

6

PRESENTATION OF STATISTICAL DATA

6.1 INTRODUCTION

In the previous lesson, you have learnt about the methods of organising and condensing data in the form of arrays and frequency distributions. It is first step towards analysis of data. Another step in this direction is presentation of data to highlight and compare significant statistical facts.

Generally data are presented in the form of tables and graphs or charts. A table is a systematic organisation of data in columns and rows. There are various types of graphs. In this lesson you will learn about table, bar charts, pie diagram (or chart) and time series line graph.

6.2 OBJECTIVES

After going through this lesson you will be able to :

- explain the meaning and purpose of a table;
- distinguish between reference table and special purpose table;
- draw the format of a table;
- explain the meaning and construction of simple and multiple bar charts;
- explain the need and construction of component bar charts;
- explain the meaning of pie chart and steps in its construction;
- explain the meaning of a time series graph and steps in its construction.

6.3 TABLE

(a) Meaning

A table is a systematic arrangement of related statistical data in columns and rows with

some predetermined aim or purpose. Can you arrange the following information in tabular form?

"There are 50 science and 50 arts students in a college. The number of students from poor families is same for each course and their total is 30. Whereas science and commerce courses are equally popular in rich families, yet the number of rich arts student is twice as much. In all 40 students are from the rich families studying in the college. The majority of students are from middle class families and their number is 80."

Let us arrange this information in tabular form. There are 150 students in all. A table leaves a more lasting impression on human mind than statements saying the same thing.

Table 6.1

Distribution of students according to course and economic status

	Science	Arts	Commerce	Total
Rich	10	20	10	40
Middle Class	30	20	30	80
Poor	10	10	10	30
Total	50	50	50	150

(b) Purpose

The purpose of a table is to simplify presentation of related data and make comparisons easy. The reader can easily locate the desired information. For example, the purpose of table 6.2 might be to show the imports and exports of country 'A' vis-a-vis other countries B, C, D and E.

Table 6.2

Imports and Exports of Country 'A' during 1995-96 (Rs. Crores)

	Country (1)	Imports (2)	Exports (3)
1	B	80	70
2	C	65	70
3	D	40	42
4	E	10	8

From the table 6.2 on exports and imports, we can easily locate the country which has highest exports. The data given in rows is read from left to right. For example, row 1 shows that country A imports 80 from B and exports 70 to B. The data given in column is read from above to downwards. For example, column 2 shows that country A imports 80, 65, 40 and 10 respectively from countries B, C, D and E.

(c) Types of Tables

Basically we have two types of tables (i) Reference or general purpose tables or (ii) special purpose or text tables. Let us discuss them one by one.

(i) Reference or general purpose tables : These tables are in a way a store of information with an aim of presenting detailed statistical material. From these tables we can derive smaller tables. Generally, statistical tables presented by Government of India and its various statistical agencies and departments are reference or general purpose tables.

(ii) Special purpose or text tables : These tables are smaller and can be obtained from reference tables. They aim to analyse a particular aspect so that we are able to bring out a specific point or answer a specific question.

(d) Parts of a Table

Parts (or elements) of a table vary from table to table depending upon the nature of data and purpose of a table. However, some points are common to all (see format of table 6.3). They are :

Table 6.3 (.....Title.....)				
Stub Head	Column head 1		Column head 2	
	Sub column head	Sub column head	Sub column head	Sub column head
Stub Entries	Main Body of the Table (field)			
Footnote	(.....)			
Source of data	(.....)			

(1) Table Number :

If more than one table has been used or presented at one place, it is always better to give them serial numbers. It makes further reference to them easy. This number is always indicated in the centre at the top.

(2) Title :

Title is to the table what heading is to an essay. It appears at the top of a table and gives idea about what is contained in the main body of the table. The title should be brief and to the point. It is better if the title is presented in bold letters or capital letters.

(3) Head note (or prefatory note) :

It is written below the title. It clarifies the contents of the table and unit of measurement like "in rupees crores" or "in lakh tons" or "in thousand bales of cotton" etc. It must be written in brackets on right side (top) of the table immediately below the title. For example, in table 6.1 the unit of measurement is rupees crores.

(4) Stub :

The stub consists of stub head and stub entries. Whereas stub describes the stub entries down below it, each stub entry labels a given data placed in its row. Both stub head and stub entries appear on the left hand column of the table. Further, stub entries describe the column heads.

(5) Main Body or Field :

It is the most important part of the table and contains the numerical information about which a hint is given in the title. For example, if the title is "Exports and Imports of Country A during 1995-96", it clearly shows that the body of the table contains statistical/numerical information on value of exports and imports of country A with different countries.

(6) Footnote :

It is a qualifying statement placed at the bottom of a table. Its purpose is to explain omission or limitations of the data presented in main body of the table. For example, if the data for the year is not available then at the bottom of a table it is mentioned there.

(7) Source of Data :

Last but not the least, it is essential to mention the source of data presented in the table. It helps the reader to check the original source of data himself and get more of it on the subject. It should mention information like title, edition, page number and source of publication etc.

POINTS TO REMEMBER

- A table is a systematic presentation of data in columns and rows.
- A table can be general purpose (reference) or special purpose (text).
- Each table has certain essential parts like table number, title, head note, caption, stub (stub head and stub entries), main body (field), footnote and source.

INTEXT QUESTIONS 6.1

1. State whether the following statements are true or false :
 - a) Satisfactory collection of data must be followed by its good presentation.
 - b) Tabulation is the only way of presenting data.
 - c) Tables help in intelligent use of statistical data.
 - d) The title of a table should be brief and to the point.

2. Fill in the blanks using suitable word given in the bracket.
- A is a systematic arrangement of statistical data in columns and rows. (table, graph)
 - Head note is written below the of the table. (title, footnote)
 - The consists of stub head and stub entries. (stub, note)
 - A foot-note is placed at the of a table. (top, main body, bottom)

6.4 BAR CHARTS OR DIAGRAMS

Meaning

A bar can be defined as a thick 'line', often made thicker to draw attention of the reader. The height of this bar shows the quantity of the variable we want to present. It is also called one dimensional diagram because only height of the bar is important and its base or width is not taken into account. To make them look more beautiful, bars are either coloured or shaded in different ways.

Types of bar charts :

There are two types of bar charts (a) simple and (b) components.

(a) Simple bar charts :

Simple bar charts can be (i) Single bar charts, and (ii) Multiple bar charts.

(i) **Single bar charts :** We can either have vertical bars (figure 6.1) or horizontal bars (figure 6.2). Normally vertical bars are often used. Let us now explain how a bar diagram can be prepared from a given data in table 6.4.

Table 6.4
Number of cars registered in three States

States	No. of Cars
A	8,000
B	10,000
C	4,000

In the case of vertical bars, States are represented on X axis and number of cars on the Y axis. As per the data given in table 6.4 each bar (rectangle with same

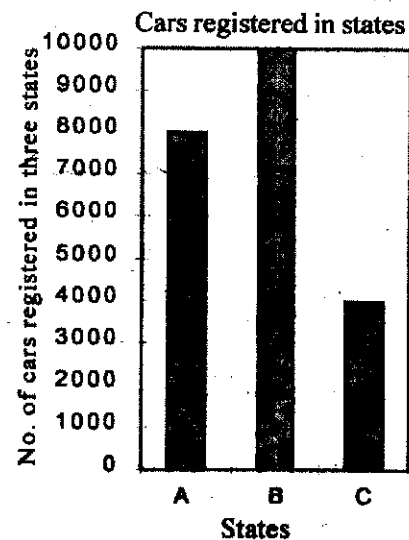


Fig. 6.1 : Single Bar Chart

base) is raised according to the value of the variable (here the number of cars registered). For example, rectangle representing State A is raised upto 8,000, for State B upto 10,000 and for State C upto 4,000. (See figure 6.1)

In case we prefer to use horizontal bars, we represent States on Y-axis. Here the bars (rectangles) are drawn horizontally upto 8,000, 10,000 and 4,000 cars respectively for the three States A, B and C. (See figure 6.2)

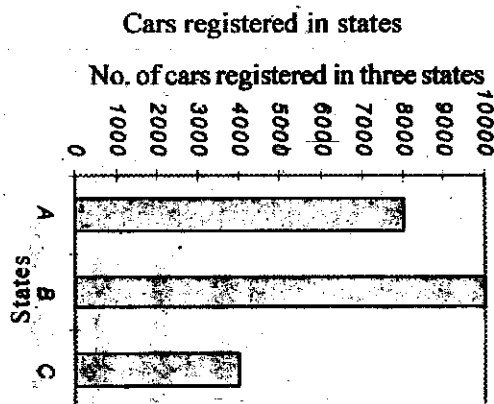


Fig. 6.2 : Single Bar Chart

(ii) Multiple bar charts :

Sometimes it is desired to represent more than one interrelated series data on a bar diagram. In such cases also simple bar diagram is not suitable. We have to use what is known as multiple bar diagram. Here the number of bars for each year or region or zone is equal to the number of variables (data) to be represented. For example, imports and exports will be represented by two bars; selling price, cost price and profits by three bars and so on. Normally we do not take more than three bars because it becomes complicated. The method of drawing bars is same as explained for simple bar diagrams. Two samples of multiple bar diagrams are presented below (figure 6.3 based on table 6.5 and figure 6.4 based on Table 6.6)

Table 6.5
Imports and Exports of Country 'X' during 1990-95

Year	(Rs. crores)	
	Imports	Exports
1990	500	450
1991	520	480
1992	600	500
1993	620	620
1994	780	700
1995	800	720

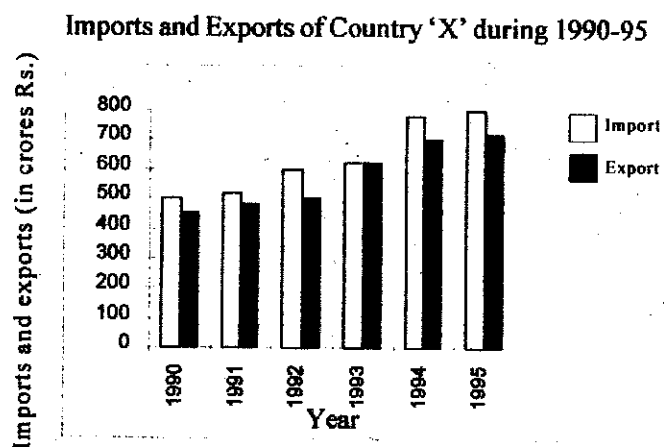


Fig. 6.3 : Multiple Bar Chart

Table 6.6
Selling price, cost price and gross profits earned by small scale industries
during 1990-93

(Rs. lakhs)

Year	Selling price	Cost price	Gross profit
1990	300	250	50
1991	400	300	100
1992	560	500	60
1993	720	620	100

Selling price, cost price and gross profit earned by SSI

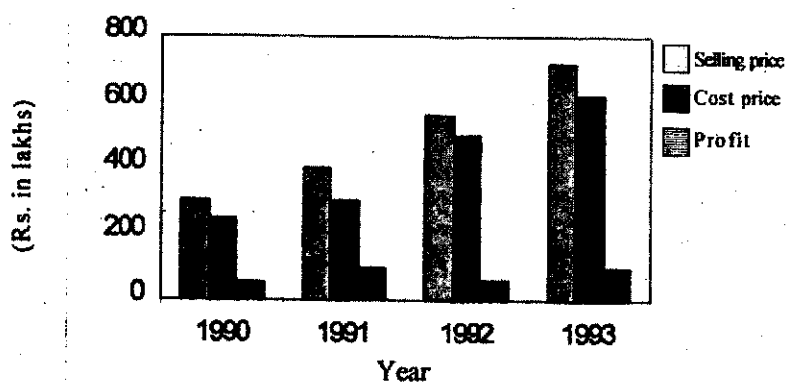


Fig. 6.4 : Multiple Bar Chart

(b) Component bar charts :

A simple bar diagram explained above is used to present only one variable. But when a breakdown of total or a series of totals is to be represented, we have to use what is called sub-divided or component bar diagrams. For example, we may like to represent trend in sales of Super Bazar in a big city like Delhi for (say) three years divided into four zones—North, East, West and South. Here we use sub-divided or component bar diagram as shown in figure 6.5. It is based on imaginary (or hypothetical) data shown in table 6.7.

Table 6.7
Zone-wise Trends in Sales of Super Bazar

Area	Sales (in lakh Rs.)		
	1995	1996	1997
North zone	100	150	200
East zone	80	140	140
West zone	300	320	320
South zone	120	140	240
Total	600	750	900

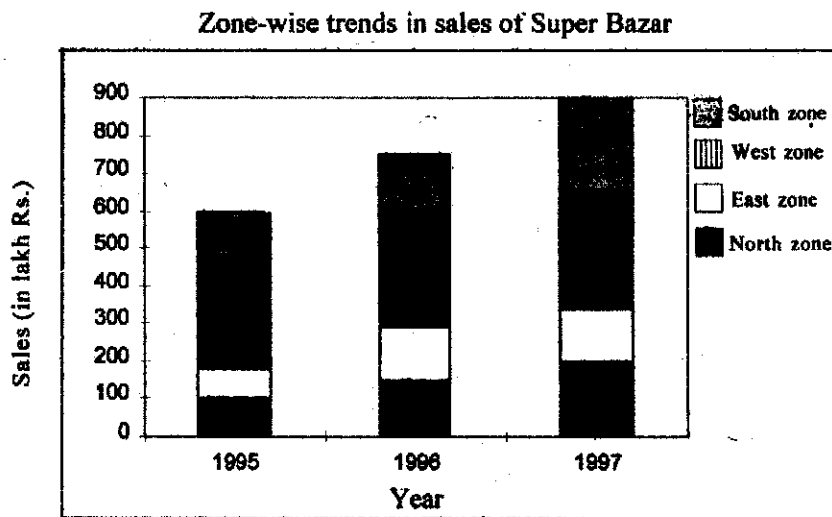


Fig. 6.5 : Component Bar Chart

Steps in the construction of a component bar diagram

Step 1. Measure sales on Y axis and year on X axis and place them in a box type diagram as shown in figure 6.5.

Step 2. Raise three rectangles with suitable bases with heights equal to total sales zone-wise (e.g. 600, 750 and 900).

Step 3. Divide each rectangle according to sales, in the year which it represents, in each zone.

Step 4. Mark or colour, for decoration, each component of the three bars. Remember that in each bar same mark or colour should be used for a particular zone for example white colour for west zone in each box.

6.5 PIE DIAGRAM

Meaning

It is also known as angular diagram. Pie diagrams are more popularly used for presenting percentage break downs of data. For example, students of a particular college may be put in three categories—Science students, Commerce students and Arts students. Or exports of India may be classified as to USA, to Europe, to Arab countries, to African countries and to others. The pie diagram can be effectively used to show these categories or breakdowns. A pie diagram, therefore, is a circle subdivided into component sectors to present the proportion of different constituent parts to the total. As such a pie diagram is shown in percentage terms.

Steps in the construction of pie diagram

Step 1. Find the value of each category or component or group as percentage of total of all categories or components or groups.

Step 2. Calculate degree of the angle formed by each category or component or group by the formula.

$$\text{Degree for a particular category/component/group} = \frac{\text{Value of the group}}{\text{Total of all groups}} \times 360^\circ$$

Step 3. Take a circle of a suitable size and draw radius.

Step 4. Now draw angles calculated in step 2 with the help of a protractor.

Step 5. Shade or colour different segments suitably or make fine distinctions between different categories or components or groups.

Step 6. For each category or component or group put the percentage in the pie diagram as shown in figure 6.6.

Let us now take an imaginary example to illustrate the construction of a pie-diagram.

Example : From the monthly budget of an industrial worker of Bombay Industrial Area, it was found that the family spent Rs. 360 on food, Rs. 108 on clothing, Rs. 90 on housing, Rs. 24 on comforts, Rs. 12 on education and entertainment and Rs. 6 on miscellaneous items. Construct a pie-diagram.

Solution : We arrange the data in tabular form given below and complete all the steps mentioned above.

Table 6.8
Monthly Family Budget of the Industrial Worker of Bombay

Items	Expenditure	Total percentage	Degree = $\frac{\text{Value of items/group}}{\text{Total value}} \times 360^\circ$
Food	360	$\frac{360}{600} \times 100 = 60$	$\frac{60}{100} \times 360^\circ = 216.0^\circ$
Clothing	108	$\frac{108}{600} \times 100 = 18$	$\frac{18}{100} \times 360^\circ = 64.8^\circ$
Housing	60	$\frac{90}{600} \times 100 = 15$	$\frac{15}{100} \times 360^\circ = 54.0^\circ$
Comforts	24	$\frac{24}{600} \times 100 = 4$	$\frac{4}{100} \times 360^\circ = 14.4^\circ$
Education & entertainment	12	$\frac{12}{600} \times 100 = 2$	$\frac{2}{100} \times 360^\circ = 7.2^\circ$
Misc.	6	$\frac{6}{100} \times 100 = 1$	$\frac{1}{100} \times 360^\circ = 3.6^\circ$
Total	600	100	360°

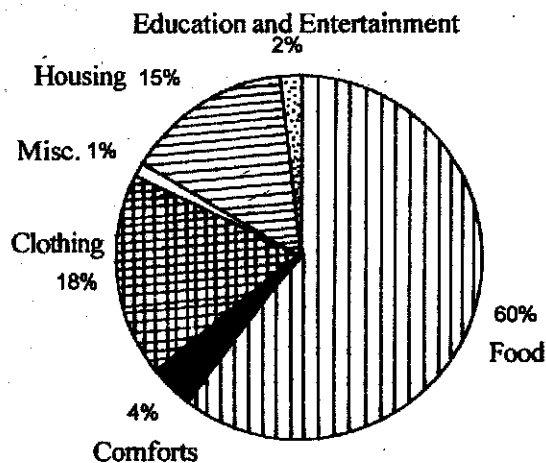


Fig. 6.6 : Pie Diagram

POINTS TO REMEMBER

- A bar diagram is often defined as a thick line made thicker to draw attention of the viewer or reader. Bars can be drawn horizontally or vertically. Height of a bar diagram shows value of the variable. Its base has no value. That is why it is called one dimensional.
- As against a simple bar diagram, where only one variable can be presented, we have what is called sub-divided or component bar diagram where two or more related variables can be presented.
- A pie diagram is a circle sub-divided into components to present the proportion of different constituent parts of the total. For different components, proportions are presented in terms of degrees obtained by the formula.
- Degree for a component/group = $\frac{\text{Value of the component/group}}{\text{Total of all components/groups}} \times 360^\circ$

INTEXT QUESTIONS 6.2

1. State whether the following statements are true or false :
 - a) The width of a bar diagram is important.
 - b) In bar diagram, height of bars shows the value of the variable.
 - c) We can have vertical as well as horizontal bars to present some data having one variable.
 - d) When a break down of data is to be represented we use multiple bar diagram.
2. Fill in the blanks with suitable word out of those given in the brackets :
 - a) A pie chart is also called.....diagram. (a bar, an angular, a multiple bar)
 - b) $\frac{\text{Value of the component}}{\text{Total of all components}} \times 360^\circ = \dots\dots\dots$ (area, radius, degree for a component)

6.6 TIME SERIES LINE GRAPH

Statistical data can also be presented in the form of line graphs. A line graph records the relationship between two variables. If one of the two variables is time—days, weeks, months or years—we get a time series line graph. For example, let us draw a line graph on the basis of the following data on production of crude oil in country 'X' from 1990-91 to 1995-96.

Table 6.9
Production of Crude Oil in Country 'X'

Year	Production (in lakh tonnes)
1990-91	106
1991-92	162
1992-93	211
1993-94	260
1994-95	290
1995-96	302

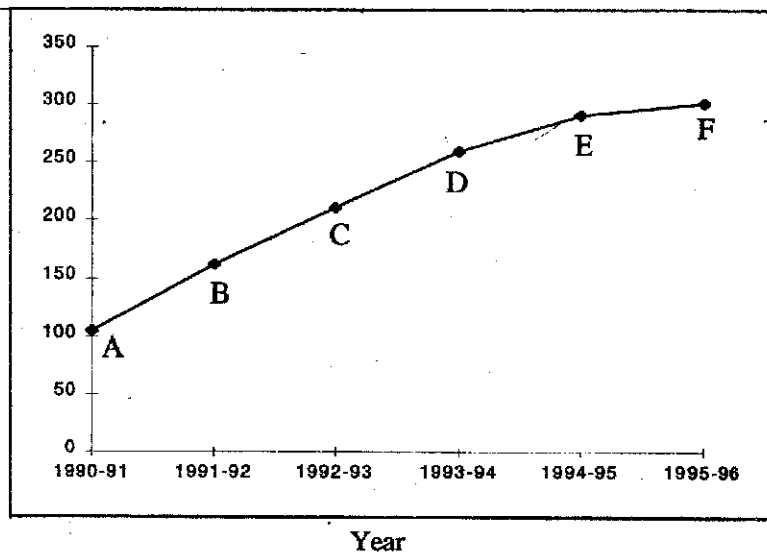


fig. 6.7 : Time Series Line Graph

The above graph is a time series line graph. The time is represented on the X axis and the production on the Y axis. Time and production are two variables in this graph. It is the production which changes with time. In other words as time passes production is affected and it increases or decreases or may remain constant. Since production changes with time, it is said to be dependent on time. Production is, therefore, treated as a dependent variable. Time is not influenced by production and therefore taken as an independent variable.

Point A on the line graph (also called curve) shows that production of crude oil in country 'X' in the year 1990-91 was 102 lakh tonnes. Similarly points B, C, D, E and F show production levels in the subsequent years. The upward rising of the curve from left to right indicates that production of crude oil in Country 'X' is constantly rising since 1990-91.

It is possible to show two or more comparable dependent variables on a time series line graph. In that case each dependent variable will be recorded on a separate curve. For example, take the following data on exports and imports of country 'X'.

Table 6.10
Exports and Imports of country 'X'

Year	Imports (in Rs. 100 crores)	Exports (in Rs. 100 crores)
1990-91	67	125
1991-92	78	136
1992-93	88	143
1993-94	97	158
1994-95	119	172
1995-96	110	198

The time series line graph prepared on the basis of above data is given below (see figure 6.8).

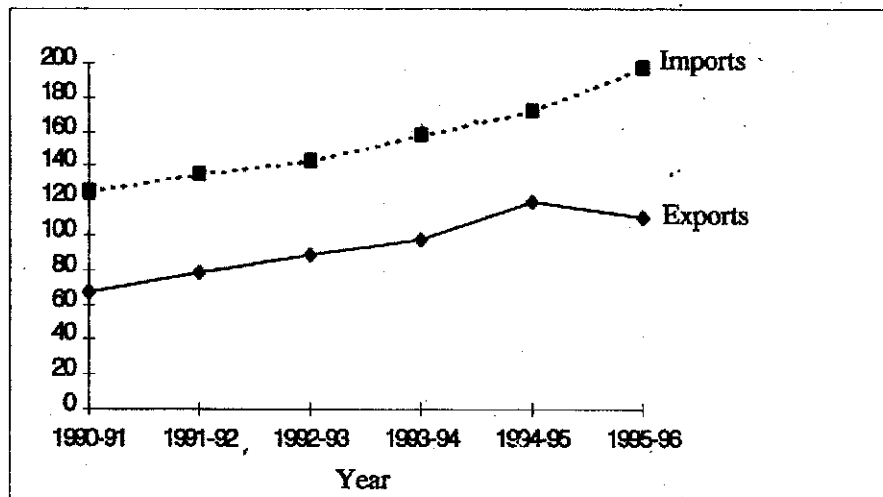


Fig. 6.8 : Time Series Line Graph

In the above graph imports are shown in broken line and exports otherwise. Such a presentation is very useful to make comparison between two dependent variables.

POINTS TO REMEMBER

- A line graph shows relationship between two variables. If one of the two variables is time, we get a time series line graph.
- In a time series line graph, time is independent variable and represented on X axis. The other variable is dependent variable shown on the Y axis.
- Two or more comparable dependent variables can be shown on a time series line graph.

INTEXT QUESTIONS 6.3

Fill in the blanks :

- A graph shows the relationship between two variables.
- If one of the variable on a line graph is..... it is called time series line graph.
- In a time series line graph.....is an independent variable.
- In a time series line graph variable is represented on the Y axis.

ACTIVITY

1. Make a blank table (format) showing the distribution of students of 12th class according to:
 - a) Subject groups i.e. Science, Arts and Commerce
 - b) Sex i.e. boys and girls
2. The following table gives selling price and cost price of a good 'X' for five years.

Year	1990	1991	1992	1993	1994
Selling price of 'X'	105	110	120	90	160
Cost price of 'X'	100	80	120	120	140

Plot the above information on a graph paper in the form of line graph. What type of graphs do you get ?

WHAT YOU HAVE LEARNT

- After data have been collected, they must now be arranged and presented in some useful form.
- A good presentation highlights the data and brings out important points for necessary comparison.
- Tables, frequency arrays, frequency distribution, time series line graphs etc., are some important ways in which data are presented.
- A table is a systematic presentation of data in columns and rows.
- Each table has some essential constituent parts like table number, title, head note, caption, stubs, main body, foot note and source of information.
- A graph is also an important way of presenting data—such as time series line graphs, bar charts, pie diagrams etc.
- When an economic variable is presented with time, it is called a time series line graph.
- A bar diagram is defined as a thick line made thicker to draw attention of the viewer. Its height is important as it shows the value of the variable.
- A bar diagram can be drawn either vertically or horizontally.
- When a breakdown of a total or a series of totals is to be shown, we use what is known as sub-divided or component bar diagram.
- A pie diagram is also an important and effective way of presenting data. It is a circle sub-divided into components to present the proportion of different constituent parts of the total.

TERMINAL EXERCISE

1. What is a statistical table? List its various parts.
2. What is the purpose of preparing a table ? In this context distinguish between reference table and text table.
3. What is a bar chart? Explain briefly its various types.
4. What is the difference between simple bar diagram, sub-divided or component bar diagram and multiple bar diagram ?
5. Explain the meaning and uses of a pie diagram. Prepare a pie diagram of family expenditure from the following data :

S.No.	Items	Expenditure (Rs.)
1.	Food	480
2.	Clothing	300
3.	Education and Entertainment	330
4.	Rent	450
5.	Miscellaneous	240
Total Expenditure		1800

6. Explain the meaning of time series line graph with the help of an example.
7. Draw a time series line graph on the basis of following data :

Production of Cement in Country 'X'

Year	Production (in lakh tonnes)
1990-91	68
1991-92	78
1992-93	81
1993-94	61
1994-95	78
1995-96	95

ANSWERS**Intext Question 6.1**

1. (a) True (b) False (c) True (d) True
2. (a) table (b) title (c) Stub (d) bottom

Intext Questions 6.2

1. (a) False (b) True (c) True (d) False
2. (a) an angular (b) degree for a component

Intext Questions 6.3

- (a) line (b) time (c) time (d) dependent

Terminal Exercise

1. Read section 6.3 (a) and (d)
2. Read section 6.3 (b) and (c)
3. Read section 6.4
4. Read section 6.4
5. Read section 6.5
6. Read section 6.6
7. Read section 6.6

Guidelines to Activities

1. Hint:

Subject group	Number of Students		Total
	Boys	Girls	
Science			
Arts			
Commerce			
Total			

- a) Fill up yourself, the title, footnote, etc. i. e. parts of a table.
 - b) Fill up the main body of the table with imaginary figures.
2. (a) Measure year on X axis and selling price (S.P.) as well as cost price (C.P.) on Y axis. We get time series line graph.