Economics
Class - XI
Presentation of Data - Notes

The presentation of data means exhibition of data in a clear and attractive manner so that the data can be easily understood and analysed.

Forms of presentation of data

1. Textual or Descriptive Presentation
2. Tabular Presentation
3. Diagrammatic Presentation (Bar diagrams, Pie diagrams, Frequency diagrams, Arithmetic line graphs)

1. Textual or Descriptive presentation of data:

In textual presentation, data is described within the text. When the quantity of data is not too large this form of presentation is more suitable.

- For example: 'Census of India 2001 reported that Indian population had risen to 102 crores of which only 49 crore were females against 53 crore males. 74 crore people resided in rural India and only 28 crores lived in towns or cities.'

Merits

It often enables one to emphasise certain specific points of the presentation.

Demerits

- A serious drawback of this method of presentation is that one has to go through the complete text of presentation for comprehension.
- It is not suitable when the amount of data to be presented is too large.

2. Tabular presentation of data (Tabulation):

Tabulation is a systematic presentation of numerical data in horizontal rows and vertical columns.

Classification Vs Tabulation

Classification	Tabulation
Classification is the process of arranging data into different groups according to their similarities and dissimilarities.	Tabulation is a systematic presentation of numerical data in horizontal rows and vertical columns.
It precedes tabulation.	Data can be tabulated only after classification.
It is a method of statistical analysis.	It is a method of presenting data.

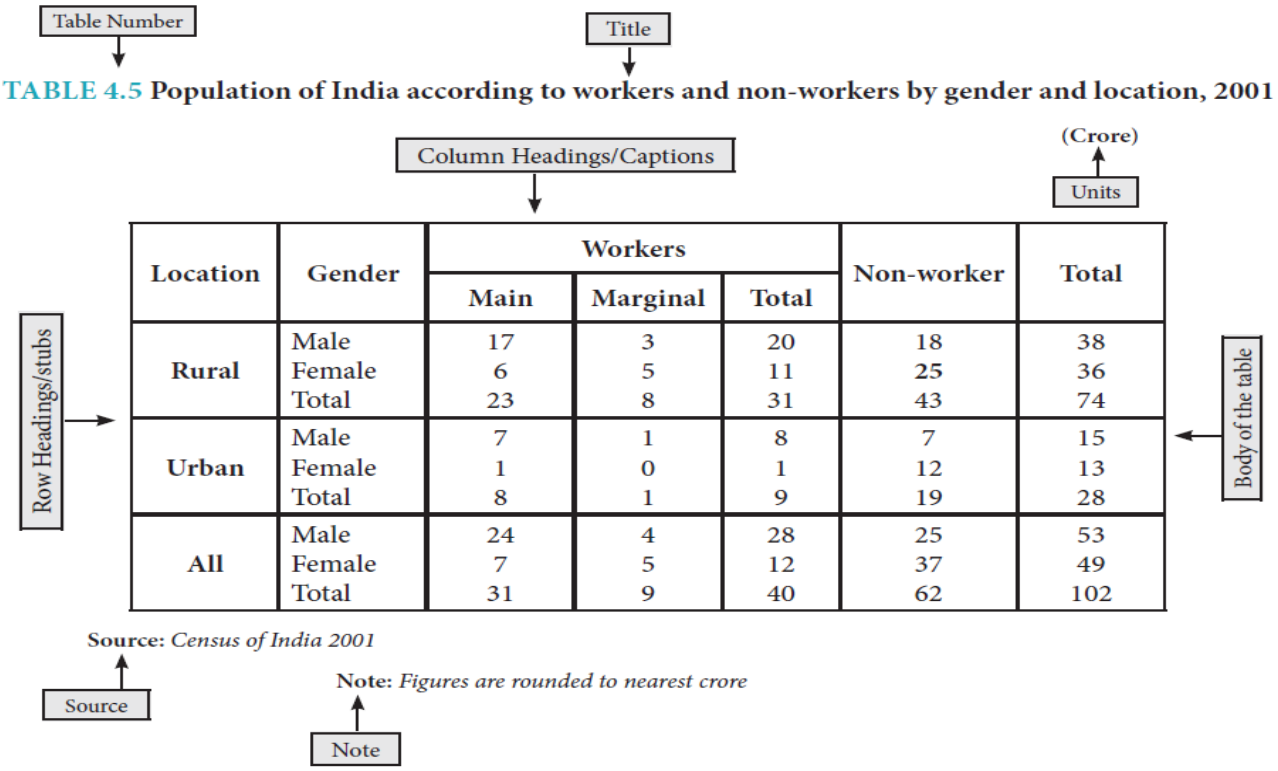
Classification used in tabulation is of four kinds: (Same as in organisation of data)

1. Qualitative classification
2. Quantitative classification
3. Temporal (Chronological) classification
4. Geographical (Spatial) classification

Parts or components of a table

1) **Table Number**: Table number is assigned to a table for identification purpose. It is the table number that distinguishes one table from another. It is given at the top or at the beginning of the title of the table.
2) **Title**: The title of a table narrates about the contents of the table. It has to be clear, brief and carefully worded so that the interpretations made from the table are clear and free from ambiguity. It is placed at the head of the table succeeding the table number or just below it.
3) **Caption or Column Headings**: At the top of each column in a table, a column designation is given to explain figures of the column. This is called caption or column heading.
4) **Stubs or Row Headings:** Each row of the table has to be given a heading to explain the figures of the row. These are also called stubs (or stub items) or row headings.

5) **Body of the Table**: It is the main part of the table and it contains the actual numerical data. Location of any one figure/data in the table is fixed and determined by the row and column of the table.
6) **Unit of Measurement**: The unit of measurement of the figures in the table (actual data) should always be stated along with the title. If different units are there for rows or columns of the table, these units must be stated along with stubs or captions.
7) **Source**: It is a brief statement or phrase indicating the source of data presented in the table. If more than one source is there, all the sources are to be written in the 'source'. Source is generally written at the bottom of the table.
8) **Note (or Footnote)**: Note is the last part of the table. It explains the specific feature of the data content of the table which is not self-explanatory and has not been explained earlier.



Location	Gender	Workers			Non-worker	Total
		Main	Marginal	Total		
Rural	Male	17	3	20	18	38
	Female	6	5	11	25	36
	Total	23	8	31	43	74
Urban	Male	7	1	8	7	15
	Female	1	0	1	12	13
	Total	8	1	9	19	28
All	Male	24	4	28	25	53
	Female	7	5	12	37	49
	Total	31	9	40	62	102

For example: Tabulate the given data.

In a sample study about the tea-drinking habit of two cities A and B, the following data were observed:

City A	City B
70% persons were males	55% persons were males
80% were tea-drinkers	35% were tea-drinkers
62% were male tea-drinkers	25% were male tea-drinkers

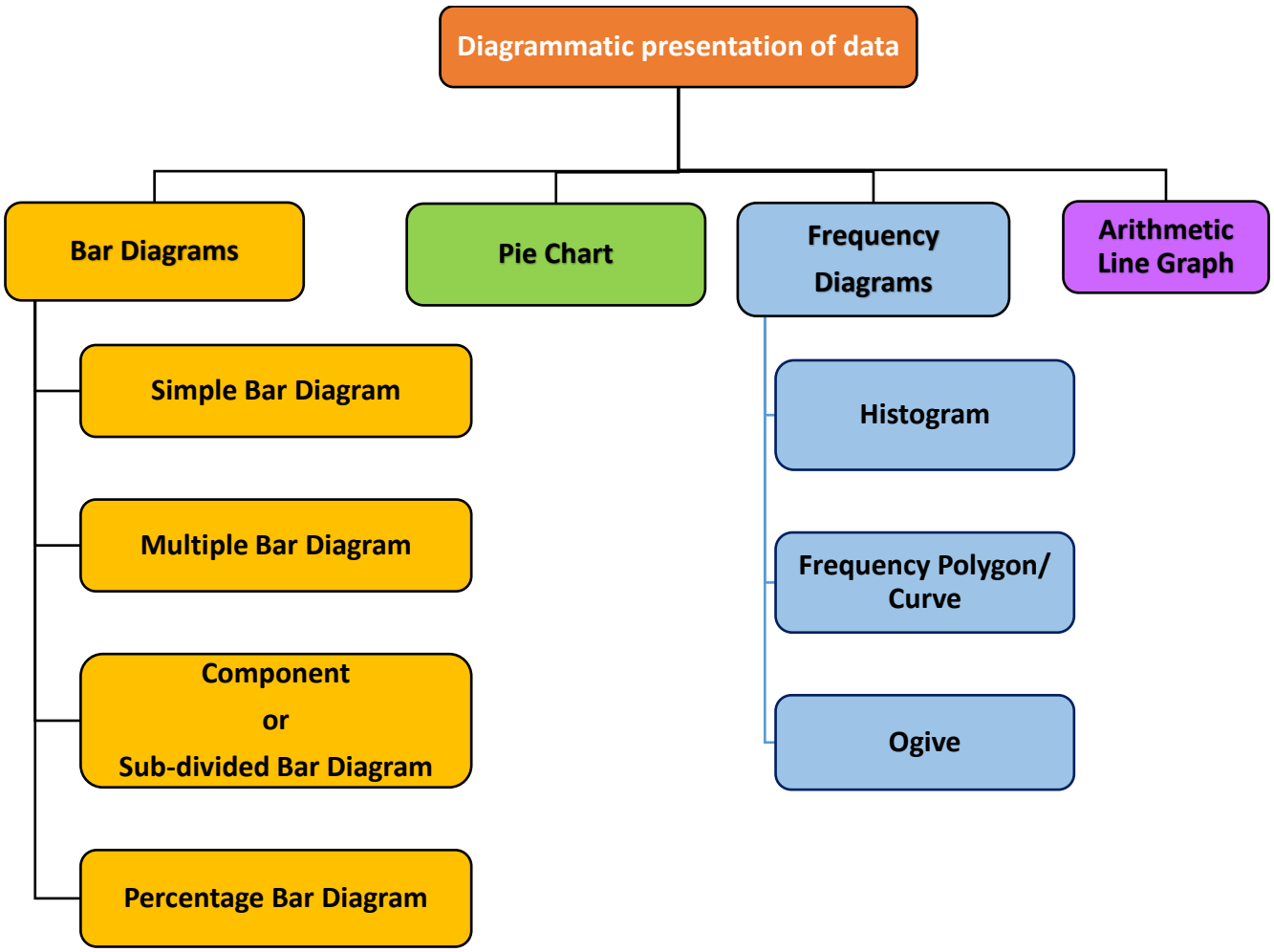
Solution: **Table No.1** **Table showing Percentage of Tea-drinkers in Cities A and B**

Attributes	City A			City B		
	Males	Females	Total	Males	Females	Total
Tea-drinkers	62	18	80	25	10	35
Non-tea drinkers	8	12	20	30	35	65
Total	70	30	100	55	45	100

Advantages of tabular presentation of data:

- The most important advantage of tabulation is that it organises data for further statistical treatment and decision making.
- It makes comparison of data easier.
- It is economical and easy to understand.

3. **Diagrammatic presentation of data**:
Diagrammatic presentation is a technique of presenting numerical data using diagrams such as bar diagrams, pie diagrams or frequency diagrams etc. It is the most attractive and appealing way to represent statistical data.



- **Bar Diagram**

A bar diagram is **one dimensional**. It is only the height (or length) and not the width of the bar that matters.

- In case of bar diagrams, the magnitude of the characteristic is shown by the height or length of the bar.
- Bar diagram comprises of a group of *equi-spaced* and *equi-width* rectangular bars for each category of data.
- Bar diagram can be drawn both for discrete and continuous variables.

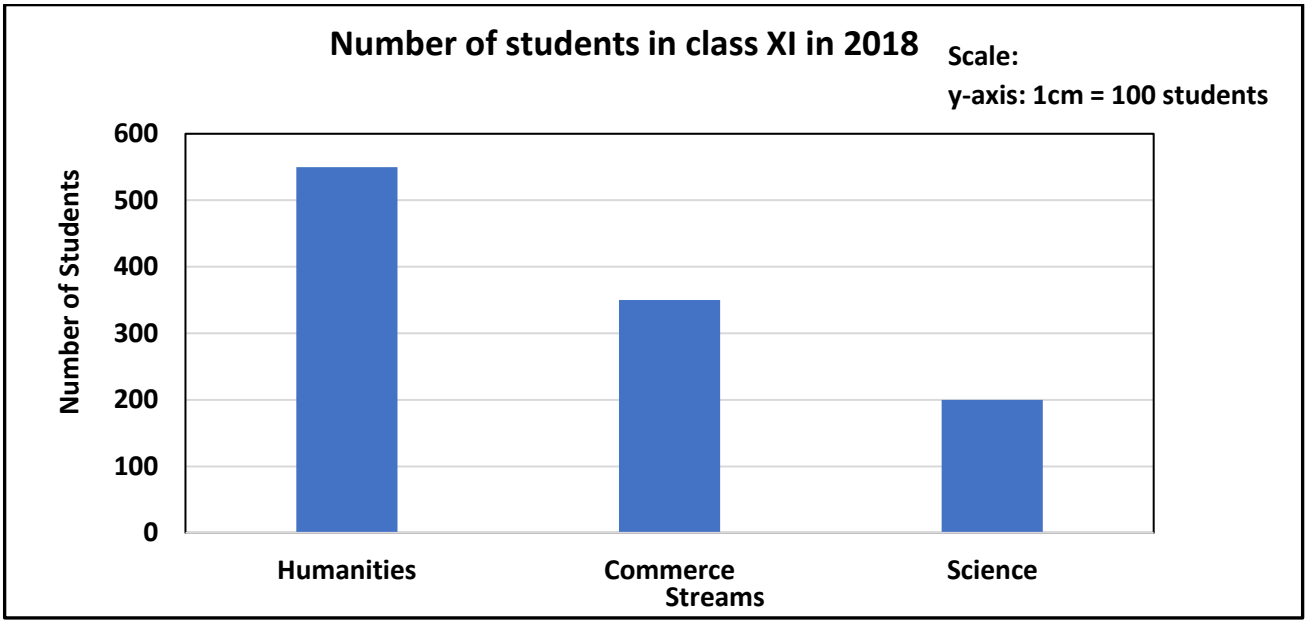
Types of bar diagrams

i. Simple Bar Diagram

It is a bar diagram which represents only one characteristic and is the simplest form of bar diagram.

For example: The bar diagram given below shows the number of students in class XI in different streams in the year 2018.

No of students in class XI in 2018			
Year	**Humanities**	**Commerce**	**Science**
2018	550	350	200

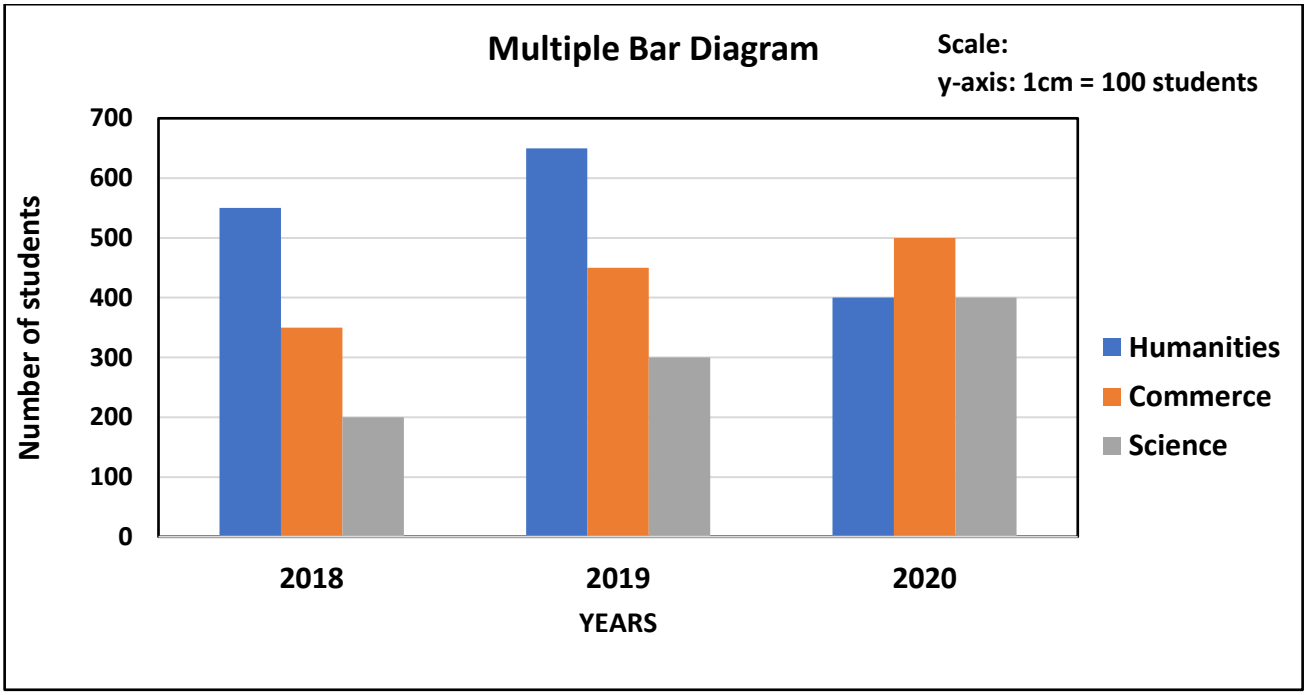


ii. Multiple Bar Diagram

It is a diagram depicting two or more characteristics in the form of adjacently placed bars of height proportional to the magnitude of the characteristics.

For example, a chart comparing the number of students in Humanities, Commerce and Sciences may be represented with 3 bars for each stream, drawn side by side (adjacent to each other) for each year.

Year	Humanities	Commerce	Science
2018	550	350	200
2019	650	450	300
2020	400	500	400



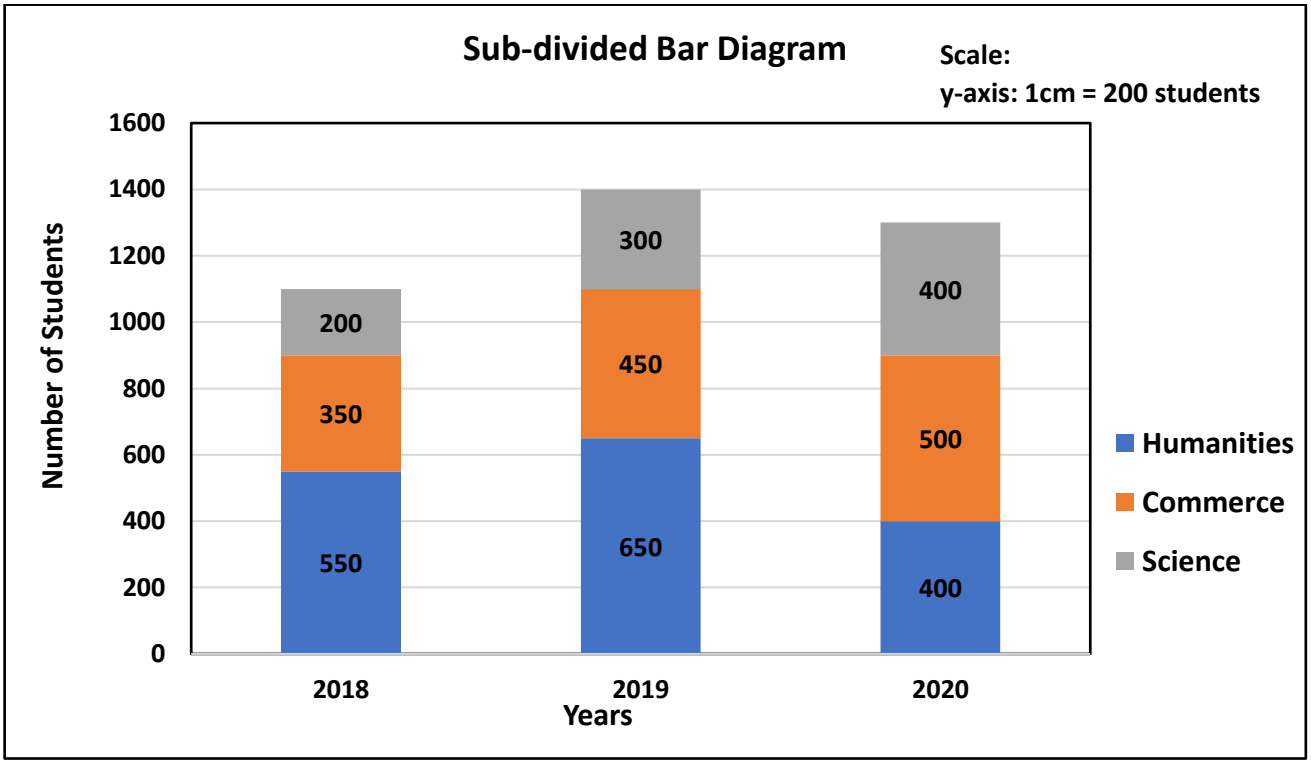
iii. Component Bar Diagram (or Sub-Divided Bar Diagram)

A component bar diagram shows the bar and its sub-divisions into two or more components.
Component bar diagrams *is also called* ***sub-divided bar diagrams***.
To construct a component bar diagram, first of all, a bar is constructed on the *x*-axis with its height

equivalent to the total value of the bar and the respective components are then marked. It can also be constructed by drawing each component one by one, each on top of the previous one in the given order.

For example: Draw a sub-divided bar diagram for the given data.

Year	Humanities	Commerce	Science	Total
2018	550	350	200	**1100**
2019	650	450	300	**1400**
2020	400	500	400	**1300**



iv. Percentage Bar Diagram

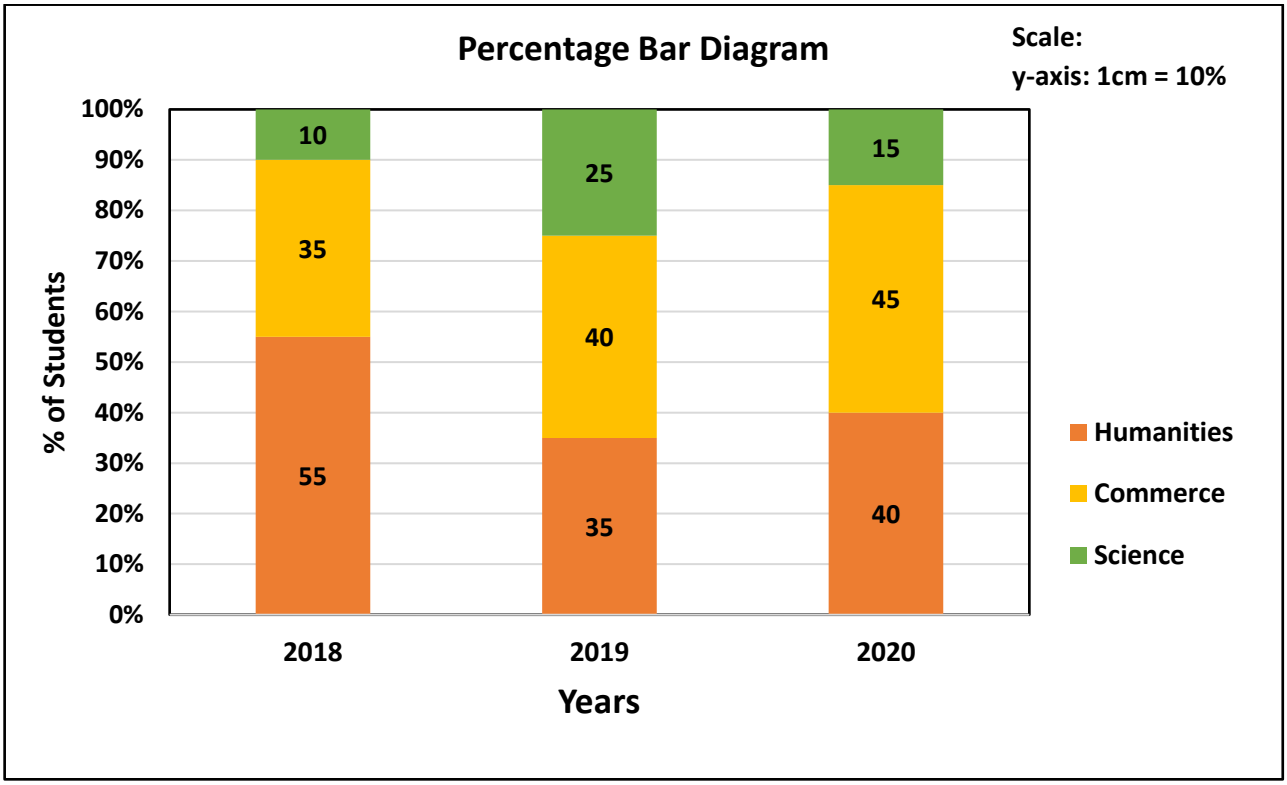
When the components are represented as percentages of the whole, it is known as a percentage bar diagram. The main feature of this component diagram is that all bars are of the same height since it represents 100%.

For example: Represent the following data using a percentage bar diagram.

Year	Humanities	Commerce	Science	Total
2018	550	350	100	**1000**
2019	700	800	500	**2000**
2020	800	900	300	**2000**

The first step, hence, is to calculate the component percentages and then plot the bar diagram with percentages on *y*-axis.

Year	Humanities (%)	Commerce (%)	Science (%)	Total (%)
2018	55	35	10	**100**
2019	35	40	25	**100**
2020	40	45	15	**100**



- **Pie Diagram or Pie Chart**

A pie diagram is also a component diagram, but it is a circle whose area is proportionally divided among the components it represents.

Steps in the construction of a pie diagram

Step 1: The value of each component is first expressed as a percentage of the total value of all the components:

$$\frac{\text{Value of the component}}{\text{Total value of all the components}} \times 100$$

Step 2: Conversion of percentages of components into angular components of the circle:

A circle in a pie chart, irrespective of its value of radius, is thought of having 100 equal parts of 3.6° (360°/100) each.

To find out the angle, which the component shall subtend at the centre of the circle, each percentage figure of every component is multiplied by 3.6°.

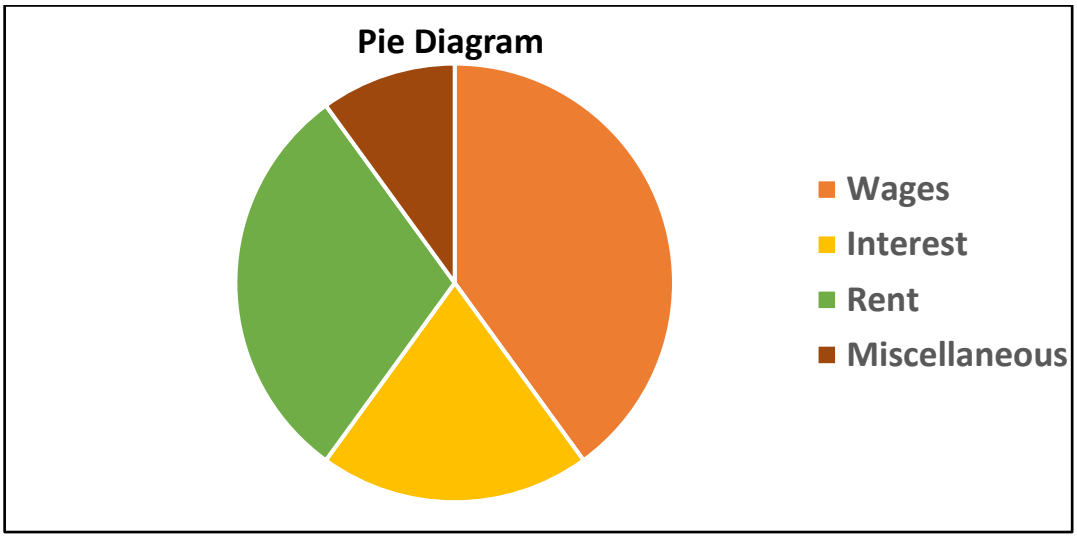
$$\text{Angular component of the circle} = \text{Percentage figure of the component} \times 3.6^\circ$$

Note: To find out the angle or degree of the component without using percentages :

$$\textbf{Degree of the component} = \frac{\textbf{Value of the component}}{\textbf{Total value of all the components}} \times 360^\circ$$

For example: Construct a pie chart for the following data.

Items	Cost	Percentage	Degrees
Wages	16000	40 %	144°
Interest	8000	20 %	72°
Rent	12000	30 %	108°
Miscellaneous	4000	10 %	36°
Total Cost	**40000**	**100 %**	**360°**



- **Frequency diagrams**

Data in the form of grouped frequency distributions are generally represented using graphs by frequency diagrams like histogram, frequency polygon, frequency curve and ogive.

Histogram

It is a graph of a frequency distribution consisting of rectangles in which the class intervals are plotted along the *x*-axis and their respective frequencies on the *y*-axis.

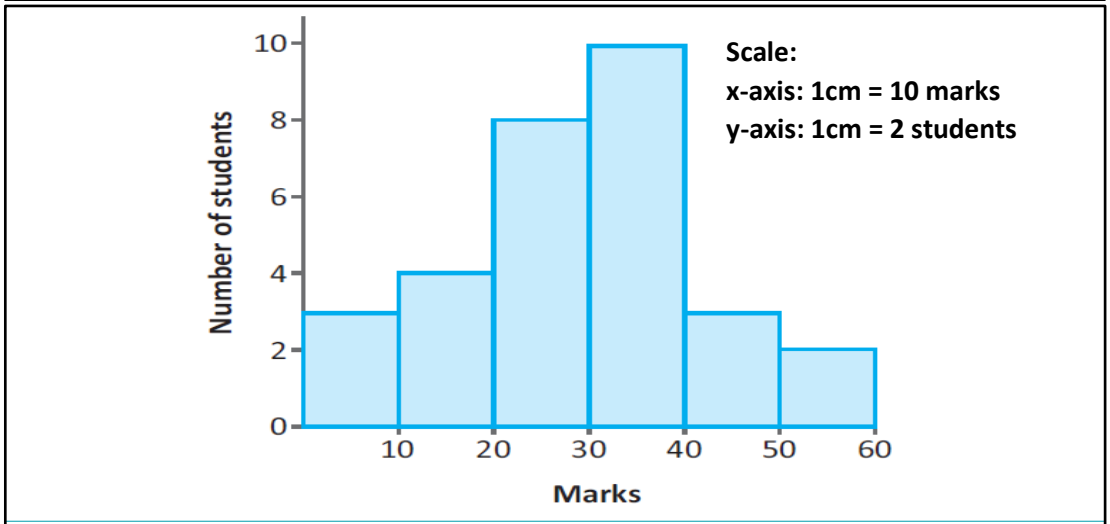
- *A histogram is a **two-dimensional diagram**.*
- *A histogram is never drawn for a discrete variable. It is drawn for continuous variables only.*

Case I: If the class intervals are of equal width

Since, for continuous variables, the lower-limit of a class interval fuses with the upper-limit of the previous interval, the rectangles are all adjacent and there is no space between two consecutive rectangles.

For example: Draw a histogram for marks obtained in statistics by 30 students of class XI.

Marks	No. of Students
0-10	3
10-20	4
20-30	8
30-40	10
40-50	3
50-60	2



Histogram for marks obtained in Statistics by 30 students of class XI

Obtaining Mode Graphically

- Graphically, mode is obtained by drawing a histogram. The rectangle with the greatest height will give the modal class.
- We join the top right point of the rectangle of the modal class with the top right point of the rectangle of the preceding class, and the top left point of the rectangle of the modal class with the top left point of the rectangle of the succeeding class.
- From the point of intersection of these lines, we draw a perpendicular on the *x*-axis intersecting the *x*-axis at a point, which gives the value of the mode.

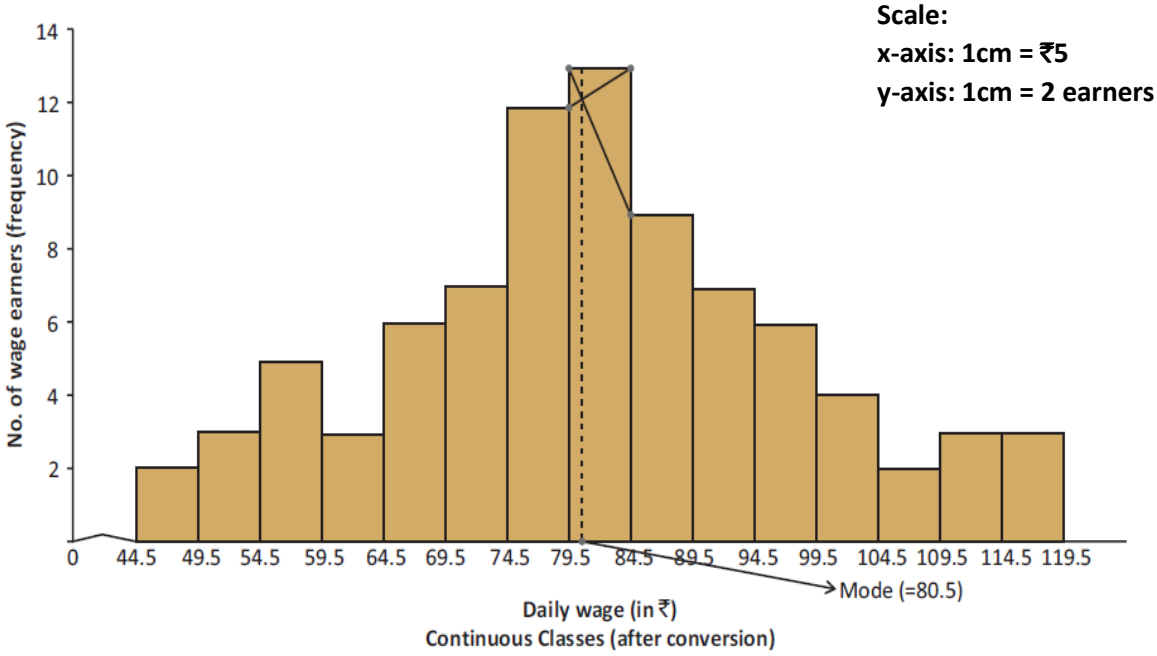
For example: Calculate the mode graphically for the given data.

Distribution of daily wage earners in a locality of a town

Daily earning (₹)	No. of wage earners (f)
45–49	2
50–54	3
55–59	5
60–64	3
65–69	6
70–74	7
75-79	12
80–84	13
85–89	9
90–94	7
95–99	6
100–104	4
105–109	2
110–114	3
115–119	3

Since the classes have gaps, they first need to be converted to exclusive series for continuity.

Daily earning (₹)	No. of wage earners (f)
44.5–49.5	2
49.5–54.5	3
54.5–59.5	5
59.5–64.5	3
64.5–69.5	6
69.5–74.5	7
74.5-79.5	12
79.5–84.5	13
84.5–89.5	9
89.5–94.5	7
94.5–99.5	6
99.5–104.5	4
104.5–109.5	2
109.5–114.5	3
114.5–119.5	3



Histogram for the distribution of 85 daily wage earners in a locality of a town.

Modal Daily Wage = ₹80.50

Case II: If the class intervals are of unequal/varying width

When classes vary in their width, the frequencies are to be adjusted to yield comparable measurements. The answer in such a situation is to divide the actual frequency by the **adjustment factor** to get the adjusted frequency. The histogram is then drawn using the adjusted frequency.

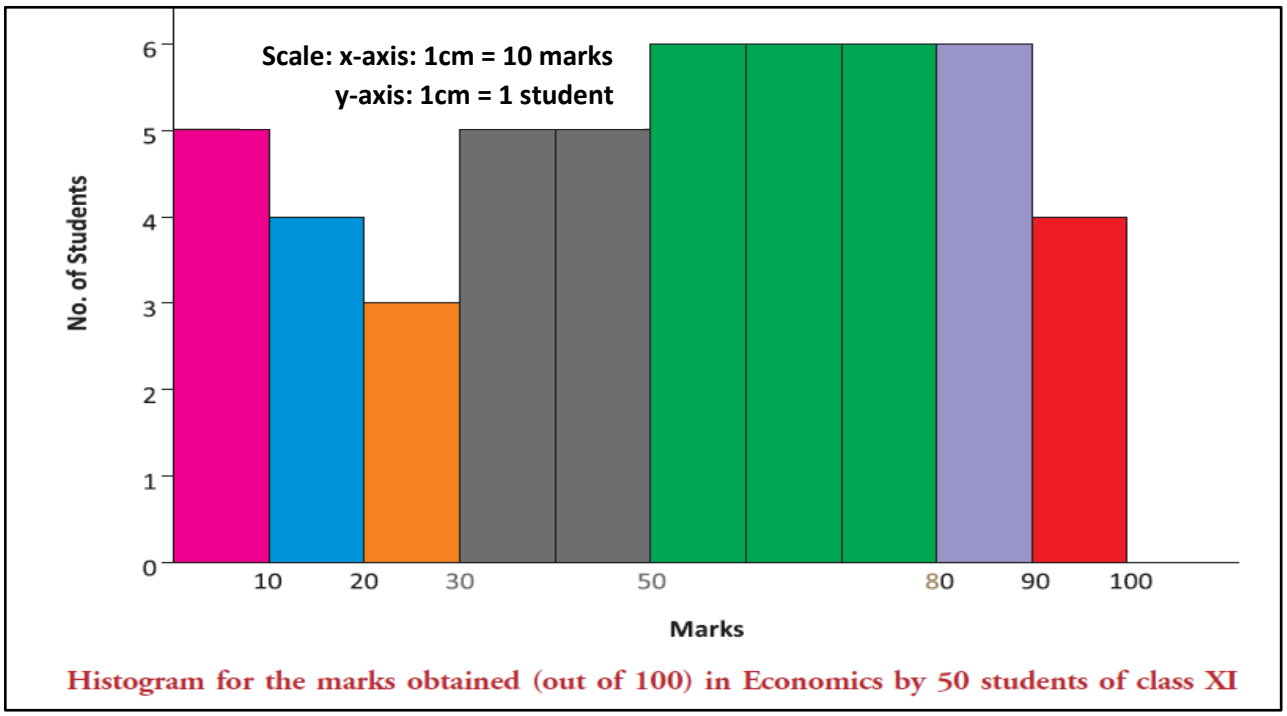
$$\text{Adjustment factor (A)} = \frac{\text{Width of the class}}{\text{Width of smallest class}}$$

For example: Draw a histogram for the following data.

Marks obtained (out of 100) in Economics by 50 students of class XI

Marks	No. of Students
0-10	5
10-20	4
20-30	3
30-50	10
50-80	18
80-90	6
90-100	4

Marks	No. of Students (F)	Adjusted Frequency = F/A
0-10	5	5
10-20	4	4
20-30	3	3
30-50	10	10 ÷ 2 = 5
50-80	18	18 ÷ 3 = 6
80-90	6	6
90-100	4	4



Histogram for the marks obtained (out of 100) in Economics by 50 students of class XI

Difference between Bar Diagram and Histogram

Bar Diagram	Histogram
A bar diagram is **one dimensional**. It is only the height (or length) of the bar and not the width of the bar that matters.	A histogram is **two-dimensional**, i.e., the width of the class and class frequency both are taken into consideration. The width in a histogram is as important as its height.
Bar diagram has equi-spaced and equi-width bars.	In Histogram, no space is left between two rectangles. In case of unequal classes, width of the rectangles may differ.
Bar diagram can be drawn both for discrete and continuous variables.	Histogram is drawn only for a continuous variable.

Frequency Polygon

A frequency polygon is a plane closed figure bounded by straight lines used for depicting frequency data.

Case I: Frequency polygon derived from histogram itself

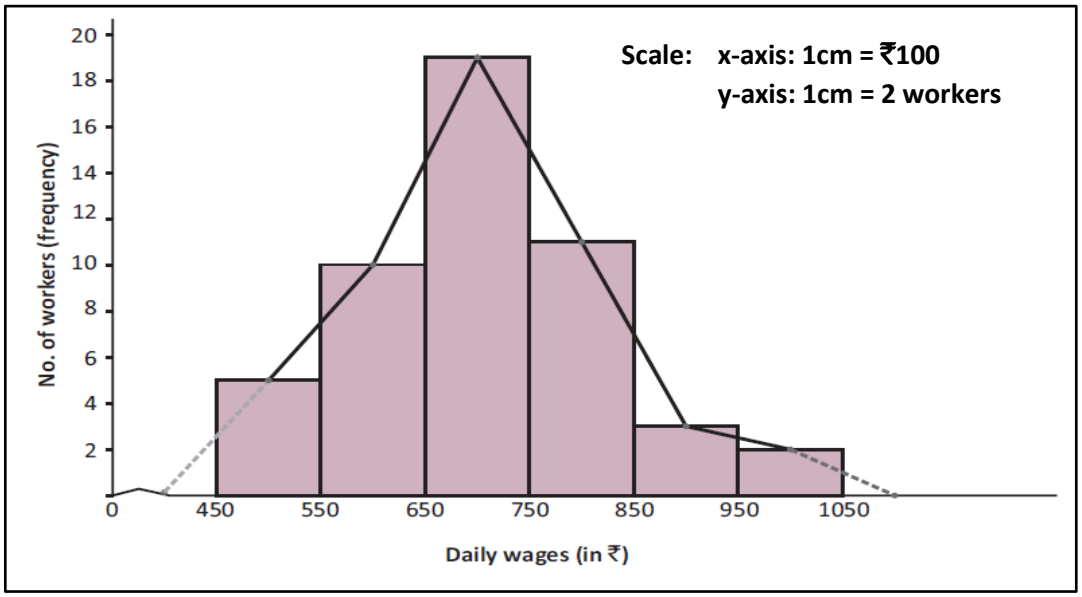
The simplest method of drawing a frequency polygon is to join the midpoints of the topside of the consecutive rectangles of the histogram using straight lines.

The figure so obtained is closed by joining the two endpoints to the base line at the mid-values of the two extreme classes (on both sides) with zero frequency.

For example: Draw a histogram and frequency polygon for the given data.

Distribution of daily wages obtained by 50 workers in a factory

Daily Wages	No. of Workers
450-550	5
550-650	10
650-750	19
750-850	11
850-950	3
950-1050	2
Total	50



Case 2: Frequency Polygon without drawing a histogram

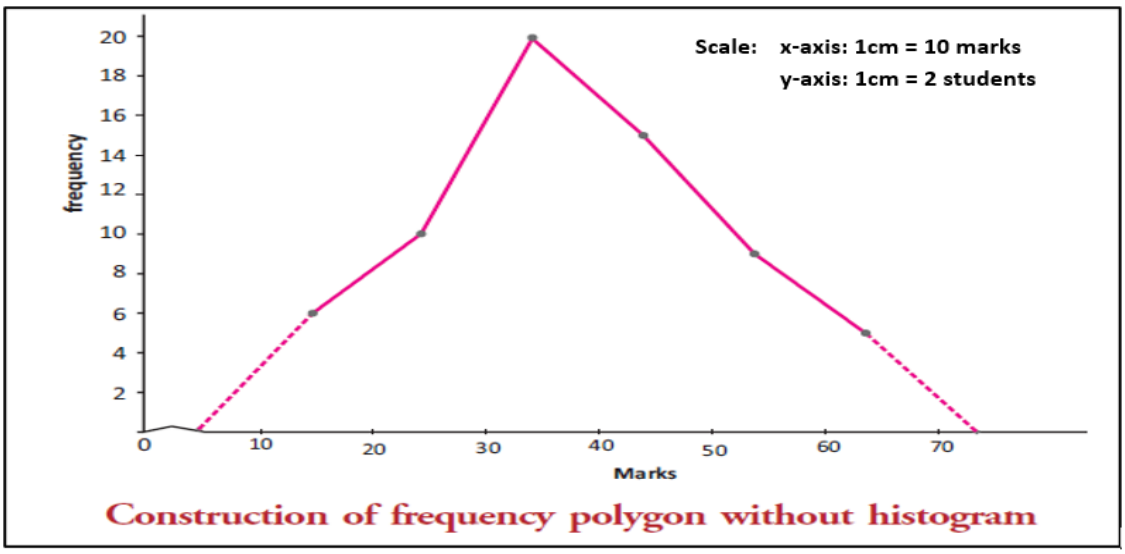
Class-marks or class midpoints can be used along the *x*-axis. Frequencies are plotted against the mid-points of class intervals.

For example: Draw a frequency polygon for the given data.

Marks	No. of Students
10-19	6
20-29	10
30-39	20
40-49	15
50-59	9
60-69	5

Solution: The classes are not continuous. However, they need not be converted into continuous classes since mid-points will remain the same.

Marks	Mid-points	No. of Students
10-19	14.5	6
20-29	24.5	10
30-39	34.5	20
40-49	44.5	15
50-59	54.5	9
60-69	64.5	5



Frequency Curve

It is obtained by drawing a smooth free-hand curve passing through the points of the frequency polygon as closely as possible.

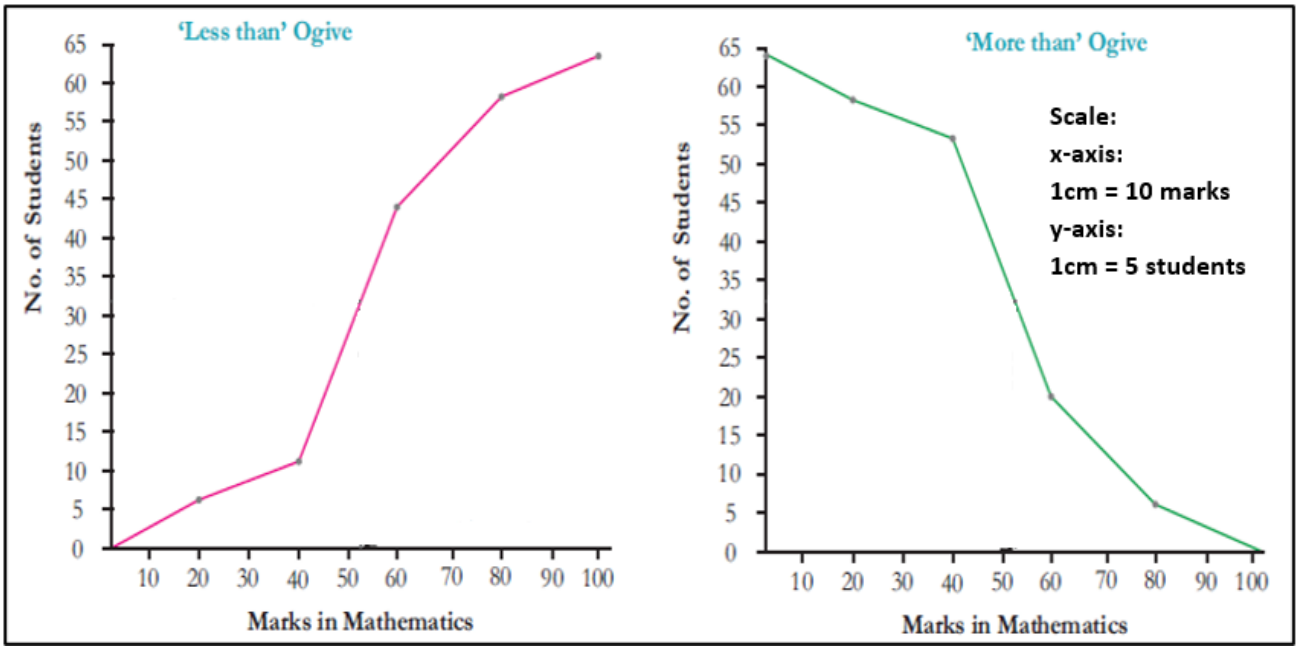
Ogive (or Cumulative Frequency Curve)

A cumulative frequency curve or ogive is obtained by plotting the cumulative frequencies along the *y*-axis and the class limits along the *x*-axis in a cumulative frequency distribution. As there are two types of cumulative frequencies — ***'less than'*** type and ***'more than'*** type, accordingly there are two ogives for any grouped frequency distribution data.

- For **'less than'** ogive, cumulative frequencies are plotted against the upper limits of the class intervals.
- For **'more than'** ogive, cumulative frequencies are plotted against the lower limits of the class interval.

Example: **Frequency distribution of marks obtained in mathematics**

Frequency distribution		Less than cumulative frequency		More than cumulative frequency	
Marks	Number of students	Marks	'Less than' cumulative frequency	Marks	'More than' cumulative frequency
0-20	6	Less than 20	6	More than 0	64
20-40	5	Less than 40	11	More than 20	58
40-60	33	Less than 60	44	More than 40	53
60-80	14	Less than 80	58	More than 60	20
80-100	6	Less than 100	64	More than 80	6
Total	64				



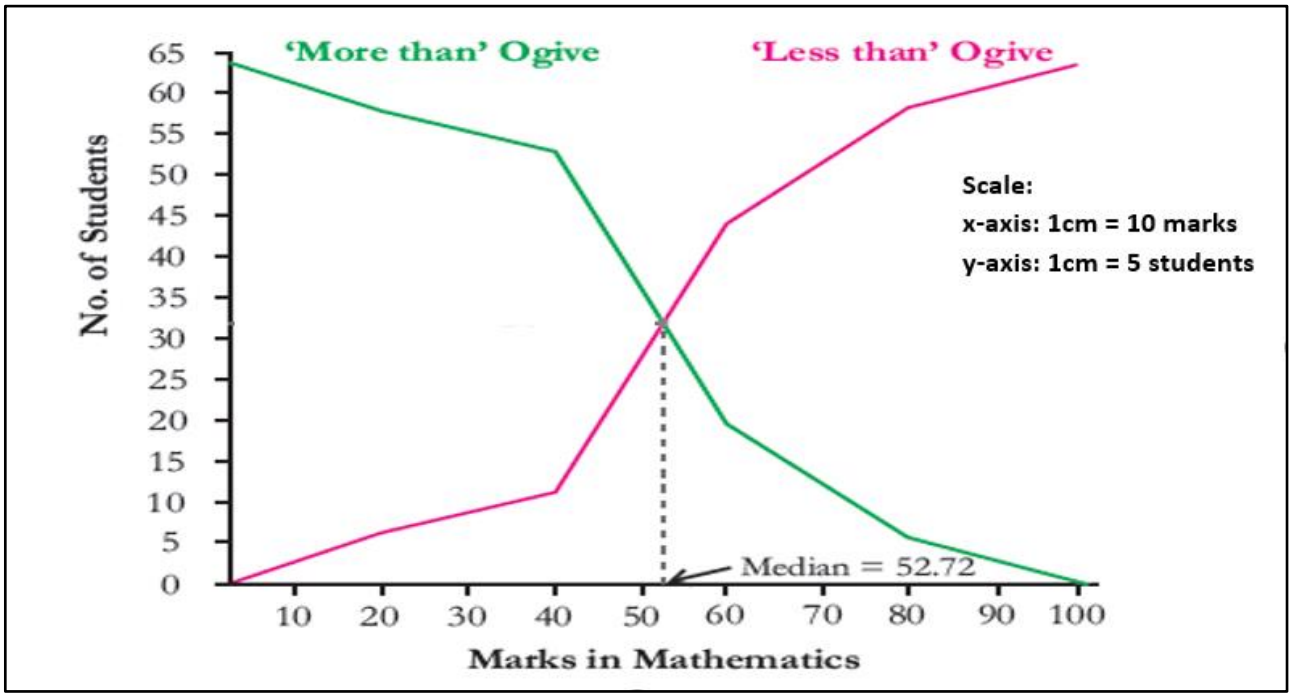
NOTE: 'Less than' ogive is never decreasing and 'More than' ogive is never increasing.

Obtaining Median Graphically

Median can be obtained graphically using ogives.

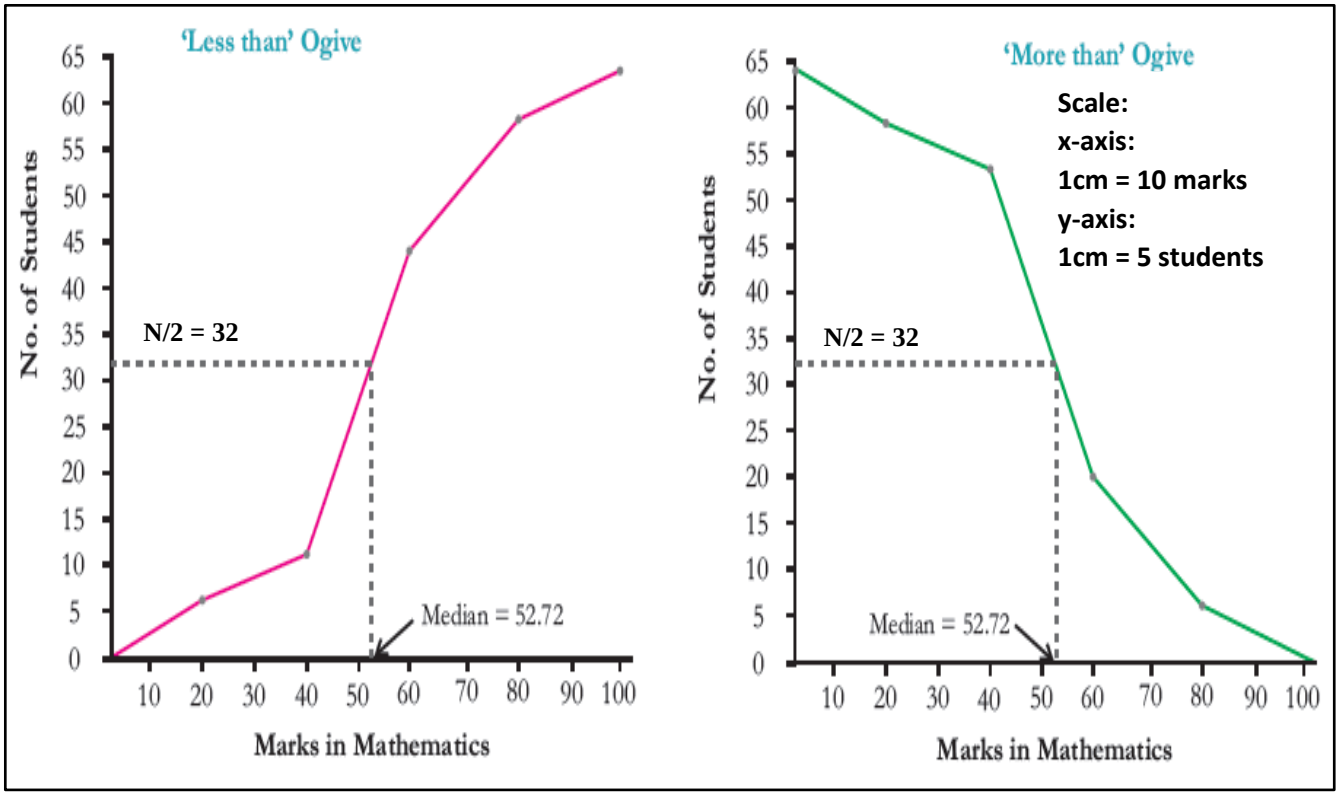
Case1: Obtaining median from less-than and more-than ogives

From the point of intersection of the two ogives, draw a line perpendicular to the *x*-axis. The point where the perpendicular line meets the *x*-axis, is the **median**.



Case2: Obtaining median from either 'less than' or 'more than' ogive

- Locate N/2 on the *y*-axis *(where N = Sum total of all frequencies)* and from this point draw a line parallel to the *x*-axis to intersect the ogive.
- From this point, draw a perpendicular line on the *x*-axis. The point where the perpendicular line meets the *x*-axis, is the **median**.



Arithmetic Line Graph

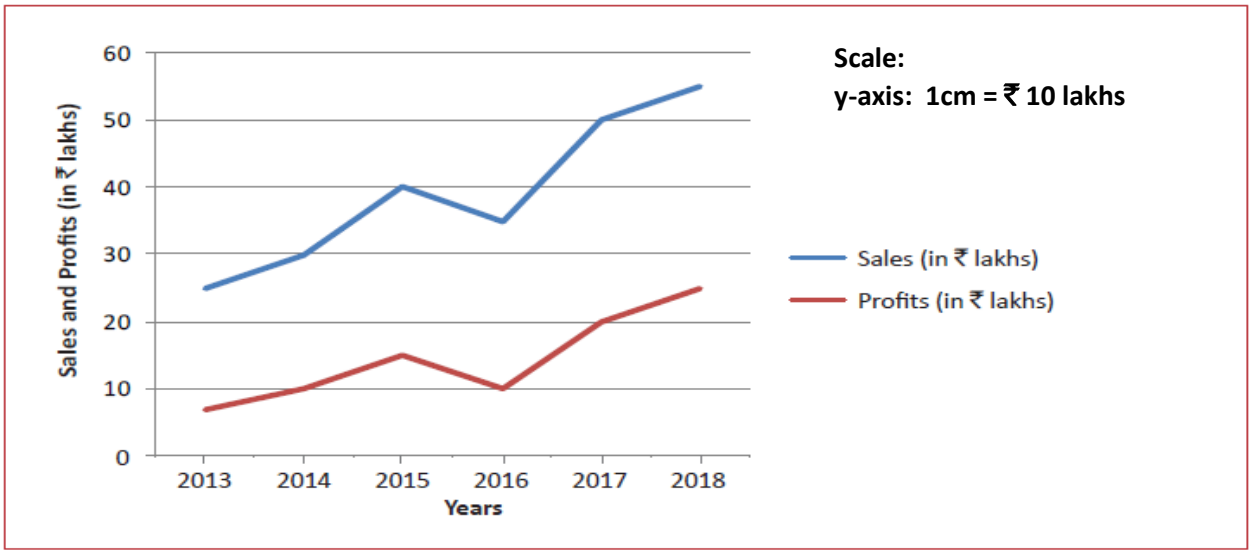
An arithmetic line graph is also called **time series graph**. In this graph, time (hour, day/date, week, month, year, etc.) is plotted along *x*-axis and the value of the variable (time series data) along *y*-axis. A line graph by joining these plotted points, thus, obtained is called ***arithmetic line graph*** (time series graph). It helps in understanding ***the long-term trend, periodicity***, ***cyclicity*** etc., in a long-term time series data.

For example:

Prepare Arithmetic line graph of the following data on sales and profits of a company X.

Year	2013	2014	2015	2016	2017	2018
Sales (₹ lakhs)	25	30	40	35	50	55
Profits (₹ lakhs)	7	10	15	10	20	25

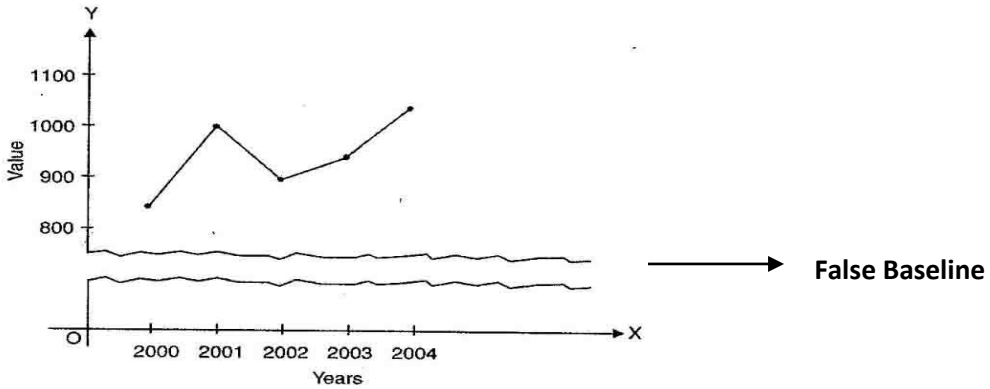
To prepare Arithmetic line graph (Time series graph), we take Year on the X-axis and Sales and Profits (in ₹ lakhs) on the Y-axis.



Arithmetic line graph on sales and profits of a company X

False Baseline

A **false base line** is used when figures in a series on the *y*-axis start with very high values or the difference between the zero and the smallest value on the *y*-axis is very large.
It is used to break the continuity of *y*-axis with the origin. For example:



Advantages of Diagrammatic Data Presentation

- **Attractive and impressive** – Diagrams and graphs are always attractive and impressive and many newspapers and magazines use them frequently to explain certain facts or phenomena.
- **Simplified presentation** – Large volumes of complex data can be presented in a simplified manner using diagrams which makes it easier for a common man to understand the data.
- **Facilitates comparisons** – Diagrammatic presentation helps in comparison of data and analysing the relationships between variables.

Limitations of Diagrammatic Presentation

- **Diagrams and graphs do not depict perfectly accurate data.** They are usually based on approximations. So, these are suitable for general guidance and not for taking particular decisions.
- **Diagrams can provide misleading results if not correctly drawn.**

Recap

- *Data (even voluminous data) speak meaningfully through presentation.*
- *For small data (quantity) textual presentation serves the purpose better.*
- *Tabulated data can be presented through diagrams which enable quicker comprehension of the facts presented otherwise.*
- *For large quantity of data tabular presentation helps in accommodating any volume of data for one or more variables.*

Click on the following links for further explanations of the topics discussed above:

https://www.youtube.com/watch?v=Xr0BgvtXWwA(Tabulation of Data and Parts of a Table)
https://www.youtube.com/watch?v=g0qmf4z766w (Presentation of data)

Summary