can be further illustrated by the fact that data is the basis of an argument. In fact, data is the starting point for most arguments.

However, data if not properly managed is not of much use. People at the higher echelons of any organization will have no time to go through the details of all the reports. The need for organized data becomes more pertinent because data can be used to describe a current situation with respect to its future possibility. Data can establish a relationship between different phenomenon like expenditure government in the various sectors of its annual budget vis-a-vis the priority sectors; The per capita income of different countries in relation to the number of deaths due to a particular disease.

Different Ways of Representing Data

Data representation in the DI section is primarily of two types:

Narration Based

Also known as caselets, these questions often involve stories that define a situation and give details of various parameters involved; including their inter-relationships.

E.g., Mittal has recently acquired four companies, viz., Bank of Bozoland (BOB), My Own Bank (MOB), Zany Obliterated Bank (ZOB) and Dogmatically Obscure Bank (DOB). He noticed that the sales of DOB are half than that of BOB, whereas, the profits of DOB are double than that of BOB. The expenses of ZOB are Rs 3 crores less than that of DOB, whereas, the profits of MOB is Rs 1 crore less than that of ZOB. The expenses of BOB are three times than that of DOB. It is also known that the sales of ZOB are Rs 15 crore or one-fourth of MOB's sales. All the figures are for 1992–93. An insider further informs Mittal that the sales of DOB are Rs 10 crores more than that of ZOB and the expenses of BOB are 90% of its own sales. Sales – Expenses = Profit

Q. The total sales of all the four companies is (Rs crores):
(a) 200 (b) 150
(c) 125 (d) 160

Pictorial

This is the most common form of data representation. In such problems, data is presented in various pictorial forms such as line graphs, bar diagrams, line charts etc.

The important point to remember pertaining to all these questions is the fact that each and every question asked in the CAT is based on some logic and reasoning meant to check your aptitude. Few questions that involve numbers may also require a basic level of calculation skills.

Let us see the various pictorial representation of data:

Table

Tabular method is the most fundamental way of representing data. In fact, most of the different kinds of data presentation formats like the bar charts, line charts etc. originate from the table. In other words, presenting the data in a tabular format is the first step in forming other types of data presentation formats.

E.g., the table given below shows the break-up of the percentage of people of different age groups frequenting bars in 4 different metro cities viz., Delhi, Hyderabad, Bangalore and Patna in the year 2002.

Cities	Percentage break-up for age groups (Years) in 2006						
	Up to 15	15-20	20-25	25-30	30-35	35-40	Above 40
Delhi	8	13	24	21	11	17	6
Hyderabad	3	8	35	23	10	16	5
Bangalore	4	21	27	11	8	14	15
Patna	1	7	43	32	9	5	3

The tabular format is considered to be the most versatile data presentation method. All data which can be expressed in any other format can also be expressed in the format of a table. On the other hand, it is quite possible that data that can be presented in a tabular format, cannot be presented in any other format like the pie chart etc.

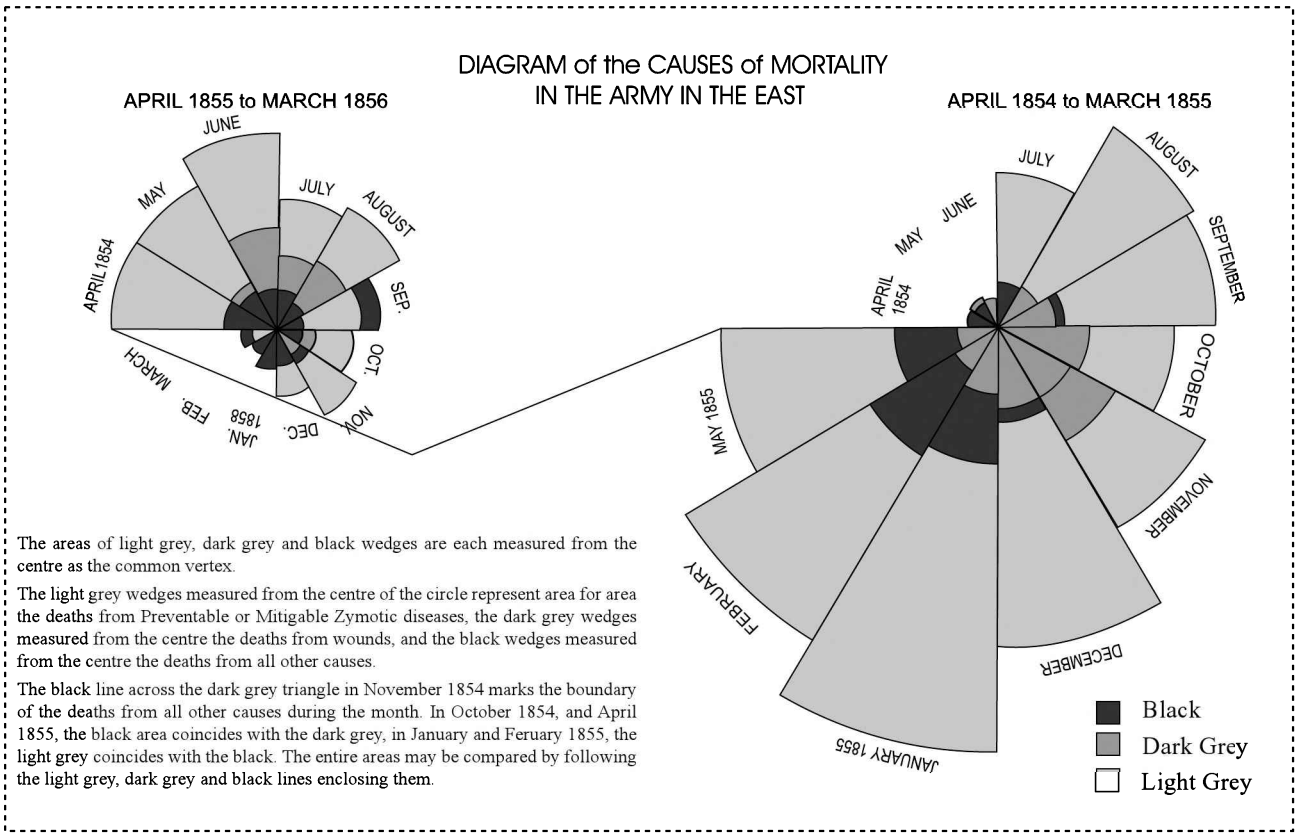
Pie Chart

Pie charts are a typical type of data representation where data is represented as a part of a circle. The circle represents the total value (or 100%), and the different parts represent certain proportions (or percentage) of the total. In a pie chart, the arc length of each sector (and in turn its central angle and area), is proportional to the part it represents.

The origin of the pie chart is traced back to Florence Nightingale in 1858. This was the year when she presented a paper on the causes of deaths in her army in the eastern part of the world.

Following is the pie chart originally developed by Florence Nightingale in the year 1858. (Actually called by her as the 'Polar Area Diagram'.)

The below graphic gives the number of deaths that occured from diseases that could have been prevented (in light grey), those that were the results of wounds (in dark grey) and those due to other causes (in black).



The areas of light grey, dark grey and black wedges are each measured from the centre as the common vertex.

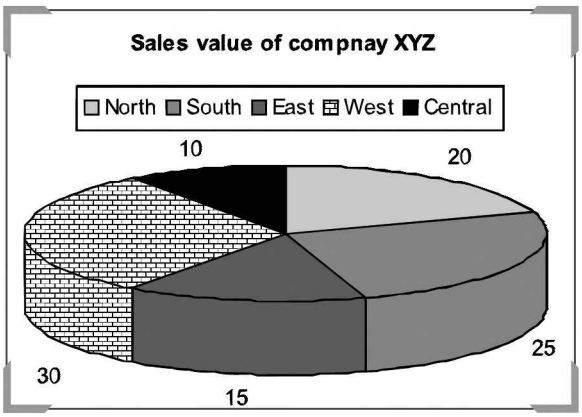
The light grey wedges measured from the centre of the circle represent area for area the deaths from Preventable or Mitigable Zymotic diseases, the dark grey wedges measured from the centre the deaths from wounds, and the black wedges measured from the centre the deaths from all other causes.

The black line across the dark grey triangle in November 1854 marks the boundary of the deaths from all other causes during the month. In October 1854, and April 1855, the black area coincides with the dark grey, in January and Feruary 1855, the light grey coincides with the black. The entire areas may be compared by following the light grey, dark grey and black lines enclosing them.

There are two approaches constructing a pie chart from any given data:

(A) Degree Approach:
The central angle in a circle represents 360°, so any part or segment in a pie chart is calculated as a proportion of 360°.

(B) Percentage Approach:
In this case, any part or segment in a pie chart is calculated as a part of 100%.



If we convert the same pie chart into the degree format, we will be required to do the following conversions:

Total	=	100%	=	360°
Hence 1%			=	3.6°
Central	=	10%	=	36°
North	=	20%	=	72°
South	=	25%	=	90°
East	=	15%	=	54°
West	=	30%	=	108°

Limitations of Pie Charts

Despite the pie chart being one of the most important ways to represent data, it is marred by limitations of its own:

- Pie charts can be used only when the sum of all categories is given, for example if the categories represent proportions or percentage of a total.
- A single pie chart can represent only one continuous variable.

Significance of Pie Charts

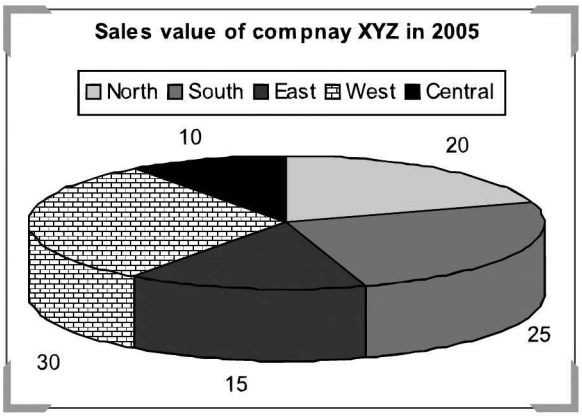
The pie chart has gained prominence due to the following reasons:

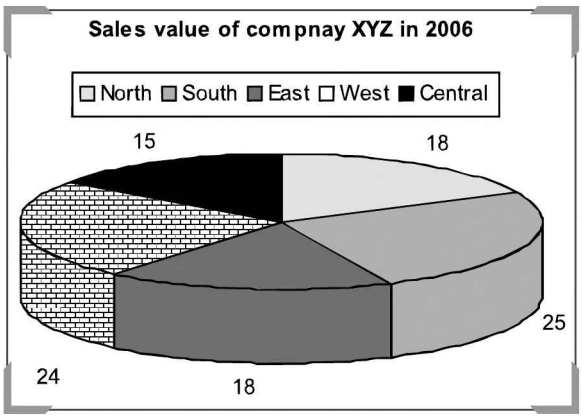
- In a pie chart, we get a clear picture of the contribution of different sectors to the build up of the total. E.g., presentation of budgets.

- Comparing two pie charts is easier than comparing two bar charts or any other format of data representation.

Example 1

Let us see the following data:





Sales value in 2005 = Rs 180 crores

Sales value in 2006 = Rs 204 crores

What is the percentage increase in the sales value of the East zone?

Solution

There are two percentage increases (A) The total sales value of company XYZ is increasing. (B) The percentage contribution of the East zone is increasing.

Percentage increase in The total sales value of the company XYZ = 30%

Percentage increase in the percentage contribution of the East zone = 20%

Hence, the net percentage increase = 56%

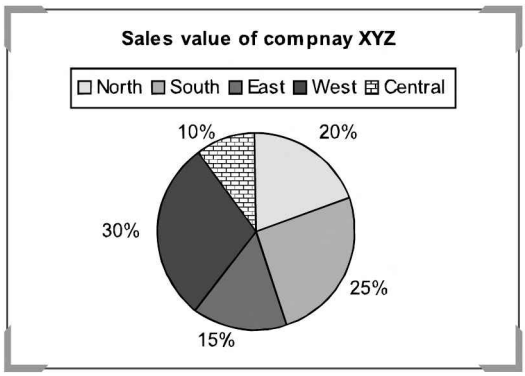
(Successive increase of 20% and 30%)

Types of Pie Charts

There are two types of pie charts:

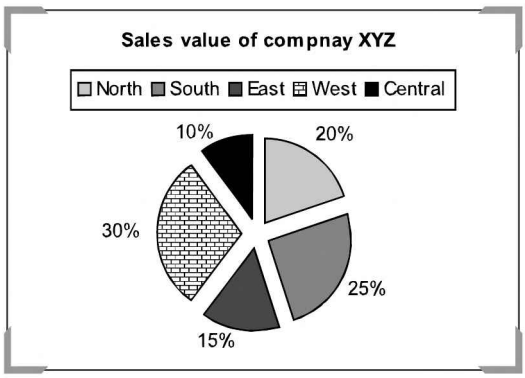
(A) Normal Pie Chart

This displays the contribution of each component of the pie.



(B) Exploded Pie Chart

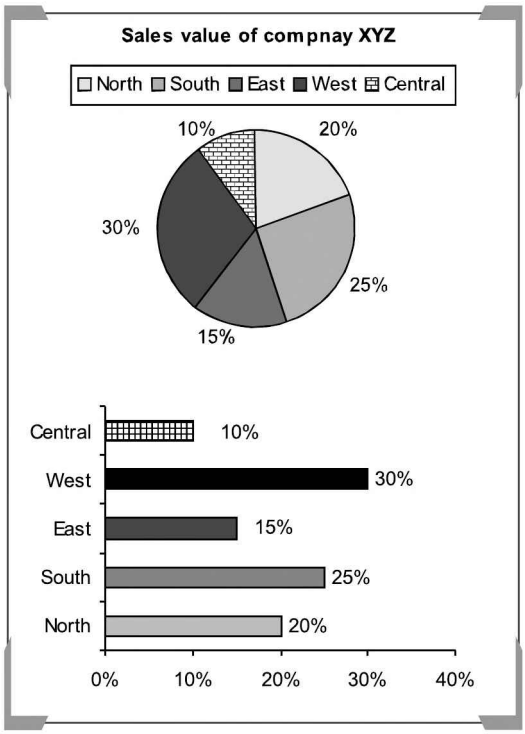
This pie chart has all the characteristics of a normal pie chart, the only addition is that the contribution of individual segments is highlighted.



Bar Chart/Bar Graph

The bar chart, in comparison to the pie chart is more versatile in representing data. It has been proven that representation using lengths as in the case of bar charts is a better indicator of data vis-a-vis pie charts wherein data is categorized in terms of areas.

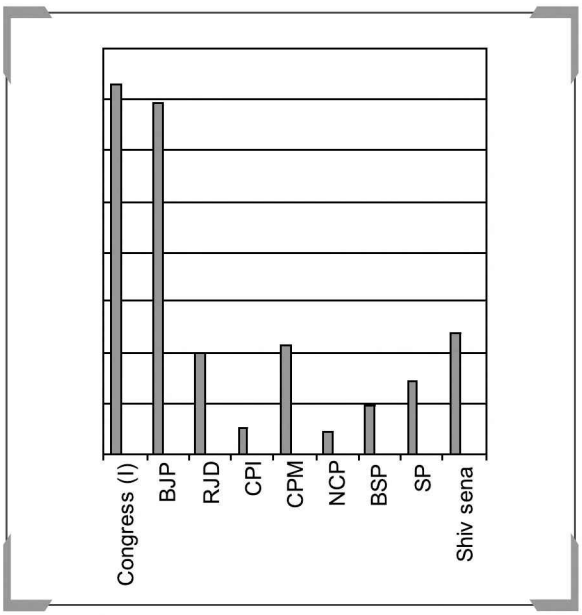
on



In the above diagram, the same data has been represented length-wise in the bar chart and area-wise in the pie chart. Obviously, it is easier to see the contribution of the various segments in the bar chart than in the pie chart.

A therefore, is a chart with rectangular bars of lengths proportional to the values which they represent. Usually, the terms 'bar chart' and 'bar graph' are used interchangeably. It should also be noted that in a bar chart, what matters is the length of the bar and not the width of the bar.

The following bar chart represents the number of seats won by different parties in the last general election.

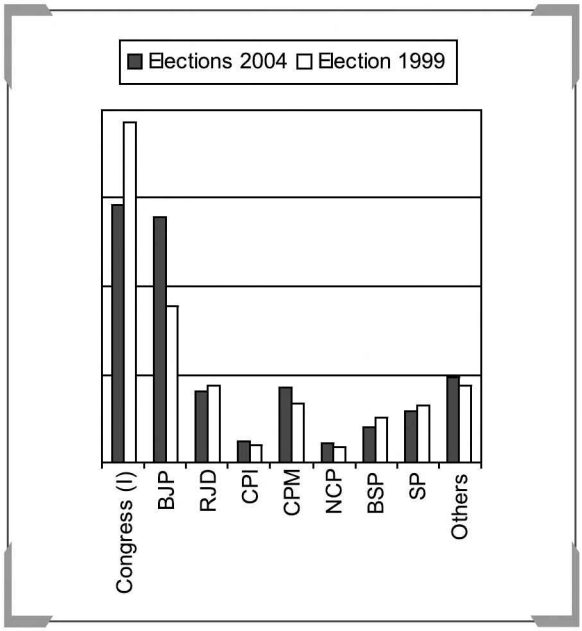


Significance of Bar Charts

Following are the major specialities of bar charts:

Unlike the pie chart, a single bar chart can be used to compare two, or more than two continuous variables.

The following bar chart represents the number of seats won by different parties in two general elections:



Since the length parameter is easier to study than the area parameter, a bar chart gives a quick understanding of the various ranks. Hence the time taken to understand the data becomes condiserably lower in a bar chart as compared to other formats of data presentation.

Types of Bar Charts

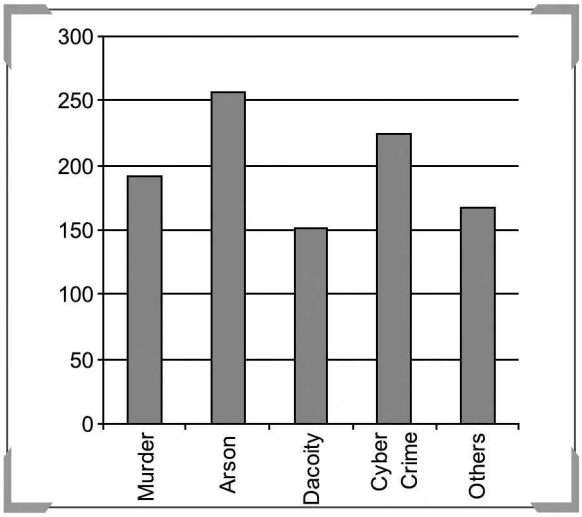
There are three types of bar charts:

(A) Normal Bar Chart

This is a simple bar chart with the values of different segments represented in the form of bars,which could be either horizontal, vertical or both.

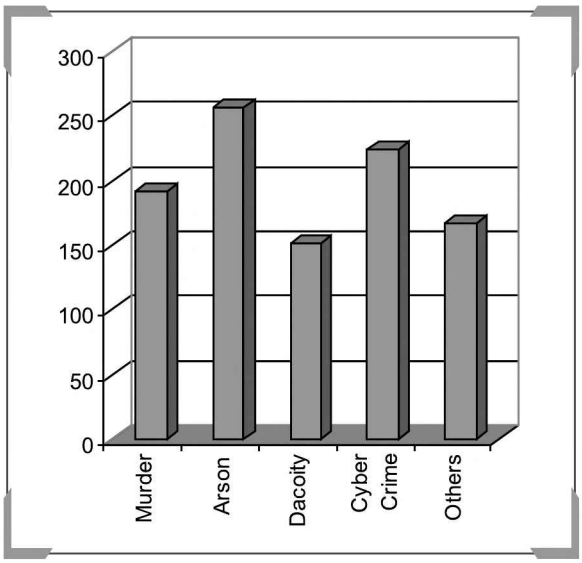
The following bar chart represents the crime cases reported in Delhi in 2007:

Bar Chart with Vertical Bars



Bar Chart with Horizontal Bars

Bar Charts with 3–D Effects



(B) Stacked Bar Chart Value-wise

When the same variable is to be represented on more than one parameters like; year etc., then we can have a stacked bar chart.

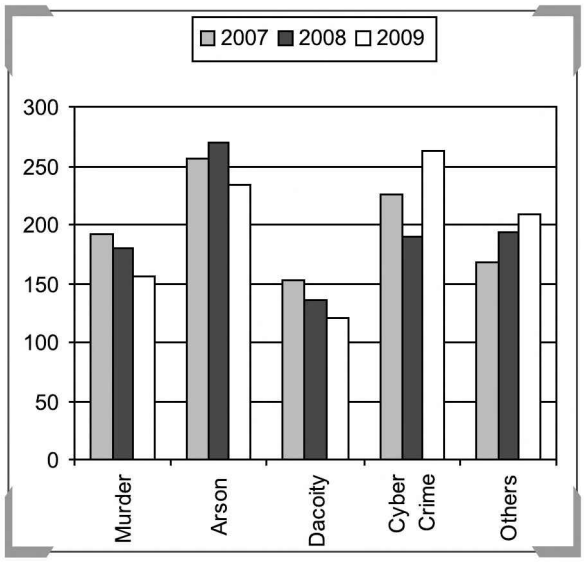
(C) Stacked Bar Chart Percentage-wise

The only difference between value-wise and percentage-wise bar charts is that in the former we apply values to stack the bars and in the latter we apply percentages.

Stacked Bar Charts are also known as Cumulative Bar Charts.

Here, we will see the same data in a normal bar chart, value-wise stacked bar chart and stacked bar chart percentage-wise

Normal Bar Chart



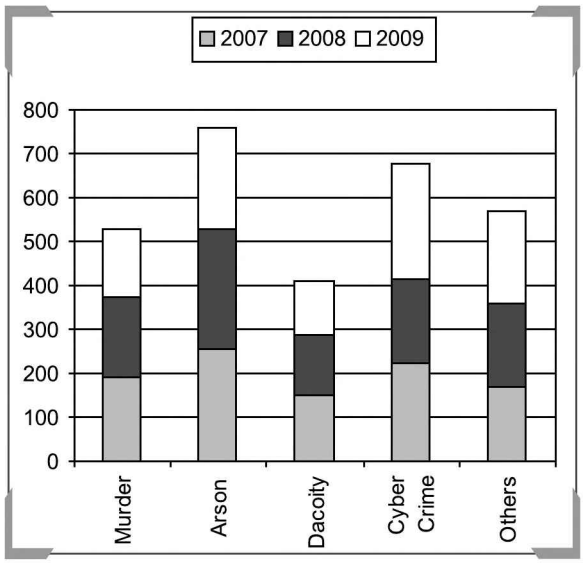
Following things can be observed in the above bar chart:

Bars representing different crimes in different years are proportional to the crimes reported.

The above bar chart takes the minimum value as 100, however the same bar chart could take the minimum value as 0 or 50 or anything else as well. The question here is, what will happen if we take the minimum value as 150?

Since some of the values are less than 150, what will happen to those? Find out yourself without using a computer.

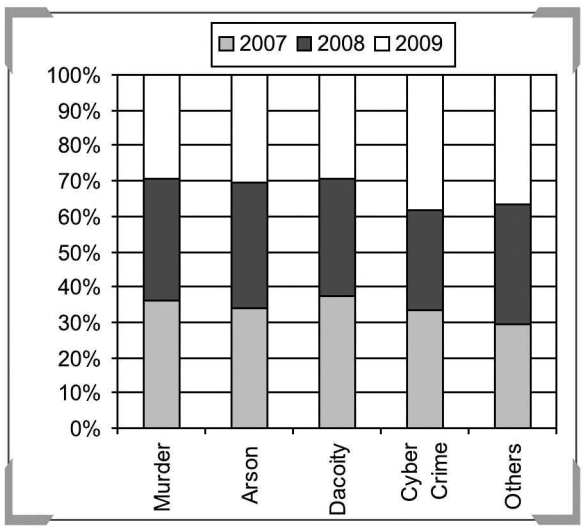
Stacked Bar Chart Value-wise



Following things can be observed in the above stacked bar chart:

- The total number of murders have been added up in one bar and the different years are shown as a part of that total.
- The same data could also have been represented by taking the sum of all the crimes reported in a particular year as a total, and the individual crimes as a part of that total.

Stacked Bar Chart Percentage-wise



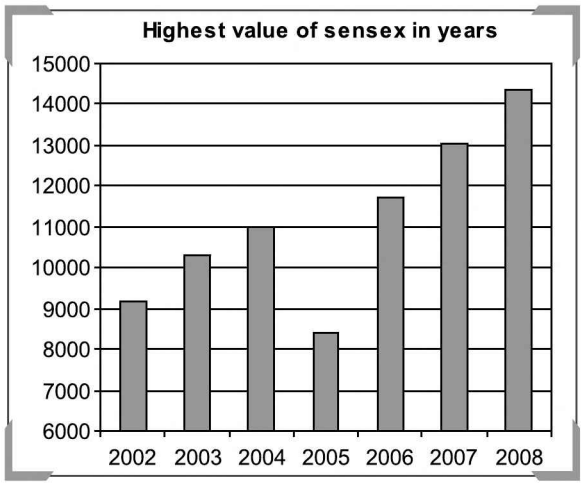
Following things can be observed in the above stacked bar chart:

- The total number of murders have been added up and they equal to 100%; and the murders reported in different years have been taken as a percentage of that total.
- The same data could have been represented by taking the sum of all the crimes reported in a particular year as a total, and the individual crimes as a part of that total.

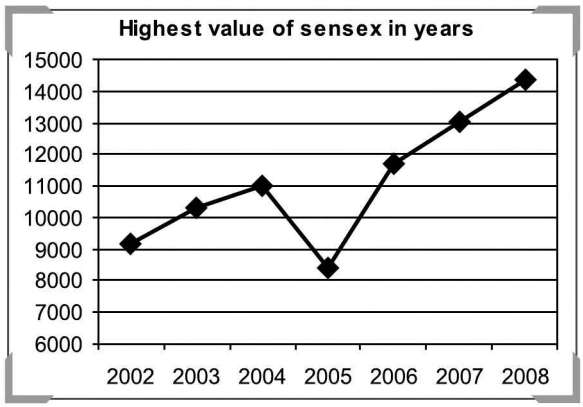
Line Chart/X–Y Chart

Line charts are seen as simplified forms of the normal bar chart.

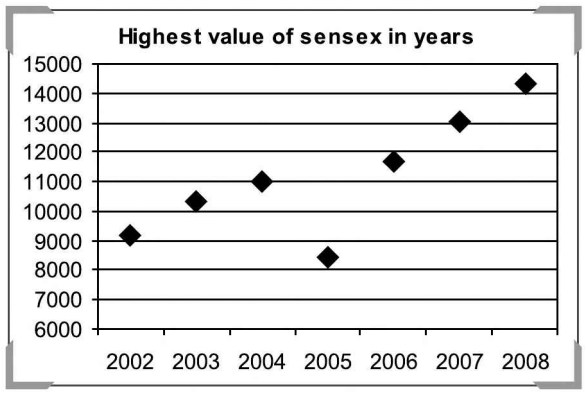
The bar chart given below represents the highest values of the sensex in the given years.



If we convert the same data into a line chart, it will look like this:



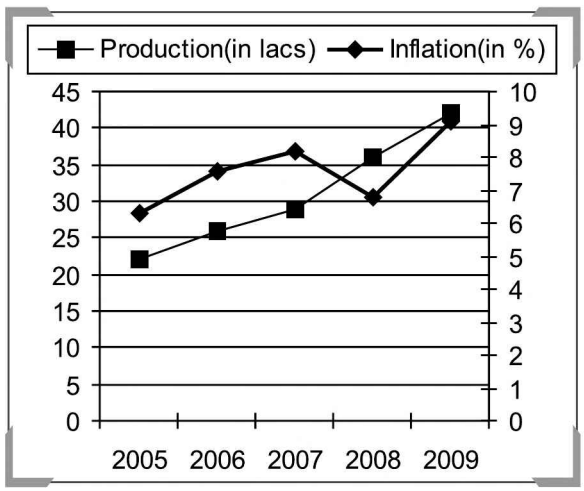
Sometimes in case of line charts, the lines are not given and only the dots are indicated in the graph. Let us see an example with the same data:



Significance of Line charts

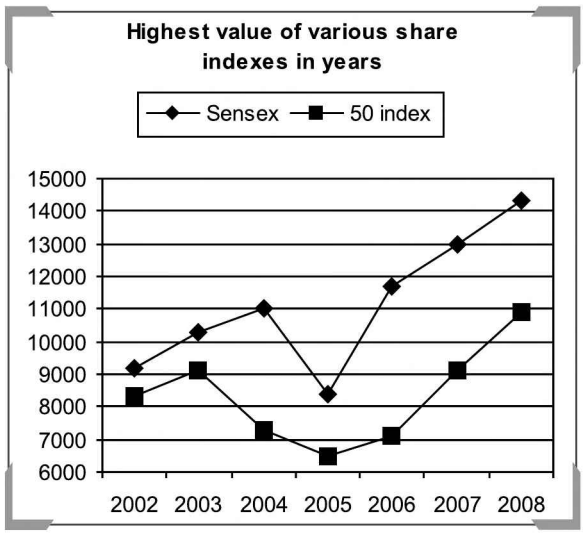
- Generally Line charts are used in case time is one of the variables in the data. The 'time' variable can be in the form of hour, day, months years or anything that represents chronological order of events.
- It is easier to calculate the percentage changes in a line chart and thereby understand the trends of the data in a better way.
- A line chart becomes very handy in case of data with two different scales.

The line chart given below represents the production of soaps by a company over a period of five years and the inflation for the same period.

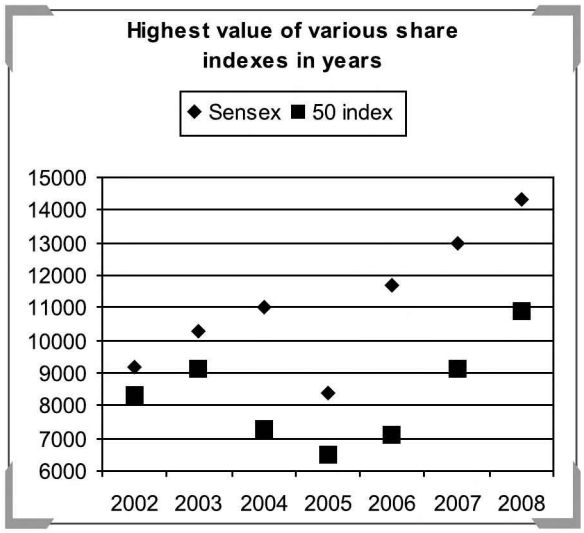


- Two or more than two variables can be represented on a line chart very easily. Besides, we can see the movement of data very easily in case of a line chart.

Below given line chart represents the movements of the highest value of two indices over a given period:



The same data can be represented using dots only also:



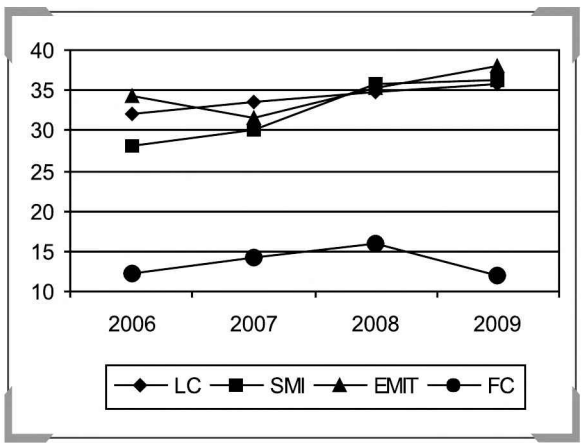
Types of Line Charts

Broadly, line charts are of three types:

Normal Line Chart

This is a simple line chart representing two or more than two variables.

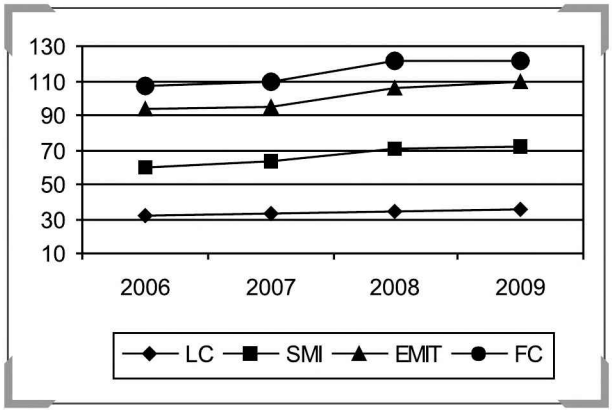
In the chart given below, The total number of enrolments for four different years of for four coaching institutes are represented:



Stacked Line Chart

In a stacked line chart, the values keep on getting added to obtain the next value.

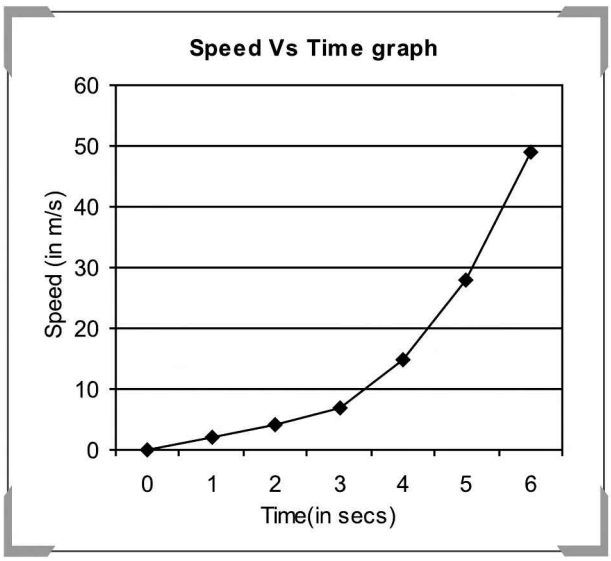
Here, the bottom line (of LC) gets added with the values of SMI to represent the value of SMI. Now this represented value of SMI is added to the actual value of EMIT to give the value of EMIT on the chart. And finally, the same is done with the value of FC.



Hence, in a stacked line chart, to obtain the values of different constituents/segments, either start with the top line or the bottom line and then keep on subtracting the values to obtain the next value.

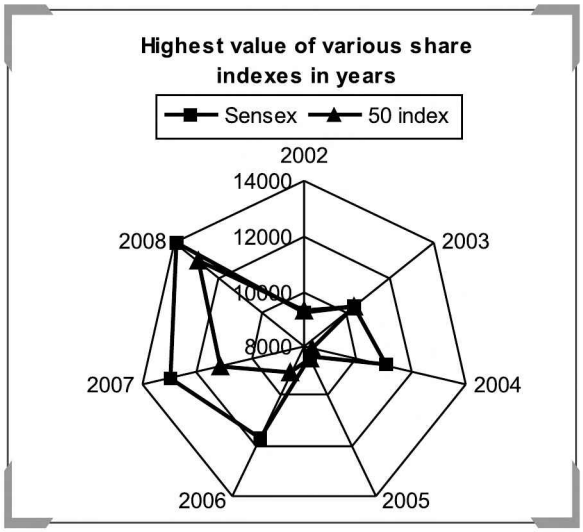
Time-Speed-Distance Line Chart

This line chart is used in tables of data collected from experiments on physical processes.



Radar Diagram

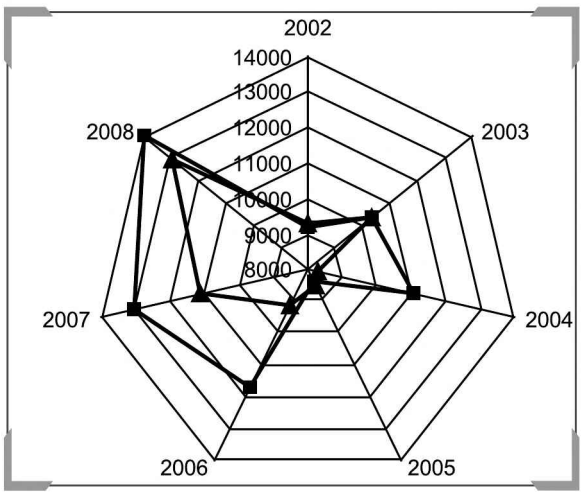
This diagram every value is represented with respect to a central point. All the changes in the values are expressed in the form of distance from this center point.



The radar diagram given below represents the highest value of two indices over a given period.

It can be seen that the centre value = 8000. With every passing circle the value increases by 2000. Since here are seven years, the diagram takes the shape of a heptagon.

Had there been only six years, it would have taken the shape of a hexagon, as shown below:



Similarly, had there been only four years, the diagram would have been in the shape of a square.

Area Diagram

In case of an area diagram, the values are represented in terms of areas.

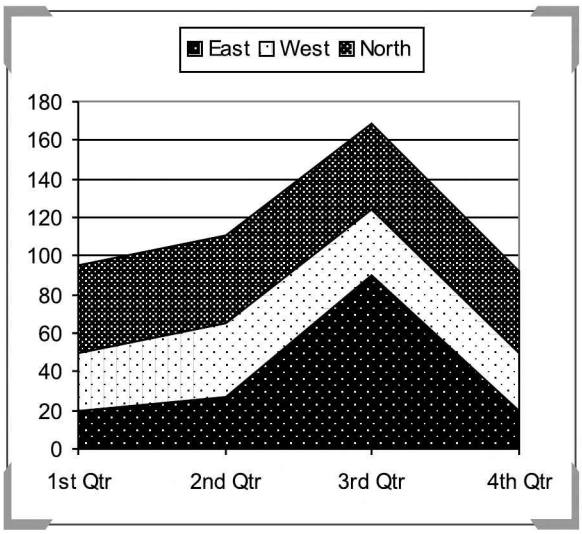
Example 2

Convert the data given below to a stacked area diagram:

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
East	20	27	90	20
West	30	38	34	30
North	45	46	45	42

Solution

The stacked area diagram corresponding to the table given above will be like this:



Floating Diagram

A floating diagram is used to represent the difference in any given variable between two different periods.

Example 3

Convert the following table into a floating diagram:

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2000	20	28	90	22
2001	22	31	95	24

Solution