ANIMAL GENETICS & BREEDING

UNIT - I
BIO-STATISTICS AND COMPUTER APPLICATION
Theory

GRAPHICAL AND DIAGRAMATIC PRESENTATION OF DATA

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PRESENTATION OF DATA

- Classification and tabulation reduce the complexity of vast and complicated statistical data but still it is not easy to interpret the tabulated data.
- Diagrams and graphs will catch the eye more easily than tables which provide array of figures.
- A glance over a graph or diagram will enable any layman (without statistical knowledge) to get an idea about the essential characteristics of the tabulated data without much strain or effort.

FUNCTIONS OF DIAGRAMS AND GRAPHS

- It will attract the attention of a large number of persons.
- They carry a *"birds – eye view"* impression in the human mind.
- It saves a lot of valuable time if presented in a form of suitable charts & graphs instead of pages of numerical figures.
- To facilitate comparison between two or more sets of data.
- Prediction equations can be represented by graphs and these will be much helpful in forecastings.

LIMITATIONS OF DIAGRAMS AND GRAPHS

- They are approximate indicators.
- Exact and accurate information's can be obtained from original tabular information.
- They cannot substitute the tabular information.
- They fail to disclose small difference when large figures are involved.

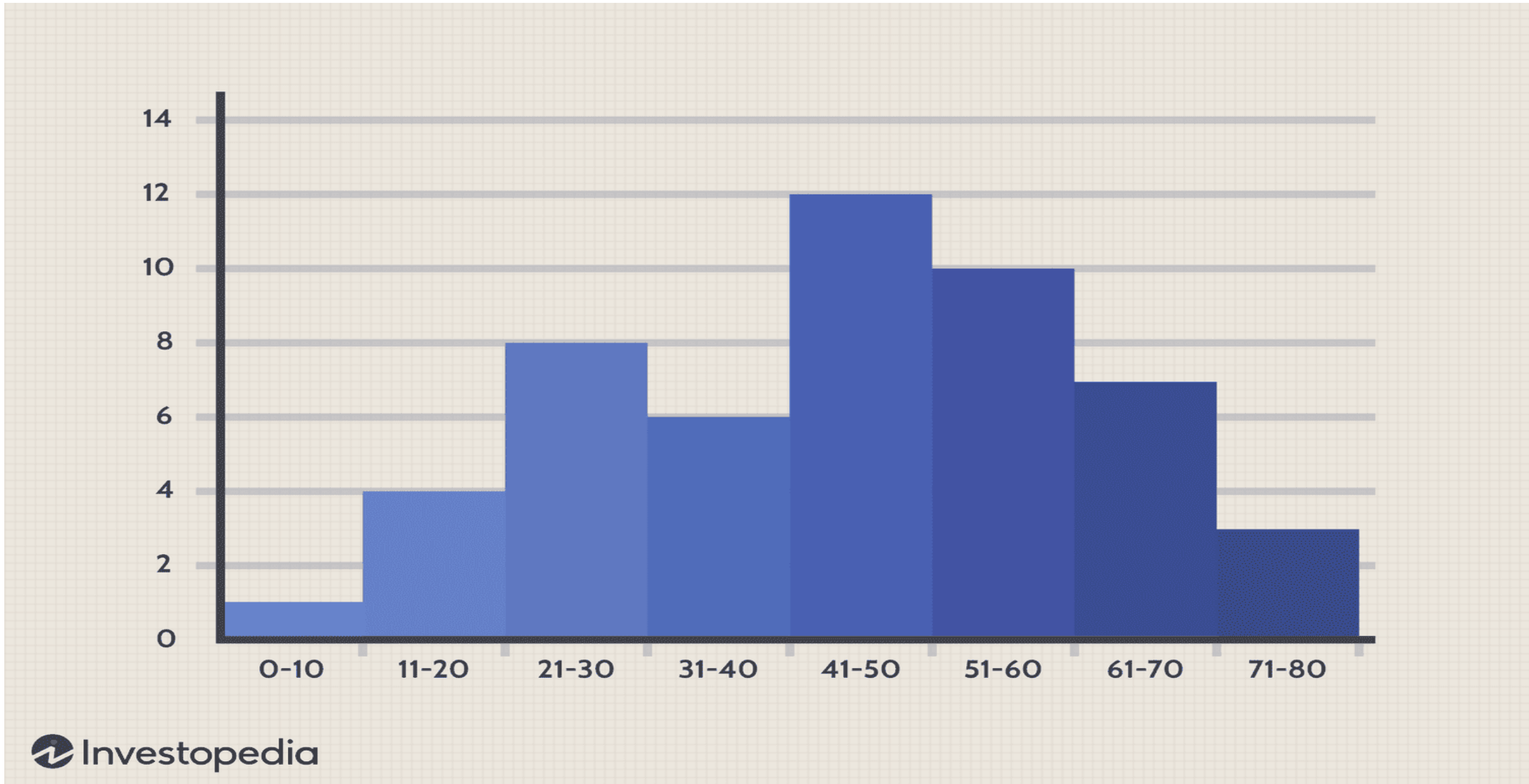
GRAPHICAL REPRESENTATION OF DATA

Graphical representation is done when the data are classified in the form of a frequency distribution. The different graphs are

- Histogram
- Frequency Polygon
- Frequency Curve
- Ogive
- Lorenz Curve

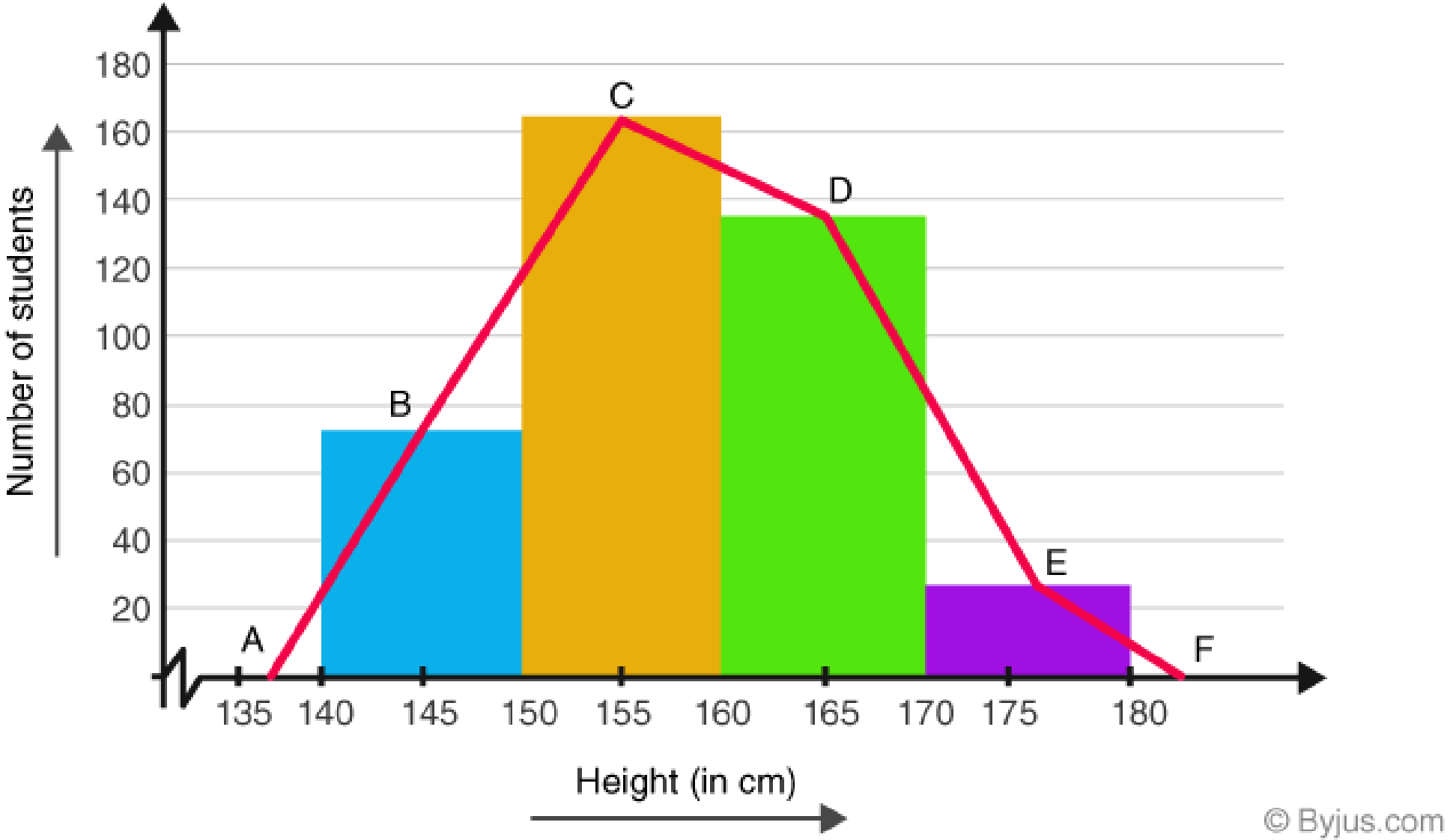
Histogram

- It is a vertical bar diagram without gap between the bars.
- It consists of bars erected over the true class interval, their areas being proportional to the frequencies of the respective classes.
- Since the intervals are of equal width, the height of each bar serves as a measure of the corresponding frequency.
- Draw the two diagonals in the highest modal class rectangles at its top corner to the pre and post modal rectangle corners and the x co-ordinate of the point of intersection is the mode.


14
12
10
8
6
4
2
0
0-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
Investopedia

Frequency Polygon

- If points are plotted with the x co-ordinate equal to the mid value of the class intervals and the corresponding frequencies as the y co-ordinate and these points are joined by means of a straight line, we obtain frequency polygon.
- These points are the midpoints of the top of the bars in the histogram.

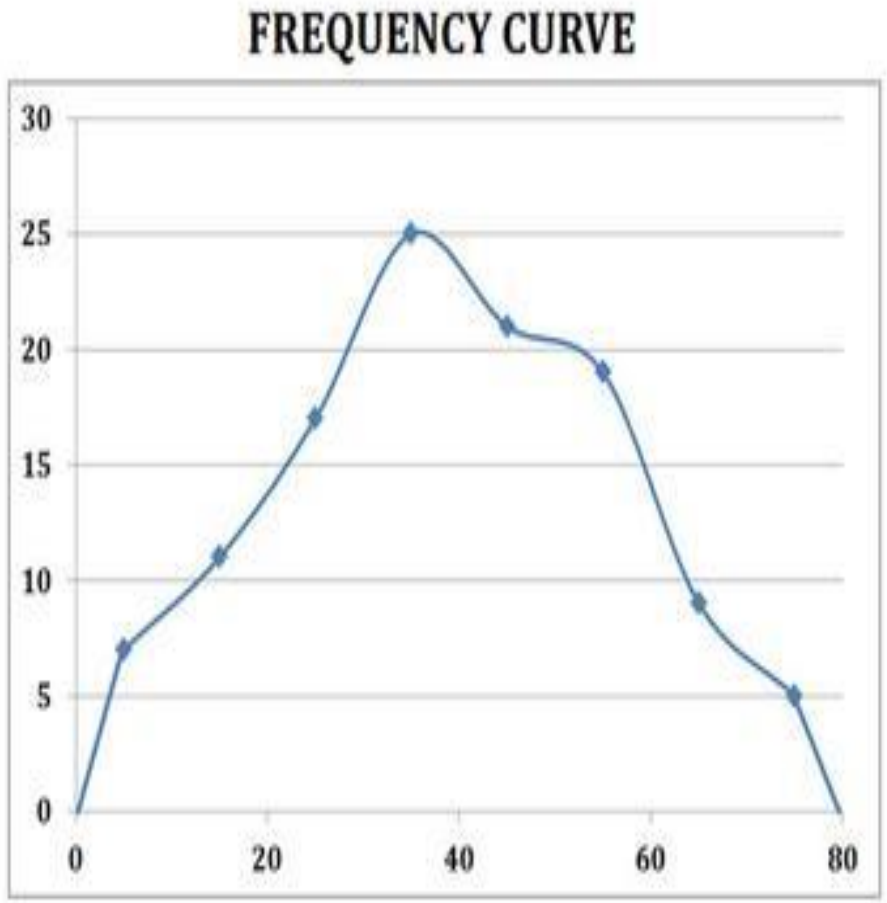

Number of students
180
160
140
120
100
80
60
40
20
A
B
C
D
E
F
135
140
145
150
155
160
165
170
175
180
Height (in cm)

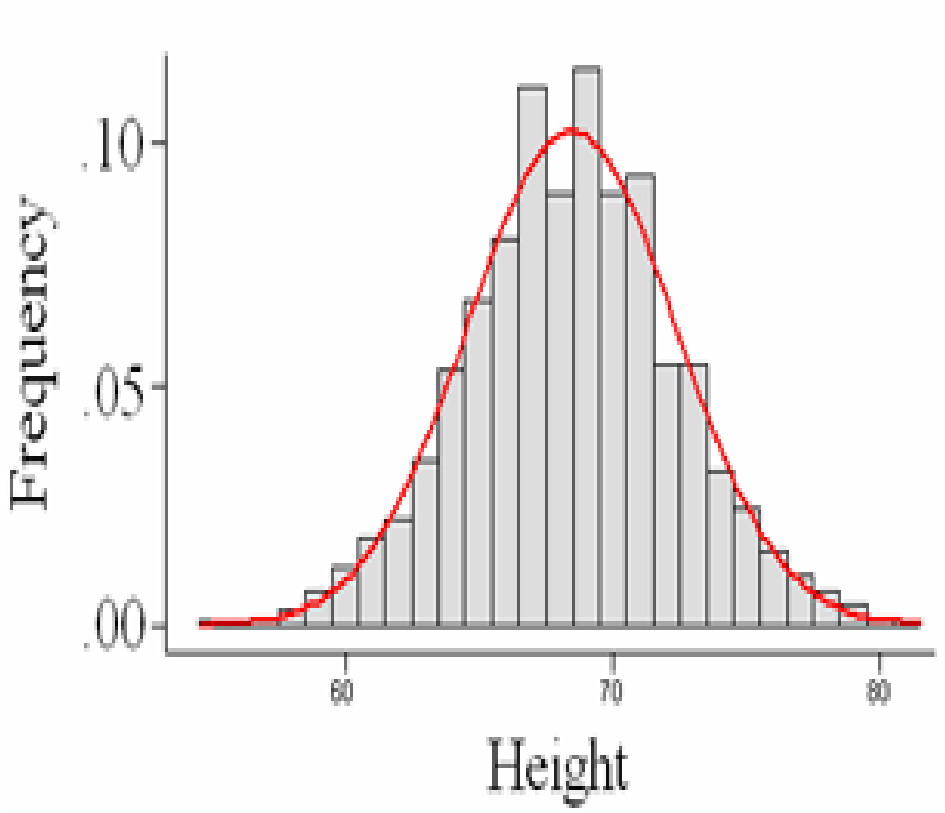
Frequency Curve

- If points are plotted with the x co-ordinate equal to the mid value of the class intervals and the corresponding frequencies as the y co-ordinate and these points are joined by means of a smooth curve then we get frequency curve.

Or

A Frequency Curve is a smooth curve which corresponds to the limiting case of a histogram computed for a frequency distribution of a continuous distribution as the number of data points becomes very large.


FREQUENCY CURVE
30
25
20
15
10
5
0
0
20
40
60
80

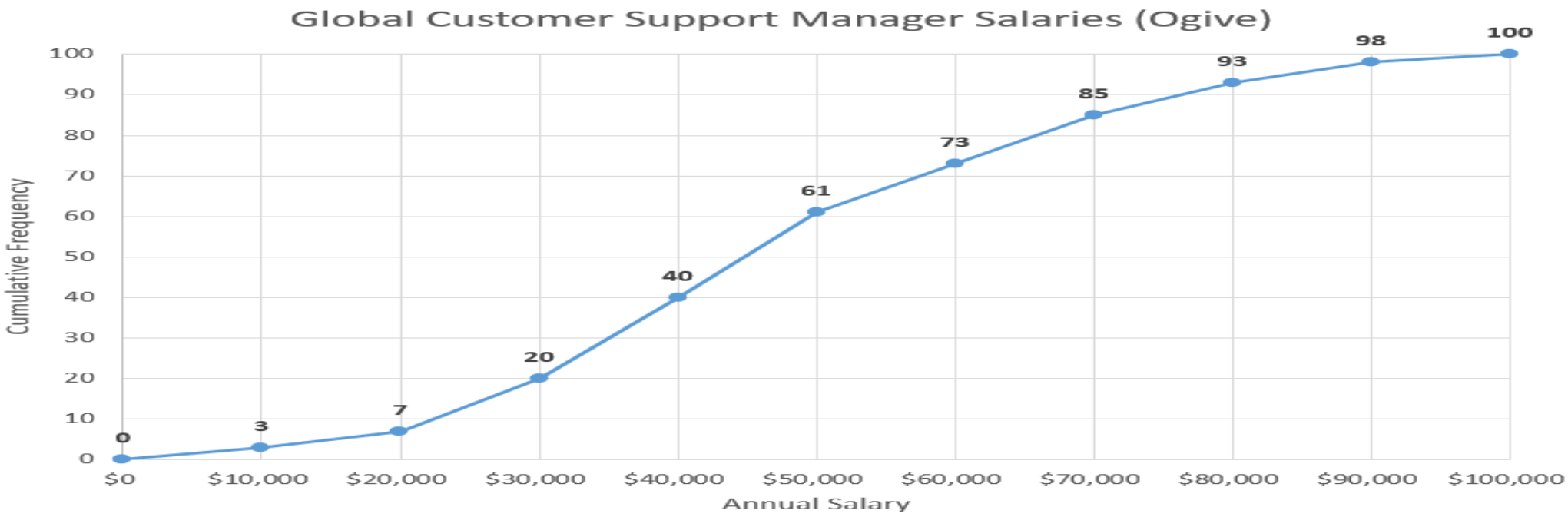

Frequency
.10
.05
.00
60
70
80
Height

Difference Between Frequency Curve And Frequency Polygon

- The main difference between a frequency polygon and a frequency curve is that a frequency polygon is drawn by connecting points with a straight line, whereas a frequency curve is drawn by connecting points following a curve.

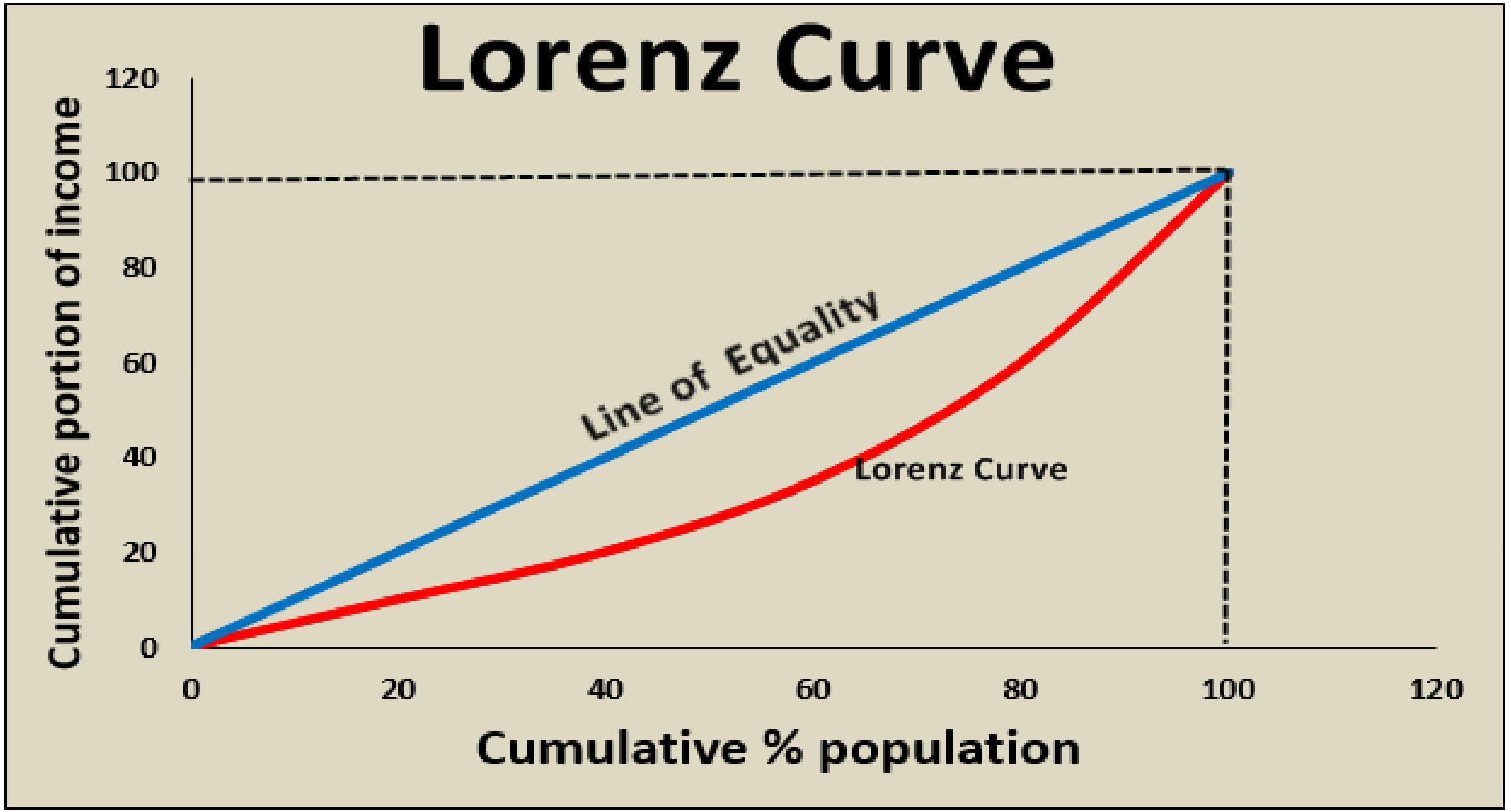
Ogive

- This is cumulative frequency curve.
- This curve is obtained by making use of cumulative frequency instead of the simple frequency.



Lorenz Curve

- This is a modification of the Ogive when the variables and the cumulative frequencies are expressed as percentages.
- It serves to measure the evenness of the distribution and is useful in picturing the distribution and dispersion of wealth, sales and profits etc.
- A Lorenz curve is a graphical representation of the distribution of income or wealth within a population. Lorenz curves graph percentiles of the population against cumulative income or wealth of people at or below that percentile.


Lorenz Curve
Cumulative portion of income
120
100
80
60
40
20
0
Line of Equality
Lorenz Curve
0
20
40
60
80
100
120
Cumulative % population

DIAGRAMMATIC REPRESENTATION OF DATA

- **Points to be followed in drawing a diagram**
  - For each diagram, a suitable short heading should be given.
  - It should be drawn to exhibit the statistical matter clearly. It should be such as to allow its significant feature to be clearly shown out by adopting suitable scale and will depend upon the space available.
  - Diagram should be drawn accurately with the help of drawing instruments.

- Colouring and different markings should be done with pencil or with colours.
- Different colours or marks or dottings are used to show different items. In such cases legend should be given for the column and item it refers. In doing so, we should see that the visual impression conveyed by the diagram is not in any way affected.
- The original data on which the diagram has been based should be given, if necessary facing the diagram as this will help the observer to see the details with clarity.
- Reference to the source of the table should be provided.

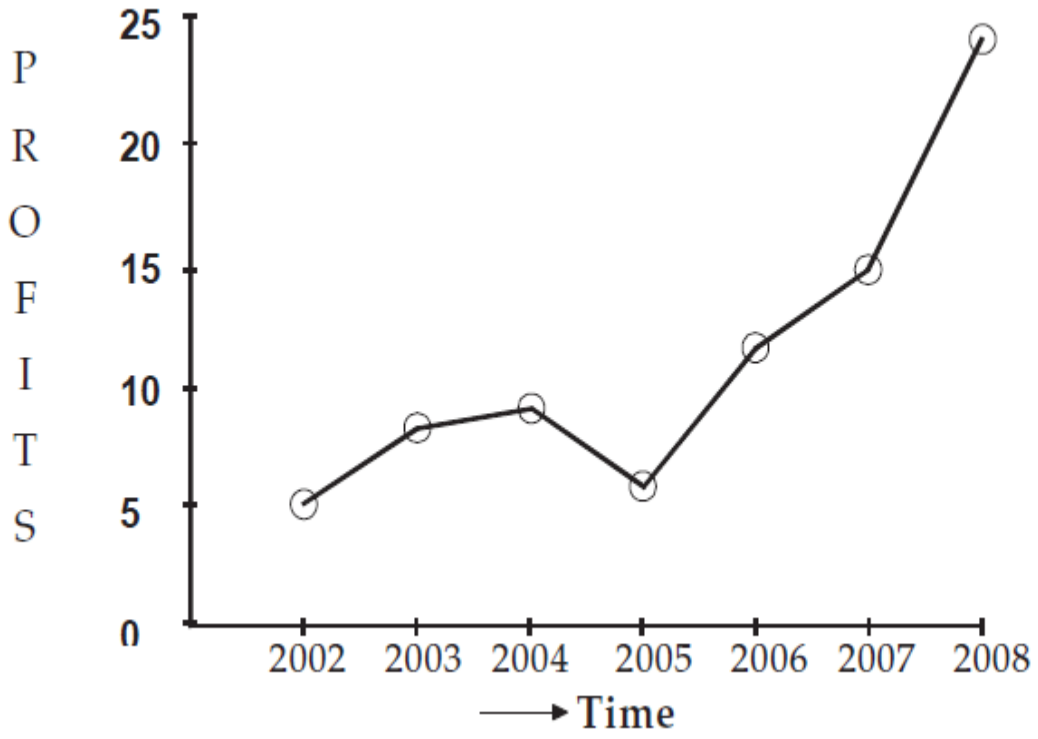
Types of a diagram

- One dimensional diagram
  - Line diagram
  - Bar Diagram
- Two dimensional (or) Area Diagram
  - Pie diagram
  - Square diagram and rectangle diagrams
- Three dimensional (or)Volume diagrams
  - Cubes
  - Spheres, Cylinders etc.
- Pictogram
  - Actual pictures

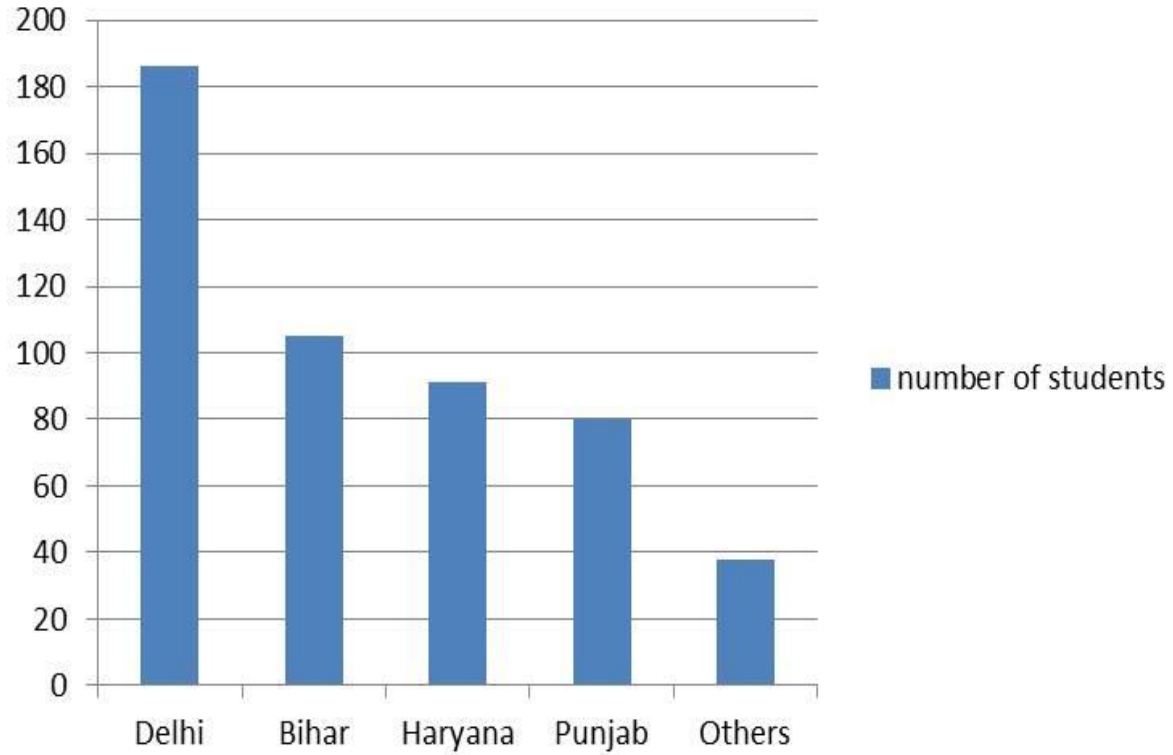
ONE DIMENSIONAL DIAGRAM

Line diagram consisting of curves and lines as well as bars

- *Line diagram*
  - This requires vertical lines to be drawn at equal intervals each of length proportional to the magnitude of the variable for the different items.
  - It has no width and hence of very poor visual effect.
  - It makes comparison easy although it is less attractive.
- *Bar Diagram*
  - It is the simplest of all statistical diagrams.
  - It consists of bars of equal width (all horizontal or vertical) standing on a common base line at equal intervals, the length of the bars being proportional to the magnitude of the variable for different items.



Line Diagram

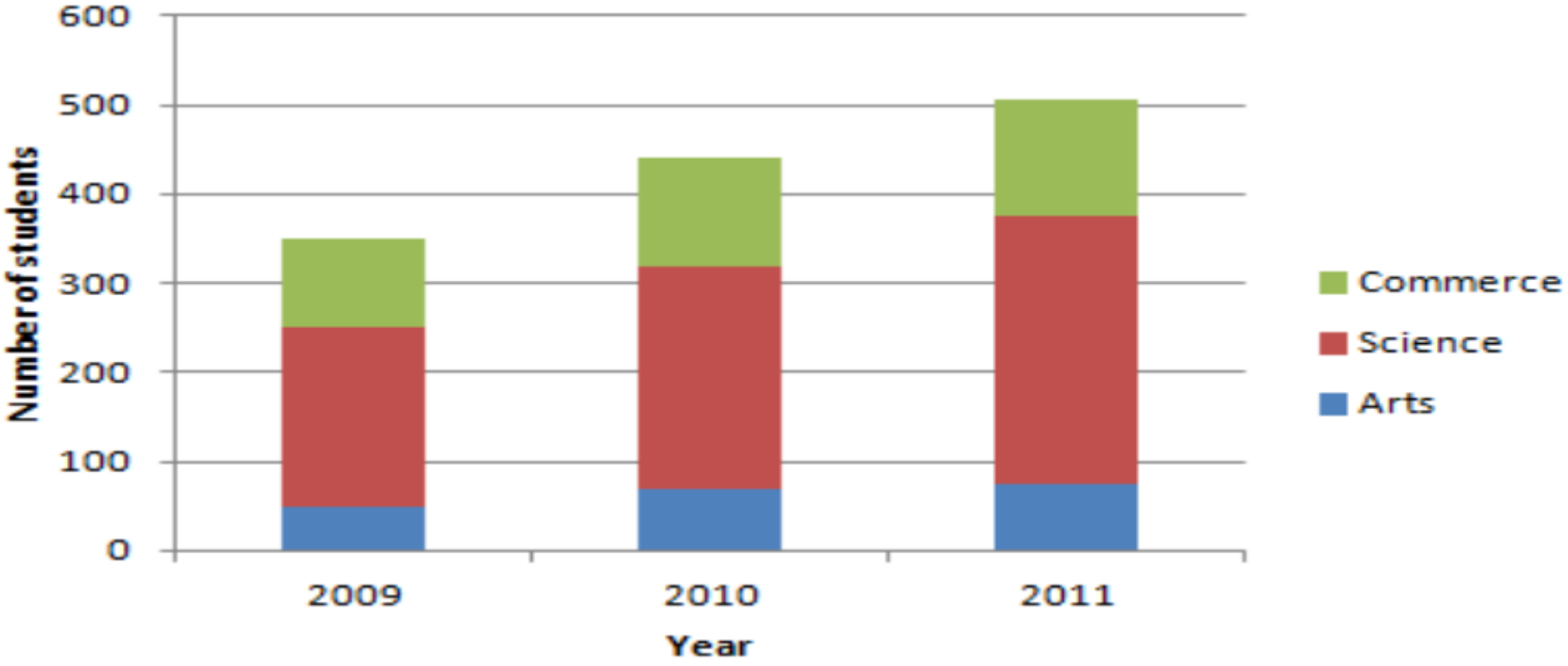


Bar Diagram

BAR DIAGRAM

❖ *Sub-divided bar diagram or component bar diagram*

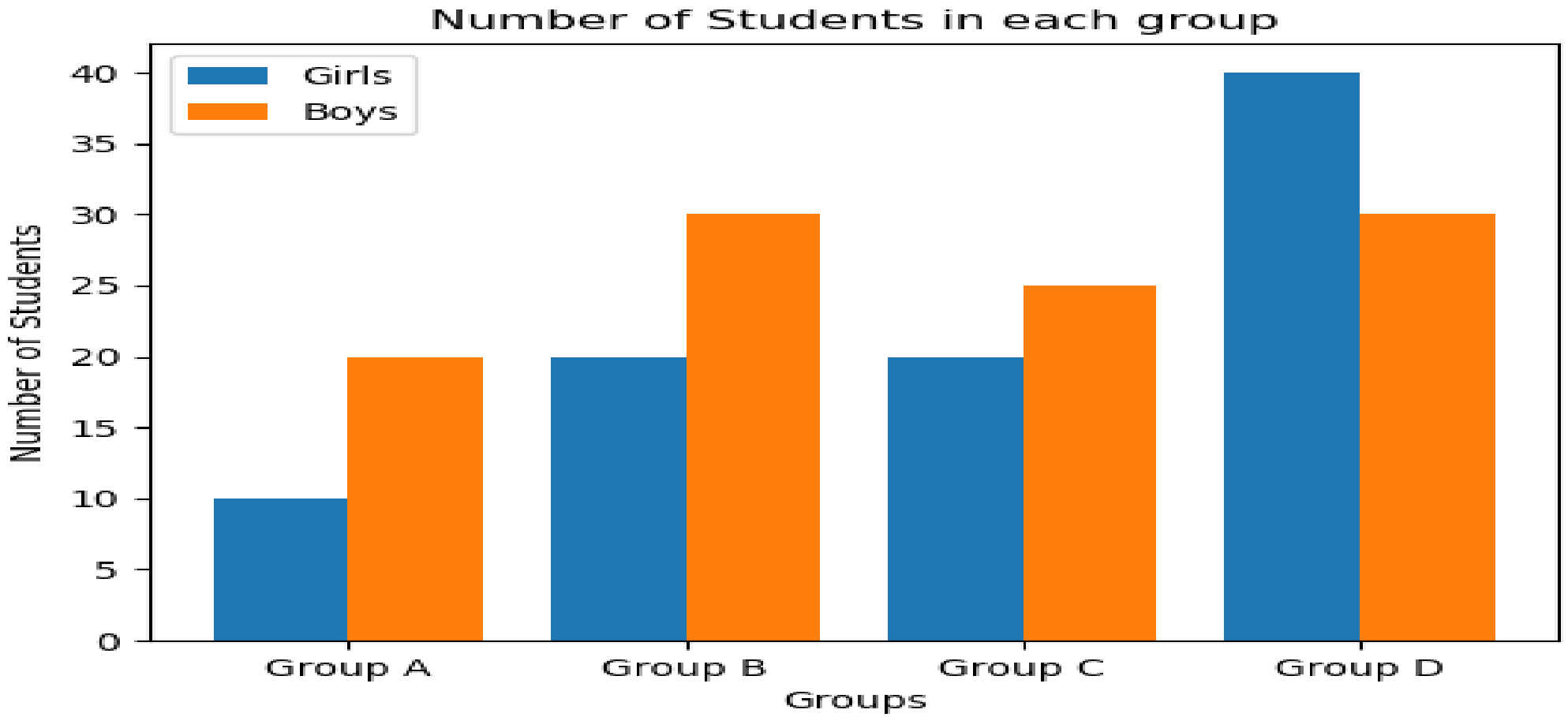
- Sometimes the variable is capable of being sub-divided into two or more component parts each representing a sub variable.
- In this case, all the bars are subdivided by lines in the same order so that each subdivision represents the parts in magnitude in the same scale.
- They are properly coloured or marked differently for visual guidance.
- Small squares should be given below the diagram containing the same colour or mark to show their significance.



Sub-divided bar diagram or component bar diagram

Superimposed or Multiple bar diagram

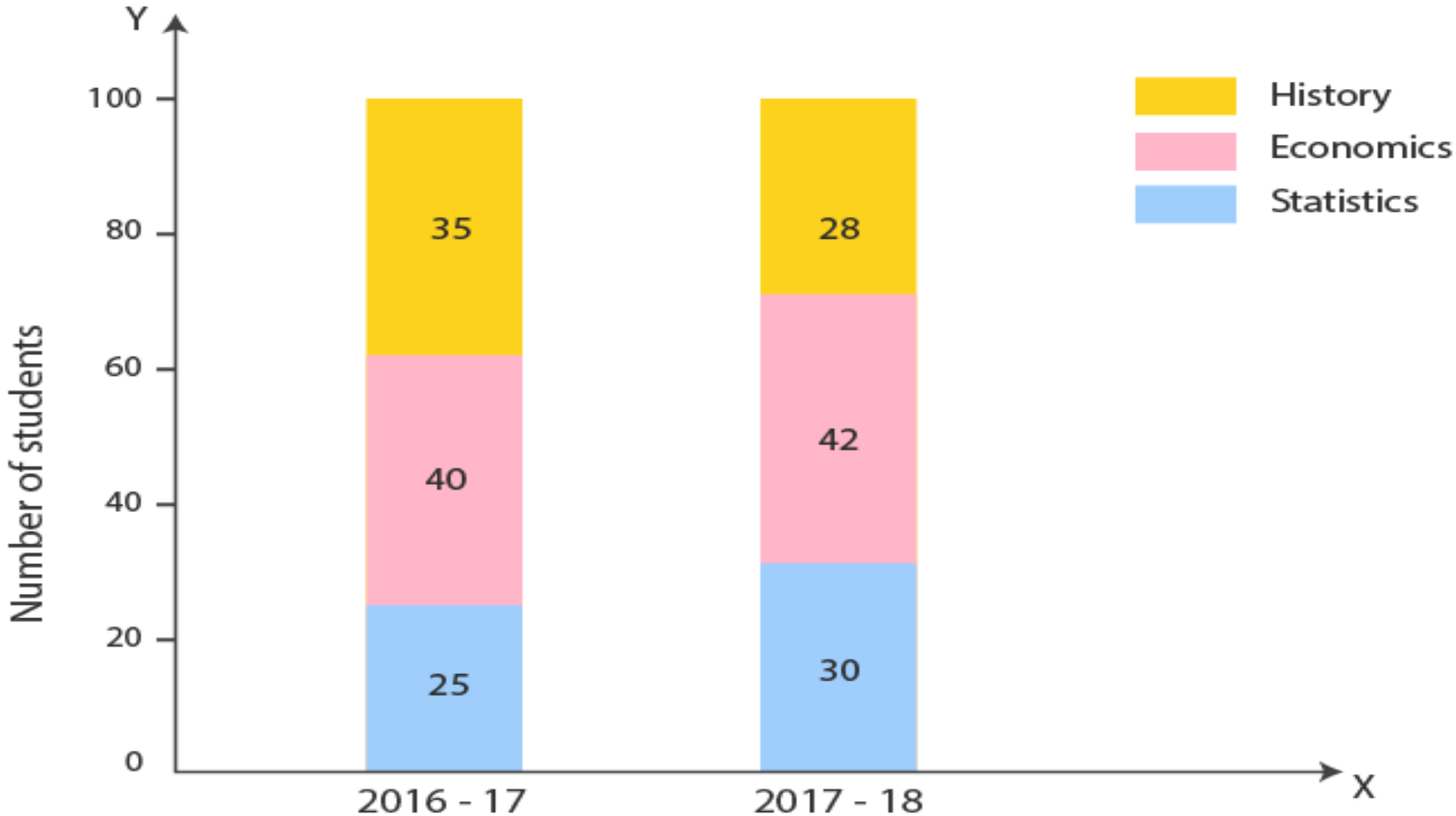
- Bars may sometimes be superimposed for comparative purpose.
- A multiple bar graph shows the relationship between different values of data.
- Each data value is represented by a column in the graph. In a multiple bar graph, multiple data points for each category of data are shown with the addition of columns.
- These are used also for two or more sets of interrelated data.



Superimposed or Multiple bar diagram

❖*Percentage bar diagram*

- When the component parts are expressed in percentages of the whole, the resulting bar diagram is called a percentage bar diagram.
- In this case all the bars are of equal length.
- A percentage bar chart, bars of length equal to 100 for each class are drawn in the first step and sub-divided into the proportion of the percentage of their component in the second step.
- The diagram so obtained is called a percentage component bar chart or percentage stacked bar chart.



Percentage bar diagram

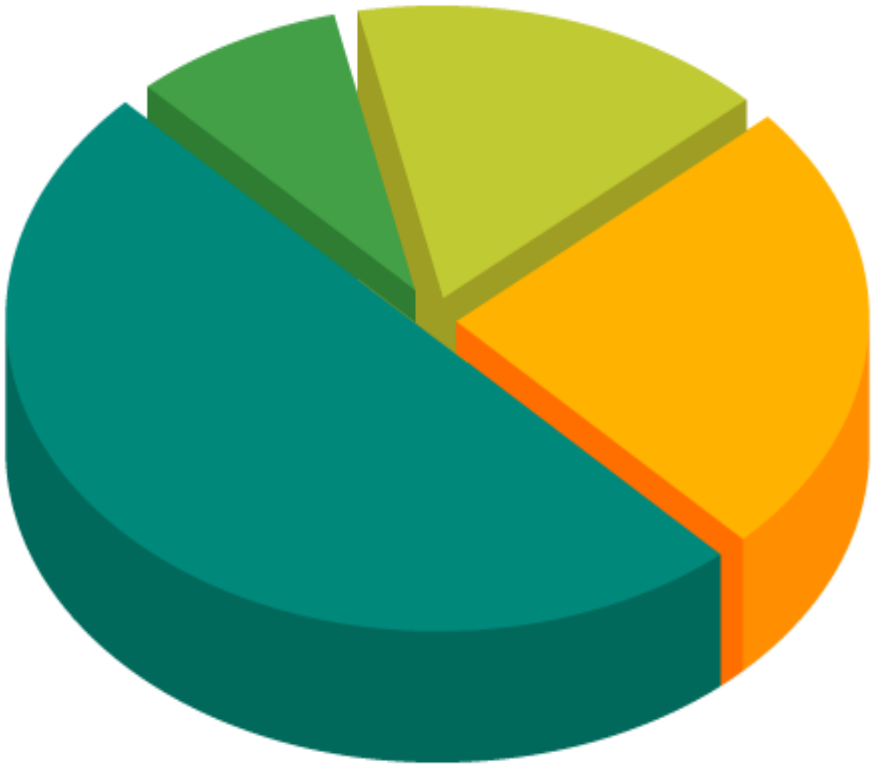
TWO DIMENSIONAL (OR) AREA DIAGRAM

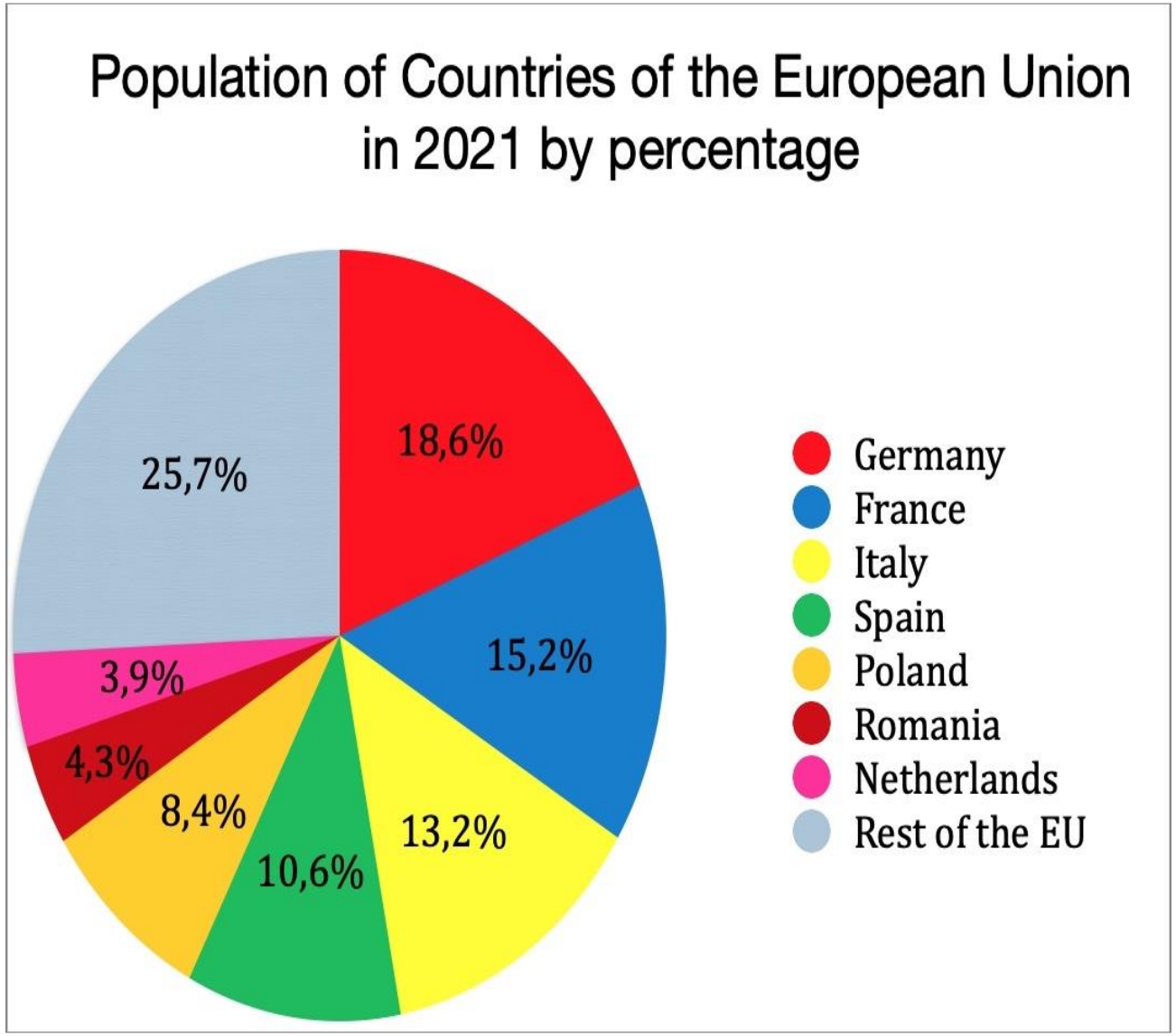
- Two-dimensional diagrams comprise only two dimensions (factors), such as length and width. They are represented by squares, rectangles, circles, and the variation of the circle is known as a pie- diagram. Here, each category is represented by the area proportional to the data points.
    - Pie diagram
    - Square diagram and rectangle diagrams

Pie Chart

- The "pie chart" is also known as a "circle chart", dividing the circular statistical graphic into sectors or sections to illustrate the numerical problems. Each sector denotes a proportionate part of the whole. To find out the composition of something, Pie-chart works the best at that time.
- The pie chart is an important type of data representation. It contains different segments and sectors in which each segment and sector of a pie chart forms a specific portion of the total(percentage). The sum of all the data is equal to 360°.
- The total value of the pie is always 100%.

Pie Chart




Population of Countries of the European Union in 2021 by percentage
18,6%
15,2%
13,2%
10,6%
8,4%
4,3%
3,9%
25,7%
Germany
France
Italy
Spain
Poland
Romania
Netherlands
Rest of the EU

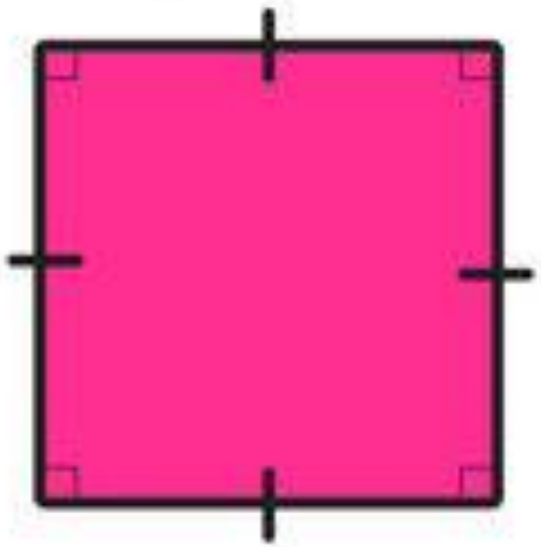
Square diagram

- Their areas should be proportional to the magnitudes of the data.
- For square diagrams, we will have to take the square root of the given figures which will give the measurement of the sides of the square. By adopting suitable scale we can draw squares.
- A square is a quadrilateral with four equal sides. There are many objects around us that are in the shape of a square. Each square shape is identified by its equal sides and its interior angles that are equal to 90°.

Rectangle diagrams

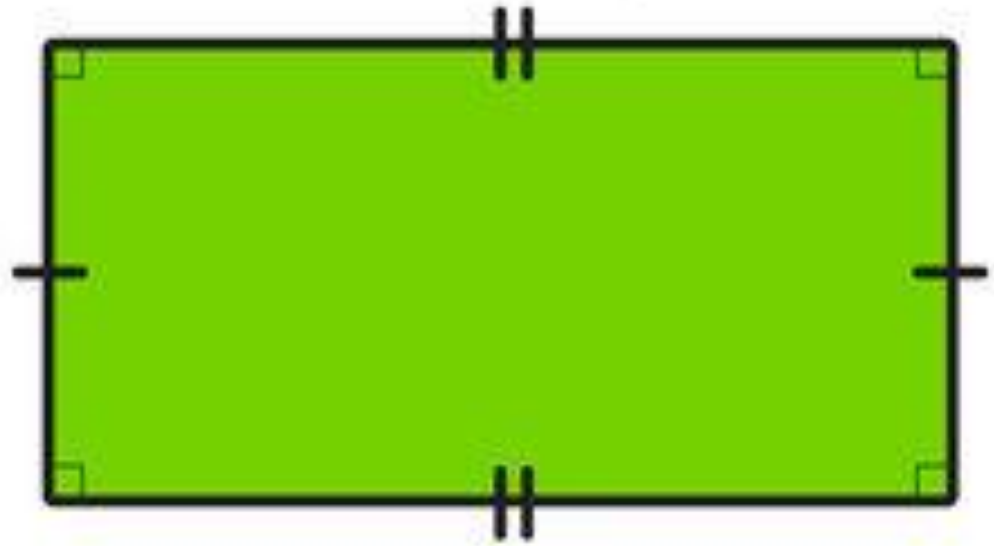
- In the case of rectangle diagrams, if we take equal breath (width) for the rectangles, then the areas will be proportional to the lengths and hence the lengths will be proportional to the magnitude of the given variables.

Square



VS

Rectangle



4 Right Angles: ✓

Oppoiste Sides are the Same Length: ✓

All Sides Are the Same Length: ✓

4 Right Angles: ✓

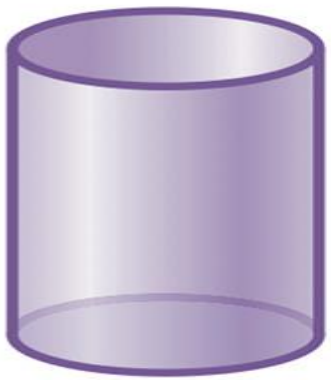
Oppoiste Sides are the Same Length: ✓

All Sides Are the Same Length: ✗

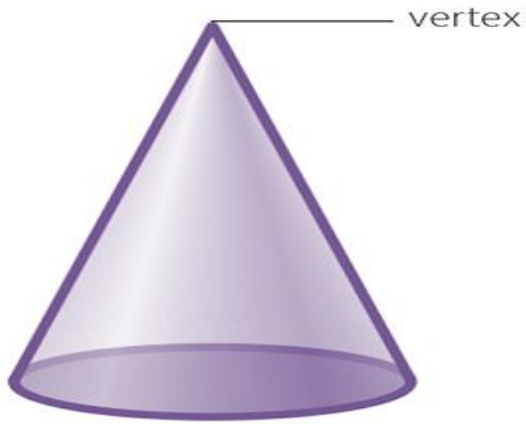
THREE DIMENSIONAL (OR) VOLUME DIAGRAM

- These comprise of cubes, spheres, prisms, cylinder and blocks.
- Of these cubes are mainly used and their sides are drawn in proportion to the cube roots of the magnitudes of the data.
- They are particularly used when the data has a very wide range. In such a case, it would be difficult to represent the quantities even by squares.

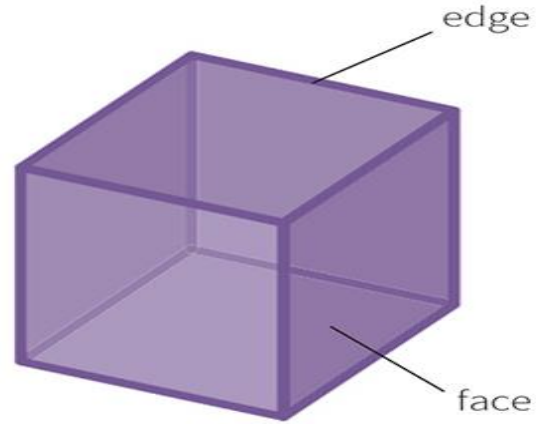
Solids



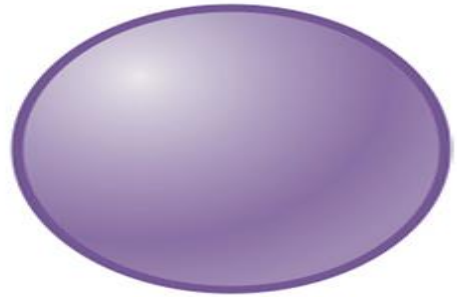
cylinder



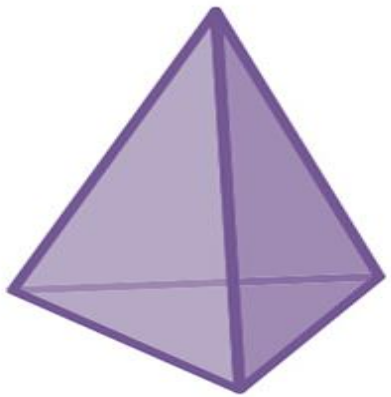
cone



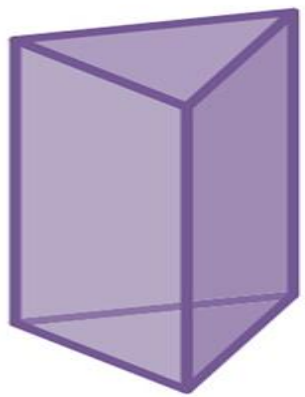
cube



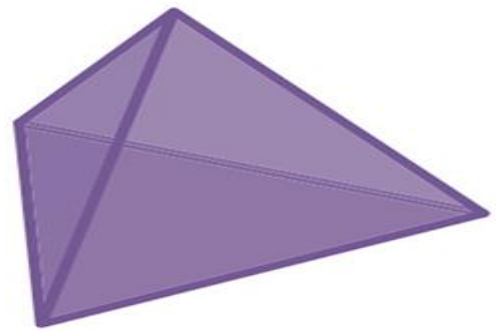
sphere



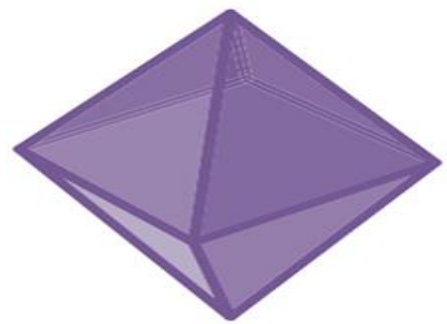
pyramid



prism



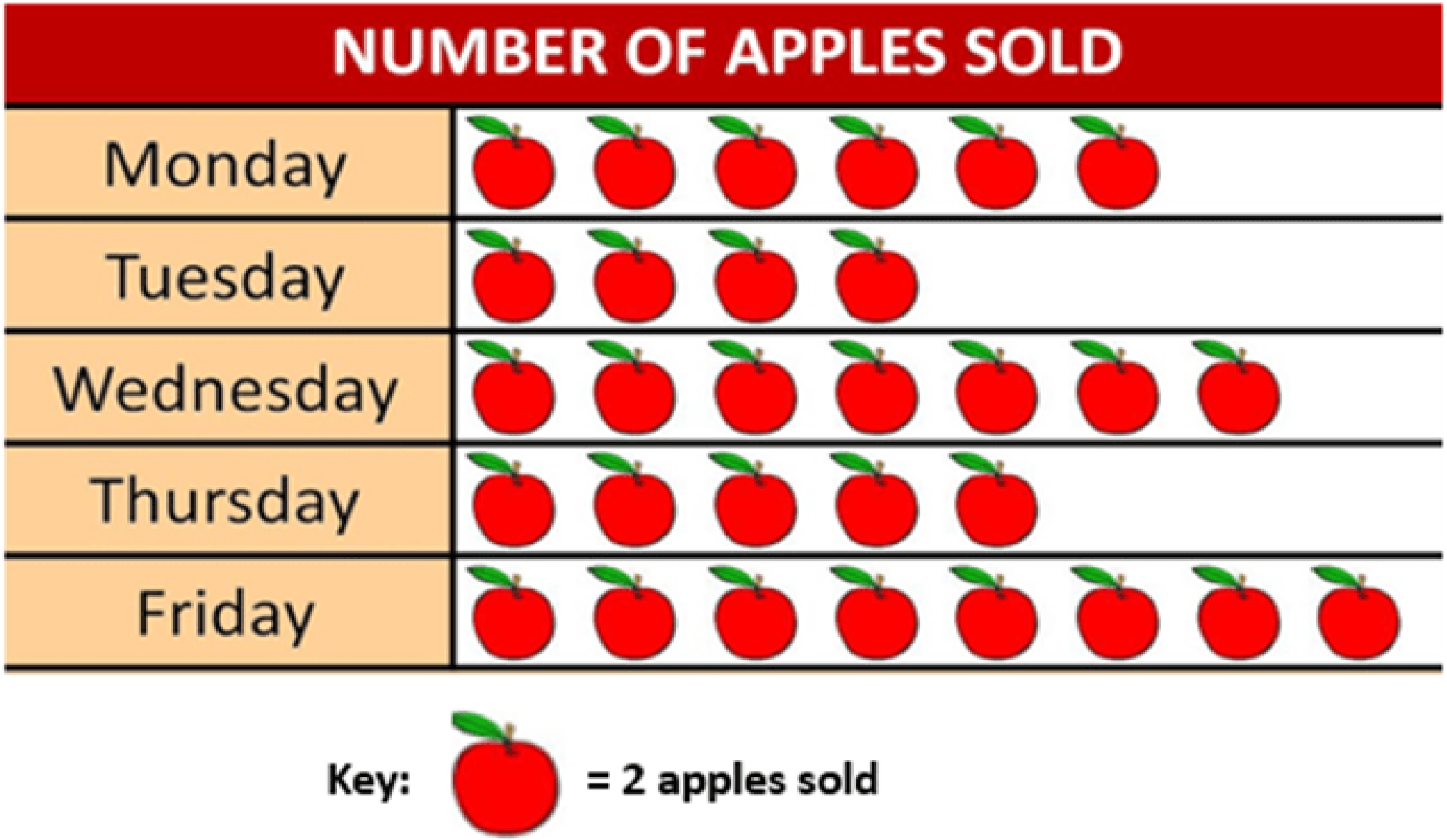
tetrahedron

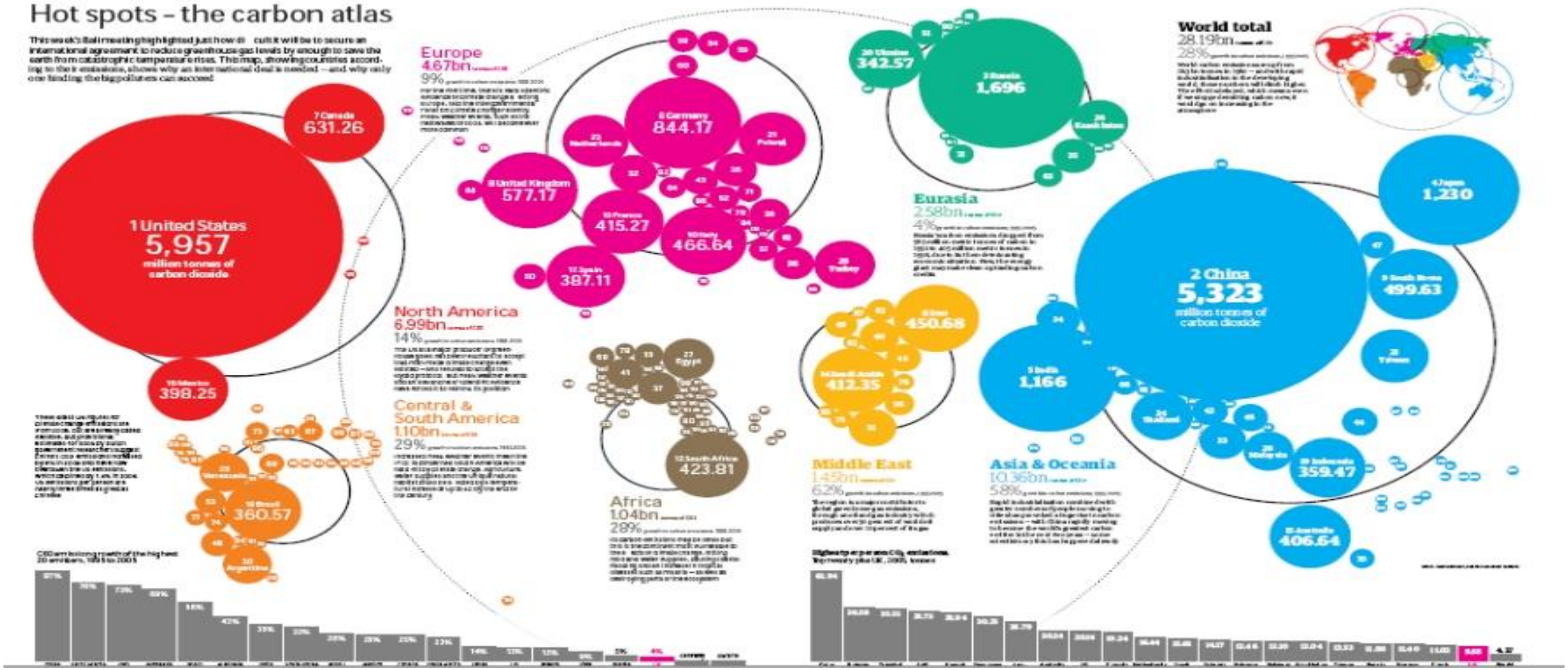


octahedron

PICTOGRAM

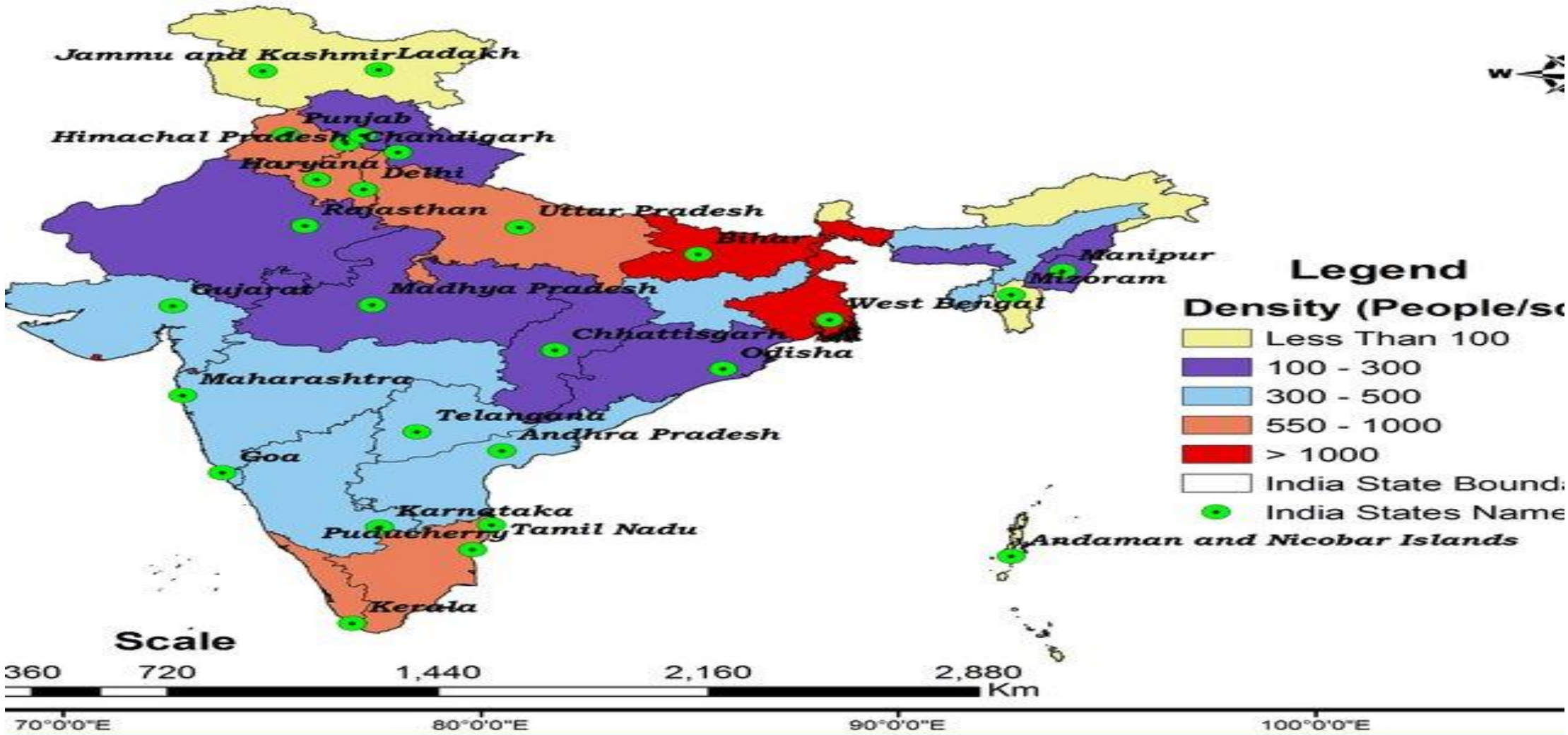
- Tabular data can also be represented by *pictogram, cartogram, maps and pictures* as these device help in attracting the attention to statistical matter which when presented in the ordinary diagrammatic form is very often ignored.
- Pictograms are diagrams of pictorial or semi-pictorial nature and are drawn in different sizes according to scale. Though they are useful in attracting the attention of the people, they very often lean on tables, ignoring the pictorial diagrams.
- They cannot be made use of with certain complicated data.


NUMBER OF APPLES SOLD
Monday
Tuesday
Wednesday
Thursday
Friday
Key:
= 2 apples sold


Hot spots – the carbon atlas
Europe
4.67bn
9%
7 Canada
631.26
1 United States
5,957
million tonnes of carbon dioxide
398.25
6 Germany
844.17
8 United Kingdom
577.17
415.27
466.64
387.11
North America
6.99bn
14%
Central & South America
1.10bn
29%
18 Brazil
360.57
Africa
1.04bn
29%
12 South Africa
423.81
Middle East
1.45bn
6.2%
Eurasia
2.58bn
4%
342.57
3 Russia
1,696
412.35
Asia & Oceania
10.36bn
58%
1,166
2 China
5,323
million tonnes of carbon dioxide
1,230
499.63
359.47
406.64
World total
28.19bn
28%

Cartogram

Map Showing State-wise Population Density in India



THANK YOU