on the measure of the independent variable.

- When having paired numerical data.

## Example

- The below Scatter plot presents data for 7 online stores, their monthly e-commerce sales, and online advertising costs for the last year.
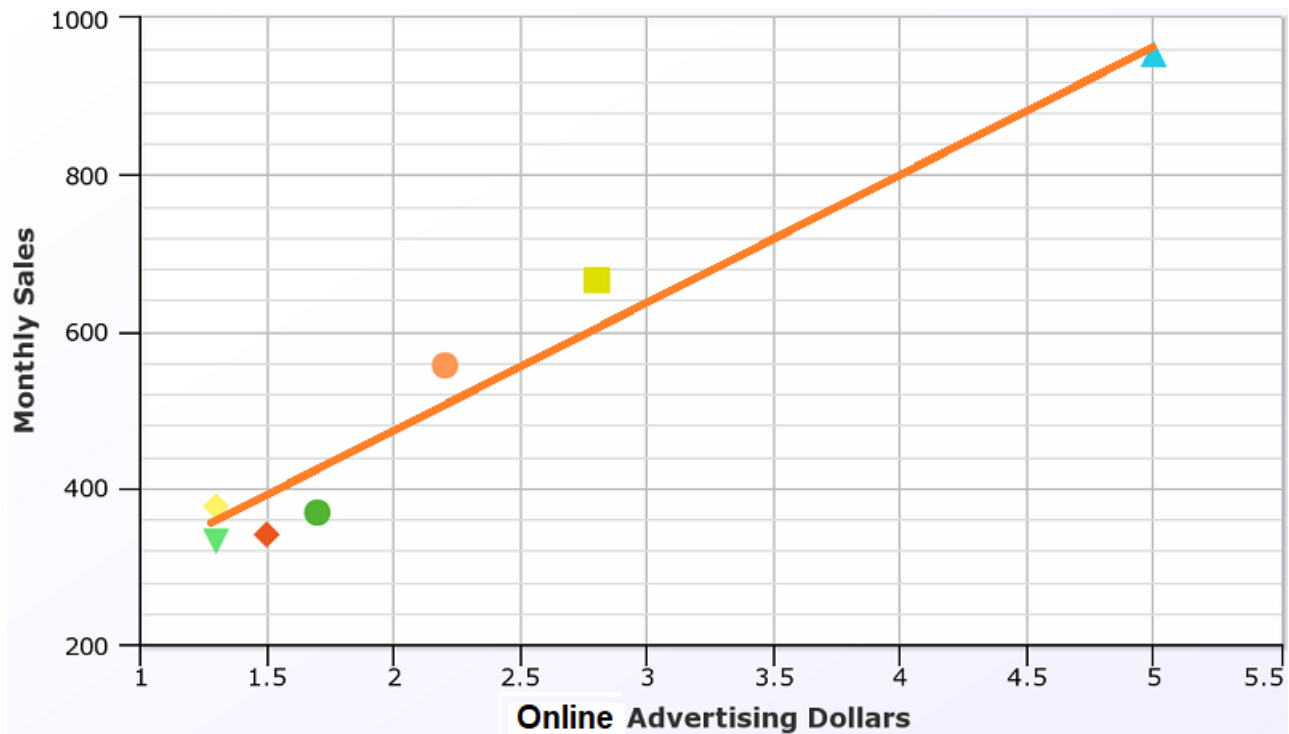
# Area Chart

- Area charts show the change in one or several quantities over time. They are very similar to the line chart. However, the area between axis and line are usually filled with colors.

❑ **Area Chart Uses**

- When you want to show trends, rather than express specific values.

- To show a simple comparison of the trend of data sets over the period of time.

- To display the magnitude of a change.

- To compare a small number of categories.

# Example

- The area chart below shows quarterly sales for product categories A and B for the last year.
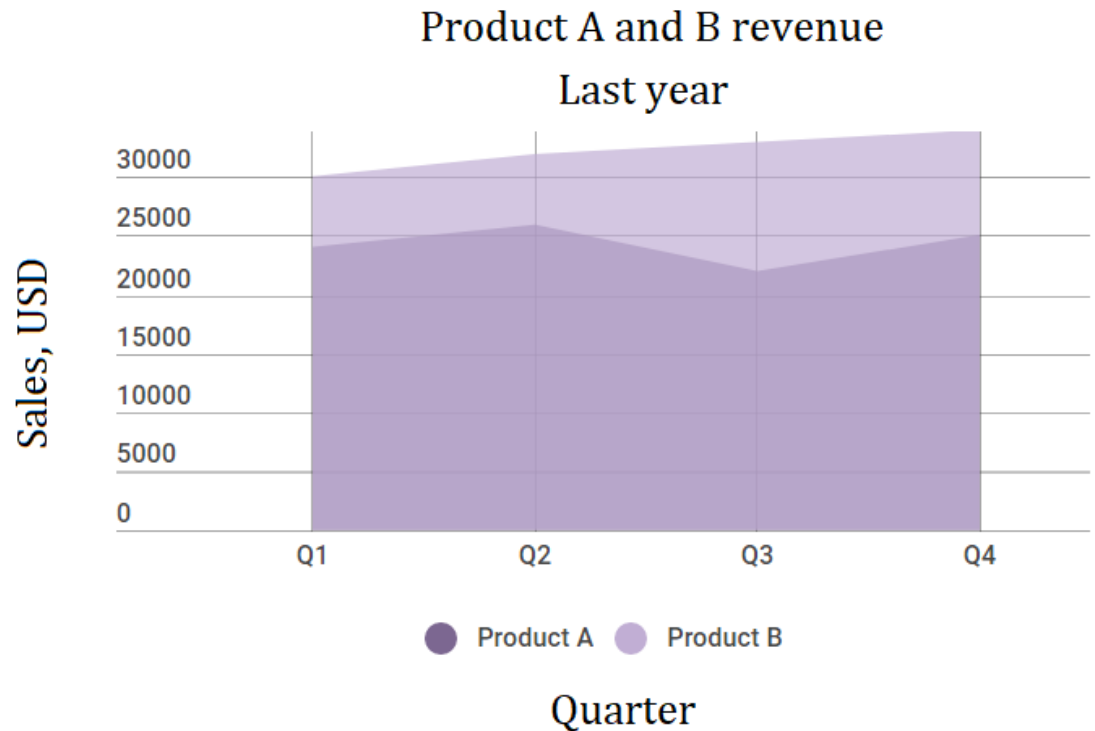
# Box and Whisker Chart

- A box and whisker chart is a statistical graph for displaying sets of numerical data through their quartiles. It displays a frequency distribution of the data.

❑ **Box and Whisker Chart Uses**

- When you want to observe the upper, lower quartiles, mean, median, deviations, etc. for a large set of data.

- When you want to see a quick view of the dataset distribution.

- When you need to compare data from different categories.

# Example

- The table and box-and-whisker plots below shows test scores for Maths and Literature for the same class.

| Maths | 35 | 77 | 92 | 43 | 55 | 66 | 73 | 70 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Literature | 35 | 43 | 40 | 43 | 50 | 60 | 70 | 92 |