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FIFTH EDITION

How to Prepare for

Data Interpretation & Logical Reasoning

for the **CAT**

COMMON ADMISSION TEST

New Pattern

ARUN SHARMA

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SECTION 1

Data Interpretation

- Basic Modes of Data Interpretation
- DI Exercises (Without Options)
- Ten Minute Test Papers
- Full Length Sectional Test Papers
- Model Test Papers

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PART 1

Basic Modes of Data Interpretation

In This Part You will Learn:

- What is Data Interpretation
- Various Types of Data Representations
  - Tables
  - Bar Charts
  - X-Y Charts
  - Pie Charts
  - Cases (Representing Data)

This Part Contains:

Individual chapters on each type of Data Representation

Exercises and Practice Questions covering various question types asked in exams (like CAT and other management exams, banking exams, and other aptitude exams) on each type of Data Representation

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1. Understand each type of data representation carefully.

2. Move from chapter to chapter solving exercises therein. Solve without time limits—focus on getting everything

3. Concentrate on interpreting:
   (i) The data-variable identification
   (ii) Their interrelationships
   (iii) The language of the questions

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1

Data Interpretation–An Overview

OUTLINE

Learning Objectives

- Get an overview of the various options for data representation.
- Answer the Question, "What Data Interpretation is all About?"

Chapter Highlights

- What is Data
- What are Variables (Discrete and Continuous)
- Organisation and Presentation of Data (Tabular, Bar Charts, X-Y Charts, Pie Charts, Reasoning Caselets, and Numerical Data based cases)
- General Hints for Data Interpretation

Since time immemorial man has indulged himself in various activities for his habitation and survival. Every activity that man indulges in generates information about various factors such as the magnitude, scope, quality and fulfillment of objectives of the particular activity. In fact, this is true no matter what the activity is—Data is generated from each and every activity.

For example, during the movement of a car from Delhi to Lucknow, there is constant data generation in the form of time taken, speed of travel, acceleration and deceleration data, car temperature data, number of revolutions of the wheel, fuel consumption data, cost data, etc. Similarly, data is also generated in the running of a fan, the making of a telephone call, the consuming of food, the running of a business establishment, etc.

Present day society is information oriented. Almost every facet of life uses quantitative data in one form or the other, and often we come across tables, charts and graphs while reading newspapers, magazines, books or watching television. These may pertain to political analyses, cricket, crime rate in the country, weather, the stock exchange, bullion market, foreign trade, travelling, etc.

WHAT IS DATA?

Data is the term used to refer to the raw numbers (facts and figures) which are thrown out from the occurrence of any event—physical, social, economic, corporate, geographical, individual, and all miscellaneous kinds of events that have the potential to throw out numbers and figures. These numbers and figures however make no sense by themselves unless they are qualified by a series of qualifiers explained as follows.

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NATURE OF DATA

A numerical value by itself represents nothing and describes absolutely nothing. Thus, if we imagine a number, say 37, it means absolutely nothing by itself. The number starts to gain some significance when it is qualified by saying that it is the temperature or weight, etc. However, just by saying that the number represents temperature doesn't complete the description of the number. It has to be further qualified by specific descriptions, that it is the temperature on 7 June 2015 in New Delhi at 2 p.m.
Thus, three facts get attached to the number to describe it more completely:

(a) It is a number representing temperature.
(b) It refers to a place called New Delhi.
(c) It refers to the date of 7 June 2015 and time of 2 p.m.

However, even with these qualifiers, The magnitude of the value is not imaginable. The natural question that will arise in the mind of the interpreter of this data is: "What does a number 37, described as the temperature at 2 pm on 7 June 2015 in New Delhi, represent in terms of its magnitude?"

The unit defines the magnitude of the data. Data without a unit is meaningless.

The information provided does not give us an idea about the magnitude of the temperature. We need to further qualify the number by attributing to it a unit.

Thus, if the number is further qualified by the unit 'degree celsius' or '°C' then it suddenly makes sense to us. The introduction of the unit in fact automatically qualifies it as the temperature.

A unit also makes a number comparable to other values and we can thus make conclusions like 35°C < 37°C and that the temperature in New Delhi on 7 June 2015 is higher than the temperature in Lucknow at the same time on the same date. Further, that if Lucknow had a temperature of 35°C we can say that Delhi had a temperature that was 2° C more than that of Lucknow or even that Delhi had a temperature that was (200/35)% higher than that of Lucknow, and so on.

These qualifiers can be seen as kinds of 'pointers' to the number and we conclude that for any number to make sense, it should have:

(a) A unit which quantifies its magnitude. The unit when attached to the number automatically adds sense to the number.
(b) A secondary set of qualifiers (pointers) which when associated with the data help us to convert the data into concrete information that helps us in decision making.

Hence, we have seen that the number 37 makes complete sense when it is qualified as: 37°C was the temperature of New Delhi on 7 June 2005 at 2 pm. It could equally have been qualified as: Rs 37 crore was the sales turnover of a company X in the year 2025.

You are encouraged at this point to think of alternative units and associated pointers which would make sense when attached to the number 37 (or for that matter any other number). While doing so, pay attention to how you are required to use a unit along with a few associated pointers to make any sense of a number.

SOME STANDARD COMMON POINTERS

Time

The time dimension is an overriding fact of our life and most data is measured in the reference frame of a particular time. Thus, we qualified the temperature of New Delhi by adding a date and a specific time to it.

Even figures related to companies/industries/corporations/organisations/departments have their respective time dimensions specified.

Other situations include movement of a car/train in a specified time duration, production in a factory in a particular time duration, etc. Units used for time are decades, years, quarters, months, weeks, days, hours, seconds, **minutes, days, etc.**

Place or Geographical Pointers

This is the second most common standard pointer which is used for making sense out of a number. Thus when we talk about economic data we talk about the country, state, area or region.
Other common pointers include: monetary value, temperature, and number of units consumed/sold/produced, etc.

DATA REPRESENTS VARIABLES

This is another way to look at data and numerical values. A variable is a quantity or an attribute whose value is not fixed/is changeable and can change with a change of some of the underlying factors. (Most data (numerical values/series of numbers) represent variables that can change their values).

As an example, we can think of the temperature of a place as a variable. This variable changes with time since the value of the temperature changes with time.
All series of numerical values will represent some variables that will underlie the set of values.

TYPES OF VARIABLES

Based on the way the value of the variable changes, it can be a discrete variable or a continuous variable.

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Discrete Variables

Variables which have only discrete value change and have "no in-between" values, e.g., continent, country, company, state, city, year, quarter, month, day, region. Change in these variables always occurs in discrete steps. Thus, the year may be either 2003 or 2004. There is nothing like 2003.05 or for that matter 2003.98 when we talk about the year as a variable.

Similarly, the country being mentioned could either be India or Pakistan or US or UK or Germany or any other.

Continuous Variables

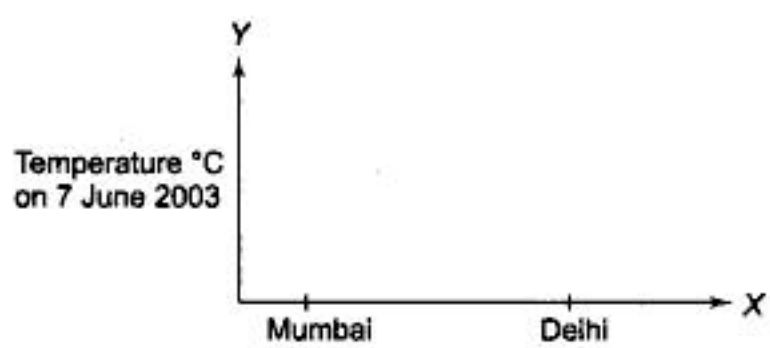
These are variables which change continuously, e.g., sales revenues, unit sales, GDP, population, temperature, speed, etc.

In this context, it can be easily seen that while continuous variables can be easily represented by an unbroken line on the XY plane, discrete variables cannot be shown in such a fashion.

Further, if a continuous variable is taken on one of the axis in the XY plane, then each point on that axis will have a certain value. However, if an axis is used to represent a discrete variable, then not every point of the axis will necessarily represent an instance of the discrete variable. Hence, such an axis will have points which lie in between two values of the discrete variable and which will have no meaning or no value in terms of that discrete variable.

Thus, in Figure 1.1, the X-axis represents a discrete variable and the Y-axis represents a continuous variable.

FIGURE 1.1 Discrete and Continuous Variables



Usually, continuous variables are represented by a series of numbers while discrete variables are normally represented by names. One possible case of exception could be the case of the year (time dimension). Here the discrete variable is represented by a number.

THE NEED FOR CAPTURING DATA

In today's highly complex world, with more and more pressure on time and other resources like money and machines, improved decision making is critical in all areas of life in order to improve the quality of output from fixed resources. In fact, the definition of a manager's work is to get maximum output out of limited resources through improved decision making.

Data, when put in the correct form and shape, gets transformed into information which feeds this need for improved decision making. The capturing of data allows us to do analysis of the same in order to make improved decisions for improved results. Hence, the capturing of data becomes exceedingly critical.

The criticality of data for improved decision making is all pervasive. It is required in the day-to-day life of an individual as well as in the day-to-day and strategic decision making of a company or a state/country/region.

Hence, as an individual I might be interested in knowing what the extra spoon of ghee in the vegetable does to my weight if my consumption is constant. On the other hand, I might be equally interested in knowing the calories I spend in twenty minutes of jogging versus cycling versus treadmill in order to decide which of these activities I should fix as my standard exercise activity. I might also be interested in knowing which route I should take to my office based on the parameters of time required, fuel consumption, distance and traffic movements. Thus, it is quite likely that I might take a 12-km route to my office rather than a 10-km route to the office since the longer route is less crowded—saving time and fuel.

On a much more macroeconomic scale, the prime minister of a country might want to get information about how to use Rs.1000 crore which is available with him for the alleviation of poverty. He has to decide between three optional schemes. For making this decision he would need information on the past effectiveness of each of these schemes in meeting the objectives of the investment. Similarly, an advertising manager would need information about the effectiveness of the various advertising media available (such as different channels and newspapers, etc.) and the cost and returns associated with each system. For that matter, the national selection committee for the Indian cricket team would also be interested in finding out the statistics associated with different opening batsmen in order to judge their ability to face fast bowlers on bouncy pitches. At the same time the weather office predicts weather based on the data available with it.

In today's world, recording data has become so crucial and reporting data has become so widespread that huge amounts of money and efforts are spent on the activity. In fact, in our day-to-day lives, each one of us has been practicing the subject of data interpretation extensively for making our own decisions. Hence, the subject is not new to any of us. What will be new is the various ways in which data can be presented as well as the typical kinds of data associated with different activities. Thus, data created and

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used to analyse the stock market will be quite different from the data created in the central zone of Indian Railways, or from the data required by the top management of a company or for that matter the top administrative officials of a district, a state. Even within companies, the data created would differ based on the industry of operation. Thus, the data used by the top management in the decision making for a newspaper house will be different from the data used by the top management of a banking group.

As a manager or as a person in a decision making situation in any organisation, you will be required to make critical decisions based on the data reported to you through various channels. Hence your ability to interpret the data and draw out information for improved decision making will go a lot towards the achievement of the organisation's objectives. Hence, all aptitude exams including the CAT, the bank PO exam and all other management entrance exams include Data Interpretation (DI) as a crucial section.

Traditionally, DI has accounted for anything between 30–40 questions in the CAT every year for the last decade. Hence, a proper understanding of DI and its inherent concepts will go a long way towards helping a student crack CAT and other aptitude tests.

DEFINITION OF DATA INTERPRETATION

The interpretation of data is the process through which inferences are drawn about the data available for analysis. In other words, the process of drawing inferences and conclusions through the interpretation of data is what DI is all about.

ORGANISATION AND PRESENTATION OF DATA

Normally, data is generated in such volumes and in such great proportions that it becomes impossible to make any useful judgements through the volume of data. Unless organised in a condensed form that will highlight the main characteristics, facilitate comparisons and render it suitable for further processing and interpretation, raw data will have little meaning. Top management people rarely find time to go through the entire details of any report, be it daily production or the sales forecast. An effective presentation of data enables them to draw upon the information with the least effort and time.

One chart table or graph gives at least 10 times more information than one page of words.

There is thus a need to organise the data into meaningful presentations. Data is organised and presented through one of the several forms of presentations available. The most commonly used amongst these are tables, pie charts, bar graphs, the line charts, and so on.

Data can be represented by using any one or more than one of these. Normally data is represented through a graphical representation or a set of graphical representations linked to each other.

Effective presentation of data is broadly classified into the following categories:

1. Tabular presentation
2. Bar charts
3. X–Y charts
4. Pie charts
5. Caselets
6. Miscellaneous charts

We will now go on and analyse each of the types of charts briefly.

TABULAR PRESENTATION

Tabular presentation is the process of presenting data systematically in horizontal rows and vertical columns. This presentation of data makes it easily understandable and usable for further statistical analysis. The heading of each row and column helps the reader understand the data and the units used for the same. The units to be attached to the values within the row/column may either be mentioned in every row or column or might be mentioned commonly at the top/bottom of the table. In such a case there would be a reference to the units, e.g., "All figures in Rs crore".

Either the columns or the rows will represent different values of a discrete variable, while the other represents a set of different continuous variables, which may or may not be related to each other.

Normally the rows represent the different values of the discrete variable, while the columns represent the multitude of continuous variables.

EXAMPLE 1

In Table 1.1 the discrete variable is the year and there are four values of it, viz., 2000, 2001, 2002, and 2003. Each of the columns represents different continuous variables with their own units.

The intersection of a row and a column denotes the value of the continuous variable for that instance of the discrete variable. For example, x denotes the value of the revenue (in Rs crore) for the year 2000.

TABLE 1.1

Year	Revenue (Rs crore)	Costs (Rs crore)	Profit (Rs crore)	Sales (units) ('000s)	No. of employees
2000	x				
2001					
2002					
2003					

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EXAMPLE 2

The marks in Physics and Biology of 20 students are as follows:

Physics: 20, 21, 20, 21, 21, 24, 22, 22, 23, 20, 23, 22, 21, 22, 20, 24, 24, 22, 23, 20.

Biology: 30, 31, 32, 31, 33, 33, 32, 31, 34, 33, 34, 33, 32, 33, 32, 32, 34, 30, 34, 33.

This information can be presented as follows (Table 1.2):

TABLE 1.2

Marks in Physics / Marks in Biology	20	21	22	23	24
30	1		1		
31		2	1		
32	2	1	1		1
33	2	1	2		1
34				3	1

Bar Charts

Bar charts are one of the easiest, graphically attractive and hence most commonly used methods of presenting all types of data. They are especially useful for representing various data series (normally 1–4). The data series comprises the continuous variables while the values of the specific instances at which the value of the data series is measured represents the values of the discrete variables.

Presentation of data as bar charts makes the comparative study of the data very easy. A bar chart consists of a group of bars which are equidistant from each other. The values on the bar charts are read by the measurement of the length or the height of the bars. The width of the bars is largely inessential and is used only for the clarity of the presentation. Example 3 will make the concept of bar charts clear.

EXAMPLE 3

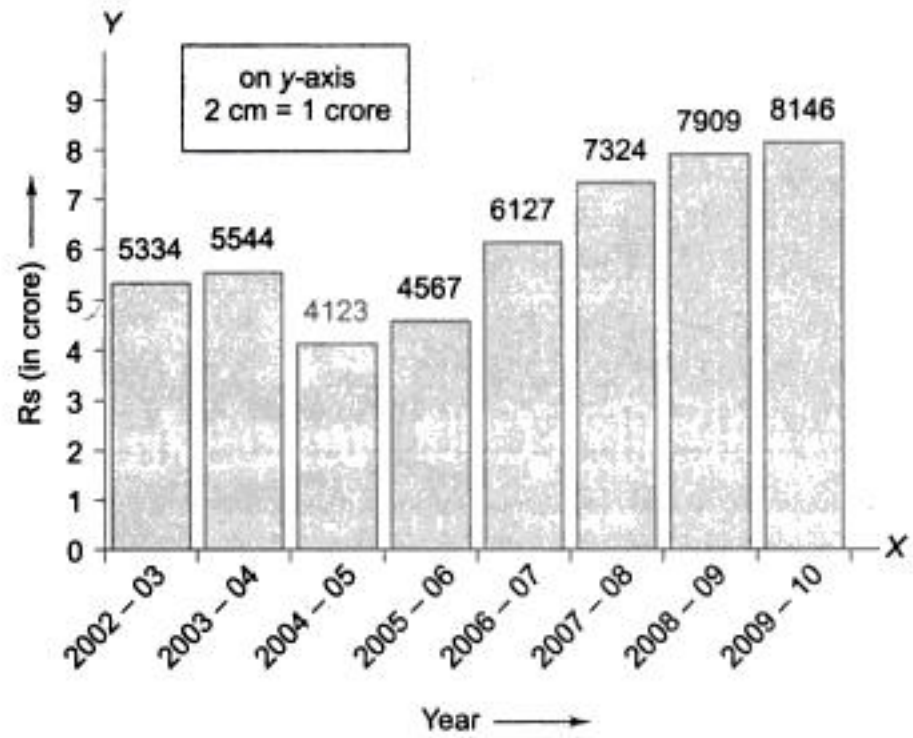
The data related to the foreign exchange reserves of India for different years is as follows:

TABLE 1.3 Foreign Exchange Reserves of India

Years	Rs (Crore)
2002–03	5,334
2003–04	5,544
2004–05	4,123
2005–06	4,567
2006–07	6,127
2007–08	7,324
2008–09	7,909
2009–10	8,146

This data is represented on the following bar diagram (Figure 1.2).

FIGURE 1.2



X–Y Charts

As the name suggests, X–Y charts are graphs that are represented on the X–Y plane. In this case we normally have one axis representing one or more continuous variable(s) while the other axis is used to represent a discrete variable. In certain cases (like speed–time graph) both the axes could be used to represent continuous variables. X–Y charts, also known as line or point diagrams, are two-dimensional diagrams in which any point in the entire plane can be represented by the corresponding values read on the X and Y axes. Normally continuous variables are plotted on either of the two axes, while the other axis is used to represent the discrete variable.

An X–Y chart is a convenient and compact way of representing data series. It is also quite easy to understand. It is often used to denote single or multiple, related or unrelated, continuous variables against a specific set of values of a discrete variable. Such graphs are useful for exhibiting trends and rate of change.

EXAMPLE 4

The following data (Table 1.4) shows the number of questions solved by 320 students at AMS in a test on data interpretation.

TABLE 1.4

Number of Questions Solved	Number of Students
0	43
1	22
2	49
3	57
4	83
5	24

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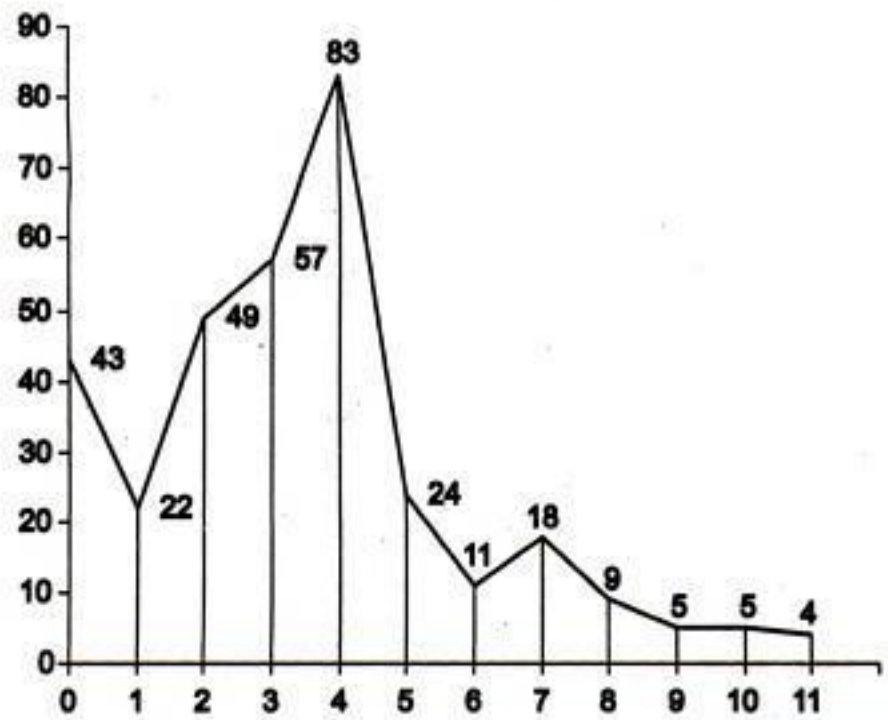
Number of Questions Solved	Number of Students
6	11
7	18
8	9
9	5
10	5
11	4

The data is represented by the following line diagram (Figure 1.3):

FIGURE 1.3



Pie Charts

As the name suggests, pie charts are a circular representation of data. The data in question represents the break-up of a whole into its parts. The share of each part in the pie diagram is proportionate to its share of the whole data. The given data is distributed over a total angle of 360°. A pie diagram can also be described as a circular figure which is divided into different sectors or segments, each sector or segment representing in area and angle, the percentage contribution of a certain component to the total.

The following formula is used for the calculation of the angle of a sector of the pie chart:

$$\text{Angle of a sector} = \frac{\text{Value of the sector}}{\text{Total value}} \times 360°$$

EXAMPLE 5

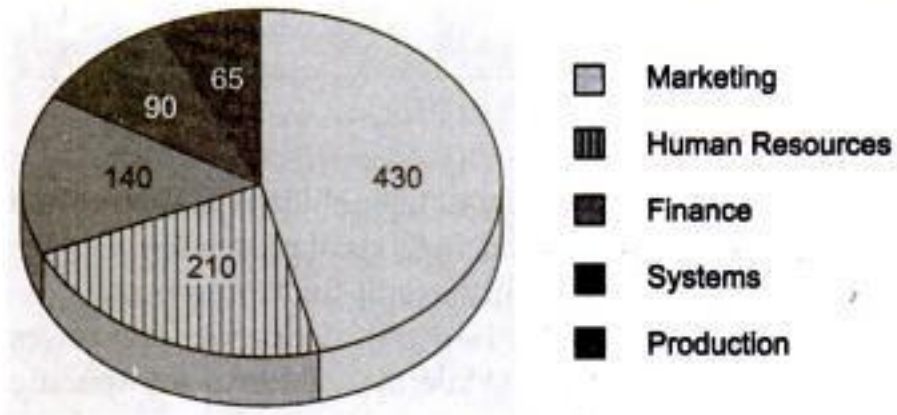
Construct a pie chart based on the following data (Table 1.5).

TABLE 1.5 Number of Students Specialising in Select Subjects

Specialisation	Number of Students
Marketing	430
Human Resources	210
Finance	140
Systems	90
Production	65

Solution We need to compute the angle of each sector based on the formula given. This will result in the following diagram (Figure 1.4).

FIGURE 1.4 Number of Students Specialising in Select Subjects



Caselet Form

In this form of data presentation, the data is given in the form of a paragraph. The student is required to understand the data presented in a paragraph and convert it into a table for solving the questions.

Broadly there are two kinds of caselets:

1. Paragraph based on reasoning.
2. Paragraph based on numerical data.

The following is an example of a caselet based on reasoning.

EXAMPLE 6

Five friends, Abhijeet, Bhushan, Chandra, Deepak and Eeshwar pursue the following professions in their respective careers (not in order): marketing, architecture, medical science, engineering and art. They live in Lucknow, Mumbai, Chennai, Delhi and Patiala but not in that order.

1. Eeshwar and Chandra do not live in Lucknow or Patiala and neither is an architect or a doctor.
2. Abhijeet and Bhushan are neither an artist nor an engineer and they do not live in Delhi or Lucknow.
3. Deepak is neither a doctor nor a marketing professional.

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4. The person living in Lucknow is neither an artist nor an engineer.
5. Abhijeet does not live in Chennai and Bhushan is not a doctor.
6. The marketing professional does not live in Patiala or Mumbai.
7. Eeshwar is not an artist.
8. The artist does not live in Delhi

Who lives in Lucknow?

Solution The solution to the problem is got by creating a table (Table 1.6) between the various variables. The following figure will result by using the direct clues between the person and his place and the person and his profession (viz. clues 1, 2, 3, 5, and 6.) The question is answered at this point itself since there is only Deepak who could live in Lucknow.

TABLE 1.6

	Marketing	Arch	Doct	Eng	Art	Lucknow	Mumbai	Chennai	Delhi	Patiala
Abhijeet				X	X	X		X	X	
Bhushan			X	X	X	X			X	
Chandra		X		X		X				X
Deepak	X		X							
Eeshwar		X		X	X	X				X

Let us now look at the use of caselets for representing numerical information. Example 7 is an instance of a caselet based on numerical data.

EXAMPLE 7

Nath Seeds, an agriculture company divided its operations into five main business areas—fruits, vegetables, medicinal plants, cash crops, and miscellaneous. It recorded the following sales in 2001, 2002, and 2003:

In 2001, sales in fruit, vegetables, medicinal plants and miscellaneous were Rs 6,250,000, Rs 2,200,000, Rs 18,80,000 and Rs 940,000 respectively. Cash crops accounted for 30 per cent of the total sales during the years.

In 2002, the total sales showed a 10 per cent increase over the previous year. While fruit and vegetables registered 8 per cent and 10 per cent increase over their corresponding figures in 2001, medicinal plants dropped by Rs 130,000, while cash crops stood at Rs 5,360,000.

In 2003, though the total sales remained the same as in 2002, fruits fell by Rs 220,000, vegetables by Rs 320,000, medicinal plants by Rs 100,000, and miscellaneous by Rs 120,000.

In order to make sense of the data presented in the form of a paragraph as above, it is normally advisable to convert it into a table. Something of the following nature will emerge and then the questions based on the caselet can be solved by just reading the values from the table (Table 1.7).

TABLE 1.7 Sales Figures for Nath Seed Company

	2001	2002	2003
Fruits	6,25,0000	6,75,0000	6,53,0000
Vegetables	2,200,000	2,420,000	2,100,000
Medicinal plants	1,880,000	1,750,000	1,650,000
Cash crops	4,830,000	5,360,000	6,120,000
Miscellaneous	9,40,000	1,430,000	1,310,000
Total	16,100,000	17,710,000	17,710,000

General Hints for Data Interpretation

Data interpretation questions are based on information given in tables, graphs or diagrams. These questions test the ability of the solver to interpret the information presented and to select the appropriate data for answering a question.

1. Read the data very carefully. Even the minutest word must not be overlooked since many a times even a single word/group of words could become critical.
2. If there are more than one graphs/charts/tables, understand the relationship between them clearly before you proceed to solve the questions asked.
3. Answer only the questions asked. Do not answer/ calculate things which have not been asked for.
4. Be careful to use proper units and beware of charts and tables with non-uniform units.

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As we now move to look at each of these types of data presentations individually, it must be mentioned here that data generation and presentation is so vast a field that it is almost impossible to divide the individual types of tables/graphs/charts into their subtypes. However, an effort has been made here to do so—the objective being to initiate the students into each of the types of data presentations. The student is expected to not just limit himself/herself to the tables and graphs that are part of this book but is expected to go much beyond and constantly be on the look-out for more and more data presentations in magazines, books, journals or even in statistical compilations. While doing so he/she should try to visualise the LOD 1 and LOD 2 type of questions which can be framed on the data (See Section 2,"Logical Reasoning"— Part 2, Logical Reasoning Exercises").

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2

Tables

OUTLINE

Learning Objectives

- Get a first hand view of how data is presented through its organisation in the form of tables.
- Get an understanding of typical data which can be represented through tables.
- Get a first hand feel of the typical question types that are asked on tables.

Chapter Highlights

- Introduction to tables
- Practice exercise on tables containing simulated examination questions

INTRODUCTION

The dictionary meaning of a table is, "a chart of facts and figures shown in horizontal rows and vertical columns." Tables are one of the most versatile methods of systematic presentation of quantitative data. In the context of the qualification of variables as either continuous or discrete variables, tables give the opportunity to present the maximum number of continuous variables with respect to a set of values for one discrete variable. Indeed, the amount of data that can be presented on a table is much higher than that which can be presented on any type of graph or chart. In fact, the data that can be represented on any type of chart (pie/bar/xy) can also be represented on a table.

The reason for the versatility of a table over the standard charts is because if we want to present any additional information on a table, it is just a matter of adding one more column/row and describing the continuous variable to be shown in the heading of the column/row.

Normally, the discrete variable/s used in a table are:

(a) Geographical or location based (city, state, country, etc.)
(b) Time period in terms of months, quarters or years
(c) Individual or company name based.
(d) Miscellaneous classifications.

The first three are the most commonly used.

The following exercise will help you to clearly understand tables and the kinds of questions that might be created on tables.

EXERCISE

Directions for Questions 1–6 *The following data (Table 2.1) shows the comparative data for state-wise literacy and population growth. Study the data carefully and answer the questions:*

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TABLE 2.1 State-wise Literacy and Population Growth

State	Percentage increase in		
	Total Literacy (From 1981 to 1991)	Female Literacy (From 1981 to 1991)	Change in % Population Growth Rate (From 1981 to 1991)
Andhra Pradesh	25.17	23.32	+ 0.09
Bihar	22.34	19.48	– 0.04
Gujarat	27.21	26.20	– 0.53
Haryana	29.19	28.67	– 0.11
Himachal Pradesh	31.06	31.00	– 0.24
Karnataka	27.52	26.63	– 0.47
Kerala	30.17	31.20	– 0.43
Madhya Pradesh	25.58	22.86	+ 0.13
Maharashtra	25.87	25.92	+ 0.10
Manipur	29.61	29.68	– 0.25

1. Which of the following states shows a higher percentage increase in female literacy than the percentage increase in total literacy?
   (i) Maharashtra (ii) Himachal Pradesh
   (iii) Kerala (iv) Karnataka
   (a) (i) only (b) (i), (ii) and (iv)
   (c) (i) and (iii) (d) All of the above
2. For the state showing the minimum percentage increase in total literacy, the numerical ratio of the percentage increase in total literacy to the change in percentage population growth rate is nearly (take absolute values only)
   (a) 508.5 (b) 558.5
   (c) 598.5 (d) None of these
3. The ratio of the percentage increase in female literacy to the percentage increase in total literacy is maximum for which state?
   (a) Kerala (b) Maharashtra
   (c) Manipur (d) Madhya Pradesh
4. The ratio of the overall simple average of the percentage increase in female literacy to the simple average percentage increase in female literacy of those states where the percentage increase is more than the overall average is:
   (a) 0.972 (b) 0.818
   (c) 0.89 (d) 0.146
5. The ratio of the simple overall average of the percentage increase in female literacy to the simple overall average of the percentage increase in total literacy is approximately equal to:
   (a) 0.894 (b) 0.968
   (c) 1.033 (d) None of these
6. Which state exhibits the highest total literacy?
   (a) Himachal Pradesh
   (b) Kerala
   (c) Manipur
   (d) Cannot be determined

Directions for Questions 7–12 *The following table (Table 2.2) shows the courier charges (in Rs) for sending a 1 kg parcel from one city to another. Study the table carefully and answer the questions that follow:*

TABLE 2.2 Courier Charges for Sending Parcels

Cities	Allahabad	Mumbai	Kolkata	Delhi	Lucknow
Allahabad	–	10	5	15	10
Mumbai	10	–	7	25	20
Kolkata	5	7	–	20	15
Delhi	15	25	20	–	10
Lucknow	10	20	15	10	–

7. Among the following, the charges will be the least for sending a parcel from
   (a) Allahabad to Lucknow
   (b) Mumbai to Delhi
   (c) Lucknow to Delhi
   (d) Kolkata to Mumbai
8. For sending parcel from Kolkata, the least charges will be for:
   (a) Allahabad (b) Mumbai
   (c) Delhi (d) Lucknow
9. For which one of the following couriers will the charges be different from the other three?
   (a) Mumbai to Allahabad
   (b) Allahabad to Lucknow
   (c) Delhi to Lucknow
   (d) Delhi to Mumbai
10. If the cost per kg is assumed to be directly proportional to the distance between the cities, then it can be inferred that Mumbai is farthest from:
    (a) Allahabad (b) Kolkata
    (c) Delhi (d) Lucknow
11. The cost of sending a parcel from Mumbai to Allahabad and then from Allahabad to Lucknow varies from the cost of directly sending a parcel from Mumbai to Lucknow by:
    (a) Rs10 (b) Rs 5
    (c) No Variance (d) Rs 20
12. Which of the following routes of sending a 1 kg parcel, will have no extra cost even if the parcel had been sent directly from the origin city to the destination city?
    (a) Mumbai- Allahabad-Delhi
    (b) Mumbai-Allahabad- Lucknow
    (c) Kolkata-Allahabad- Lucknow
    (d) All of these

Directions for Questions 13–17 *Study Table 2.3 and answer the given questions.*

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TABLE 2.3 Employees Working in Various Departments of Hoola Boola Moola, Inc.

Years	Departments (Number of Employees)				
	Production	Marketing	Corporate	Accounts	Research
1999	150	25	50	45	75
2000	225	40	45	62	70
2001	450	65	30	90	73
2002	470	73	32	105	70
2003	500	80	35	132	74
2004	505	75	36	130	75

13. In which year did the total number of employees reach (approximately) twice the total number of employees that the factory had in the year 1999?
    (a) 2000 (b) 2001
    (c) 2002 (d) 2003
14. In which department did the number of employees (approximately) remain the same during the years 1999 and 2004?
    (a) Production (b) Corporate
    (c) Research (d) None of these
15. In how many years was the number of employees working in the production department more than 50% of the total employees?
    (a) 2 (b) 3
    (c) 4 (d) 5
16. In which year/s did each department have a larger number of employees than it had in the immediately preceding year?
    (a) 2002 (b) 2004
    (c) 2001 (d) 2003
17. Which department had less than 10% of the employees through all the years shown in the table?
    (a) Marketing (b) Corporate
    (c) Accounts (d) None of these

Directions for Questions 18–22 *Study the data carefully (Table 2.4) and answer the following questions.*

TABLE 2.4 Production of Three Types of Plastic Materials in the Island of Hoola Boola Moola.

Months	Production of plastic materials					
	Polypropylene (in thousand tonnes)		Polyethylene Production (in thousand tonnes)		Nylon Filament Yarn Production (in thousand tonnes)	
	2011–12	2012–13	2011–12	2012–13	2011–12	2012–13
March	17.6	20.8	104	40	3150	2900
April	16.4	20.6	100	88	3050	2850
May	16.0	21.4	80	96	3000	2900
June	15.4	19.2	88	80	2520	2800
July	16.0	19.2	90	84	2600	2700
August	16.6	21.4	94	80	2650	2750
September	16.4	20.8	98	84	2500	2650
October	17.8	23.0	100	80	2200	3000
November	16.4	22.6	104	92	2000	2950
December	17.6	21.8	108	88	2250	3000
January	20.0	20.0	96	100	2750	2350
February	19.8	17.8	20	96	2600	2250
March	21.0	–	40	96	2900	–

18. In 2011–12, the ratio of the difference between the maximum and the minimum production of polyethylene, to the difference between the maximum and minimum production of Polypropylene, is nearly
    (a) 14 (b) 15
    (c) 16 (d) 18
19. The ratio of the maximum production of polyethylene in 2012–13 to the minimum production of polyethylene in 2011–12 is:
    (a) 4.8 (b) 5
    (c) 5.4 (d) 4.2
20. The maximum number of times the production in 2011–12 equals the production in 2012–13 (for the same month) is for which products?
    (a) Polypropylene
    (b) Polyethylene
    (c) Nylon Filament Yarn
    (d) None of these
21. For polypropylene, the production in 2011–12 is greater than the production in 2012–13, (for the corresponding month) for how many months:
    (a) 1 (b) 2
    (c) 3 (d) 4
22. The difference between the minimum production of polypropylene in 2012 – 13 and the minimum production of polypropylene in 2011–12 is how many times the difference in July's production of polyethylene (of the two years)?
    (a) 3 times (b) 2 times
    (c) equal (d) 0.4 times

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Directions for Questions 23–26 *Study Table 2.5 and answer the questions given below.*

TABLE 2.5 Age-wise Brand Ownership of Television Sets

Brand	1 year old	1–2 years old	2–5 years old	More than 5 years old
LG	15%	45%	40%	
Samsung	5%	15%	25%	55%
BPL	10%	10%	10%	70%
Videocon	25%	55%	20%	
Sony	15%	50%	20%	15%

23. If 1,00,000 TVs were sold last year, how many LG sets were sold?
    (a) 10,000 (b) 12,500
    (c) 15,000 (d) Cannot be determined
24. If the total BPL sets sold to date are 500,000, how many are more than one year old?
    (a) 500,000 (b) 450,000
    (c) 50,000 (d) Cannot be determined
25. Can we say that Samsung has lost market share?
    (a) Yes (b) No
26. When did Videocon capture the maximum market?
    (a) Last year (b) 2 years ago
    (c) 5 years ago (d) Cannot be determined

Additional Data for Questions 27–29 *Assume that these are the only brands of TVs that were sold and to date the numbers sold are as provided by Table 2.6. Answer questions 27–29 based on the information provided.*

TABLE 2.6 Data Relating to Television Sales

Brand	Units sold
LG	2,000,000
Samsung	7,000,000
BPL	3,000,000
Videocon	5,000,000
Sony	4,000,000

27. How many sets were sold over five years back?
    (a) 60 lakh (b) 65.5 lakh
    (c) 70 lakh (d) Cannot be determined
28. Which TV had the highest sales in the previous year?
    (a) BPL (b) Sony
    (c) Videocon (d) LG
29. If 50% of all TVs which are more than five years old are now defective, how many TV sets are not defective? (Assume that there are no other defectives in any other category.)
    (a) 177.75 lakh (b) 180 lakh
    (c) 145.5 lakh (d) Cannot be determined

Directions for Questions 30–34 *Read the table (Table 2.7) and answer the questions that follow:*

TABLE 2.7 Distribution of Students at Harvard University According to Professional Courses

S.No.	Course	FACULTY			
		Engineering		Non-Engineering	
		Girls	Boys	Girls	Boys
1.	Business Management	25	45	25	65
2.	Computers	23	186	20	32
3.	Finance	25	120	12	58
4.	Others	12	100	3	5

30. If 60% of the boys and 70% of the girls are successful in the courses taken by them, then what is the combined pass percentage? (approximately)
    (a) 67.2 (b) 63.1
    (c) 62 (d) 68.5
31. In which course is the percentage of girls (among the total number of students) higher than the percentage of girls in any other course?
    (a) Business Management
    (b) Computers
    (c) Finance
    (d) Others
32. By what percentage is the number of students doing Computers more than the number of students doing Business Management?
    (a) 67.2 (b) 63.1
    (c) 62 (d) 68.5
33. The percentage of girl engineers doing Business Management are:
    (a) 11.2 (b) 12.2
    (c) 15 (d) None of these
34. Taking all the courses together, by what percentage do the number of boys exceed the number of girls?
    (a) 521.4% (b) 421.4%
    (c) 321.4% (d) None of these

Directions for Questions 35–40 *Study Table 2.8 and answer the questions following that.*

TABLE 2.8 Age-wise Population Distribution of a State

Age Group	Percentage
Up to 15	30.00
Up to 25	47.75
Up to 35	65.00
Up to 45	79.50
Up to 55	93.75
Up to 65	98.87
Up to 110	100.00

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35. Which one of the age groups listed below accounts for the maximum population in the state?
    (a) 0–15 (b) 15–35
    (c) 26–45 (d) 46+
36. Out of every 400,000 people, the number of persons below 25 years is (approximately):
    (a) 181,000 (b) 191,000
    (c) 194,000 (d) None of these
37. If it is known that there are 40 million people below 36 years of age, then how many million people (approximately) are in the age group of 56–65?
    (a) 4.2 million (b) 3.8 million
    (c) 3.15 million (d) Cannot be determined
38. If there are 20 million people in the age group of 56 and above, what is the difference (approximately) between the total number of people in the age group of 16–25 and 46–55?
    (a) 10.2 million (b) 11.2 million
    (c) 12.2 million (d) Cannot be determined
39. If the difference between the number of people in the age groups of 46–55 and 26–35 is 3.9 million, then the total population (approximately) of the country is:
    (a) 120 million (b) 130 million
    (c) 390 million (d) None of these
40. What is the ratio of the number of people between 15 to 35 and the number of people above 35?
    (a) 2:1 (b) 65:35
    (c) 1:1 (d) None of these

ANSWER KEY

1. (c)	2. (b)	3. (a)	4. (c)	5. (b)	6. (d)	7. (d)
8. (a)	9. (d)	10. (c)	11. (c)	12. (d)	13. (b)	14. (c)
15. (d)	16. (d)	17. (a)	18. (c)	19. (b)	20. (a)	21. (a)
22. (d)	23. (d)	24. (b)	25. (b)	26. (d)	27. (b)	28. (c)
29. (a)	30. (c)	31. (a)	32. (b)	33. (d)	34. (c)	35. (b)
36. (b)	37. (c)	38. (b)	39. (b)	40. (c)		

EXPLANATORY NOTES

1. Maharashtra and Kerala show the required property.
2. 22.34/0.04 = 558.5.
3. Kerala's ratio of 312/301.7 is the highest amongst the four states.
4. Average of second column divided by average of Haryana, Himachal Pradesh, Karnataka, Kerala and Manipur—the states where average percentage increase in female literacy is higher than the overall average.
5. Sum of second column to the sum of the first column.
6. The data given is for the percentage change in literacy and hence this cannot be answered.
7. Kolkata to Mumbai costs Rs 7 only while the other three cost Rs 10, Rs 25 and Rs 10 respectively.
8. Kolkata to Allahabad will involve the least cost.
9. The cost of sending a parcel from Mumbai to Allahabad, from Allahabad to Lucknow and from Delhi to Lucknow are the same at Rs 10 each, while the cost of sending a parcel from Delhi to Mumbai is Rs 25 (different from the other three costs).
10. Mumbai is farthest from Delhi as it involves the greatest cost, and cost is proportional to distance.
11. The cost of sending a parcel from Mumbai to Lucknow via Allahabad is Rs (10+10) = Rs 20. The cost of sending a parcel from Mumbai to Lucknow directly is also Rs 20. Hence there is no variance in the cost.
12. It can be seen that there is no variance of cost in either of these three cases.
13. Total of 1999 is 345 while in 2001 it crosses 690.
14. The number of employees in research is 75 for the years 1999 and 2004.
15. This happens every year after 2000. Hence 5 is the answer.
16. Visual inspection gives 2003 as the required year.
17. Marketing is the only department which satisfies this condition.
18. 88/5.6 = 16
19. 100/20 = 5

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20. Happens once for Polypropylene in January.
21. The statement is true for one month.
22. 2.4/6=0.4
23. The data gives brandwise ownership by age, not market share details. Hence, the question cannot be answered.
24. 90% of the total BPL sets are over one year old.
25. No information is available about this.
26. No information about market shares is available.
27. 55% of Samsung + 70% of BPL + 15% of Sony= 65.5 lac sets.
28. Videocon sold 25% of its 5,000,000 TV sets in the last year. This value is higher than the sales of any other T.V. (Total T.V. sets sold–Defectives)
29. 210–0.5* 65.5 = 177.75 lac sets
30. Take the weighted average. It can be seen that the approximate ratio of boys to girls is 4:1. Hence, using allegation, the answer will be

Note: (This Technique is explained in detail in my book QA for CAT)

31. Visual ratio comparison question. It is clearly the case for Business Magagement.
32. 101/160 = 63.1%
33. 25/85 = 5/17 = 30% (approx). Hence none of these.
34. (611–145)/145 = 466/145 = 321.4%
35. Visual Interpretation of the age groups given, 15–35 has 35%(65 –30), which is the max.

Note for interpretation of the table: The table shows the cumulative percentage of people upto a certain age. Thus, it can be interpreted that 30% of the people belong to the under 15 age group, while 47.75% of the people are from the age group up to 25. Hence, the percentage of people between 15–24 will be 47.75 – 30 = 17.75%. Use this logic to solve questions 35–40.

36. 47.75% of 400,000
37. 65% corresponds to 40 million and correspondingly 5.12% corresponds to 3.15 million. (5.12 = 98.87 – 93.75)
38. 6.25% people belong to the age group 56 and above, and this corresponds to 20 million, then 3.5% (difference between the respective age groups referred to) = 11.2 million.
39. 3% is 3.9 million, hence 100% will be 130 million.
40. 35% of the population is between 15–35 and 35% is above 35. Hence the answer is 1:1.

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3

Bar Charts

OUTLINE

Learning Objectives

- Get a first hand view of how data is presented through its organisation in the form of bar charts.
- Get an understanding of typical data which can be represented through bar charts. Also understand the concept of time series.
- Get a first hand feel of the typical question types that are asked on the basis of bar charts.
- Different Bar Charts covered include Simple Bar Charts, Composite Bar Charts, Deviation Bar Charts, Stacked Bar Charts, Percentage Representation on a stacked bar chart, etc.

Chapter Highlights

- Introduction to bar charts
- Practice exercise on bar charts containing simulated examination questions

In the chapter on tables, we discussed them as a convenient and versatile tool for presenting data. We saw their flexibility and versatility for presenting data. Besides, we also got an exposure to the kind of questions that can be created on a table.

However, it must be pointed out here that the visual impact created by tables is considerably lower than that which is created by graphs and charts. Charts and graphs give a bird's eye-view of the numerical data to be presented. Hence, they become easy to understand and facilitate comparisons. They have been used extensively since time immemorial, as due to their visual impact they save a lot of time and effort.

In the current chapter we will concentrate on Bar Charts as a device of presenting data.

Bar diagrams (or bar charts) are one of the oldest and most commonly used diagrams for presenting data. A bar chart consists of bars, each of which is a thick box. The value of the reading of the bar is determined by the height of the bar.

Points noteworthy with respect to bar charts:

- Bar diagrams are visual aids for presenting statistical data. Very often in bar charts, different colours, shades, dots, dashes, etc. are used in the bars to distinguish between different continuous variables being represented. There will always be an explanatory index indicating the meanings of the different colours, shades and markings.

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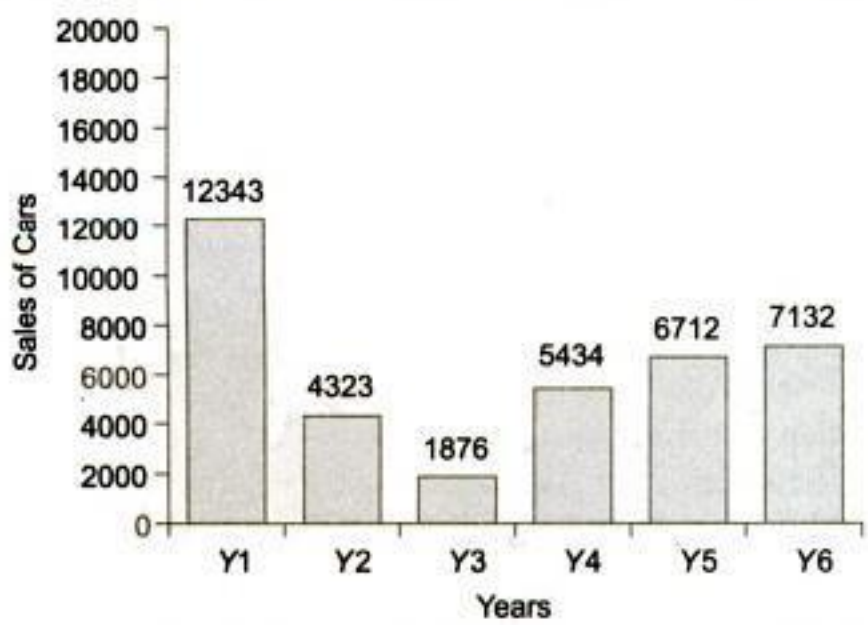
- Each bar diagram has a title (which is displayed either at the top or at the bottom of the diagram) indicating the subject matter depicted in the diagram. Besides, at times, there may be footnotes at the bottom of the diagram to explain facts that are not covered in the title. The student is advised to be very careful about reading these footnotes and not to overlook these facts while interpreting bar diagrams.
- One axis (normally the x-axis) of every bar diagram will represent a discrete variable while the other axis represents the scale for one or more continuous variables.

We now move onto the different kinds of bar charts and the kinds of data that can be represented on a bar chart:

SIMPLE BAR CHART

The simple bar chart is the 'simplest' bar chart which has one continuous variable charted along with one discrete variable. Figure 3.1 shows an example.

FIGURE 3.1 Simple Bar Chart



The following kinds of data can be represented on a simple bar chart:

Discrete Variable	Continuous Variable
Years	Sales (in Rs) trend of a single company
Years	Sales (in units) trend of a single company
Years	Profit trend of a single company
Years	Profit per unit trend of a single company
Years	No. of employees trend of a single company
Years	Population trend of a single country
Company names	Sales of each company for a particular year

TASK FOR STUDENT

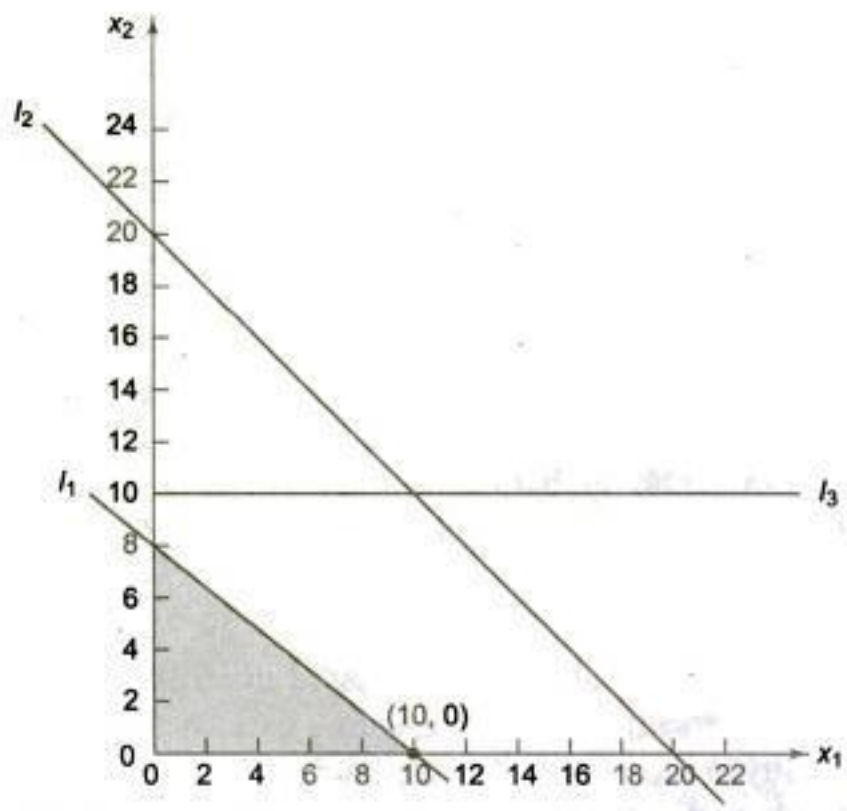
Doubtlessly there will be varied types of data that can be represented on a simple bar chart. You are required to add to the list given and try to visualise simple bar charts for your own set of combinations of one discrete and one continuous variable.

STACKED BAR CHART

The length of a bar, on a bar chart, normally represents the magnitude of a single continuous variable. However, in certain cases it might be feasible and in fact required to break up the magnitude of the main continuous variable into its component parts. When this sort of representation is used, the chart formed is called a stacked bar chart.

Different shades, colours, etc. are used to distinguish the various components and an index is given along with the chart to explain these differences. Figure 3.2 gives an example.

FIGURE 3.2 Stacked Bar Chart



COMPOSITE BAR CHART

One of the primary limitations of the simple bar chart is that it can only be used to display a single continuous variable. Similarly, although a stacked/component bar chart can display multiple continuous variables, it can only do so if all the continuous variables add up to a single continuous variable. In other words, it can only display one continuous variable and its constituent parts.

However, if two or more sets of continuous variables are to be shown on the same bar chart, we use what is called a composite bar chart. Figure 3.3 will make it clear.

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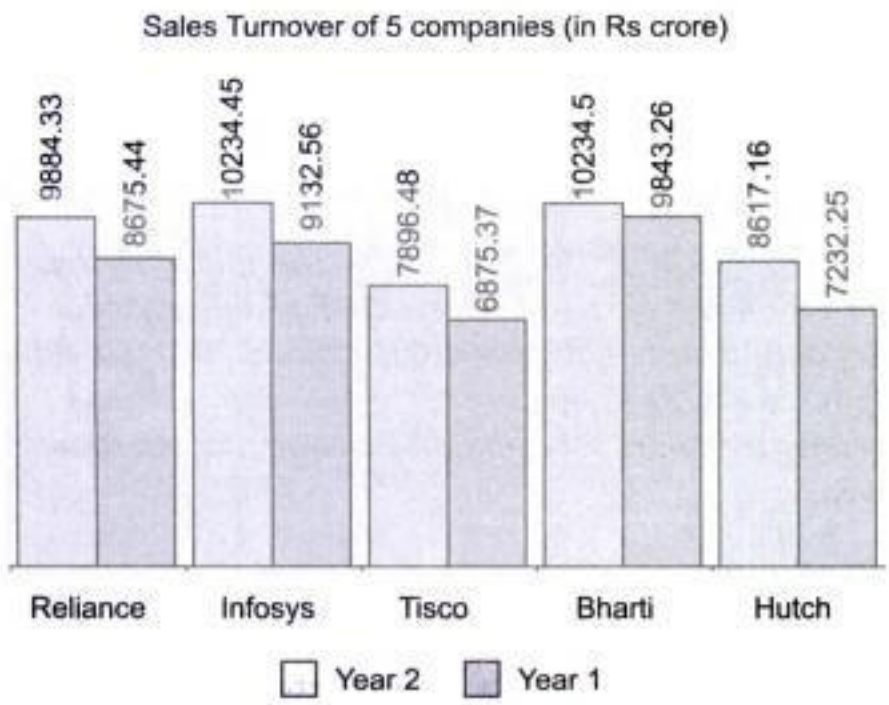
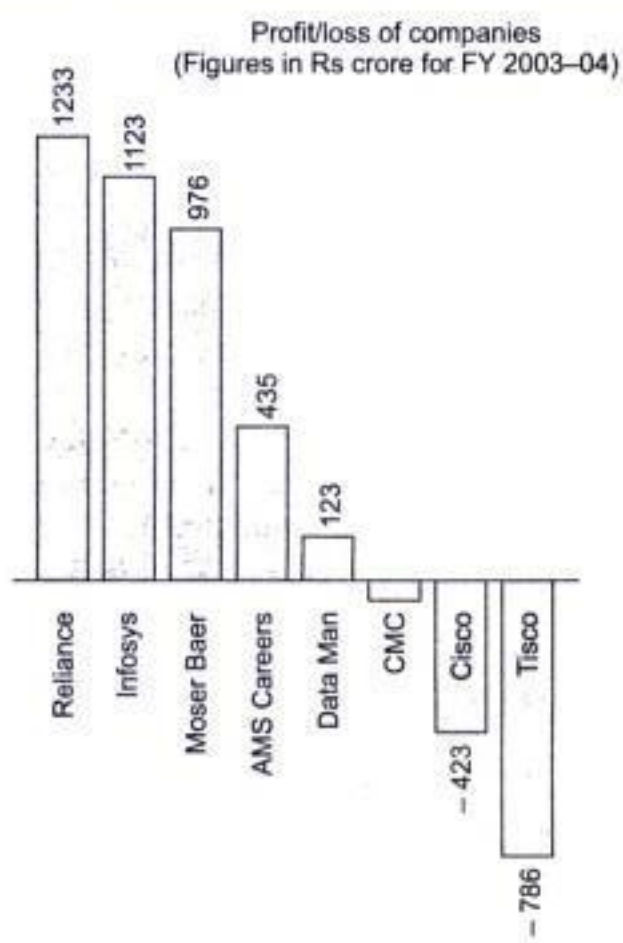
FIGURE 3.3 Composite Bar Chart



THE USE OF BAR CHARTS TO SHOW DEVIATIONS

Deviation bars are useful for graphic presentation of continuous variables which can have both positive and negative values, i.e., surplus or deficit, net profit or loss, net of imports and exports. In general, continuous variables which have both positive and negative values are best represented on bar charts.

FIGURE 3.4 Representing Deviation Through Bar Charts



A base line is created and positive values (such as profit, surplus), etc., are represented by bars above the base line while negative deviations (loss or deficit) are represented by bars below the base line. Figure 3.4 will make it clear.

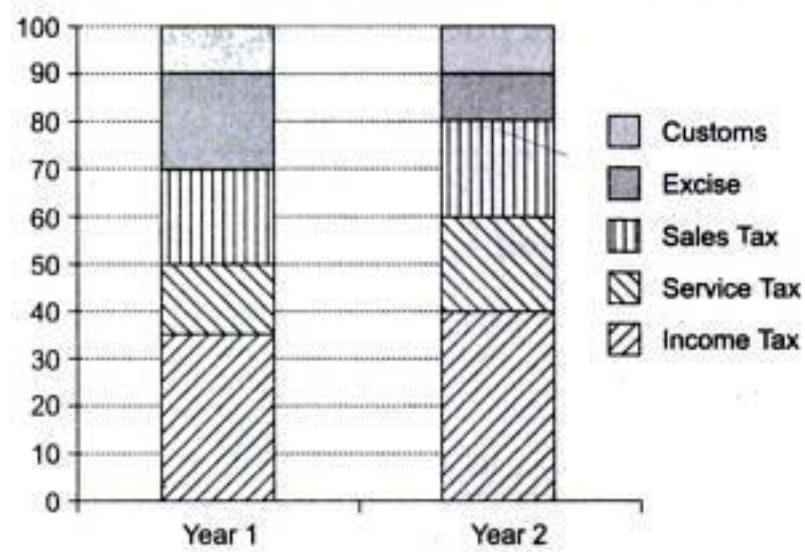
REPRESENTATION OF PERCENTAGE ON A STACKED BAR CHART

Sometimes stacked bars can also be used to represent the break-up of some continuous variable. Figure 3.5 will make it clear.

Such a use of bar charts is quite convenient for comparing two or more sets of data.

Figure 3.5 shows the break-up of the various sources of revenues for the Government of India over a two-year period.

FIGURE 3.5 Representing Percentage on a Stacked Bar Chart

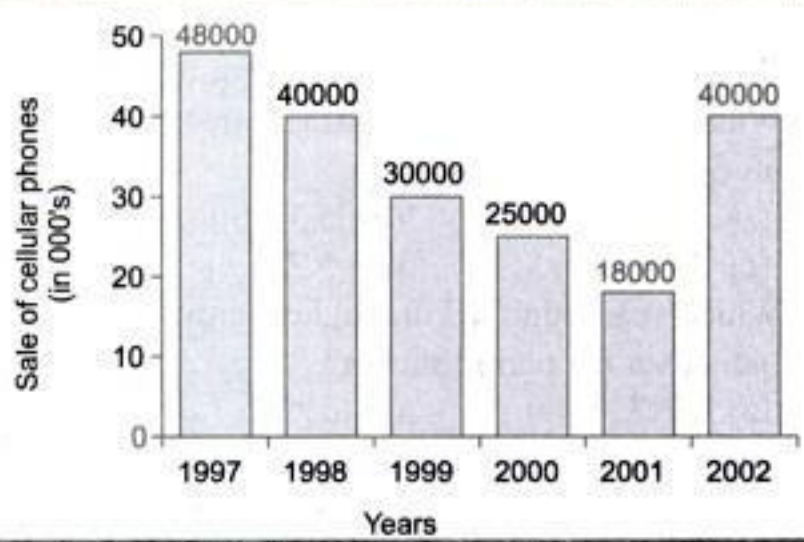


We now move on to give you a feel of the kinds of questions that can be created on bar graphs.

EXERCISE

Directions for Questions 1–4 *Study the following bar chart (Figure 3.6) to answer the questions*

FIGURE 3.6 Sale of Cellular Phones



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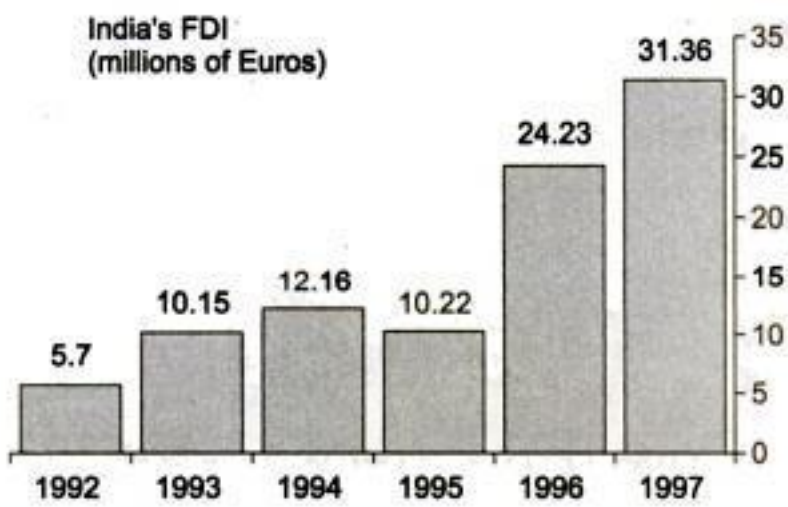
1. The percentage increase in sales from 2001 to 2002 was
   (a) 115% (b) 128%
   (c) 122% (d) 118%
2. The sum of sales of cellular phones in the years 1999 and 2001 is equal to that in
   (a) 1997 (b) 1998
   (c) 2000 (d) 2002
3. The two years between which the rate of change of cellular phones is minimum are:
   (a) 1997 and 1998 (b) 1999 and 2000
   (c) Both 1 & 2 (d) 2001 and 2002.
4. The difference in the sales of cellular phones for the years 1997 and 1999 is
   (a) 500 units (b) 1,000 units
   (c) 5,000 units (d) 18,000 units

Directions for Questions 5–9 *The following bar chart (Figure 3.7) shows the trends of foreign direct investment (FDI) into India from all over the world.*

FIGURE 3.7 Trends of FDI in India

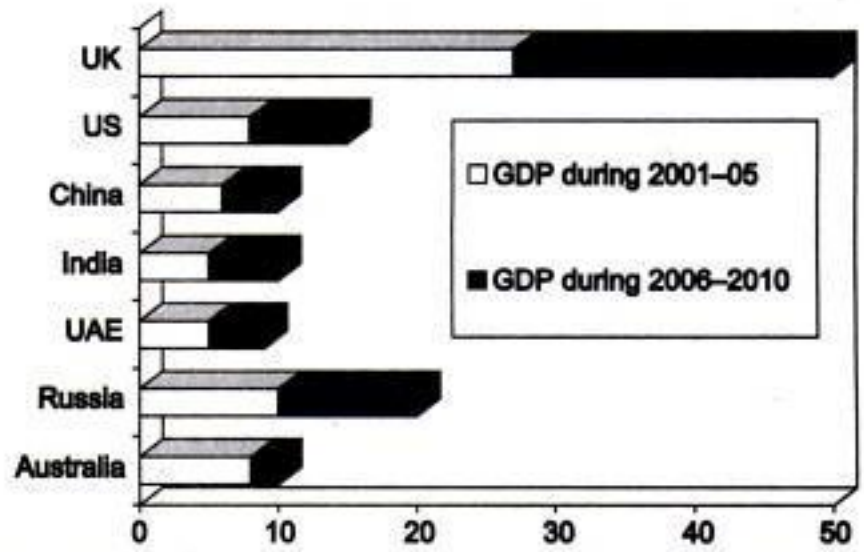


5. What was India's total FDI for the period shown in the figure?
   (a) 93.82 (b) 93.22
   (c) 93.19 (d) None of these
6. What was the absolute difference in the FDI to India in between 1996 & 1997?
   (a) 7.29 (b) 7.13
   (c) 8.13 (d) None of these
7. What was the ratio of investment in 1997 over the investment in 1992?
   (a) 5.50 (b) 5.36
   (c) 5.64 (d) 5.75
8. Which year exhibited the highest growth in FDI in India over the period shown?
   (a) 1993 (b) 1994
   (c) 1995 (d) 1996
9. If India's FDI from OPEC countries was proportionately the same in 1992 and 1997 as the total FDI from all over the world and if the FDI in 1992 from the OPEC countries was Euro 2 million, what was the amount of FDI from the OPEC countries in 1997?
   (a) 11 (b) 10.72
   (c) 11.28 (d) 11.5

Directions for Questions 10–13 *The following bar chart (Figure 3.8) represents the GDP of different countries during the half decades 2001–05 and 2006–10. All figures are in Rs billion.*

Study the chart carefully and answer the questions given.

FIGURE 3.8 GDP of Select Countries



10. Which of the countries listed below accounts for the highest GDP during the half decade 2001 to 2005?
    (a) Russia (b) China
    (c) India (d) UAE
11. Which of the countries listed below accounts for the maximum GDP during the half decade 2006 to 2010?
    (a) UAE (b) US
    (c) India (d) China
12. Out of every Rs 10,000 spent during the decade 2001–10, approximately how much was the GDP of Russia during the half decade 2001–05?
    (a) Rs 700 (b) Rs 1,400
    (c) Rs 2,800 (d) None of these
13. The GDP of UAE is what fraction of the GDP of the UK for the decade (approximately)?
    (a) $1/4^{th}$ (b) $1/5^{th}$
    (c) $1/6^{th}$ (d) Data inadequate

Directions for Questions 14–17 *The following chart (Figure 3.9) represents the number of students of AMS Careers at its Lucknow centre who passed the CAT exam or the XAT exam or the CET exam or none of these exams. (Assume that there are no students who passed more than one exam.)*

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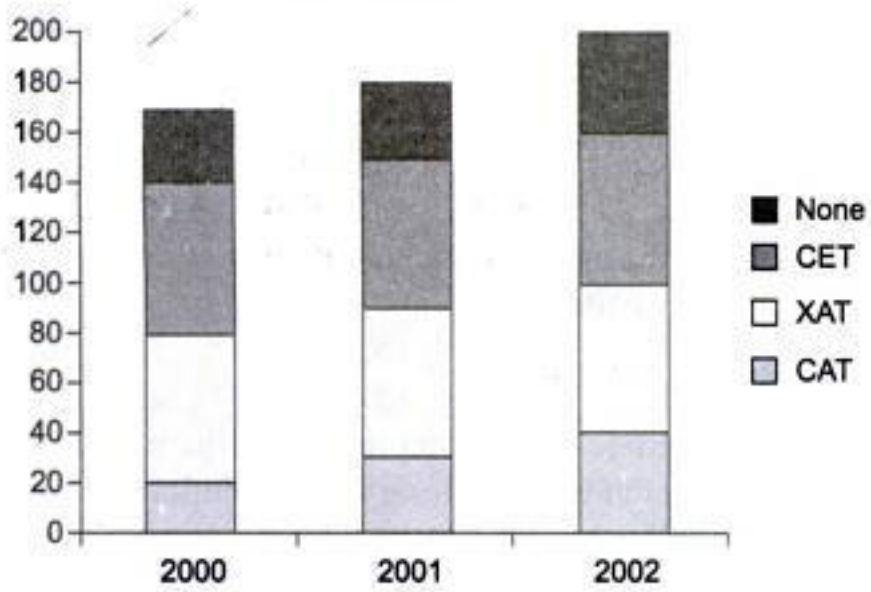
FIGURE 3.9 Number of Students who Qualified CAT/XAT/CET/CET Exams

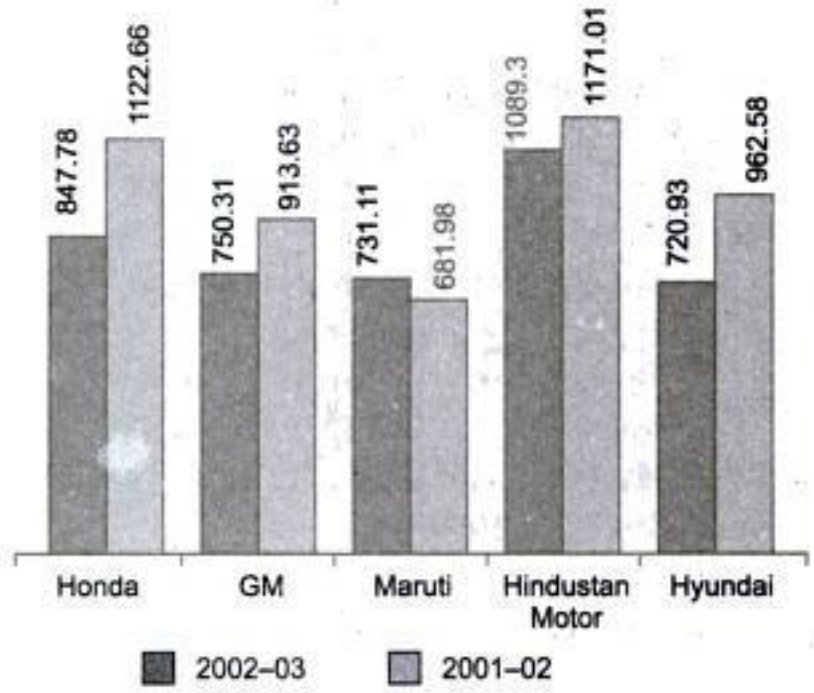


14. What was the percentage of students who cleared CAT in 2000?
    (a) 19.56% (b) 12.65%
    (c) 14.28% (d) 11.76%
15. What was the percentage of students who succeeded in at least one of the three exams in 2000?
    (a) 82.4% (b) 82.8%
    (c) 82.35% (d) 83.3%
16. Which year showed the best result in MBA entrance exams for the institute (in terms of percentage of students who cleared)?
    (a) 2000 (b) 2001
    (c) 2002 (d) Cannot be determined
17. What is the percentage increase in the number of students in 2002 over 2000?
    (a) 30% (b) 17.64%
    (c) 117.6% (d) 85%

Directions for Questions 18–22 *Study the following bar chart (Figure 3.10) carefully and answer the questions given.*

18. What is the approximate difference between the average sales turnover of all the companies put together between the years 2001–02 and 2002–03?
    (a) 133.45 (b) 142.48
    (c) 117.6 (d) None of these
19. What should have been the sales turnover of GM in 2002–03 to have shown an excess of the same quantum over 2001–02 as shown by the sales turnover of Maruti?
    (a) 953.76 (b) 963.76
    (c) 952.76 (d) 962.76

FIGURE 3.10 Sales Turnover of 5 companies (in Rs crore)



20. Which of the companies shows the maximum percentage difference in sales turnover between the two years?
    (a) Honda (b) GM
    (c) Hyundai (d) Maruti
21. What is the percentage change in the overall sales turnover of the five companies together between 2001–02 to 2002–03?
    (a) 17.21% (b) 14.68%
    (c) 12.67% (d) 21.24%
22. What is the absolute change in the overall sales turnover of the five companies together between 2001–02 to 2002–03?
    (a) 712.43 (b) 142.48
    (c) 683.53 (d) None of these

Directions for Questions 23–25 *The following chart (Figure 3.11) shows the production of cars in thousands.*

23. The ratio of Hindustan Motors' production in 2003–04 to Honda's production in 2002–03 is:
    (a) 0.66 (b) 1.5
    (c) 2 (d) None of these
24. For how many companies has there been no decrease in production in any year from the previous year?
    (a) One (b) Two
    (c) Three (d) Four
25. How many companies have shown production below their average production in 2002–03, but have showed above average production in 2003–04?
    (a) One (b) Two
    (c) Three (d) Four

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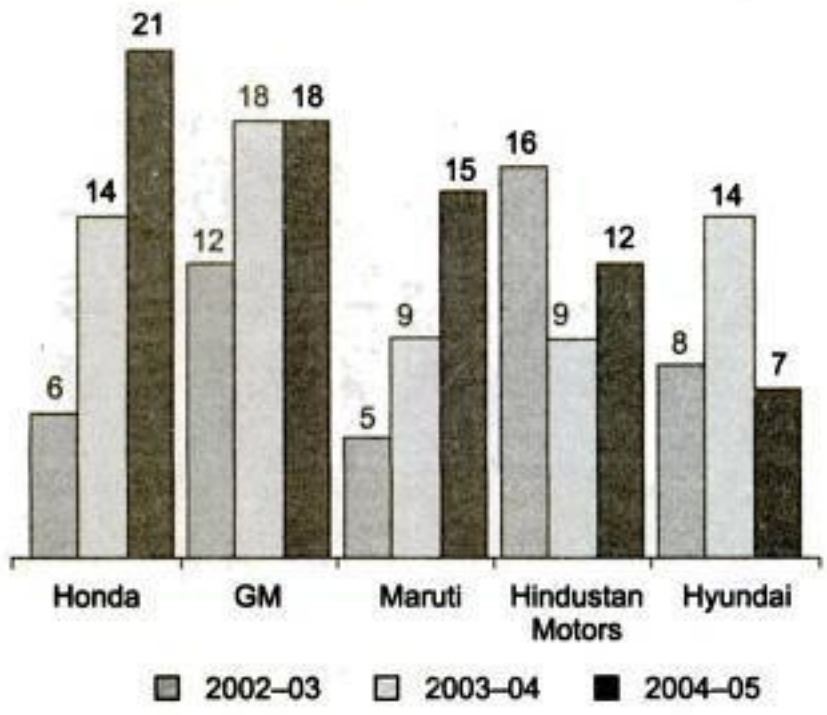
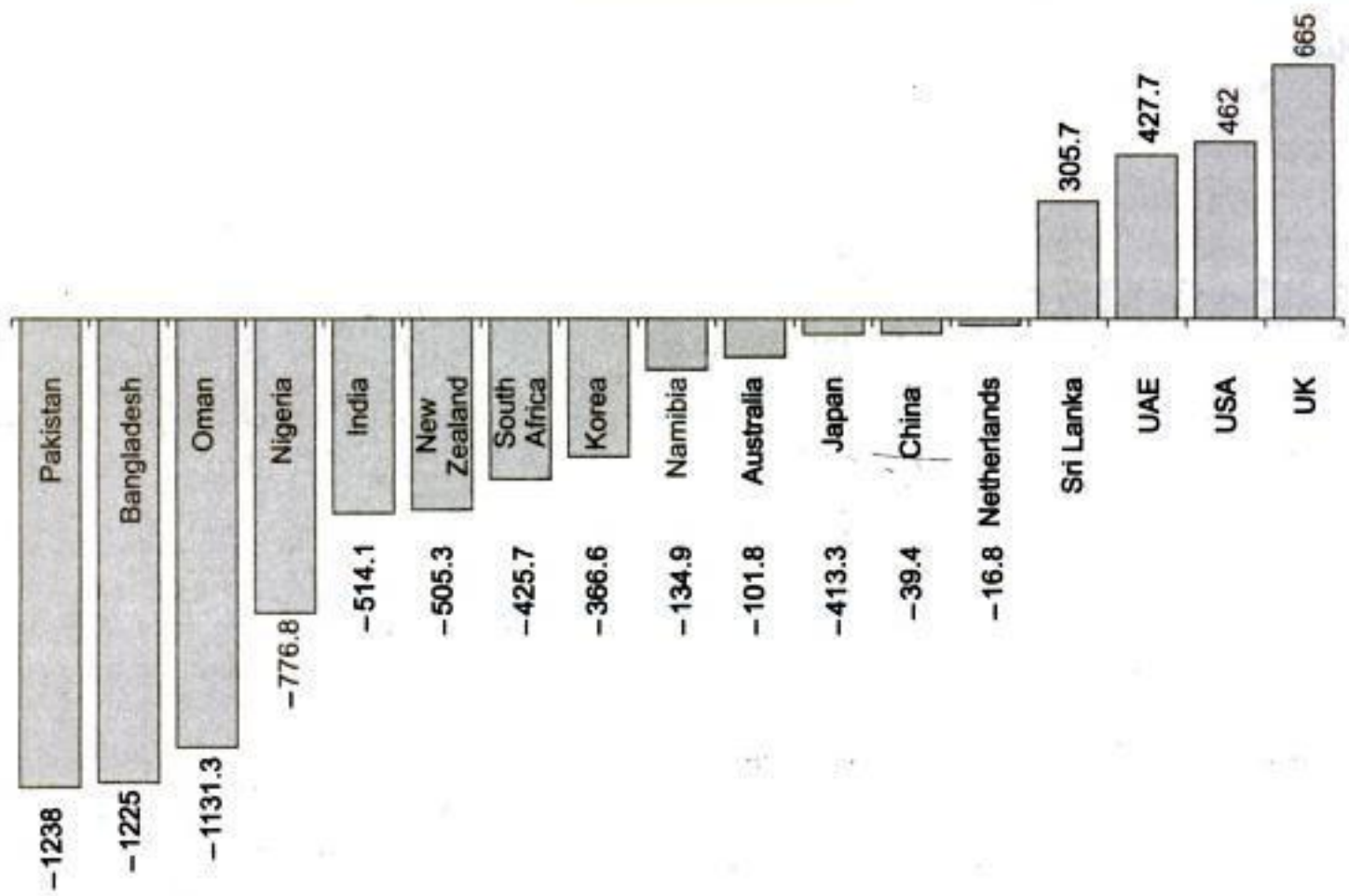
FIGURE 3.11 Production of Cars for 2002–05 period from Select Manufacturers



Directions for Questions 26–30 *The total of the first three deficit countries (in Rs crore) = 3594.3. The total of the next five deficit countries (in Rs crore) = 2588.5. The total of the last five deficit countries (in Rs crore) = 334.2. The total of the four surplus countries (in Rs crore) = 1860.4.*

26. The state whose surplus is nearly equal to the average of the four surplus countries is
    (a) Sri Lanka (b) UAE
    (c) USA (d) UK
27. The ratio of the deficit of the first five deficit countries to the overall deficit of all the deficit countries is nearly equal to:
    (a) 0.72 (b) 0.75
    (c) 0.80 (d) 0.85
28. The average of the total deficit of the middle five deficit countries is closest to the deficit of which country?
    (a) Korea (b) South Africa
    (c) UAE (d) None of these
29. The net total deficit/surplus is equal to:
    (a) 4656.6 surplus (b) 4656.6 deficit
    (c) 3836.5 deficit (d) None of these
30. The ratio between the difference between the highest and the lowest of the surplus countries to the difference between Bangladesh and Oman is:
    (a) 3.44 (b) 2.96
    (c) 4.5 (d) 3.83

FIGURE 3.12 Cumulative Trade Deficit/Surplus of Countries for the Year 2006–07 (All figures in Rs crore)



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Directions for Questions 31–35 *Study the following bar charts (Figures 3.13 (A) and 3.13) (B) before answering the questions.*

FIGURE 3.13 *(A)* Foreign Trade (Imports) by Countries for the Year 1993–94

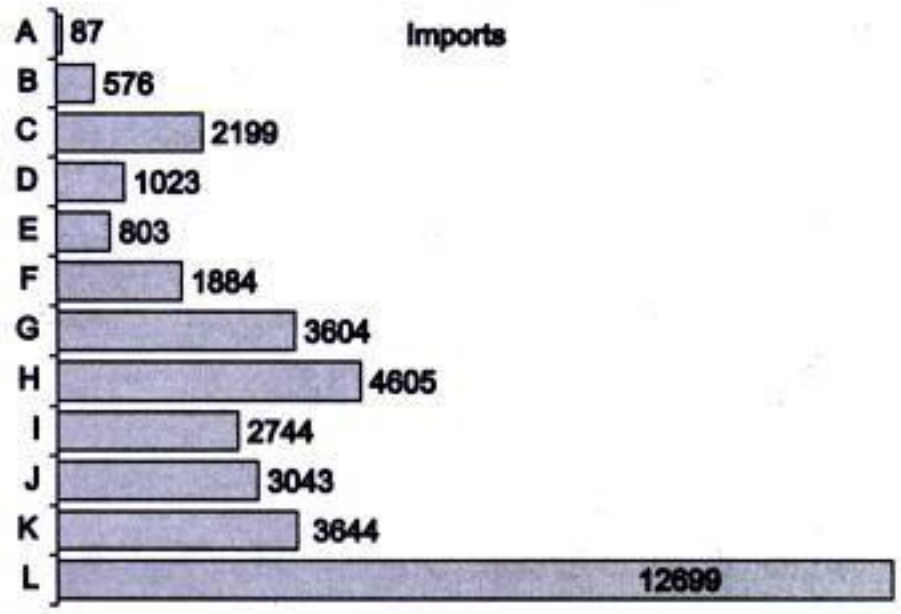
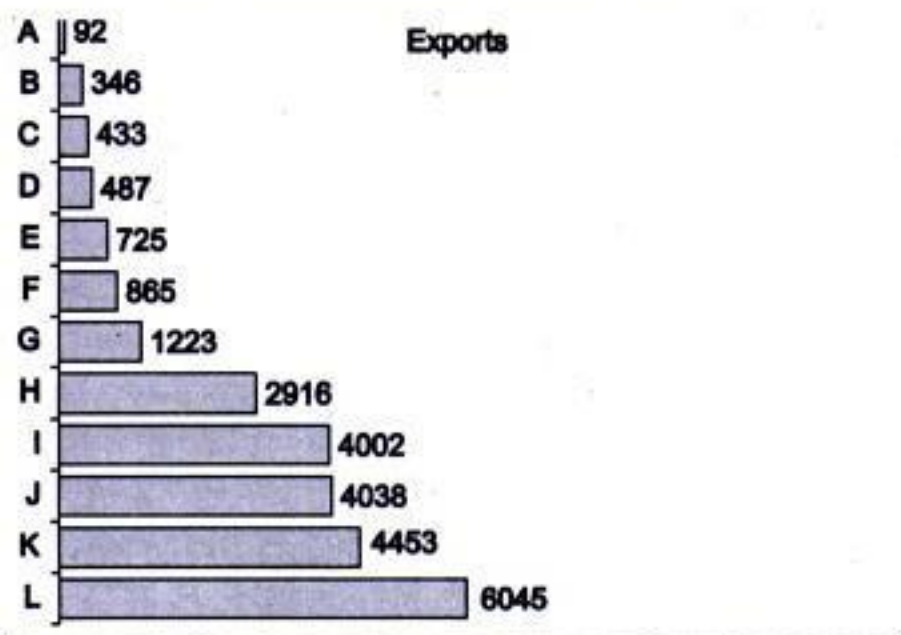


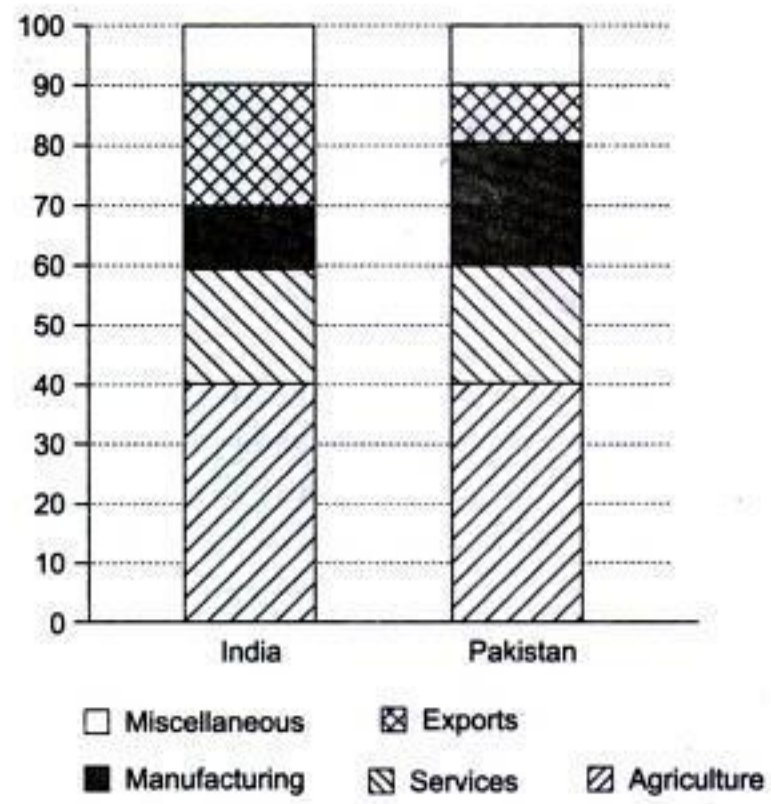
FIGURE 3.13 *(B)* Foreign Trade (Exports) by Countries for the Year 1993–94



31. How many countries exhibited a trade surplus?
    (a) 5 (b) 4
    (c) 3 (d) 6
32. The highest trade deficit was shown by which country?
    (a) C (b) G
    (c) H (d) L
33. The ratio of Exports to Imports was highest for which country?
    (a) A (b) I
    (c) J (d) K
34. The total trade deficit/surplus for all the countries put together was?
    (a) 11286 surplus (b) 11286 deficit
    (c) 10286 deficit (d) None of these
35. The ratio of the maximum exports to the minimum imports was closest to:
    (a) 64 (b) 69
    (c) 74 (d) 79

Directions for Questions 36–40 *The following bar chart (Figure 3.14) shows the composition of the GDP of two countries (India and Pakistan).*

FIGURE 3.14 Composition of GDP of Two Countries



36. What fraction of India's GDP is accounted for by Services?
    (a) 6/33 (b) $1/5^{th}$
    (c) $2/3^{rd}$ (d) None of the above
37. If the total GDP of Pakistan is Rs10,000 crore, then the GDP accounted for by Manufacturing is:
    (a) Rs 200 crore (b) Rs 600 crore
    (c) Rs 2,000 crore (d) Rs 6,000 crore
38. If the total GDP of India is Rs 30,000 crores, then the GDP accounted for by Agriculture, Services and Miscellaneous is:
    (a) Rs 18,500 crore (b) Rs 18,000 crore
    (c) Rs 21,000 crore (d) Rs 15,000 crore
39. Which country accounts for higher earning out of Services and Miscellaneous together?
    (a) India
    (b) Pakistan
    (c) Both spend equal amounts
    (d) Cannot be determined
40. If the total GDP is the same for both the countries, then what percentage is Pakistan's income through agriculture over India's income through services?
    (a) 100% (b) 200%
    (c) 133.33% (d) None of these

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ANSWER KEY

1. (c)	2. (a)	3. (c)	4. (d)	5. (a)	6. (b)	7. (a)
8. (d)	9. (a)	10. (a)	11. (b)	12. (d)	13. (b)	14. (d)
15. (c)	16. (b)	17. (b)	18. (b)	19. (d)	20. (c)	21. (b)
22. (a)	23. (b)	24. (c)	25. (c)	26. (c)	27. (b)	28. (a)
29. (b)	30. (d)	31. (b)	32. (d)	33. (b)	34. (b)	35. (b)
36. (b)	37. (c)	38. (c)	39. (d)	40. (a)		

EXPLANATORY NOTES

1. The percentage increase exhibited is: $\frac{40-18}{18} \times 100 = 122\%$ approx.
2. The sum of sales in the two years is 30,000 + 18,000 = 48,000, which is the sales value for 1997.
3. The lowest rate of change is 16.66% and is exhibited by both 1 and 2.
4. The required answer is got by 48,000 – 30,000 = 18,000.
5. Total FDI investment in the figure shown is = 5.7 + 10.15 + 12.16 + 10.22 + 24.23 + 31.36 = 93.82 bn
6. The difference in investments over 1986–87 was $ 11.13 bn.
7. The 1997 figure of investment as a factor of 1992 investment = 31.36/5.70.
8. It can be seen that the FDI in 1996 more than doubles over that of 1995. No other year is close to this rate of growth.
9. (a). Let x be the FDI in 1997.

   Then: $\frac{2}{5.7} = \frac{x}{31.36}$
10. Visually clear that Russia is the answer.
11. Visually clear that US is the highest amongst the given options.
12. Russia will account for 10 out of 125, i.e., 8% of the total, i.e., 800 out of 10,000 (approximate values based on visual interpretation).
13. 10/50 = 20% = $1/5^{th}$
14. $\frac{20 \times 100}{170}$
15. $\frac{140 \times 100}{170}$
16. Compare the respective pass percentages for the three years. $\frac{140}{170} < \frac{150}{180}$ and $\frac{150}{180} > \frac{160}{200}$
17. $\frac{30 \times 100}{170}$
18. Difference between the sum of the two years divided by 5.
19. GM should have increased its sales turnover by Rs 49.13 crore. Hence, the answer is: 913.63 + 49.13 = 962.76
20. Hyundai with 25.25% is marginally higher than Honda with 24.5%.
21. The required answer will be given by
    100 – the percentage value of the fraction (Absolute change/ first year's value)
22. Absolute value of the difference between the sum of the turnover of the five companies for 2001–02 and 2002–03.
23. The required ratio is 9/6 = 1.5.
24. By visual inspection we can say that Honda, GM and Maruti have not shown a decrease.
25. Average sales of company:

$$\text{Honda} = \frac{6+14+21}{3} = 13.66$$

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$$\text{GM} = \frac{12+18+18}{3} = 16$$

$$\text{Maruti} = \frac{5+9+15}{3} = 9.66$$

$$\text{Hindustan Motors} = \frac{16+9+12}{3} = 12.33$$

$$\text{Hyundai} = \frac{8+14+7}{3} = 9.66$$

Honda, GM and Hyundai satisfy the criteria.

26. The average trade surplus of the four countries is: 1860.4/4= 465.1. Of the four options, USA has the closest value.
27. The required answer is 4885.2/6517.
28. The middle five deficit countries are India, New Zealand, South Africa, Korea and Namibia. Their average deficit is 1946.6/5=389.32. Korea's deficit is closest to this value.
29. Adding all surpluses and subtracting all deficits will give an overall value of deficit of 4656.6.
30. The required answer will be equal to 360/94 (approximately).
31. Out of a total of 12 countries, 8 showed a deficit while 4 showed a surplus.
32. Visually it is clear that L has the highest trade deficit.
33. I has a ratio of 4002/2744 = 1.45, which is the highest.
34. Sum of exports–sum of imports = deficit (11286).
35. 6045/87
36. Services accounts for 20%, i.e., $1/5^{th}$ of the GDP of India.
37. 20% of 10000 = 2000
38. (40+20+10)% of 30,000 = Rs 21,000 crore.
39. Although the percentage on Services and Miscellaneous put together is equal for both the countries, we cannot comment on this since we have no data about the respective GDPs.
40. Since the GDP is same, the answer will be got by (40–20)/20 = 100%.

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4

X-Y Charts

OUTLINE

Learning Objectives

- Get a first hand view of how data is presented through its organisation in the form of X-Y charts.
- Get an understanding of the typical data which can be represented through X-Y charts. Also understand the concept of time series as it applies to X-Y Charts.
- Get a first hand feel of what are the typical question types that are asked on the basis of X-Y charts.

Chapter Highlights

- Introduction to X-Y charts
- Practice exercise on X-Y charts containing simulated examination questions
- Link between X-Y Charts and Time Series data

In Chapter 3, we studied bar charts or bar diagrams as a mode of data presentation. In this chapter, we shall concentrate on *x-y* graphs as a mode of data presentation. While bar charts are useful for visual presentation of categorical and geographical data, data related to time-series and frequency distribution is best represented through *x-y* or line graphs. This representation is widely used by newspapers, television, government reports, magazines and research papers.

Besides, *x-y* graphs are also very useful for determining trends, rate of change and for illustrating comparisons with respect to some time series.

THE TYPICAL DATA SHOWN ON AN X–Y CHART INVOLVES A TIME SERIES

A time series is an arrangement of data on the basis of time, i.e., in chronological order. The time period may be a year, quarter, month, week, days, hours, etc. Time series are extremely essential for the measurement of economic and business performance. Hence, most data relating to economics and business are in the form of time series. In time-series data, time (the independent variable) is seen as a discrete variable while the continuous variable being measured defines the other dependent variable.

Thus we have continuous variables like the population of a country, GDP of a country, data on exports and imports in an economy, data of production, sales, profit, etc., of a company and so forth which are measured against time.

Normally time is taken along the *x*-axis and the dependent continuous variable is taken along the *y*-axis.

As you go through the exercise below you will see examples of various presentations of data, possible through *x-y* charts. These are listed below for your quick reference. As you go through the exercise, familiarise yourself with the following representations.

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Examples of Various Types of Data Presentation Possible through X-Y Charts.

1. **Single Dependent (Continuous) Variable Graph:** These graphs show changes in a single variable over a certain period of time.
2. **More than One Dependent (Continuous) Variable Graph:** In this type of graph, two or more lines are drawn to represent two or more dependent variables.
3. **Graphs with Two Scales:** When two continuous variables having different units of measurement have to be shown on the same graph, we use two scales on the graph.
4. **Range Graph:** For some specific types of data (such as temperatures, run rates, etc.), it is essential to depict the range of the variation of the variable over a period of time. This is depicted using a range graph, which shows the deviation between different values of the variable under consideration.
5. **Band Graph:** Like a stacked bar chart, the band graph is a line graph used to display the total value of a continuous variable broken up into its different components for each period.
6. **Speed Time Graph:** This is a special case of an x-y chart where the respective axes show the speed of a moving body against time.

EXERCISE

Directions for Questions 1–5 Refer to the graph (Figure 4.1) and answer the questions given below.

FIGURE 4.1 Consumer Price Index in 1993–94

1. Which month showed the highest absolute difference in the Consumer Price Index (CPI) over the previous month?
   (a) March (b) April
   (c) May (d) July
2. Which month showed the highest percentage difference in the CPI over the previous month?
   (a) March (b) April
   (c) May (d) July
3. For how many months was the CPI greater than 350?
   (a) One (b) Two
   (c) Three (d) Four
4. In how many months was there a decrease in the CPI?
   (a) One (b) Two
   (c) Three (d) Four
5. The difference in the number of months in which there was an increase in the CPI and the number of months in which there was a decrease was:
   (a) One (b) Two
   (c) Three (d) Four

Directions for Questions 6–10 *The following graph (Figure 4.2) shows the sales history (units) of the Lux brand of soap. Observe the sales curve carefully and answer the following questions.*

6. For how many months was the sales value (by units) at its lowest monthly level?
   (a) One (b) Two
   (c) Three (d) Four
7. The ratio of the number of months in which there was a decrease to the number of months in which there was no decrease in the sales value was:
   (a) 2:9 (b) 2:8
   (c) 2:10 (d) None of these
8. The number of months which exhibited a sales volume greater than 12.5% of the overall annual sales volume was:
   (a) One (b) Two
   (c) Three (d) None of these
9. The highest percentage increase was shown in which month?
   (a) March (b) April
   (c) September (d) November
10. The highest absolute increase was shown in which month?
   (a) March (b) April
   (c) September (d) All of these

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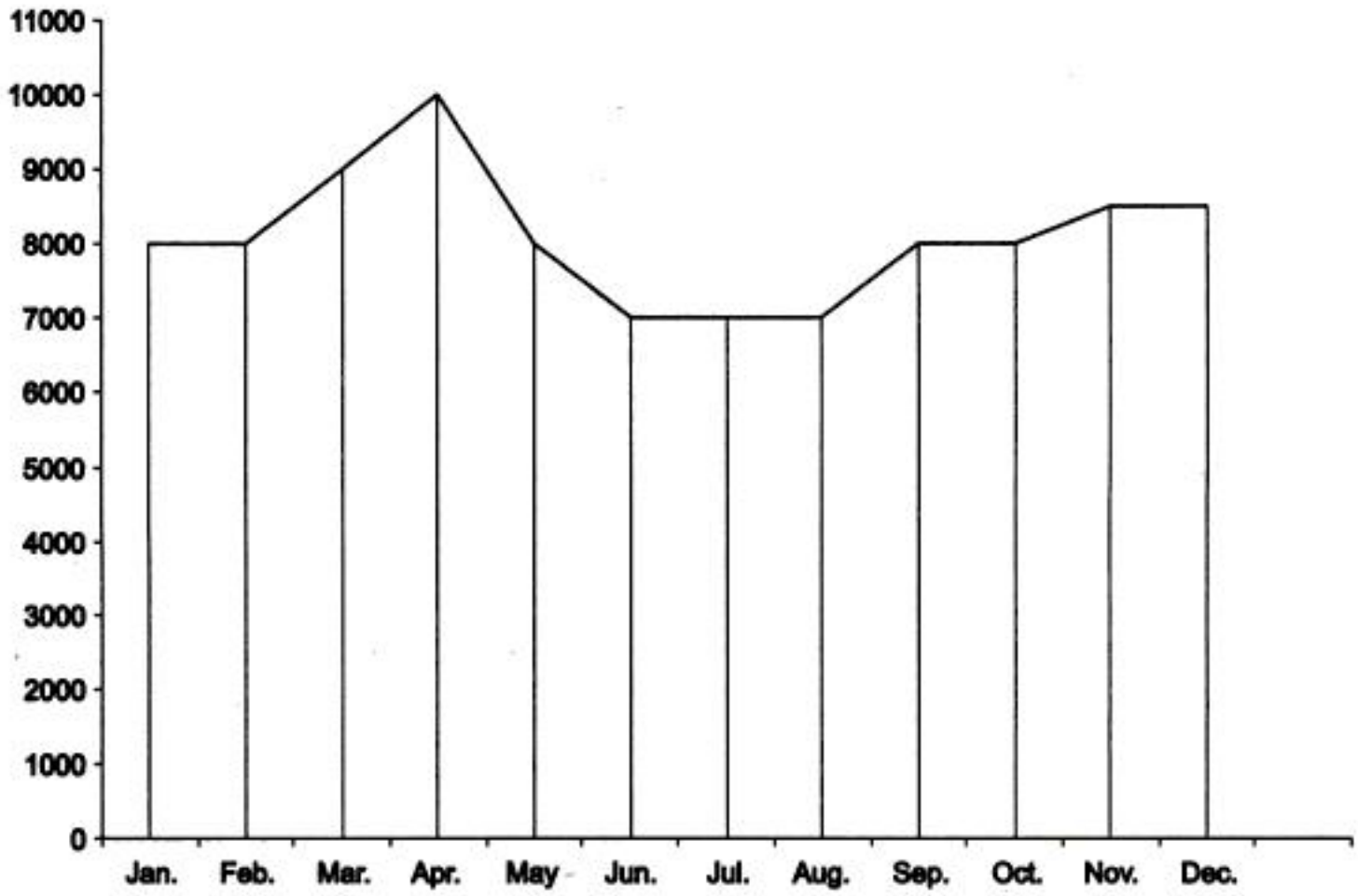
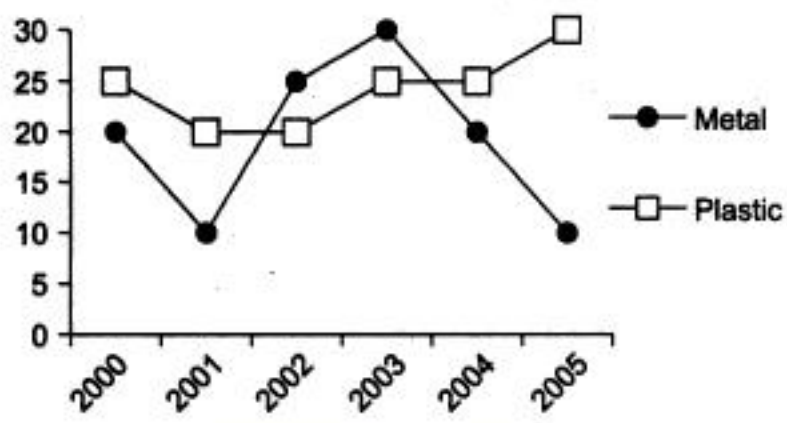
FIGURE 4.2 Sales History of Lux Brand of Soap



Directions for Questions 11–17 *Consider the following graph (Figure 4.3) and answer the questions based on it. The graph shows the trend of consumption of metals and plastics in the production of cars between 2000–05.*

FIGURE 4.3 Consumption of Metals versus Plastics in the Given Years for Car Manufacturing (in thousand tonnes)



11. The number of years for which the consumption of Metal was less than the consumption of Plastic over the given time period was:
    (a) One (b) Two
    (c) Three (d) Four

12. The total consumption of plastic (for car manufacturing) divided by the total consumption of Metal (for car manufacturing) over the period will give a ratio closest to:
    (a) 4:3 (b) 5:4
    (c) 6:5 (d) 7:4

13. Which item and for which year shows the highest percentage change in consumption over the previous year?
    (a) Metal 2003 (b) Plastic 2003
    (c) Metal 2002 (d) Plastic 2005

14. For the two data series shown, how many years have shown a decrease in consumption (for both the items individually)?
    (a) One (b) Two
    (c) Three (d) Four

15. The ratio of the highest total consumption in any single year to the lowest total consumption of the two items taken together in any year was equal to:
    (a) 5:3 (b) 7:4
    (c) 11:6 (d) 11:7

16. Which year showed the highest percentage increase in the total consumption of the two metals?
    (a) 2001 (b) 2002
    (c) 2003 (d) 2004

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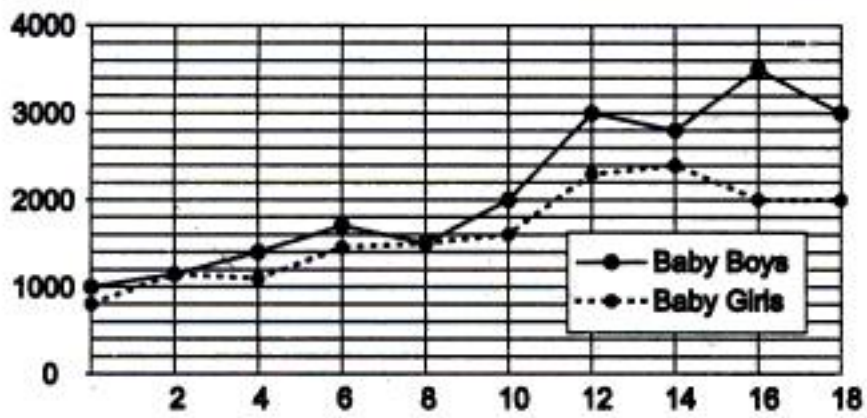
17. Which year showed the highest percentage decrease in the total consumption of the two metals?
    (a) 2001 (b) 2002
    (c) 2004 (d) 2005

Directions for Questions 18–23 *Consider the following graph (Figure 4.4) and answer the questions based on it.*

FIGURE 4.4 Calories Required Per Day by Baby Boys and Baby Girls in the First Eighteen Months of their Lives

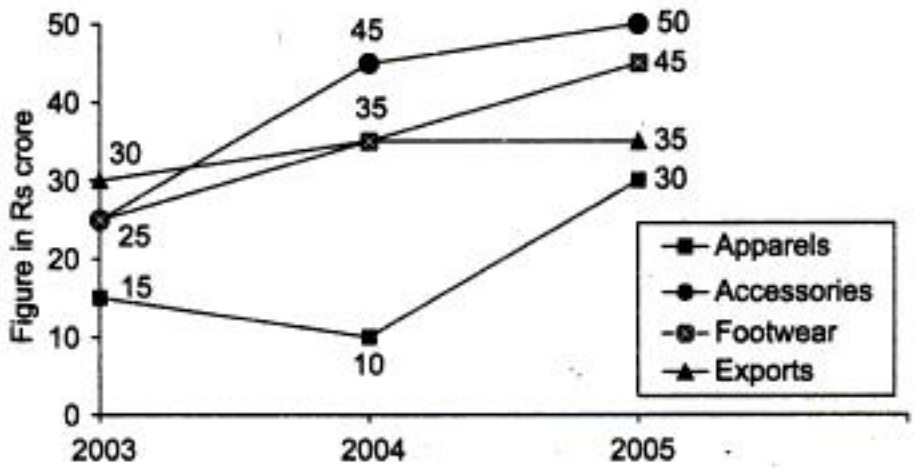


18. At what ages are the requirements of calories for baby boys and baby girls equal?
    (a) 2 months
    (b) 4 months
    (c) 8 months
    (d) 2 months and 8 months
19. The difference between the calorie requirement for baby boys and baby girls at the age of 6 months is approximately equal to:
    (a) 300 calories (b) 250 calories
    (c) 400 calories (d) 200 calories
20. If in a family there are four baby boys aged 4, 6, 8, and 12 months respectively, and three baby girls aged 2.8 and 16 months respectively, then what is the total calorie requirement per day for the babies in the family?
    (a) 12,100 (b) 12,250
    (c) 12,400 (d) None of these
21. If the baby girl aged 16 months goes away, what is the percentage change in the calorie requirement per month for the family?
    (a) 16.3% (b) 17.4%
    (c) 14.3% (d) 12.2%
22. If the great doctor Raju informs Ravi that the graphs have got mixed up and what is shown for the baby boys is for the baby girls and vice versa, then the answer for Question 20 would have been?
    (a) 12,100 (b) 12,250
    (c) 12,400 (d) None of these
23. It can be inferred from the graph that in general, calorie requirements for baby boys and baby girls:
    (a) are quite different at all ages.
    (b) are similar till the age of 17 months.
    (c) reaches a peak value at the same age.
    (d) increase at nearly the same rate till the age of 13.

Directions for Questions 24–26 *Consider the following graph (Figure 4.5) and answer the questions based on it.*

FIGURE 4.5 Production of Select Leather Industries for the Period 2003–2005

(Assume all production is consumed locally.)



24. The percentage increase in the sales of footwear between 2003 and 2004 was
    (a) 20% (b) 30%
    (c) 40% (d) 50%
25. In 2004, if 20% of the footwear sold within the country had been additionally exported at the local price, the percentage increase in export income in the period 1993 to 1994 would have been
    (a) 20% (b) 30%
    (c) 40% (d) 50%
26. If the sales of footwear had touched Rs 80 crore in 2005, the average annual percentage growth of footwear for the two year period 2003–2005 would have been (approximately):
    (a) 50% (b) 75%
    (c) 80% (d) 90%

Directions for Questions 27–29 *The following graph (Figure 4.6) gives us information about the number of washing machines produced by HLL. Answer questions 27–30 based on the graph.*

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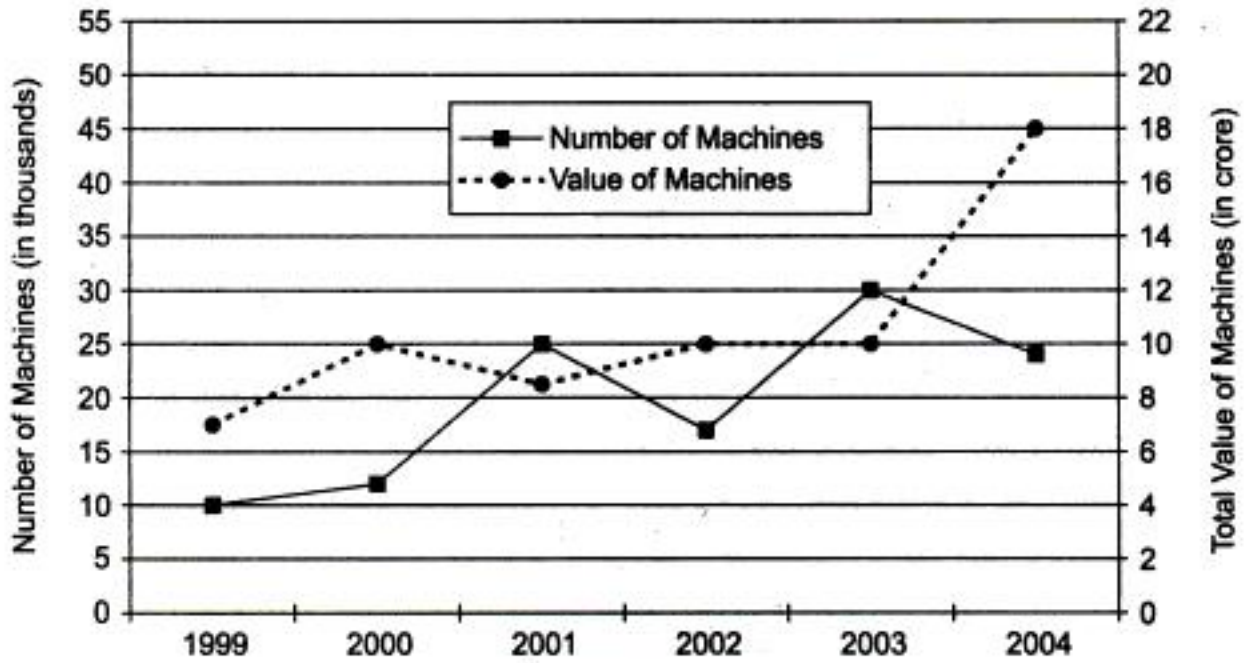
FIGURE 4.6 Washing Machines Manufactured by HLL

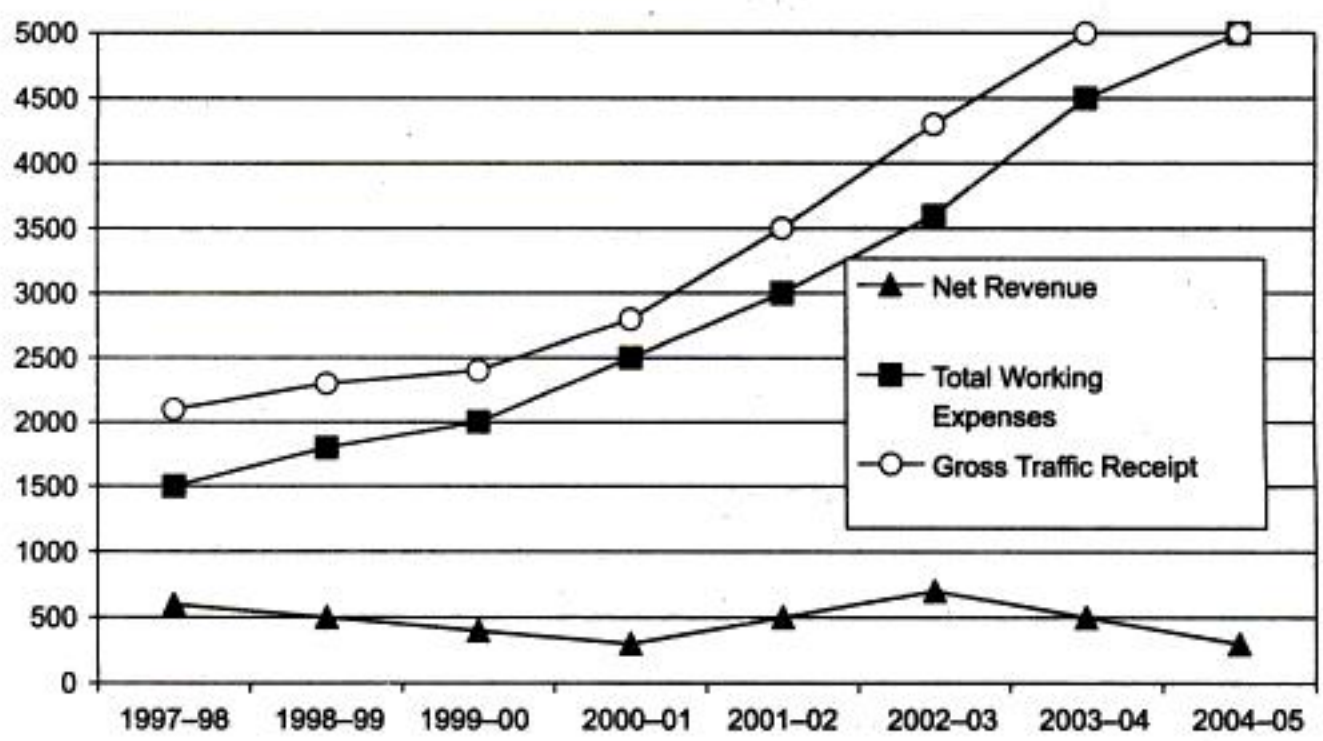


Note: Figures for 2004 are estimated figures. Also, assume that everything produced is sold in the same year.

27. What was the value of each machine in 2000?
    (a) Rs 20,000 (b) Rs 83,33.33
    (c) Rs 20,00 (d) Rs 833.33
28. What was the percentage drop in the production of the number of machines from 2001 to 2002?
    (a) 20% (b) 25%
    (c) 27% (d) 32%
29. What was the difference in the value per machine between the years 2000 and 2003?
    (a) Rs 2000 (b) Rs 5000
    (c) Rs 4000 (d) None of these

Directions for Questions 30–32 *Use the following graph (Figure 4.7) showing railway finances for the year 1997–98 to 2004–05, to answer the questions given.*

FIGURE 4.7 Railway Finance: 1997–98 to 2004–05



30. The difference between the gross traffic receipt and the total working expenses was highest during which of the following years?
    (a) 1997–98 (b) 2001–02
    (c) 2002–03 (d) 2004–05
31. By what per cent did gross traffic receipts increase between 1997–98 and 2004–05?
    (a) 38% (b) 124%
    (c) 133% (d) 138%

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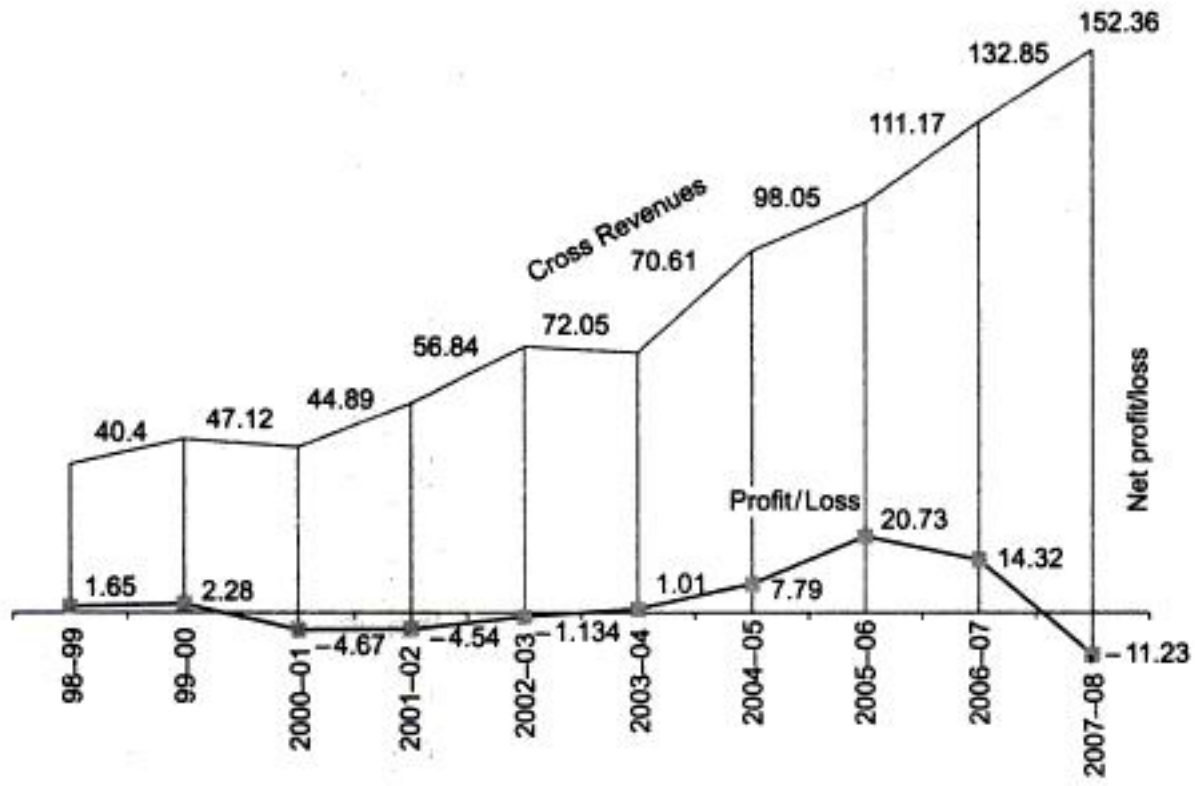
32. Between the years 1997–98 and 1999–00, the ratio of the increase in gross traffic receipts and total working expenses was:
(a) 5:3 (b) 3:5
(c) 2:3 (d) None of these

Directions for Questions 33–35 *Study the following graph (Figure 4.8) carefully and answer the given questions.*

FIGURE 4.8 Gross Revenues and the Profit/Loss for HBL Limited (All figures in Rs crore)



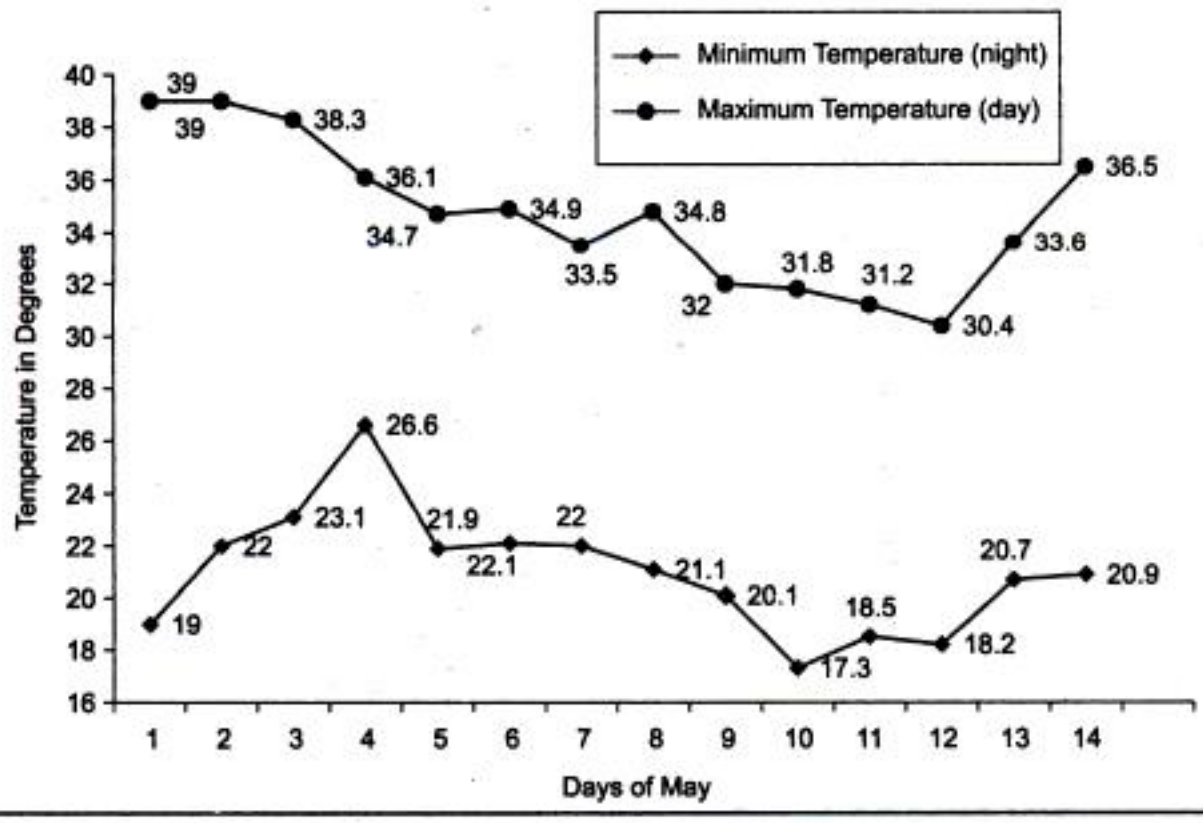
33. The highest percentage growth in total revenue was recorded in:
(a) 2000–01 (b) 2001–02
(c) 2002–03 (d) 2004–05

34. In which year was the net profit as a percentage of gross revenue at its second highest level?
(a) 2004–05 (b) 2005–06
(c) 2006–07 (d) None of these

35. For which of the following years was the trend of gross revenue and net profit/loss dissimilar?
(a) 2001–02 (b) 2002–03
(c) 2003–04 (d) 2004–05

Directions for Questions 36–37 *Observe the given graph (Figurer 4.9) carefully and answer the following questions.*

FIGURE 4.9 Min. and Max. Temperatures in the Month of May



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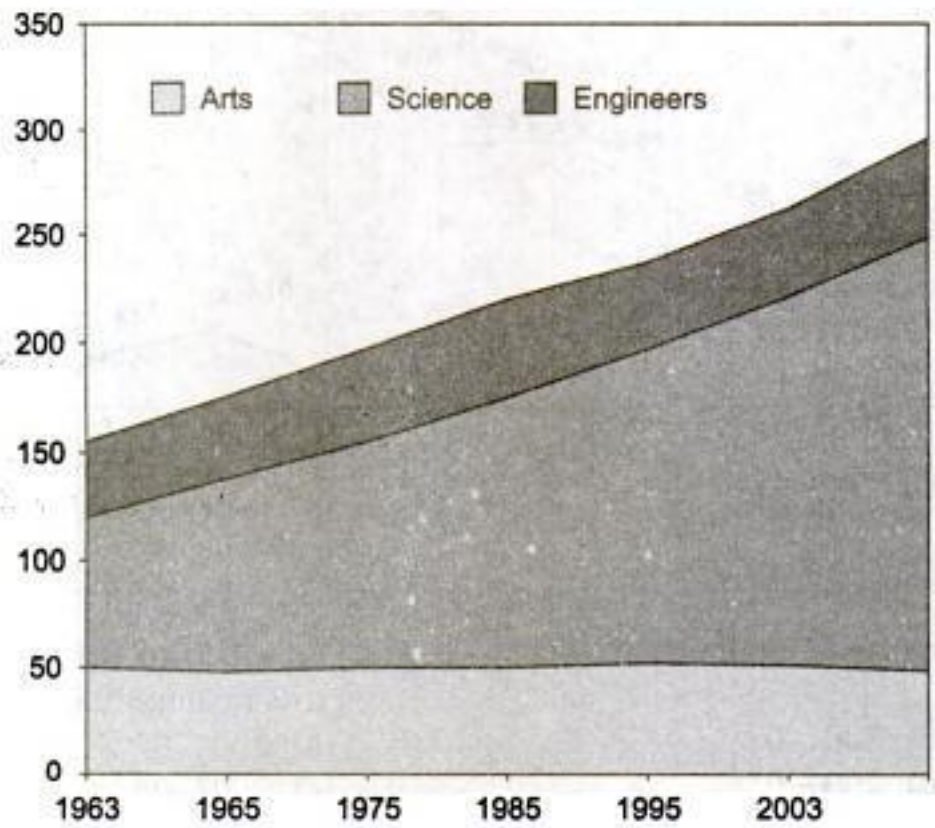
36. The minimum difference between day and night temperatures is:
    (a) 9.5 degrees (b) 11.5 degrees
    (c) 9.7 degrees (d) None of these
37. The highest ratio of the night to day temperature is for:
    (a) 1st May (b) 3rd May
    (c) 4th May (d) None of these

Directions for Questions 38–39 *Study the following graph (Figure 4.10) carefully and answer the given questions. Assume that the curve between any two years marked on the graph is a straight line and the difference between any two years can be got by interpolation. Beyond 2003 the values go up to 2005 and are the projected values for 2004 and 2005.*

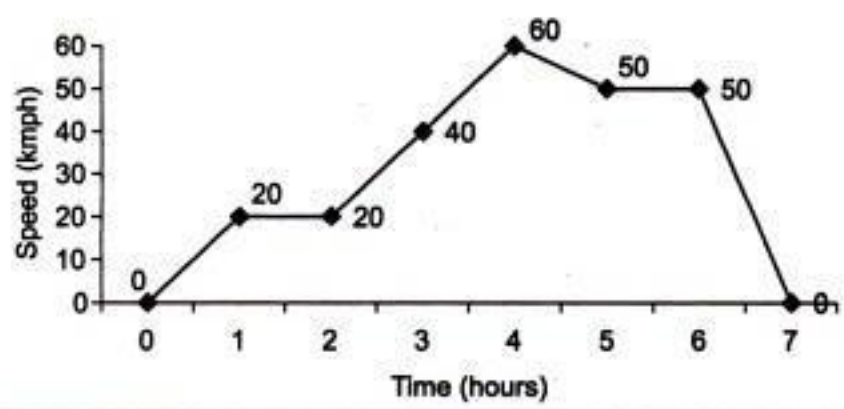
FIGURE 4.10 Academic Background of Students Joining Harvard Business School (HBS)



38. In 1963, the percentage of HBS students who were engineers was about
    (a) 20% (b) 25%
    (c) 30% (d) 35%
39. Which was the first year when more than 200 students were studying in a batch at HBS?
    (a) 1973 (b) 1978
    (c) 1983 (d) 1985

Directions for Question 40 *The following graph (Figure 4.11) gives the movement of a car with respect to time. (Assume that the speed dimension on the y-axis is marked at every 10 kmph and there is uniform acceleration between hours.)*

FIGURE 4.11 Movement of a Car with Respect to Time



40. Find the average speed of the car (in kmph).
    (a) 36.28 (b) 34.28
    (c) 33.57 (d) None of these

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ANSWER KEY

1. (b)	2. (b)	3. (b)	4. (b)	5. (a)	6. (c)	7. (a)
8. (d)	9. (c)	10. (d)	11. (d)	12. (b)	13. (c)	14. (a)
15. (c)	16. (b)	17. (a)	18. (d)	19. (b)	20. (b)	21. (a)
22. (d)	23. (a)	24. (c)	25. (a)	26. (c)	27. (b)	28. (d)
29. (b)	30. (c)	31. (d)	32. (b)	33. (d)	34. (c)	35. (c)
36. (a)	37. (c)	38. (b)	39. (b)	40. (b)		

EXPLANATORY NOTES

1. & 2. Visually clear that it is April.
3. April and July — Two.
4. The CPI decreased in March and May.
5. The CPI increased in three months (April, June and July) while it decreased in two months (March and May). Hence, the required answer is 3–2=1.
6. The sales value was at 7000 for three months, viz., June, July and August.
7. Only two months out of 11 have shown a decrease. Hence, 2:9.
8. The total sales volume was 97,000. 12.5% of this value would mean $1/8^{th}$ of this value, i.e., more than 12,000. This has never occurred during this time.
9. September shows the highest growth and the least initial value. Hence, highest percentage increase.
10. March, April and September all show an increase of 1,000 units (which is the highest increase during the period shown).
11. Visually seen as 4.
12. 145:115 = 29:23 is closest to 5:4.
13. Metals in 2002 is more than doubling over it's 2001 value.
14. 2001 is the only year which satisfies the condition.
15. 55 in 2003 to 30 in 2001. Gives 11:6 as the answer.
16. 50% in 2002.
17. 33.33% between 2000 to 2001.
18. Visually clear that the graphs are equal at the ages of 2 and 8 months.
19. The required answer = 1700–1450=250 calories.
20. Add all the values to get 12250.
21. The required change will be 2000/12250 = 16.3%
22. Reverse the calculation for Question 20 and get 12500 as the total calorie requirement per day.
23. The two lines run roughly parallel to each other till the age of 13, so (d) is correct. After the age of 13, the curves separate out.
24. 10/25=40%.
25. Exports would have increased by 20% of the footwear's value, i.e., by 7 on 35–20%.
26. Solve through options. When you try with 80%, you get 25 + 80% of 25 = 45 + 80% of 45 = 81. Hence the answer is just below 80%.
27. 10 crore/12,000.
28. 25,000 to 17,000.
29. 8333.33 – 3333.33 = 5000
30. Visually see the net revenue line to be maximum for 2002–03.
31. The required ratio is 2900/2100.
32. 300/500
33. Visually seen as 2004–05.
34. 2005–06 is the highest and 2006–07 is the second highest.
35. Visually seen that the gross revenue decreases in 2003–04 but the net profit has increased.
36. 9.5 for 4th of May

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37. This ratio depends on the difference between the two temperatures on a single day as well as on the day temperature of the same day. The lower the difference, the higher the ratio. Also, the data given is such that the day temperatures are in the same range, hence the effect of the same on the ratio will be minimal. For solving this question find out the days which need to be checked and compare the ratios between those days only. 4th of May will give the highest ratio required, since the difference is the lowest on that day.
38. Approximately 40 out of 160 = 25%.
39. Visually checking the options, we get 1978 as the answer.
40. The average speed will be given by the ratio of total distance by the total time.
    The distance covered in any hour will be given by the average speed of the hour.
    Distance covered in first hour = (20 + 0)/2 =10 km.
    Distance covered in second hour = 20 km/hour = 20 km
    Distance covered in third hour = (20 + 40)/2 = 30
    Distance covered in fourth hour = (40 + 60)/2 = 50 km
    Distance covered in fifth hour = (60 + 50)/2 = 55 km
    Distance covered in sixth hour = 50 km
    Distance covered in seventh hour = (50+0)/2 = 25
    The required average speed = 240/7 = 34.28 km/hour

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5

Pie Charts

OUTLINE

Learning Objectives

- Get a first hand view of how data is presented through its organisation in the form of Pie charts.
- Get an understanding of typical data which can be represented through Pie charts. Also understand the concept of how distribution of a whole is done in the form of Pie Charts.
- Get a first hand feel of the typical question types that are asked on the basis of Pie charts.

Chapter Highlights

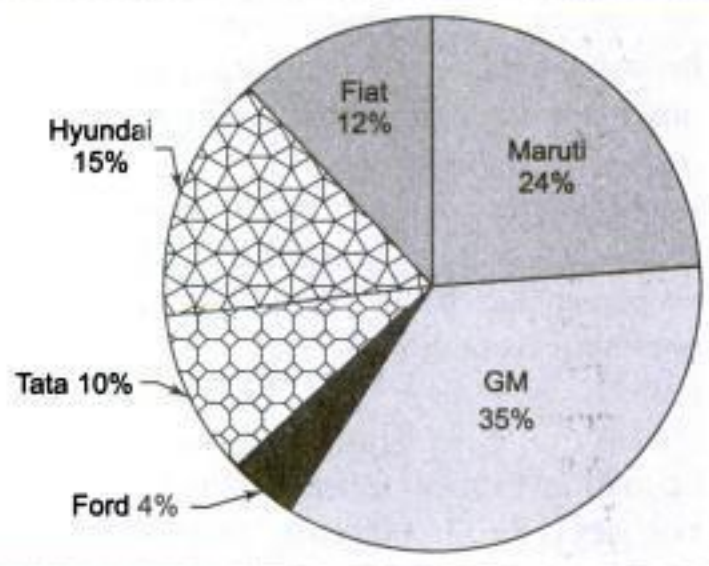
- Introduction to Pie charts
- Practice exercise on Pie charts containing simulated examination questions

Pie charts are specific types of data presentation where the data is represented in the form of a circle. In a pie chart, a circle is divided into various sections or segments such that each sector or segment represents a certain proportion or percentage of the total. In such a diagram, the total of all the given items is equated to 360 degrees and the degrees of angles, representing different items, are calculated proportionately. The entire diagram looks like a pie and its components resemble slices cut from a pie. The pie chart is used to show the break-up of one continuous variable into its component parts.

For example, Figure 5.1 shows the distribution of the sales of the car industry between six car companies.

Looking at Figure 5.1, we can infer that Maruti accounts for 24 per cent of the market share, while GM accounts for 35 per cent of the market share, Ford for 4 per cent of the market share, Tata for 10 per cent of the market share, Hyundai for 15 per cent of the market share and Fiat for 12 per cent of the market share.

FIGURE 5.1 Pie Diagram Showing Distribution of Car Sales Between Six Companies



The pie chart encompasses a circle of 360 degrees which represents 100 per cent of the value of the continuous variable. Thus, 3.6 degrees on the pie chart represent 1 percent of the total value of the continuous variable being represented.

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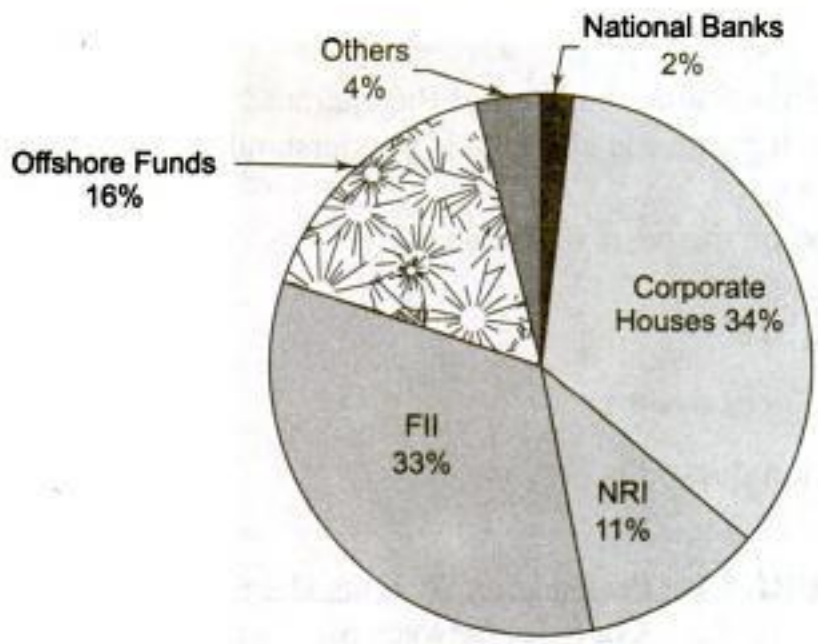
A single pie diagram can represent only one continuous variable. Hence, in terms of versatility of data representation, pie charts are less versatile than either of bar charts, *x-y* graphs or tables. However, their utility is in the fact that the representation of data is cleaner and it gives an immediate idea of the relative distribution of the continuous variable amongst different sectors.

The following exercise will make the use of Pie charts clear to you.

EXERCISE

Directions for Questions 1–7 *The following pie chart (Figure 5.2) shows the amount of subscriptions generated for India Bonds from different categories of investors.*

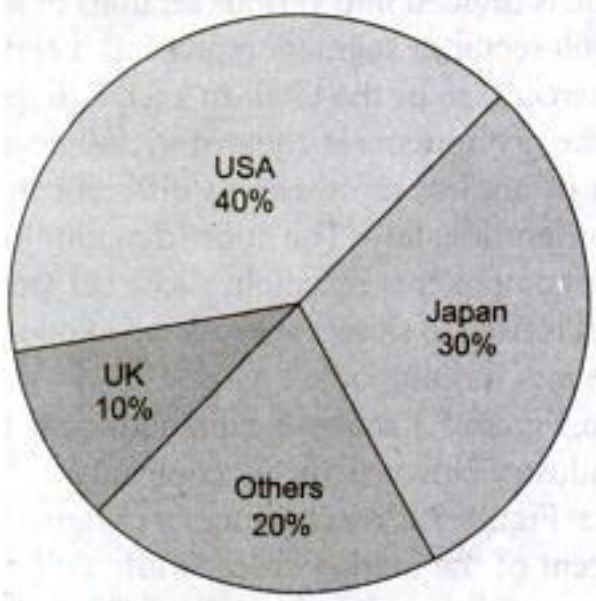
FIGURE 5.2 Subscriptions Generated for India Bonds



1. If the investments by NRIs are Rs 4,000 crore, then the investment by corporate houses and FIIs together is:
   (a) 24,000 crore (b) 24,363 crore
   (c) 25,423.4 crore (d) 25,643.3 crore
2. What percentage of the total investment is coming from either FIIs or NRIs?
   (a) 33% (b) 11%
   (c) 44% (d) 22%
3. If the total investment other than by FII and corporate houses is Rs 335,000 crore, then the investment by NRIs and Offshore funds will be (approximately):
   (a) 274,100 (b) 285,600
   (c) 293,000 (d) Cannot be determined
4. What is the approximate ratio of investment flows into India Bonds from NRIs to corporate houses?
   (a) 1:4 (b) 1:3
   (c) 3:1 (d) Cannot be determined
5. In the corporate sector, approximately how many degrees should be there in the central angle?
   (a) 120 (b) 121
   (c) 122 (d) 123
6. If the total investment flows from FIIs were to be doubled in the next year and the investment flows from all other sources had remained constant at their existing levels for this year, then what would be the proportion of FII investment in the total investment flows into India Bonds in the next year (approximately)?
   (a) 40% (b) 50%
   (c) 60% (d) 70%
7. If the inflow from the FIIs after the doubling (of Question 6) were to the tune of US$ 500 million, what would be the total investment into India Bonds next year (in US $ millions)?
   (a) 1000
   (b) 1500
   (c) 800
   (d) Cannot be determined

Directions for Questions 8–14 *The following pie charts (Figures 5.3 (a) and (b)) exhibit the distribution of the overseas tourist traffic from India. The two charts show the tourist distribution by country and the age profile of the tourists respectively. Study the charts carefully and answer the questions which follow.*

FIGURE 5.3 Distribution of Overseas Tourist Traffic from India



(a)

(*Contd.*)

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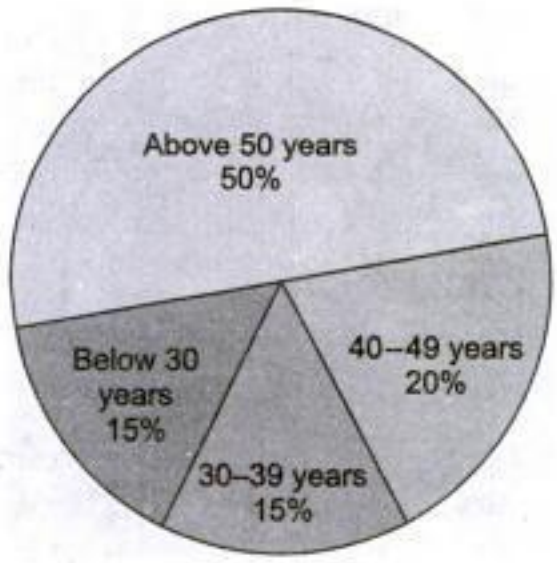
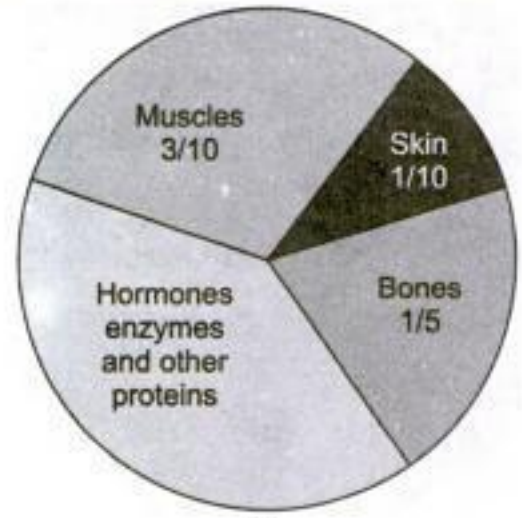


(b)

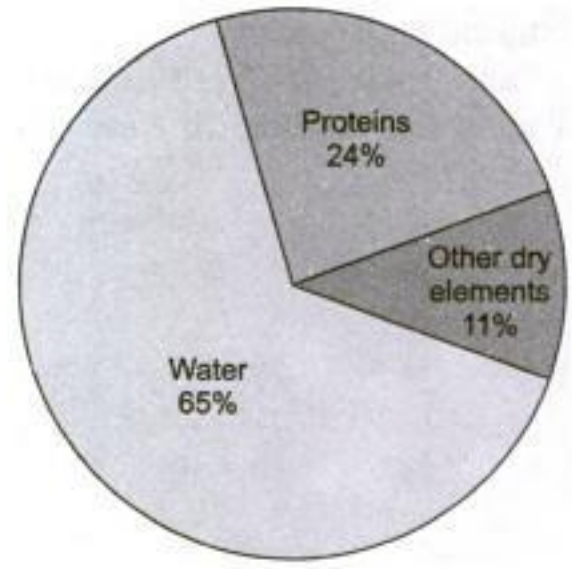
8. What percentage of the Indian tourists went to either USA or UK ?
   (a) 40% (b) 50%
   (c) 60% (d) 70%
9. The ratio of the number of Indian tourists that went to USA to the number of Indian tourists who were below 30 years of age is:
   (a) 2:1 (b) 8:3
   (c) 3:8 (d) Cannot be determined
10. If amongst other countries, Switzerland accounted for 25% of the Indian tourist traffic, and it is known from official Swiss records that a total of 25 lakh Indian tourists had gone to Switzerland during the year, then find the number of 30–39-year-old Indian tourists who went abroad in that year.
   (a) 18.75 lakh (b) 25 lakh
   (c) 50 lakh (d) 75 lakh
11. For Question10, what was the volume of traffic of Indian tourists in the US?
   (a) 150 lakh (b) 125 lakh
   (c) 200 lakh (d) None of these
12. For Questions 10 and 11, what can be inferred about the number of 50+-year-olds who visited UK during the year?
   (a) At least 25 lakh (b) Exactly 25 lakh
   (c) At least 10 lakh (d) Cannot be determined
13. Solve question 12 assuming that the age distribution of overseas Indian tourists was uniform for all the countries.
   (a) At least 25 lakh (b) Exactly 25 lakh
   (c) At least 10 lakh (d) Cannot be determined
14. With the assumption of Question 13 and the data from Questions 10 and 11 taken to be true, find the ratio of the number of 50+ year-olds Indian tourists visiting USA in the year to the number of below 50-year-old Indian tourists visiting UK or Switzerland during the year.
   (a) 2:1 (b) 8:3
   (c) 3:8 (d) Cannot be determined

Directions for Questions 15–17 *The following pie charts Figures 5.4 (a) and (b) give the information about the distribution of weight in the human body according to different kinds of components. Study the pie charts carefully and answer the questions given.*

FIGURE 5.4 Distribution of Weight in Human Body



(a)



(b)

15. How much of the human body is neither made of bones nor skin?
   (a) 40% (b) 50%
   (c) 60% (d) 70%
16. What is the ratio of the distribution of proteins in the muscles to that of the distribution of proteins in the bones?
   (a) 2:1 (b) 2:3
   (c) 3:2 (d) Cannot be determined
17. What percentage of proteins of the human body is equivalent to the weight of its skin?
   (a) 41.66% (b) 43.33%
   (c) 44.44% (d) Cannot be determined

Directions for Questions 18–20 *Use the pie diagrams given to answer the following questions. The pie chart below [Figures 5.5 (a)] shows the distribution of the New York market share by value of different computer companies in 2005.*

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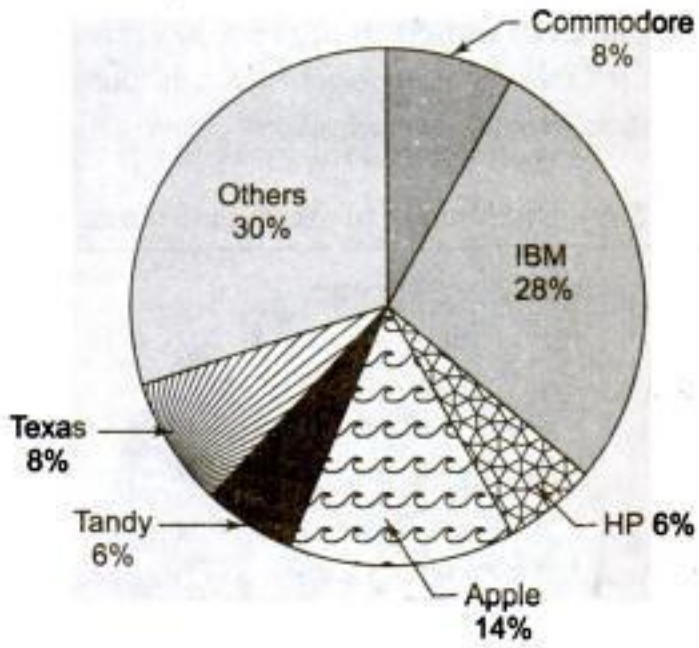
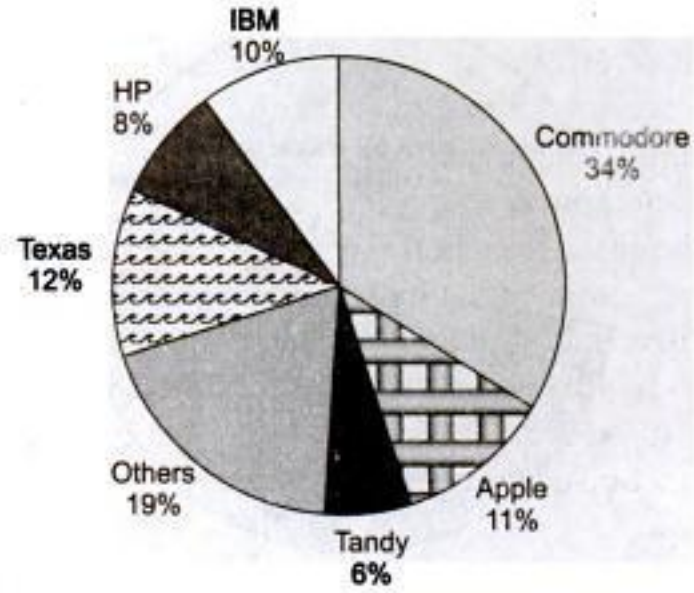
FIGURE 5.5 Distribution of New York Market Share



(a)



(b)

The pie chart below [Figures 5.5 (b)] shows the distribution of New York market share by volume of different computer companies in 2005.

Number of units sold in 2005 in New York = 1,500

Value of units sold in 2005 in New York = US $ 1,650,000.

18. In 2005, the average unit sale price of an IBM PC was approximately (in US$)
    (a) 3180 (b) 2800
    (c) 393 (d) 3080
19. For the year 2005, which company has realised the lowest average unit sales price for a PC?
    (a) Commodore (b) IBM
    (c) Tandy (d) Cannot be determined
20. Over the period 2005–06, if sales (value-wise) of IBM PCs increased by 50% and of Apple by 15%, assuming that PC sales of all other computer companies remained the same, by what percentage (approximately) would the PC sales in New York (value-wise) increase over the same period?
    (a) 16.1% (b) 18%
    (c) 14% (d) None of these

ANSWER KEY

1. (b)	2. (c)	3. (a)	4. (b)	5. (c)	6. (b)	7. (a)
8. (b)	9. (b)	10. (d)	11. (c)	12. (d)	13. (b)	14. (b)
15. (d)	16. (d)	17. (a)	18. (d)	19. (d)	20. (a)	

EXPLANATORY NOTES

1. (67/11) × 4000
2. 33 + 11= 44
3. Investment other than NRI and corporate houses is 33% = 335000. Also, investment by offshore funds and NRIs is equal to 27 %. Hence, 27 × 335,000/33.
4. 11:34 is approximately equal to 1:3.
5. 34 × 3.6 = 122.4 (since 1 % = 3.6 degrees).
6. FIIs currently account for 33 out of 100. If their value is doubled and all other investments are kept constant then their new value would be 66 out of 133 →σ approximately equal to 50%.
7. 500 million would be approximately 50% of the total investment. Then 1000 will be the total investment.
8. 40 + 10 = 70% (from the first chart)

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9. 40:15 = 8:3
10. 5% corresponds to Switzerland's 25 lakh. Hence 15% will be 75 lakh.
11. US accounts for 40%, i.e., 8 times 5%. Since Switzerland's 5% is 25 lakh, US will be 200 lakh.
12. Nothing can be said about the age break-up of the Indian tourists who have gone to any destination. Hence, cannot be determined.
13. If the age distribution is uniform, then 50+ -year-olds will account for 50% of the total Indian tourist traffic in UK, i.e., 5% of the total Indian tourist traffic worldwide will be 50+-year-olds who went to UK,. i.e., 25 lakh based on Switzerland's value from Question 10.
14. 50% of 40: (50% of 10 +50% of 5) = 20:7.5 = 8:3.
15. 20+10 = 30% is made up of either bones or skin. Hence, 70% is made up of neither.
16. Cannot be determined since the respective distributions are not known.
17. 10/24
18. IBM accounts for 28% of the share by value and 10% of the share by volume. Hence, (1,650,000/1500) × (28/10)= 1,100 × 2.8 = 3,080.
19. Although it seems to be Commodore, the answer cannot be determined due to the fact that we are unaware of the break-up of the sales value and volume of the companies comprising the others categories.
20. If we assume the total sales to be 100 in the first year, IBM's sales would go up by 50% (from 28 to 42) contributing an increase of 14 to the total sales value. Similarly, Apple's increase of 15% would contribute an increase of 2.1 to the total sales value. The net change would be 14 + 2.1 on 100, i.e., 16.1%.

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6

Cases

OUTLINE

Learning Objectives

- Get a first hand view of how data is presented through cases.
- Get an understanding of typical language used for writing data in the form of language.
- Get a first hand feel of the question types created on the basis of cases.

Chapter Highlights

- Introduction to data-based Cases
- Practice exercise on Cases

INTRODUCTION

The case form of data representation is used by question setters in order to test the student's feel for numbers, for variables and their inter-relationships and his/her ability to convert the information provided into a useful data representation format. Questions and their answers hinge on the student's ability to first spot the variables under consideration and then to interrelate the given variables in order to make sense of the raw information provided by the case.

A case is nothing but a paragraph/passage which provides information about the values of the variables. Most cases are solved by converting the provided information into a tabular format. The student is advised to follow the following steps while solving data interpretation questions based on cases:

STEP 1

During your first reading, identify the variables in the data, the number of instances of the variables provided and the respective inter-relationships amongst the variables.

On having identified these things the student will be in a position to establish a clear picture of the information and the requisite tabular format to solve the given case.

This step is also extremely important from the examination point of view, since it will help you estimate the amount of time required to solve the case. Hence, you will be in a position to make a better decision about whether the case you are pursuing is worth solving under the exam conditions.

STEP 2

Chart out the table required and fill in the direct data given in the question into the table. At this stage the objective should not be to complete the table but to get down the direct information provided in the case into the table. It is important to distinguish between the two approaches, since trying to complete the table for the sake of completing the table might result in a lot of unnecessary work on the part of the student (which can easily be avoided). Remember, marks are allotted for the answer to the questions asked, not for filling the table. (Hence, we will do only as much as is asked and not one step more.)

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STEP 3

With the basic framework of the table ready, the approach of the student should be to identify the required solutions from the questions asked and solve only to get the answer of the question asked.

However, note here that as a rule any intermediate information derived in this process should be directly transferred to the table, since it is quite likely that the calculations you have done for one question might be repeated in the next question. Hence, in order to avoid re-working on things already done once, transfer any information derived during the process of solving one question onto the table so that it is available for all subsequent questions.

EXERCISE

Case 1 Mr Hoola Boola is facing a decision problem. He has excellent training products but is not sure about the demand for his products. He wants to set up a training centre to provide training programmes of Sr Executive, Jr executive and non-executive level. His financial advisor Mr Balmas told him that if he wants to set up a non-executive level training centre, the total cost would be on two counts—the first would be a fixed cost which is Rs 2 lakh per annum. Besides, it would also entail a variable cost of training per candidate. This would be Rs 1,000 per candidate trained. He further estimated that if a training centre is set up for conducting Jr executive and non-executive level training programmes, the total fixed cost would be Rs 3.2 lakh per annum and the cost of training per candidate will be Rs 750. Mr Balmas motivates Mr Hoola to set up a combined training centre for Sr executive, Jr executive and non-executive, the fixed cost of which is Rs 5 lakh per annum and the cost of providing training per candidate is Rs 500.

You as a hotshot IIM, Ahmedabad MBA, have some decision making abilities. Please help Mr Hoola Boola by answering the following questions:

1. What would be the volume that Mr Hoola should train where he would be indifferent between setting up a non-executive level and non-executive and Jr executive level training centre?
   (a) 495 (b) 490
   (c) 480 (d) 475
2. What would be the volume that Mr Hoola should train where he would be indifferent between setting up a training centre for jr and non-executive and sr, jr and non executive level.
   (a) 710 (b) 720
   (c) 730 (d) 740
3. What would be the volume that Mr Hoola should train where he could be indifferent between setting up a training centre for non-executive and for all three categories?
   (a) 450 (b) 500
   (c) 550 (d) 600
4. Assume that Mr Hoola shares the same vision that Mr Balmas has and sets up a training centre for all three categories. In the first year he manages to train 1200 candidates at Rs 1250 per candidate. What would be his profits?
   (a) 3.2 lakh (b) 3.6 lakh
   (c) 4 lakh (d) 4.4 lakh
5. In Question 4, what is the profit percentage in the first year of operation?
   (a) 27.27% (b) 36.66%
   (c) 40% (d) 44.44%

Case 2 Not surprisingly the growth of the hotel industry is driven by the increase in the number of people using hotels and the increase in per person use of the hotel. In 2004, it is expected that there will be 200 million hotel users in India, or about 20 per cent of the population will generate Rs 50 billion in hotel revenues. Industry revenues should expand from Rs 50 billion to Rs 150 billion by 2008, while the number of users should grow to over 560 million or to about half the population of India in the same period.

6. What is the estimated population of India in 2004?
   (a) 98 crore (b) 100 crore
   (c) 110 crore (d) 115 crore
7. What will be the simple average growth rate of population of India in the given period 2004–2008?
   (a) 2% (b) 3%
   (c) 4% (d) 4.5%
8. What will be the growth in percentage of users in India by 2008?
   (a) 100% (b) 150%
   (c) 180% (d) 200%
9. What will be the percentage growth of the revenues of the hotel industry in the given period?
   (a) 200% (b) 230%
   (c) 260% (d) 300%
10. It is believed that if 50% of the population of any country can afford hotel-use, it is economically developed. Can we say that India will be a developed country by 2007?
    (a) Yes (b) No
    (c) Cannot say (d) Data inadequate

Case 3 Bihar and Orissa are the most deprived states of India. While they contain one-fifth of India's population, they have almost one-third of India's illiterates. In 1998,

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only a small fraction of Orissa and Bihar's population was literate versus 85 per cent of Kerala's population. More than two-thirds of the births are not attended by any medical facility, 1/10th of the infants born in Orissa and Bihar die in infancy and an equal number before reaching the age of five. Almost 90 per cent of the under five deaths are due to malnutrition.

From amongst the lucky kids who have survived for the first five years, 1/3rd of them work as child labourers and only half of the remaining are sent to school. Of those who attend classes, only 40 per cent are able to reach Std V. In India, 30 per cent of the children under 16 work as labourers. Orissa and Bihar contain 1/3rd of the child labourers in India. India has the largest population of child labourers, which is 1/15th of its total population.

In Orissa and Bihar, out of 100 children enrolled in school, 32 are girls. And out of 100 who attend Std X, only 10 are girls. Only 38 out of 100 Indian women are literate versus 57 per cent of males. Even in wealthy states such as Punjab, girls suffer from malnutrition seven times more than boys do. The total population of the country was 90 crore in 1998 and the ratio of male to female in India was 10 to 9.

11. According to the information provided, what percentage of the infants in Orissa and Bihar attend Std V?
    (a) 11.33 (b) 10.66
    (c) 13.33 (d) None of these
12. The number of child labourers in India in 1998 are:
    (a) 15 crore (b) 16 crore
    (c) 12 crore (d) 6 crore
13. In Orissa and Bihar, out of 100 born, approximately how many children work as child labourers?
    (a) 27 (b) 32
    (c) 13 (d) 38
14. What percentage of girl children enrolled in school reach Std X in Orissa and Bihar?
    (a) 10% (b) 32%
    (c) 60% (d) Insufficient data
15. In 1998, the literates in Kerala exceed the literates in UP and Bihar by:
    (a) 30% (b) 35%
    (c) 27% (d) Insufficient data
16. The number of literates in India in 1998 is:
    (a) 16.2 crore (b) 27 crore
    (c) 43.2 crore (d) Insufficient data
17. The number of illiterates in Orissa and Bihar in 1998 is almost :
    (a) 18 crore (b) 13.2 crore
    (c) 15.6 crore (d) Insufficient data

Case 4 It was realised by AMS Careers, that for creating awareness in the market, newspaper advertising is very effective but it should be done consistently. *The Times of India* (TOI) which claims to have 40 per cent of the total market share brings out a weekly supplement 'Education Times' in which the advertising cost for the range 0 to 240 sq.cm for 1–2 insertions with a validity period of 30 days is Rs 50/cm^2, for 3–5 insertions with a validity period of 60 days is Rs 43/cm^2 and 6 onwards insertions with validity period of 90 days is Rs 40/cm^2. The cost for size of advertisement 241+ cm^2 for 1–2 insertions with validity period 30 days is Rs 50/cm^2 and for 3–5 insertions with validity period 60 days is Rs 40/cm^2 and for 6 onwards insertion with validity period of 90 days is Rs 35/cm^2. The expected response generation per insertion in TOI in the size 161–200 cm^2 is 40 and in the size 200 + cm^2 is 50. Another great market player is *Hindustan Times* with the weekly supplement 'HT Horizons' and it claims to have 35% of the total market share and the cost of advertising in it for 1–2 insertions with validity period: Number of insertion + one week is Rs 40/cm^2, for 3–6 insertions with validity period: Number of insertions + 2 weeks is Rs 37/cm^2 and for 7 insertions onwards with validity period: no. of insertions + 3 weeks is Rs 34/cm^2. The expected response generation per insertion is 35 for 160–200 cm^2 and 45 for 200+ cm^2 size.

Please help AMS Careers with the correct decisions on the following plans.

18. If AMS looks to generating exactly 95 responses in 2 insertions, which newspaper combination should be selected?
    (a) TOI
    (b) HT
    (c) One TOI and one HT insertion
    (d) Data inadequate
19. AMS has decided to advertise in TOI but is confused on length between 80 cm and 81 cm but is sure about the width, i.e., 3 cm and 3 insertions. What should be the length?
    (a) 80 cm (b) 81 cm
    (c) either 80 or 81 (d) Data inadequate
20. If AMS wants to go for two insertions of exactly 80 cm^2, which newspaper should be selected and what is the percentage difference in the cost differential between the campaign cost between the two newspapers with respect to the lower priced newspaper. (Assume that cost is the only consideration.)
    (a) HT, 20% (b) HT, 25%
    (c) TOI, 20% (d) TOI, 25%
21. If AMS decides to go in for an advertising campaign of 10 insertions, which will be the best option (in terms of cost) for a size of 243 cm^2?
    (a) HT (b) TOI
    (c) either HT or TOI (d) Data inadequate

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22. In Question 21, if AMS is considering its decision only on the basis of validity period which is best?
    (a) HT (b) TOI
    (c) Either HT or TOI (d) Data inadequate
23. If the only consideration for the choice of the newspaper is the number of responses, then AMS should run the campaign of Question 22 in:
    (a) HT (b) TOI
    (c) Either HT or TOI (d) Data inadequate

Case 5 Mr Kunal Dwivedi wants to buy a motorbike which is priced at Rs 45,500. The bike is also available at Rs 25,000 down payment and monthly installments of Rs 1000 per month for 2 years or Rs 18,000 down payment and monthly installment of Rs 1000 per month for 3 years. Mr Kunal has with him only Rs 12,000. He wants to borrow the balance money of the down payment from a private lender whose terms are:

If Rs 6,000 is borrowed for 12 months, the rate of interest is 20 per cent. The interest will be calculated on the whole amount for the whole year, even though the repayment has to be done in 12 equal monthly installments starting from the first month itself. Thus he will have to repay an amount of Rs 600 per month for 12 months to repay Rs 6000 (Principal) + Rs 1200 (Interest @ 20 per cent).

If Rs 10,000 upwards is borrowed for one year, the rate of interest is 30 per cent and is calculated in exactly the same manner as above.

24. If Mr Kunal is ready to pay either of the down payments then which of the installment schemes is the better option of the two? (Assume that Mr Kunal will pay the installments out of his own earnings and he keeps his savings with himself and earns no interest on the same.) Also assume that instead of borrowing the remaining money for the down payment, he saves the balance before purchase.
    (a) Rs 1000 for 2 years (b) Rs 2000 for 3 years
    (c) either of two (d) Data inadequate
25. What is the percentage difference in the total amount paid to the bike dealer, between the two installment schemes (with respect to the total payment of the scheme with Rs 25,000 down payment)?
    (a) 10.2 % (b) 13.5 %
    (c) 11.4 % (d) None of these
26. If Kunal can spare only a total of Rs 2000 to be paid to the bike dealer and the money lender from his monthly earnings starting from the first month onwards which scheme should he choose?
    (a) Rs 1000 for 2 years (b) Rs 1000 for 3 years
    (c) either of two (d) Data inadequate

Case 6 AMS, Inc. is the leader in selling ideas universe wide but its maximum revenue comes from three principal planets only, viz., Earth, Mars, Jupiter. Further, it has three products, viz., CSP, CC and CP. In a particular year, the number of units sold had a distribution as follows: The number of units of CCs sold on Mars was 12 per cent of the number of units of CPs sold on Earth. The number of units of CPs sold on Jupiter was 1000. Total number of CC units sold was 2600. Total number of CP units was 200 higher than that of the total number of units of CCs sold. The number of units of CSP sold on Mars was 10 per cent of the number of units of CP sold on Jupiter. The number of units of CSP sold on Earth was 2000. The number of units of CC sold on Earth was 15 per cent of the number of units of CSP sold on Jupiter.

The prices of the units on the different planets were as follows:

Earth → Rs 15 per unit
Mars → Rs 10 per unit
Jupiter → Rs 8 per unit

The number of units of CSP sold on Jupiter was 300. The number of units of CP sold on Earth was 600.

27. The number of units of CC sold on Jupiter is:
    (a) 1520 (b) 2483
    (c) 3423 (d) 600
28. The revenue generated on Earth is greater than that generated on Jupiter by about
    (a) Rs 8000 (b) Rs 9000
    (c) Rs 10,000 (d) None of these
29. The overall revenue generated is the highest from
    (a) CSPs (b) CP
    (c) CCs (d) Can't be determined

Case 7 George has recently acquired shares of four companies, namely Asian Paintz (AZ), BMZ, ChaeWoo (CW) and Dataman (DT). The financial results of these companies for the financial year ended 2002–03 revealed these interesting facts: Profits of AZ were 10 per cent of its sales, while the profits of BMZ were 20 per cent of its sales. While the profits of CW and DT were the same, the sales of CW were the same as those of BMZ. The total expenses of CW were 400 per cent more than its profits while the sales of DT were 200 per cent more than its profits. The total expenses of CW were Rs 10 million and the total expenses of CW were 11.11 per cent more than those of AZ.

30. Which company had the lowest total expenses?
    (a) AZ (b) BMZ
    (c) CW (d) DT
31. Which company had the lowest profits?
    (a) AZ (b) BMZ
    (c) CW (d) DT

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32. If next year, the profits of AZ were to equal CW's current profit, then with an increase of 12.5 per cent in sales, what would be the profit of AZ expressed as a percentage of sales next year?
    (a) 17.77 per cent (b) 22.22 per cent
    (c) 18.88 per cent (d) None of these
33. If profits of DT and BMZ were to be exchanged, what would be the ratio of the profit percentage (expressed as a percentage of sales) for these two companies?
    (a) 7:13 (b) 5:12
    (c) 12:5 (d) 5:13
34. What is the ratio of the highest and the lowest profit?
    (a) 12:5 (b) 7:18
    (c) 5:12 (d) 12:23

Case 8 Fabric X has to go through three stages of manufacturing, viz., spinning, weaving and dyeing. In Rimal Fabric Company, there are six spinning machines, ten weaving machines and five dyeing machines. Each machine works for 10 hrs a day. One unit of Fabric X needs 40 minutes on a spinning machine, 2 hours on a weaving machine and 30 minutes on a dyeing machine in order to be completed. Similarly one unit of Fabric Y needs 60 minutes on a spinning machine, 30 minutes on a weaving machine and 60 minutes on a dyeing machine in order to be completed.

35. In a day, how many units of Fabric Y can be completed at most?
    (a) 20 (b) 30
    (c) 40 (d) 50
36. If 20 units of Fabric Y are made in a day, how many units of Fabric X can be completed the same day?
    (a) 0 (b) 20
    (c) 40 (d) 45
37. If only 30 units of Fabric Y are made in a day, how many machine hours will be idle that day?
    (a) 120 (b) 130
    (c) 135 (d) 150
38. If one more dyeing machine is added, at the most how many more units of Fabric X can be made in a day?
    (a) 0 (b) 5
    (c) 8 (d) 10
39. If only Fabric X has to be made, what machines should be bought so that there is a maximum increase in production capacity (only one machine has to be bought)?
    (a) spinning machine (b) weaving machine
    (c) dyeing machine (d) any one of three
40. If only Fabric Y has to be made, what machines should be bought so that there is a maximum increase in production capacity (only one machine has to be bought)?
    (a) spinning machine (b) weaving machine
    (c) dyeing machine (d) any one of three

ANSWER KEY

1. (c)	2. (b)	3. (d)	4. (c)	5. (b)	6. (b)	7. (b)
8. (c)	9. (a)	10. (d)	11. (b)	12. (d)	13. (a)	14. (d)
15. (d)	16. (c)	17. (c)	18. (c)	19. (b)	20. (b)	21. (a)
22. (a)	23. (b)	24. (a)	25. (a)	26. (b)	27. (b)	28. (d)
29. (a)	30. (d)	31. (a)	32. (a)	33. (c)	34. (a)	35. (b)
36. (d)	37. (c)	38. (a)	39. (b)	40. (c)		

EXPLANATORY NOTES

Case 1

1. Let x be the volume. So the cost of training x candidates in both of these should be the same for indifference between the two options
   i.e., 2 lakh + 1000 x = 3.2 lakh + 750 x
   $\Rightarrow 250x = 1.2$ lakh
   $\Rightarrow x = 120{,}000/250 = 480$
2. Let x be the volume.
   3.2 lakh + 750 x = 5 lakh + 500 x
   $\Rightarrow 250\,x = 1.8$ lakh $\Rightarrow x = 720$
3. Let x be the volume.
   2 lakh + 1000 x = 5 lakh + 500 x
   $\therefore x = 600$.
4. Total sales = 1200 × 1250 = 15 lakh
   Total cost (for all 3 levels) = 5 lakh + 500 × 1200 = 11 lakh
   Thus profit = Total sales – Total cost = Rs 15 lakh – Rs 11 lakh = Rs 4 lakh
5. Total cost = 11 lakh
   profit = 4 lakh
   $\therefore$ profit % = (4/11) × 100 = 36.36%

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Case 2

6. 200 million = 20 % of population
   ⇒ Population = 200 × 5 = 1000 million = 100 crore
7. 2004 population = 1000 million
   Population in 2008 or after 4 years = 560 × 2 = 1120 million
   ∴ Growth rate = (120 × 100)/(1000 × 4) = (12/4)%
   = 3 % per annum simple growth rate.
8. Hotel users in 2004 = 200 million
   Hotel users in 2008 = 560 million
   ∴ Growth in percentage = $\frac{560-200}{200}$
9. Total revenue in 2004 = 50 billion
   Total revenue in 2008 = 150 billion
   ∴ Growth in percentage = $\frac{150-50}{50} \times 100 = \frac{100}{50} =$ 200%
10. By 2008 half or 50% of the Indian population will be using hotels.
    We do not have any information about 2007. Hence the data is inadequate.

Case 3

11. Born 100 ⇒ 10 die at infancy
    90 ⇒ 10 die till age 5
    $80 \Rightarrow \frac{2}{3} \times \frac{1}{2} \times 80$ go to school
    ∴ Who attend Std. V = $80 \times \frac{1}{3} \times 0.4 = 10.66\%$
12. No. of child labourers in India = $\left(90 \times \frac{1}{15}\right)$ crore = 6 crore
13. Out of 100 born, 20 die by the age of 5.
    Number of child labourers in Orissa and Bihar = $\frac{1}{3} \times 80 \cong 27$
14. Since we do not know how many children reach Std X, the answer cannot be found. Hence, (d).
15. Since we do not know the exact population of Kerala, Orissa and Bihar, the answer cannot be found.
16. Number of female literates = $90 \times \frac{9}{19} \times 0.38 = 16.2$ = crore
    Number of male literates = $90 \times \frac{10}{19} \times 0.57 = 27$ crore
    ∴ Total literates = 16.2 + 27 = 43.2 crore
17. Total illiterates in India = 90 – 43.2 = 46.8 crore
    ∴ No. of illiterates in Orissa and Bihar = $\frac{1}{3} \times 46.8$ = 15.6 crore

Case 4

18. The required 95 responses will be got by combining 50 through the TOI and 45 through the HT in insertions of size 200 + cm^2.
19. The solution will be got by comparing the cost of the two campaigns against one another. Since the expected response is the same,
    Cost of 3 insertions of 240 cm^2 = 43 × 240 × 3=720 × 43 = Rs 30,960
    Cost of 3 insertions of 81 × 3 = 243 cm^2 = 40 × 243 × 3 = 729 × 40 = Rs 29,160
    AMS should go for a height of 81 cm since the cost of the campaign is lower.
20. TOI = 50 × 2 × 80 = 8000
    HT = 40 × 2 × 80 = 6400
    ∴ Percentage difference = (1600/6400) = 25%
    Since cost is the only consideration, HT should be selected and the required percentage difference is 25% between the two costs over two insertions of 80 cm^2.
21. Cost of campaign in TOI = 243 × 35 × 10.
    Cost of campaign in HT = 243 × 34 × 10.
    ∴ HT is better in terms of cost.
22. Validity Period for HT =10 + 3 = 13 weeks = 91 days
    Validity Period for TOI = 90 days
    Hence, HT is the better option in terms of validity.
23. TOI will give an expected response of 50 × 10 = 500 while HT will given an expected response of 45 × 10 = 450. Hence, TOI will be a better option in terms of numbers of responses.

Case 5

24. Total cost on cash down of 25,000 = 25,000 + 24,000 = Rs 49,000
    Total cost on cash down of 18,000 = 18,000 + 36,000 = Rs 54,000
    ∴ Option (a) is better since it is given that Mr Kunal does not earn any interest on his money.
25. Total cost on down payment of 25,000 = 25,000 + 24,000 = Rs 49,000
    Total cost on down payment of 18,000 = 18,000 + 36,000 = Rs 54,000
    Required answer = 5000/49,000 is approximately equal to 10.2%
26. For the second installment scheme he has to borrow Rs 6000. Hence, his monthly repayment will be Rs 600 per month towards the money lender and Rs 1000 per month towards the bike dealer. Hence, the total repayment will be Rs 1600 per month.
    For the first installment scheme he will have to borrow Rs 13000, which will entail a monthly

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repayment of Rs 1408.33 per month to the money lender. (13,000 + 3900 to be repaid in 12 monthly installments.) Besides, he also has to pay Rs1000 per month towards the bike dealer. Hence, the total repayment will be Rs 2408.33 per month. This is outside his monthly limit of Rs 2000 repayment per month. Hence he has to go for the second scheme.

Case 6

The following table emerges out of the case.

	Earth		Mars		Jupiter		TOTAL	
	Sales	**Revenue**	**Sales**	**Revenue**	**Sales**	**Revenue**	**Sales**	**Revenue**
CSP	2000	30,000	100	1000	300	2400	**2400**	**33,400**
CC	45	675	72	720	2483	19864	**2600**	**21259**
CP	600	9000	1200	12,000	1000	8000	**2800**	**29,000**
Total		**39,675**		**13,320**		**30,264**		

The answers can be read out of the table itself.

27. 2483
28. None of these
29. CSP

Note that the table structure has to be created according to the information provided and the filling in of the specific values within the table should only be for the questions asked. Hence, the values which were not sought by the questions asked have been left without being calculated for the table.

Case 7

The following data table can be formed from the information provided.

Company	Sales	Expenses	Profits
AZ	10	9	1
BMZ	12	9.6	2.4
CW	12	10	2
DT	6	4	2

The values in the table are got through the following process:

Let sales of AZ = x, then its profits= 0.1 x.

Sales of BMW= Sales of CW = y.

Profit of BMW = 20% of its sales = $0.2y$.

Sales of CW is 400% more than profits of CW. Hence, profit of CW= $0.166y$= Profits of DT.

Sales of DT is 200% more than profits of DT. Hence, sales of DT= $0.5y$

Also expenses of CW = $y - 0.166y = 0.833y$ = 10 million.

Hence, $y = 12$.

Also, expenses of AZ = $0.9x$ = 9 million. Hence, x = 10 million.

Answers:

30. Lowest total expense = 4 million for DT.
31. Lowest profits = 1 million for AZ.
32. 2/11.25 = 17.77%
33. The respective profit percentages would have been 40% and 16.66%—a ratio of 12:5.
34. The required ratio is 1:2.4 = 5:12.

Case 8

X	0.66 hours	2 hours	0.5 hours	Time required per unit processed
Y	1 hour	0.5 hours	1 hour	Time required per unit processed
	Spinning	Weaving	Dyeing	
Capacity available	60	100	50	

35. With respect to Fabric Y, 60 units can be made in 60 hours on the spinning machine, 200 units can be woven on the weaving machine and 50 units can be made on the dyeing machine. Since, only 50 units can be dyed, only 50 units can be completed in a day.
36. 20 units of fabric Y will consume 20 hours on spinning, 10 hours on weaving and 20 hours on dyeing. Capacity left will be 40 hours of spinning, 90 hours on weaving and 30 hours on dyeing. In this available time 60 units can be spun, 45 units can be woven and 60 units can by dyed. Hence, only 45 units of X can be completed after 20 units of Y are made.
37. 30 units of Y will consume (30+15+30) = 75 hours totally. 135 hours will remain idle.

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38. The capacity constraint for fabric X lies in weaving. Hence, adding any number of dyeing machines is not going to affect the number of units of fabric X that can be produced in a day.
39. As per the logic given for the above question, a weaving machine will be required.
40. For fabric Y, the constraint lies in the dyeing machine. Hence, if one machine has to be bought and the capacity of Fabric Y has to be increased, a dyeing machine should be procured.

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PART 2

DI Exercises (Without Options)

In This Part You will Learn:

- What are the various question patterns and types in Data Interpretation. The questions you have encountered in Part 1 were exclusively based on single types of data representations while in this part you would come across multiple data representations used together to form DI question sets.
- To solve actual questions based on question patterns used in exams and will also find out ways :
  - To improve your interpretation of data
  - To improve your anticipation of questions when you see data
  - To improve your DI problem solving skills, and
  - To improve your speed and understanding of DI questions.

This Part Contains:

- Various practice exercises without options
- Practice questions covering various question types asked in exams (like CAT and other management exams, banking exams, and other aptitude exams)

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1. Try to solve each question set with a time limit of 1 minute per question. If you finish solving a set of questions within a time limit then in case there is/are question/s left, solve them till you get all the answers correct.

2. After you finish solving a question set, try to focus on thinking about additional data possibilities which could be added to the given data set (A note on this is attached after the first question set in this part).

3. Focus on learning through every question that you come across in this part. Remember that DI is a subject which is experientially learnt.

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1

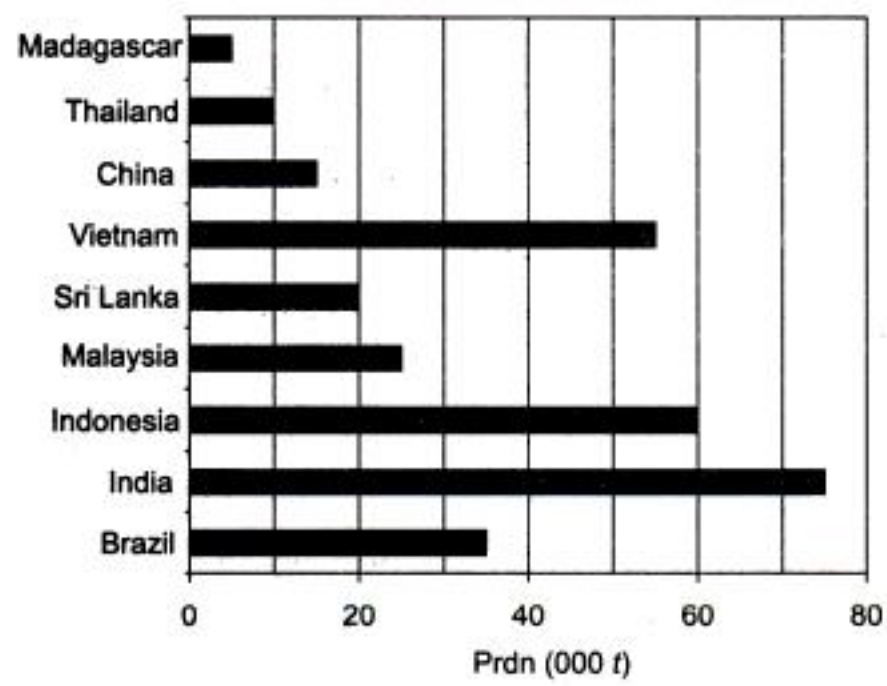
DI Exercises (Without Options)

EXERCISE

I.

The following bar chart (Figure 1.1) gives the information of the pepper production in nine countries of the world.

FIGURE 1.1 Global Pepper Production (2004)



(Assume that there are only nine countries in the world which produce pepper.)

1. What percentage of the world's total pepper production in 2004 is contributed by India's pepper production in the same year?
2. What percentage of India's pepper production for the year is the total production of Madagascar, Thailand, Sri Lanka and Malaysia?
3. If India's productivity of pepper production is twice that of Vietnam, find what percentage of the land used for pepper production in Vietnam is the land used for pepper production in India?
4. Arrange the nine countries according to the increasing order of their pepper production in 2004.
5. The production of Vietnam is how much more/less percentage than the production of each country. (Find all eight respective values.)
6. Find the percentage deviation from the average value of production per country for each of the nine countries. (Find all the nine respective values.)
7. Find the minimum difference between the pepper productions between any two countries.
8. Find the maximum difference between the pepper productions between any two countries.
9. The ratio of the maximum difference (Q.8) to the minimum difference (Q.7) is:
10. The minimum difference (Q.7) is what percentage of the maximum difference (Q.8).
11. Convert the data shown in the above bar chart into:
    (a) A pie chart.
    (b) A table.
    (c) Write a paragraph which will capture the entire information.

Note on Interpretation: The information provided shows the production of pepper amongst the nine pepper producing countries of the world. Since these are the only countries which produce pepper in the world, we can add up the total production in these nine countries to get the overall world pepper production in 2004. [This information can also be presented in the form of a pie chart.] Note that in case there were more than 9 countries producing pepper,

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the production of the remaining countries could have been aggregated into one more bar below Brazil as Others. In such a case, the total world production would have been the addition of the ten figures in the chart (9 shown + Others).

Additional Data Possibilities to Link with the Given Data:

1. The trend of global pepper production over a 5-year period could be shown on another bar, then the figure above would show the break up for the year 2004 production.
2. Area used for pepper production in each of these countries could be provided. This would help us estimate the productivity per unit area in each of the nine countries and compare it between each other and/or with global average productivity.
3. Price of pepper in each of these countries—This would give us the estimate of the value of pepper production, which in turn can be linked to GDP of these countries.

Task for Student

Create additional information based on what is provided above and on whatever else you can imagine to link to the above bar chart, then try to create questions on these. Please do this for each and every graph/chart in this part of the book and also go ahead and follow this practice with all graphs and charts that you see in magazines and newspapers.

Importance—Improvement in scores in DI will occur in small invisible incremental steps. What is needed is that you follow a process that will develop your mind and help it solve questions faster. Doing the task prescribed above, will give you a clearer perspective of more complex data and will significantly improve the process of interpretation in your mind.

Furthermore, the task of creating questions on data provided/created will also help you get a perspective on the kind of questions that can be created on any given chart/diagram/graph. The end result would be that under strenuous examination conditions, you will be able to select the lesser complicated graphs more easily—thus saving time and ensuring better scores through avoiding the more complicated data sets (thus avoiding errors).

II.

Study the following table (Table 1.1) and answer the questions given below that.

TABLE 1.1 Productivity of Oilseeds (kg/ha)

Crop	India	World	Highest productivity in the world
Groundnut	913	1336	6075
Rapeseed–mustard	875	1543	6667
Soybean	1008	2148	3571
Sunflower	556	1247	2858
Sesame	332	389	1175
Castor	1221	1014	1221
Sunflower	606	846	2250
Linseed	344	858	2136

1. For which of the oilseeds categories does India show the highest productivity in the world?
2. In how many categories is India's productivity not more than 50 percent of the world's productivity?
3. What percentage of the world's productivity is India's productivity in the groundnut category?
4. What percentage of the world's productivity is India's productivity in the sunflower category?
5. What percentage of the world's productivity is India's productivity in the linseed category?
6. What percentage of India's productivity is the world's productivity in castor?
7. In which of the oilseeds categories does India exhibit the lowest productivity in the world?
8. Find the percentage difference between India's productivity in the rapeseed-mustard category and the world's highest productivity in castor.
9. Find the percentage difference between India's productivity in the castor category and the world's highest productivity in the linseed category.
10. Find the percentage difference between India's productivity in the sesame category and the weighted average of the world's highest productivity in castor and the world's highest productivity in sunflower.

Note on Interpretation: The data provided shows productivity of different crops in kg/hectare for India, for the whole world and for the country with the highest productivity in the world.

$$\text{Productivity is defined as} = \frac{\text{Production}}{\text{Area used for production}}$$

The world's total productivity comes from the world's total production and the total area used for production in the entire world.

The world's highest productivity is for a country whose name is undisclosed.

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Additional Data Possibilities

A table showing production in India, world's total production and the production in the country which shows the highest productivity in the world for each crop. This will lead to questions on area under production, ratios of area under production, apart from questions on production value comparisons.

III.

Study the following Table (Table 1.2) and answer the questions given below that.

TABLE 1.2 Area and Production of Important Spices in India (1999–2000)

Spices	Area (000 ha)	Production (000 t)
Black pepper	192.3	58.3
Cardamom (small)	72.4	9.3
Chilli	915.2	1018.0
Ginger	77.6	263.2
Turmeric	161.3	653.2
Coriander	546.5	290.0
Cumin	264.0	108.7
Garlic	114.4	495.3
Other seed spices	84.7	99.4
Tree spices	28.4	11.1
Others	43.2	16.7
Total	2500.0	3023.2

1. Which of the spices has the largest production in India?
2. Find out the productivity of black pepper in India.
3. For which of the spices, is the productivity in India the highest, (excluding others)?
4. For which of the spices, is the productivity in India the lowest, (excluding others)?
5. By what percentage is the maximum productivity of any spice minimum more than that of all spices?
6. By what percentage is the productivity of any spice less than that of all spices?
7. Find out the productivity of cardamom (small) in India.
8. Find out the productivity of coriander in India.
9. Find out the productivity of turmeric in India.
10. Find out the productivity of garlic in India.
11. Represent the above data as a line graph and as a set of pie charts.
12. Arrange the productivity and the area under production in increasing order excluding others.

Note on Interpretation Production divided by area gives productivity in tonnes/hectare

T/ha*1000 = kg/ha

Also if a conversion factor is provided between hectare and another unit of area measurement such as acre, sq. yard, sq. km, etc. then productivity would be measured in t/acre, t/sq yard, t/sq km or kg/acre, kg/sq yard, kg/sq km.

Additional Data Possibilities

(a) The trend of production and the areas under usage could be provided for any particular spice over a ten-year period.

(b) An additional column of fertilizer used/ha would give us an idea of the total use of fertilizers. Similarly, other columns can be added like—man-hour / ha, price in Rs / tonne for each of the spices mentioned.

IV.

Study the following table (Table 1.3) and answer the questions following that.

TABLE 1.3 Per cent Contribution of Select Crops in Total Food Grain Production of India

Year	Crop	Per cent contribution
1970	Rice	39.45
2000		42.79
1970	Wheat	22.02
2000		34.83
1970	Coarse Cereals	27.52
2000		15.42
1970	Pulses	11.01
2000		06.96

Total food grain production in 1970 is equal to 2343.34 million tonnes.

Total food grain production in 2000 is equal to 3865.73 million tonnes.

1. Arrange the entire crop in the increasing order of their percentage point difference in the percentage contribution to total food grain production between 1970 and 2000.
2. Find the percentage increment in the production of rice during the given period.
3. Find the percentage increment in the production of wheat during the given period.
4. Find the percentage increment in the production of coarse cereals during the given period.
5. Find the percentage increment in the production of pulses during the given period.
6. The total production of rice and wheat in 1970 increased by what percentage during the given period?
7. Find the difference between the production of coarse cereals in 1970 and the production of wheat in 2000.

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8. By what percentage has the difference between the production of coarse cereals and pulses in 1970 increased during the given period.
9. Find the difference between the production of pulses in 1970 and the production of rice in 2000.
10. Find the highest ratio between the production of any variety of food grain in 1970 to any variety of food grain in 2000.
11. Convert the data shown in the above bar chart into:
    (a) A pie chart.
    (b) A bar chart.
    (c) Write a paragraph which will capture the entire information.

Notes on Interpretation: The data provides the percentage breakup of the food grain production in India in 1970 and 2000.

While it can be seen clearly that the proportion of rice and wheat has gone up, that of coarse cereals and pulses has come down. Understand that a conclusion about the absolute values of the production of each of these food grains, can only be drawn by using the additional data provided (total food grain production in 1970 and 2000).

V.

From the information given in Table 1.4, answer the questions following that.

TABLE 1.4 Data on Production and Consumption
(Production + Import = Consumption + Export + Increase in Closing Stock)

Year	Consumption (tonnes)	Export (tonnes)	Import (tonnes)	Increase (Decrease) in Closing Stock (tonnes)
1993–94	450,480	186	19,940	7015
1994–95	485,850	1,961	8,093	(7465)
1995–96	525,465	1,130	51,635	33640
1996–97	561,765	1,598	19,770	4120
1997–98	571,820	1,415	32,070	39990
1998–99	591,545	1,840	29,534	40665
1999–00	628,110	5,989	20,207	4605
2000–01	631,475	13,356	8,572	(8580)

1. Find the percentage growth in the quantity of the consumption during the entire period.
2. Find the total net increase in the quantity of the closing stock during the entire period.
3. During which year is the percentage growth of consumption the highest?
4. During which year is the percentage growth of consumption the lowest?
5. Find the quantity of production in 1993–1994.
6. Find the quantity of production in 1999–2000.
7. Find the percentage growth in the quantity of production during the entire period.
8. For which year is the ratio of export to import the maximum?
9. For which year is the ratio of export to import the minimum?
10. Find the difference between the quantity of export and the quantity of import over the entire period.
11. Convert the data shown in the above bar chart into:
    (a) A pie chart.
    (b) A bar chart.

Notes on Interpretation: The availability of any commodity is defined as:

opening stock + production + imports.

The usage of any commodity occurs out of the availability and happens through:
consumption + exports +wastage.

The difference between availability and usage is reflected in the change in stock.

There can be two situations in this context:

1. Increase in stock—occurs when production + import is greater than consumption + exports + wastage
2. Decrease in stock—occurs when production + import is less than consumption + exports + Wastage.

Note: In this case, the wastage has to be ignored, since it is not provided.

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VI.

Study the following table (Table 1.5) and answer the questions given below that.

TABLE 1.5 Coconuts: Area of Cultivation and Total Production (1999–2000)

States/Union Territories	Area ('000 Hectares)	Production (Million nuts)
Andhra Pradesh	101.7	1051.8
Assam	20.2	150.1
Goa	25.0	121.6
Karnataka	320.6	1670.3
Kerala	899.1	5167.0
Maharashtra	15.1	226.7
Orissa	29.0	163.3
Tamil Nadu	304.0	3222.0
Tripura	9.1	7.5
West Bengal	24.2	324.3
A&N Islands	24.7	87.5
Lakshadweep	2.8	28.3
Pondicherry	2.2	31.2
All India	1777.7	12251.6

1. Find the number of states in which the production is more than the national (All India) productivity level.
2. For which state is the production highest?
3. For which state is the production lowest?
4. If a minimum qualification of area under use for coconut production is set at 1 per cent, then from amongst the states/union territory that meet this minimum requirement, which state/union territory has exhibited the highest productivity level.
5. Solve Question 4 for the lowest productivity level.
6. In how many states/union territories is the production of coconut more than the national average production per state/union territory? (Consider only the given states/union territories.)
7. In how many states/union territories is the area used for coconut production less than the national average per state/union territory? (Consider only the given states/union territories.)
8. Arrange the states/union territory in increasing order of productivity of coconut.
9. If we define a new term 'productability' as the ratio of the area (hectare) to the production (million nuts), arrange the states/union territories in the increasing order of productability.
10. For which state/union territory is the rank in Questions 8 and 9 the same.
11. Convert the data shown above into:
    (a) Pie charts.
    (b) Bar chart/s.
    (c) line graph.

VII.

Study the following table (Table 1.6) and answer the questions given below that.

TABLE 1.6 Compounded Annual Growth Rate of Important Crops (1971–74)

Crop	Area	Production
Rice	0.49	2.79
Wheat	1.28	4.03
Sugarcane	2.05	3.86
Cardamom	1.13	4.24
Tea	0.76	2.36
Coffee	3.04	4.26
Rubber	3.77	6.92

1. Find the percentage growth in yield per ha of rice.
2. Find the percentage growth in yield per ha of wheat.
3. Find the percentage growth in yield per ha of sugarcane.
4. Find the percentage growth in yield per ha of cardamom.
5. Find the percentage growth in yield per ha of tea.
6. Find the percentage growth in yield per ha of coffee.
7. Find the percentage growth in yield per ha of rubber.
8. Find the percentage growth rate of the area under cultivation of the crops given in Table 1.6.
9. Find the percentage growth rate of the production of the crops given in Table 1.6.
10. Convert the data shown above into:
    (a) Pie charts.
    (b) Bar charts.

Notes on Interpretation: The student should realise that the figures in the table show the compounded annual growth rates of the production and the area under production for each state. This means that if the initial area for rice was 100 in 1971, it would become
$100 \times 1.0049 \times 1.0049 \times 1.0049$ in 1974.

Similarly if the production of rice in 1971 was 100, it would became $100 \times (1.0279)^3$ (since there are three years).

Thus, the percentage change in yield per hectare for rice would be:

$$\frac{100 \times (1.0274)^3}{(1.0049)^3}$$

The answer to the first seven questions will be obtained through similar calculation. Questions 8 and 9 cannot be answered because there is no data about the proportionate areas of each crop. (Q.8.) Neither is there any data about the proportionate productions of the individual crops. (Q.9.).

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The student should clearly conceptualise that these answers could have been found if the area under production had been given for each of the crops. Besides, even if the actual area and production had not been given, this could have been solved if the proportional areas had been given.

VIII.

Study the following figure (Figure 1.2) and answer the questions given below that.

FIGURE 1.2 Consumption of Natural Rubber According to End-Products for the Year 2001
Total Consumption: 120 mt

NR (Natural Rubber)

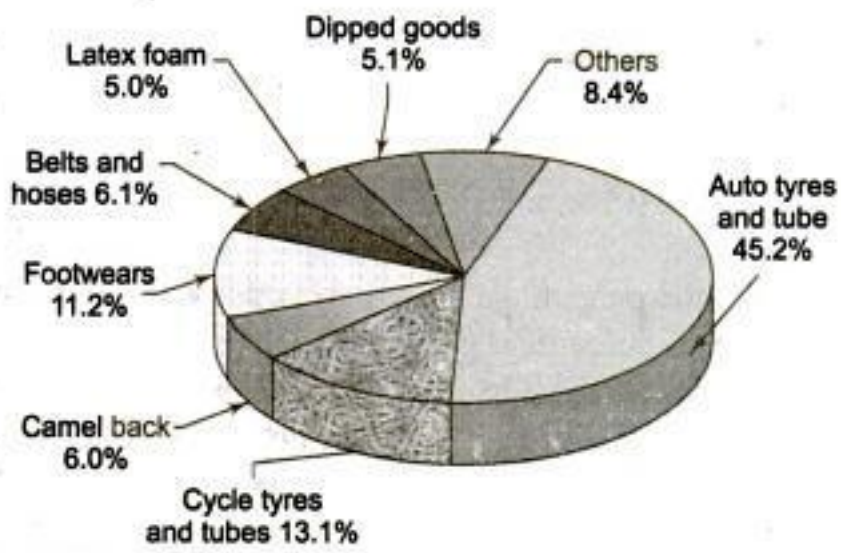
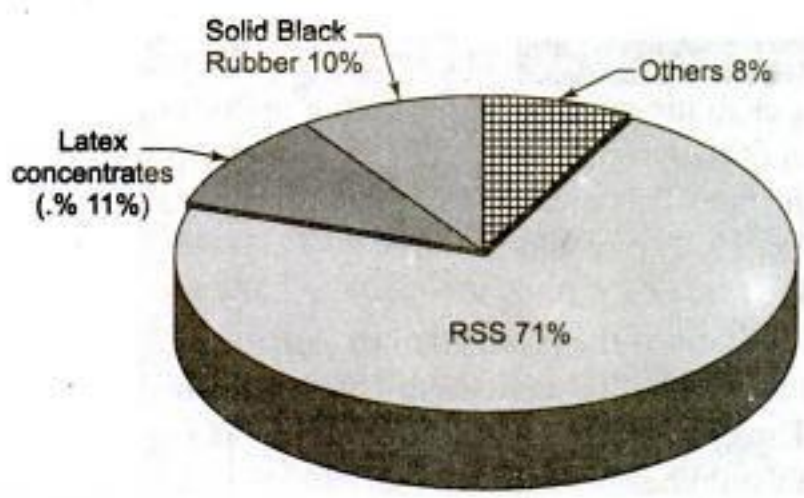


FIGURE 1.3 Natural Rubber Production in India for the Year 2000–01 Total Production: 150mt



1. If natural rubber of the type RSS is capable of being consumed anywhere, then what is the least number of consumption modes which can be used to consume the entire RSS type natural rubber, that has been produced in the year 2001?
2. Solve Question 1 for Solid Black.
3. Solve Question 2 for Solid Black for the maximum number of consumption modes instead of for the minimum number of consumption modes.
4. Solve Question 1 for latex concentrates for the maximum number of consumption modes instead of for the minimum number of consumption modes.
5. Find the difference between the quantity of production of RSS natural rubber and latex concentrate natural rubber.
6. Find the difference between the quantity of natural rubber consumed for dipped goods and for latex foam.
7. Find the difference between the quantity of natural rubber consumed for footwear and for auto tires and tubes.
8. Find the percentage increment in the production of RSS type Natural Rubber, if in the next year the production of natural rubber is equal to 200mt and all other types of natural rubber have increased by exactly 10 per cent.
9. Find the percentage increment in the total consumption of natural rubber in the next year if the consumption of auto tires and tubes and cycle tires and tubes goes up by 20 per cent each next year. (Assume that there is no change in the consumption in any other category.)
10. Find the average of production of all types of rubber in 2001.
11. Convert the data shown above into:
    (a) table.
    (b) bar charts.
    (c) paragraph capturing the entire information.

Notes on Interpretation: The two pies shown typically represent the consumption and production of natural rubber in India for the year 2001. Both the figures are in M.T. Normally in such cases the value of the consumption and production is the same. However, in this case, it can be seen that such is not the case. The production is higher by 30 M.T. than the consumption. This can be interpreted to have gone into either increase in stock of natural rubber or in export or in other sectors. Since no information is available about either of these two, we cannot draw any definite conclusion.

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IX.

Study the following tables (Tables 1.7 and 1.8) and answer the questions given below that.

TABLE 1.7 Advertisement Tariffs (Black and White)

	1	3	6	12
Black & White Advertisement	**Monthly Insertion**	**Quarter Insertion**	**Half-year Insertion**	**Annual Insertion**
Full Page	4000	3500 × 3	3000 × 6	2500 × 12
Half Page	2500	2000 × 3	1500 × 6	1250 × 12
Quarter Page	1000	800 × 3	700 × 6	600 × 12
Strip	400	350 × 3	300 × 6	250 × 12

TABLE 1.8 Advertisement Tariffs (Colour)

Colour Ad.	Monthly Insertion	Quarter Insertion	Half-year Insertion	Annual Insertion
Inside Front Cover	12000	10000 × 3	8000 × 6	6000 × 12
Inside Back Cover	10000	8000 × 3	6000 × 6	5000 × 12
Back Cover	12500	11000 × 3	9500 × 6	7500 × 12
Full Page	7000	6000 × 3	5000 × 6	4000 × 12

Table 1.7 shows the advertisement tariff plan of a national monthly magazine.

1. Find the difference between the cost of eight monthly full page black and white insertions booked every month and one annual full page black and white insertion (for 12 insertions).
2. Find the difference between the cost of 6 half page black and white insertions booked monthly and one half-year black and white insertion of full page.
   We define percentage annual saving as the following:
   Percentage annual saving

$$= \frac{(\text{cost of 12 monthly insertions} - \text{Cost of one annual insertion}) \times 100}{\text{Cost of 12 montly insertions}}$$

   Similarly there are percentage half-yearly savings and percentage quarterly savings which can be defined.
3. Find the percentage annual saving for a full page black and white advertisement.
4. Arrange in increasing order the percentage annual saving for different categories of black and white advertisements.
5. Arrange the percentage annual saving for different categories of colour advertisements in increasing order.
6. Find the percentage half-yearly savings for different sizes of black and white advertisements.
7. Find the percentage half-yearly saving for different sizes of colour advertisements.
8. Arrange the percentage quarterly saving for different categories of advertisements on black and white paper in ascending order.
9. Arrange the percentage quarterly saving for different categories of advertisements on colour paper.
10. Arrange the percentage quarterly saving for different categories of advertisements on both types of paper.
11. Convert the data shown in the above chart into a set of bar charts.

Notes on Interpretation: The data presented is typical of the advertisement tariffs of most newspapers and magazines. As can be clearly seen, the rate of an insertion depends upon:

1—The size of an advertisement;
2—The colour of the advertisement,
3—The number of times it is booked for,
4—The placement of the advertisement – (inside front, inside back, back cover, etc.)

In general, if an advertiser books an advertisement for more number of times, it costs him less every time the advertisement is printed.

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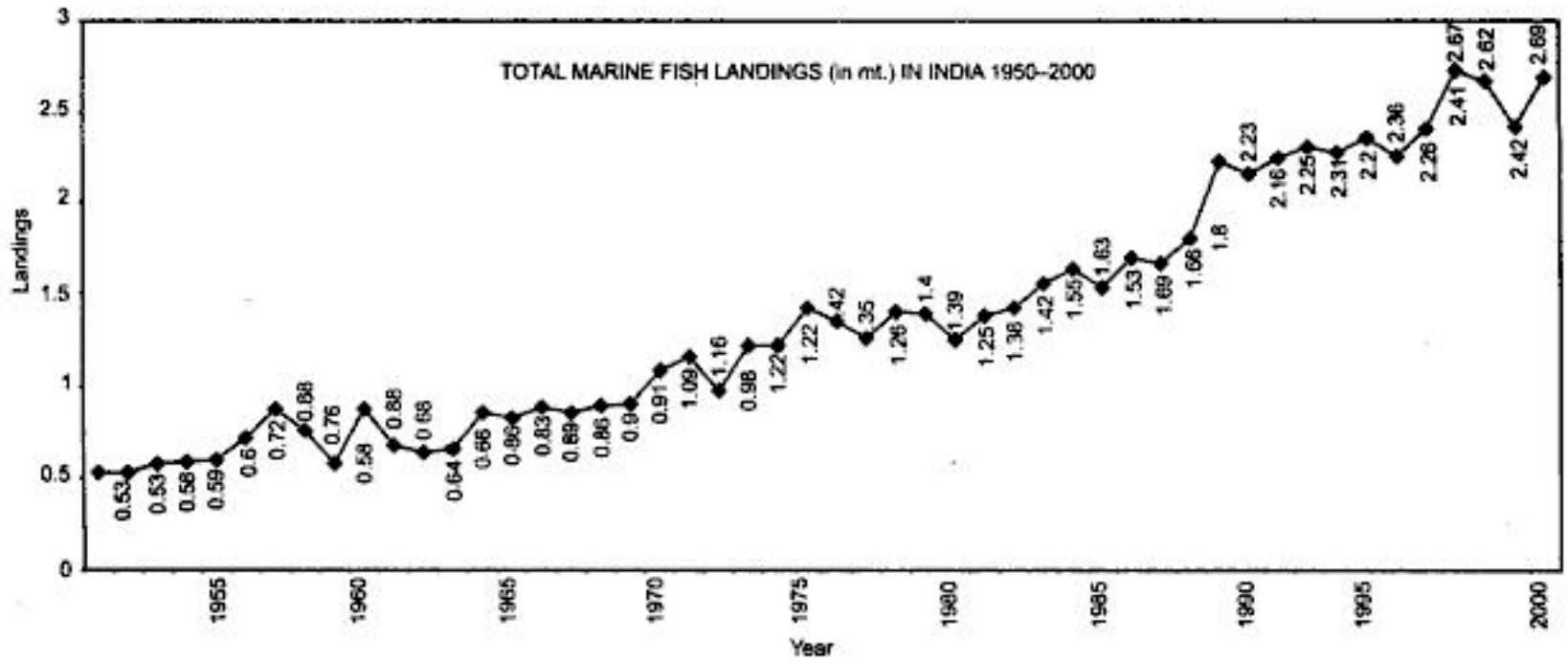
X.

Study the following figure (Figure 1.4) and answer the questions given below.

FIGURE 1.4 Total Marine Fish Landings in India 1950–2000 (in mt.)



1. Find the total marine fish landing for the first decade (1951–60), for the next decade (1961–1970), and so on upto for the last decade (1991–2000).
2. Find the percentage change between the marine fish landings in successive decades (as defined above).
3. For which year is the absolute annual growth in marine fish landing the highest?
4. For which year is the annual percentage growth in marine fish landing the highest?
5. Find the number of years in which the marine fish landing is more than five times the marine fish landing of the first year.
6. Find the number of years in which the percentage annual growth in marine fish landing is more than 10 per cent.
7. Find the number of years in which the percentage decrease in total marine fish landings is less than 10 per cent.
8. Find the number of years in which the percentage annual change in total marine fish landings is less than 10 per cent.
9. Find the total marine fish landing during the entire period (50 years).
10. Find the number of decades in which the total marine fish landing is more than 20 per cent of the total marine fish landing for the entire period.
11. For how many years is there an increase in the total marine fish landing over the previous year?
12. For how many years is the total marine fish landing higher than the average annual marine fish landing over the entire period?

Notes on Interpretation: The time graph shows the absolute value of the total marine fish landings in India for 1950–2000. A close look at the chart will yield the stand out years as: 1959–1960, 1972–1973, 1988–1989 and 1996–1997.

Typical questions on such graphs include, highest percentage change, highest absolute change. Average, moving average etc., the highest absolute change can be seen visually from the graph (the steepest year — obviously 1988—1989).

The highest percentage change is short-listed visually and has to be checked for the combined effect of highest absolute change and least initial value.

XI.

Study the following figures (Figures 1.5 and 1.6) and answer the questions given below that.

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FIGURE 1.5 Value share of Major Spices Exported from India (1999–2000)

Total value = Rs 500 crore

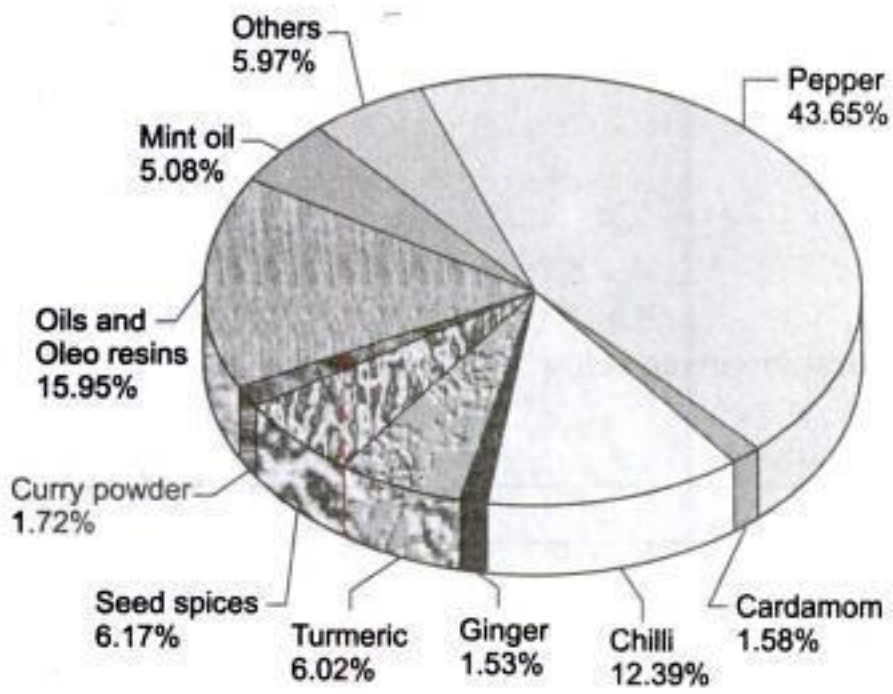
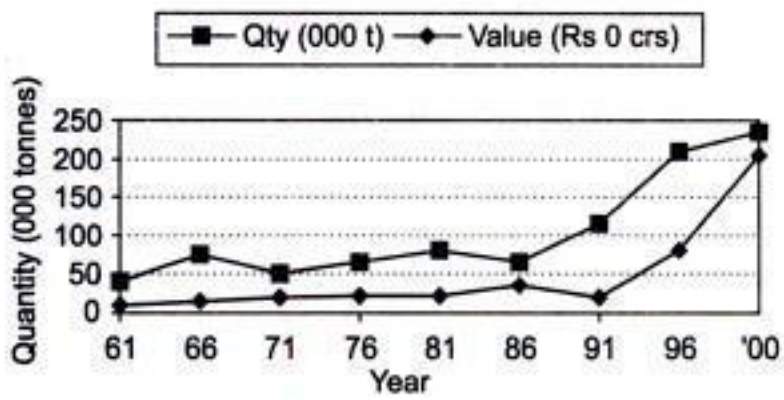


FIGURE 1.6 Trends in Export of Spices from India



1. Find the value of pepper exported from India in 2000.
2. Find the difference between the value of the mint oil and that of curry powder exported from India in 2000.
3. If 50 per cent of the pepper exports, 20 per cent of the cardamom exports and 50 per cent of the turmeric exports are to USA, then find the value of these spices, which are exported to USA (for the year 2000).
4. Out of the total production of the different spices, if 10 per cent of the pepper, 20 per cent of the cardamom, 25 per cent of the chilli, 20 per cent of the ginger, 10 per cent of the turmeric, 16.666 per cent of the seed spices, 50 per cent of the curry powder, 33.333 per cent of oils and oleo resins, 20 per cent of the mint oil and 25 per cent of others are exported, find the total value of all the spices produced in the country (For the year 2000.)
5. Assuming the information in Question 4 to be true, find the value of domestic consumption.
6. For Question 4, find the value of the spices exported from India.

Directions for Questions 7–11 *There are two categories of spices:*

a. Spices that have more than 10 per cent share in the value of the spices exported.

b. Spices which have 10 per cent or less than 10 per cent share in the value of the spices exported. If in the next year the exports of category A spices increase by 20 per cent and that of category B spices increase by 10 per cent only:

7. Find the absolute increase in the export of category A.
8. Find the absolute increase in the export of category B.
9. Find the absolute increase in the export of all spices.
10. Find the percentage increase in the export of all spices.
11. Convert the above data in a) bar charts and b) table/s.

Notes on Interpretation: The line graph shows the trend of export of spices in terms of the quantity and the value of the total export are of spices from India. The left hand axis shows that the quantity is 1000 tonnes, while the right hand axis shows the value in Rs crore. The pie shows the distribution of the spice exports for the particular year of 2000. Note that the value of Rs 500 crore for 2000 (as seen from the line graph) has been divided into its constituent parts.

The value–quantity association: $\frac{\text{Value}}{\text{Quantity}} = \frac{\text{Price/unit}}{\text{quantity}}$

XII.

Study the following table (Table 1.9) and answer the questions given below that.

TABLE 1.9 Trade Deficit 1996–2001

(All figures in Rs crore)

	1996–97	1997–98	1998–99	1999–2000	2000–01
Exports	34133	35680	34298	38285	44894
Imports	48948	51187	47544	55383	59264

Trade Deficit = Import–Export

$$TD\% = \frac{\text{Trade Deficit}}{\text{export}} \times 100$$

1. For which year is the trade deficit the highest?
2. Find the total trade deficit during the entire period.
3. Find the annual percentage change in export for all the consecutive years.
4. Find the percentage of trade deficit for all the years individually.
5. Find the annual percentage change in the import for each of the consecutive years.

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6. Find the annual change in the percentage of trade deficit for each of the consecutive years.
7. Find the total import during the entire period.
8. Find the total export during the entire period.
9. For which year is the ratio of the import to the export the maximum?
10. For which year is the ratio of the import to the export the minimum?

Notes on Interpretation: The table is self-explanatory.
Import–Export = Trade deficits (when import is greater than export)
Export–Import=Trade surplus (when export is greater than import)

XIII.

Study the following figures (Figures 1.7 and 1.8) and answer the questions given below.

FIGURE 1.7 Tobacco Production in Leading Tobacco Producing Countries

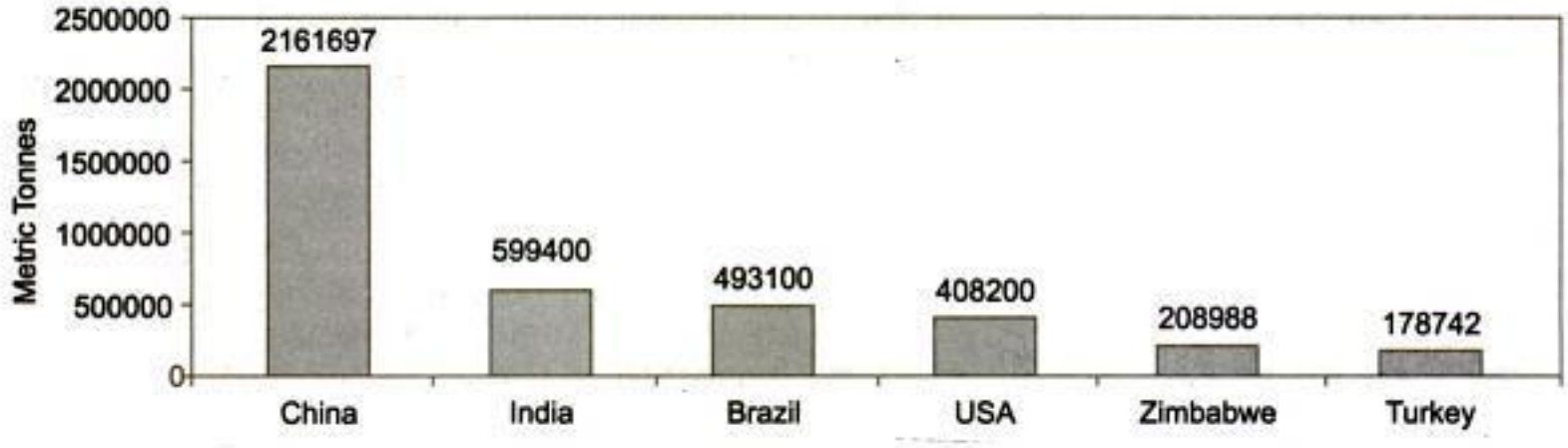
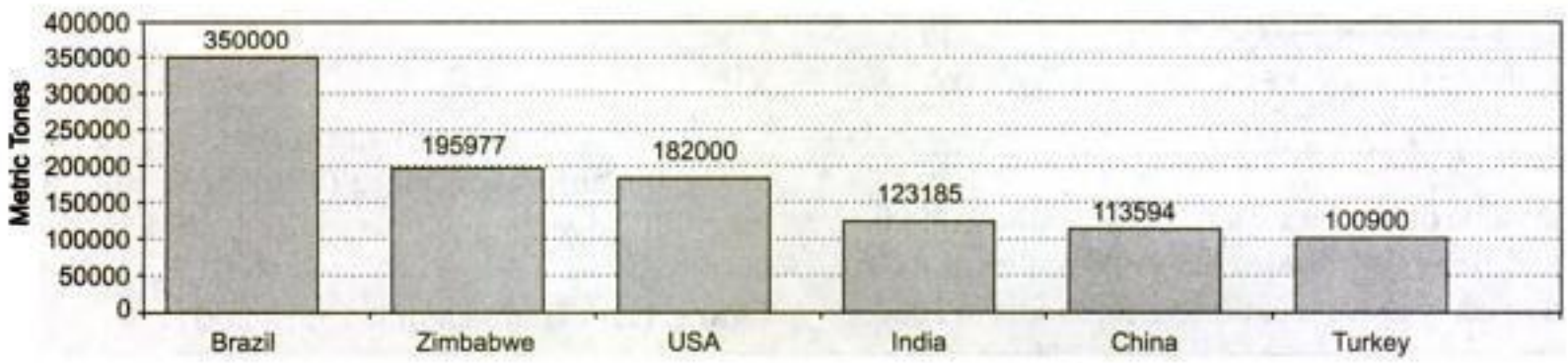


FIGURE 1.8 Tabacco Export from Leading Tobacco Exporting Countries



Assumptions:

- The tobacco, which is not consumed in the country, is exported to the countries where tobacco is not produced.
- Export ratio is defined as the ratio of the tobacco exported to the tobacco produced in a particular country.
- There are only six countries, which produce and export tobacco.

1. For which country is the export ratio the maximum?
2. For which country is the export ratio the minimum?
3. For which country is the per capita consumption of tobacco the maximum?
4. For which country is the per capita consumption of tobacco the minimum?
5. China's tobacco production is how many times that of Turkey?
6. China's tobacco consumption is how many times that of USA?
7. By what percentage is India's tobacco production more than that of Brazil?
8. By what percentage is India's tobacco consumption more than that of Zimbabwe?

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9. What percentage of the world's total production of tobacco is exported from the tobacco producing countries?
10. Arrange all the six tobacco-producing countries in increasing order of their consumption of tobacco.
11. Convert the data in the figures into a set of pie charts.

Notes on Interpretation: The information provided gives the quantity of tobacco produced in the six countries which produced tobacco and the tobacco exported by these six countries.

The difference between the tobacco produced and the tobacco exported will be the tobacco available in the country (if we assume zero imports).

However the zero imports assumptions cannot be made normally unless explicitly stated, since it is possible that a country exports one kind of tobacco while it imports another kind of tobacco. In this case we assume zero imports and 100% use of production in either consumption or exports, since it is stated clearly.

XIV.

Study the following figure (Figure 1.9) and answer the questions given below.

FIGURE 1.9 Intermediary Economics (Fruits & Vegetables)

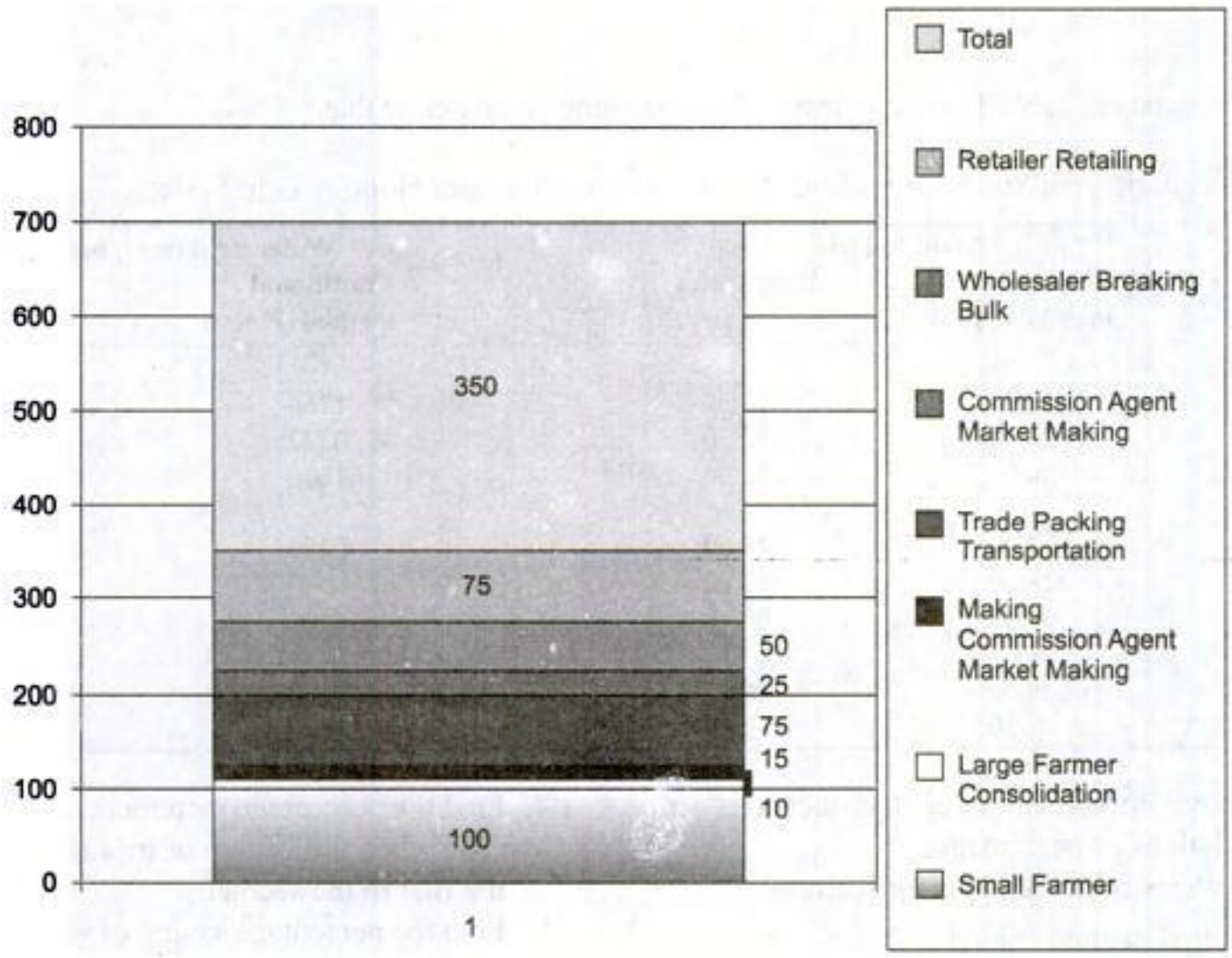

Figure 1.9 shows the distribution of Rs 350 paid by the end customer to the retailer for one unit of fruits and vegetables. The distribution can be seen to be made to different categories of intermediaries and producers

1. The small farmer's share is what percentage of the price paid by the customer?
2. The total commission agents market making share is by what percentage less than the small farmer's share?
3. If the total value of the fruits and vegetables produced by the small farmer is Rs 476,000, then find the 'trade packing transportation making' cost on the fruits and vegetables.
4. The share of the retailer's retailing is by what percentage more/less than the total share of the commission agent market making in the entire marketing process?

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5. The share of the wholesaler (wholesaler breaking bulk) is what percentage of the price paid by the customer?
6. The share of the trade packing transportation making is what percentage of the price paid by the customer?
7. The share of the retailer (retailer retailing) is what percentage of the price paid by the customer?

For the following Questions (8–12) assume that the money spent by the end customer on fruits and vegetables is Rs 21,000 crore.

8. Find the amount, which the small farmers will receive.
9. Find the amount, which the retailers will receive.
10. Find the difference between the share of the wholesaler and the small farmer.
11. Find the percentage difference between the share of the wholesaler and the small farmer.
12. Convert the above data into:
    (a) a pie chart.
    (b) paragraph form that captures the entire data.

Notes on Interpretation: This chart essentially is all about interpretation. It shows the composition of Rs 350 that the end user pays in terms of who gets how much out of the same.

Thus, the interpretation is that while the small farmer gets Rs 100, the large farmer gets Rs 10 for consolidation, the commission agent gets Rs 15 for his market making activities, Rs 75 goes towards trade packing, another Rs 25 to a second commission agent, for market making at the wholesaler's level, Rs 50 goes to the wholesaler for breaking bulks into smaller lots and Rs 75 goes to the retailer for his retailing activities.

XV.

Study the following table (Table 1.10) and answer the questions given below that.

TABLE 1.10 Comparison of Yield per Ha and Water used in mm under Flood & Drip System

Crops	Yield MT/Ha		Water used (mm) per hectare	
	Traditional method (Flood)	Drip System	Traditional method (Flood)	Drip System
Fruit Crops				
Banana	57.5	87.50	1760	970
Grapes	26.40	32.50	0532	278
Citrus	100.00	150.00	1660	640
Vegetables				
Tomato	32.00	48.00	0300	184
Brinjal	28.00	32.00	0090	042
Chilli	04.20	06.10	0100	042
Cash Crops				
Sugarcane	128.00	170.00	2150	940
Cotton	2.30	2.90	0090	042

Based on the above interpretation, all the questions are essentially calculations of percentage.

There are two systems of irrigation in agriculture

(i) Traditional method (Flood).
(ii) Drip system.

1. Find the percentage increment in the yield of bananas when the system of irrigation is changed from the first to the second.
2. Find the percentage increment in the yield of citrus when the system of irrigation is changed from the first to the second.
3. Find the percentage increment in the yield of brinjal when the system of irrigation is changed from the first to the second.
4. Find the percentage increment in the yield of sugarcane when the system of irrigation is changed from the first to the second.
5. Find the percentage saving of water used in the irrigation of grapes when the system of irrigation is changed from the first to the second.
6. Find the percentage saving of water used in irrigation of tomato when the system of irrigation is changed from the first to the second.
7. Find the percentage loss of water used in irrigation of cotton when the system of irrigation is changed from the second to the first.
8. Find the percentage loss of water used in irrigation of chilli when the system of irrigation is changed from the second to the first.

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9. Which of the crops showed the minimum percentage change in the yield per ha when the system of irrigation is changed from the second to the first?
10. Which of the crops showed the maximum percentage change in the use of water when the system of irrigation is changed from the second to the first?
11. Represent the data above in the form of a set of:
    (a) bar charts.
    (b) pie charts.

Notes on Interpretation: There are two basic methods of irrigation and the data given in the table shows the yield in MT/hectare of land for different types of food crops, vegetables and cash crops. The data also shows the usage of water under the flood and the drip system of irrigation.

A closer look at the figure gives us that not only does the drip system of irrigation increase the output of yield per hectare, but it also results in reduction of usage of water per hectare of land. So, while the drip system increases productivity of land, it reduces the usage and hence the cost of the water.

XVI.

Based on the data given below (Table 1.11) answer the questions following that.

TABLE 1.11 Average Productivity of Select Vegetables in the World and India

Vegetables	World's average productivity (q/ha)	Productivity in India (q/ha)	Capacity of production (q/ha)
Eggplant	127.30	130.80	500.00
Cabbage	216.20	156.80	450.00
Cauliflower	136.24	147.00	300.00
Chilli (green)	8.292	8.80	70.00
Cucumber	145.12	67.50	130.00
Beans	68.83	22.00	80.00
Okra	143.57	85.00	200.00
Onion	137.96	141.90	400.00
Pea	60.83	72.90	150.00
Radish	123.45	123.90	250.00
Tomato	250.96	156.00	1000.00

Define the following ratios:

$$\text{CP/PI Ratio} = \frac{\text{Capacity of Production}}{\text{Productivity in India}}$$

$$\text{CP/WP Ratio} = \frac{\text{Capacity of Production}}{\text{World's Average Productivity}}$$

1. Find the number of crops for which India's productivity is more than the world's average productivity.
2. The productivity of certain crops in India is greater than the world's average productivity. For each of these crops, what is the percentage difference between the world's productivity and India's productivity?
3. The difference between the productivity of cabbage in India and in the world is:
4. For which crop is the CP/PI ratio the maximum?
5. For which crop is the CP/PI ratio the minimum?
6. For which crop is the CP/WP ratio the maximum?
7. For which crop is the CP/WP ratio the minimum?
8. The productivity of beans in India is what percentage of the world's average productivity of beans?
9. The productivity of tomatoes in India is what percentage of the world's average productivity of tomatoes?
10. The productivity of okra in India is what percentage of the world's average productivity of okra?
11. If beans production had occurred at it's capacity for production for the entire world, then what would have been the estimated increment in the production in terms of:
    (a) absolute value increase?
    (b) percentage increase?
12. Represent the data above in the form of a set of:
    (a) bar charts.
    (b) pie charts.
    (c) line graph.

Notes on Interpretation: The average productivity of any vegetable is defined as the ratio of:

$$\frac{\text{Total Production in quintals}}{\text{Total area under Productivity}}$$

When these values are considered for the whole world, we get the world's average productivity.

When the same values are considered for India only, we get the productivity in India.

The capacity of production (defined in quintals / hectare) has to be interpreted as the maximum possible production per hectare of land. [Normally this figure is what farmers and agriculturists should aspire for.]

We also need to realise that India's production as well as India's area under production are both parts of the overall world's production and area under production.

Besides, it should also be noted that if India's productivity is higher than the world's productivity then the productivity of the rest of the world will drop below that of the whole world's productivity.

The reverse will also be true.

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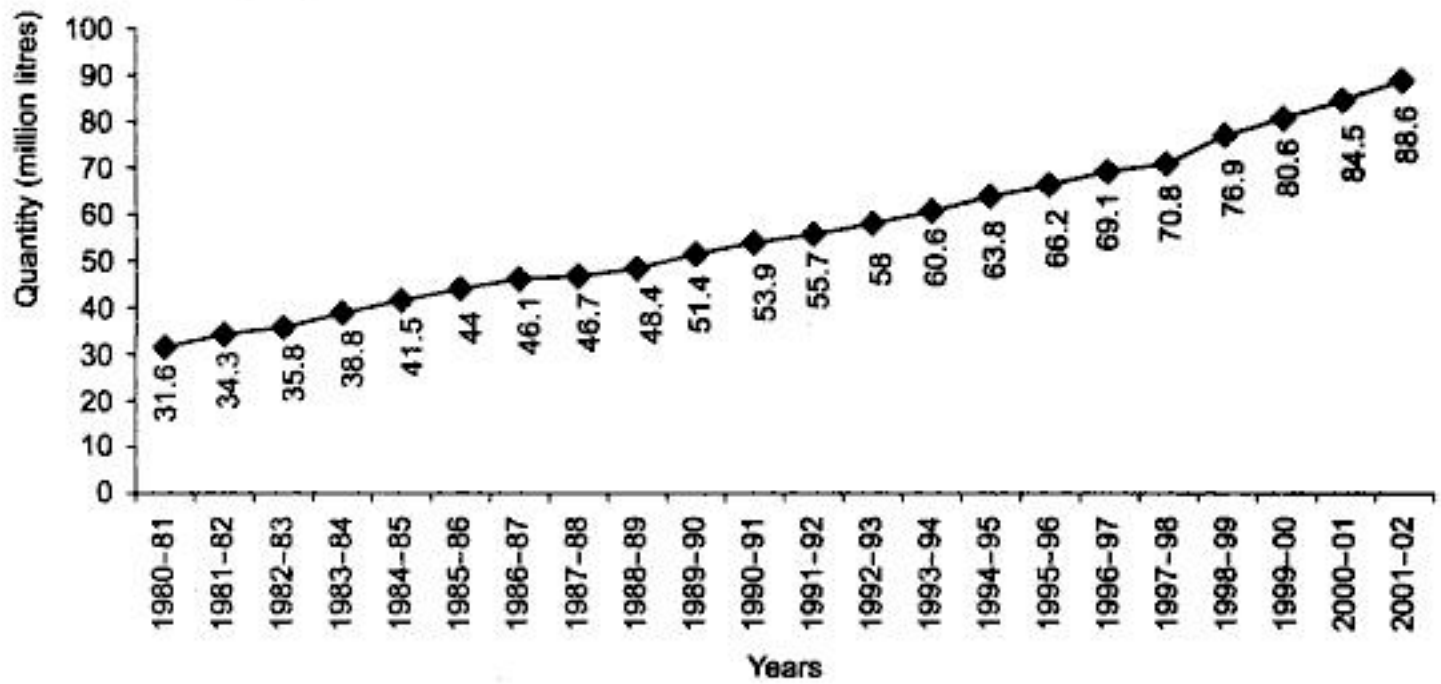
XVII.

Based on Figure 1.10 which gives the data of milk production in India from 1980–81 to 2001–02, answer the questions following that.

FIGURE 1.10 Milk Production of India (in million litres)



1. In which year was the increase in the milk production in India the maximum?
2. For Question 1, find the percentage increment.
3. In which year, was the percentage increment in the milk production the maximum?
4. For Question 3, find the absolute value of the increment.
5. In which year was the increase in the milk production in India the minimum?
6. For Question 5, find the percentage increment.
7. In which year was the percentage increment in milk production the minimum?
8. For Question 7, find the percentage increment.
9. Find the percentage growth in the milk production in India during the entire period.
10. Find the compounded annual percentage growth rate in the milk production in India during the entire period.
11. How much milk was produced in India during the entire period?
12. Represent the data above in the form of a set of:
    (a) bar charts.
    (b) pie charts.
    (c) table.

Notes on Interpretation: The data here is representing a trend line for the total milk production in India. This data is quite similar to the chart X (Marine fish landings) as both the charts show long terms trends.

XVIII.

Study the following table (Table 1.12) and answer the questions following that.

TABLE 1.12 Price of Milk in Select Countries

(US dollars)

Country	Price of 100 litres of milk
European community	37.5
USA	22.8
Japan	85.5
Australia	22.5
New Zealand	20.2
India	18.8

1. Find the difference between the prices of 100 litres of milk in USA and in India.
2. Find the difference between the prices of 500 litres of milk in Australia and in Japan.
3. Find the difference between the prices of 700 litres of milk in the European community and in New Zealand.
   Which one of the following is more costly than the other?
4. 9 litres of milk in USA and 10 litres of milk in Australia.
5. 9 litres of milk in USA and 10 litres of milk in India.

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Fill in the blanks in the following questions.

6. The price of 100 litres of milk in Japan is _____ times of the price of 250 litres of milk in New Zealand.
7. The profit earned if 100 litres of milk are bought in India and sold in the European Community is _____ (Assume that the cost of transportation is 20 per cent of the landed price in the European Community).
8. The average price of buying 100 litres of milk each from all the listed countries in terms of US$/ litres is _____.
9. The average price of buying 100 litres of milk each from all the listed countries in terms of Rs/ litres is _____. (1 US $ = Rs 48)
10. Assume that the following consumption pattern (as in Table 1.13) is followed in the markets for milk shown in Table 1.12.

TABLE 1.13 Milk Consumption in Select Countries

Country	Milk Consumption in Lakh of Litres
European Community	245
USA	320
Japan	150
Australia	225
New Zealand	120
India	450

Draw a pie chart showing the relative consumption spending on milk in the countries shown.

Notes on Interpretation: The table is self-explanatory.

It could have been complicated further by including the currency rates for the currency of each of the countries with respect to US dollars. Besides, further complications could have been created if the cross currency rates between the six countries shown had also been included. Then, questions could have been framed where you would have been asked to identify arbitrage possibilities through milk trading.

The concept of Arbitrage: It is best explained by an example:

Suppose two euros (currency of the European community) = 1 US dollar
and 50 rupees = 1 US dollar
while 1 Euro = 30 rupees

Then, the effective price of 100 litres of milk in the EC would be

$$37.5 \times 2 = 75 \text{ Euros} = 75 \times 30 = 2250$$

i.e., Rs 22.50/litre

However, in India, the effective price of milk would have been 18.8 – 50 = Rs 940
i.e., Rs 9.4/litre

Note: That the differential is higher than that created only due to the price in US dollars.

Obviously, it will be profitable to purchase milk in India and sell it in EC. This profitability is due to two reasons:

(a) The lower rate of milk in India compared to the EC (in US dollars).
(b) Currency advantages.

XIX.

Study the following table (Table 1.14) and answer the questions given below that.

TABLE 1.14 Demand Projections for Alloy and Stainless Steel

Item	1997	1998	1999	2000	2001	2002
Alloy constructional steel	585	608	633	658	685	879
Carbon constructional steel	725	771	820	872	927	1189
Spring steel	286	292	298	304	310	398
Free cutting, ball bearing and others	169	183	198	215	233	299
Stainless steel	717	780	849	924	1005	1693
Total Alloy & Stainless Steel	2482	2634	2798	2973	3160	4457

1. For which year is the demand for spring steel, as a percentage of the total alloy and stainless steel the maximum?
2. For which year is the ratio of alloy constructional steel to the total alloy and stainless steel the maximum?
3. For which year is the ratio of the carbon constructional steel to the total alloy and stainless steel the minimum?
4. For which year is the demand for free cutting, ball bearing and others as a percentage of the total alloy and stainless steel the minimum?
5. Find the total demand of the alloy constructional steel for the entire period.
6. Find the total demand of the spring steel for the entire period.
7. Find the total demand of the stainless steel for the entire period.

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8. Find the total demand of free cutting, ball bearing and others for the entire period.
9. Total demand in Question no.5 is what percentage of the Total Alloy and stainless steel for the entire period?
10. Total demand in Question no.7 is what percentage of the total alloy and stainless steel for the entire period?
11. Represent the data above in the form of a set of:
    (a) bar charts.
    (b) pie charts.
    (c) line graphs.

Notes on Interpretation The table shows the demand projection of different kinds of steels for six years—1997 to 2002.

Some trends are clearly visible from the data.

For example projected demand for all kinds of steel has always grown over the entire period.

The maximum growth in demand is for the year 2002 from 2001. This growth also represents the maximum percentage growth in demand for steel between any two consecutive years.

XX.

Study the following table (Table 1.15) and answer the questions given below that.

TABLE 1.15 Performance at a Glance of Two-Wheelers

Year	Production	Sales
1994	17,56,155	17,63,558
1995	21,95,260	22,09,270
1996	26,56,017	26,58,288
1997	29,79,227	29,63,497

1. Find the percentage growth in the production of two-wheelers from 1994 to 1995.
2. Find the percentage growth in the production of two-wheelers from 1996 to 1997.
3. Find the percentage growth in the production of two-wheelers from 1995 to 1996.
4. Find the percentage growth in the sales of two-wheelers from 1996 to 1997.
5. Find the percentage growth in the sales of two-wheelers from 1994 to 1995.
6. Find the percentage growth in the sales of two-wheelers from 1995 to 1996.
7. Find the total production of two-wheelers during the entire period given in the table.
8. Find the total sales of two-wheelers during the entire period given in the table.
9. Find the ratio of the production to the sales of two-wheelers in 1994.
10. Find the ratio of the sales to the production of two-wheelers in 1997.
11. Draw a pie chart for the production of two-wheelers from 1994 to 1997.
12. Draw a pie chart for the sales of two-wheelers from 1994 to 1997.

Notes on Interpretation: The difference between production and sales shows the net effect on the stock of two wheelers, (i.e., inventory.)

There can be two cases:

Case 1: Production > sales. The excess production will go towards increasing the stock in the godowns.

Case 2: Sales > production. The extra two wheelers sold will be supplied from the inventory leading to a reduction in the stock in the godown (i.e. reduction in inventory).

XXI.

Based on data given in Table 1.16 answer the questions given below that

TABLE 1.16 Data of Production, Import and Export of Aluminium

Assume Production + Imports – Exports = Consumption

Period	Production	Imports	Exports
1994–95	6503	5538	1030
1995–96	7402	6944	783
1996–97	5383	11,403	304

1. Find the consumption of Aluminium in the year 1994–95.
2. Find the consumption of Aluminium in the year 1995–96.
3. Find the consumption of Aluminium in the year 1996–97.
4. Find the percentage growth in the consumption of Aluminium from 1994–95 to 1996–97.
5. Find the percentage growth in the consumption of Aluminium from 1995–96 to 1996–97.
6. Find the percentage growth in the consumption of Aluminium from 1994–95 to 1995–96.
7. Find the total production of Aluminium during the entire period.
8. Find the total exports of Aluminium during the entire period.
9. The total import of Aluminium is what percentage of the total consumption of Aluminium during the entire period.

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10. The total production of Aluminium is what percentage of the total consumption of Aluminium during the entire period.
11. Represent the data above in the form of a set of:
    (a) bar charts
    (b) pie charts
    (c) line graphs.

Notes on Interpretation: The relevant formulae to be applied here are:

production + imports + opening stock = availability
availability – usage = closing stock

where usage = consumption + exports + wastage.

In the current case there is no information about consumption, wastage and opening stock. Hence no conclusions can be drawn about availability or closing stock. In such cases if information was available about consumption then we would have the relationship:

[production + imports] – [consumption + exports] = change in stock.

Note that stock will increase if: [production + imports] > [consumption + exports] and stock will decrease if: [consumption + exports] >[production + imports]

However, with the given information which clearly states that:

[production + imports – exports = consumption] it is clear that the issue of stock does not arise since this means that everything produced or imported is consumed or exported. Such cases normally occur in the context of perishable items.

XXII.

Study Table 1.17 and answer the questions following that.

TABLE 1.17 Trend in Production, Consumption, Import and Export of Cotton for India

National level trends (lakh bales of 170 kg each)						
Period	**1995–1996**	**1996–1997**	**1997–1998**	**1998–1999**	**1999–2000**	**2000–2001**
Production	167.45	178.70	158.00	165.00	156.00	146.00
Consumption	138.29	158.30	149.78	145.53	150.60	149.88
Import	0.50	0.30	4.13	7.87	19.00	16.00
Export	8.40	16.82	3.50	1.01	1.00	0.60

Assume opening inventory = 20 lakh bales. Then closing inventory = opening inventory + production + import – consumption – export – wastage.

For the entire period assume the wastage to be zero,

1. Find the closing inventory for each period.
2. Find the difference between the closing inventories of consecutive periods.
3. Find the percentage growth of production of cotton from 1996–97 to 2000–01.
4. Find the average annual growth rate of production of cotton from 1995–96 to 2000–01.
5. Find the absolute increase in the consumption during the entire period.
6. Find the number of years for which the ratio of the import to the export is greater than 1.
7. Find the number of years for which the ratio of the production to the consumption is more than 1.5.
8. For which year is the percentage growth in the production the maximum?
9. For which year is the percentage change in the consumption the minimum?
10. For which category (amongst production, consumption, import, export) is the percentage growth during the entire period the maximum?
11. Find the total amount of consumption during the entire period.
12. Represent the data above in the form of a set of:
    (a) bar charts (b) pie charts
    (c) line graphs.

Notes on Interpretation: The concepts used in this question have already been explained in the question set XXI.

Besides, since wastage for the entire period shown is given as zero, we can use the formula:

Closing inventory = opening inventory +production + import – consumption – export.

[Note that there is no difference between closing inventory and closing stock. i.e. they are the same.]

XXIII.

Based on information given in Table 1.18, answer the questions following that.

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TABLE 1.18 Rank Wise Information about the Top 25 Losers in Terms of Market Cap (M-Cap) in a Two Week Period

Companies	M-Cap (Rs cr) 20/09/05	06/09/05
HPCL	6564.34	9202.63
RCF	769.61	1070.28
HMT	735.03	997.20
BPCL	5814.00	7620.00
BEML	193.88	247.16
BEL	1197.20	1507.20
Neyveli Lignite	3128.93	3934.23
Andrew Yule & Co	61.02	74.80
SAIL	2829.32	3428.23
Concor	1526.62	1817.45
ITI	164.12	194.04
EIL	1712.04	1999.86
HOC	88.59	103.41
Nalco	6017.86	6797.47
SCI	2120.07	2389.67
Dredging Corp.	639.66	715.82
Hindustan Zinc	728.86	811.26
IOC	16527.48	18302.87
Kochi Refineries	568.42	626.58
Gail	5302.23	5830.76
ONGC	48609.95	53165.80
IBP	560.84	610.23
Balmer Lawrie	135.70	146.94
Chennai Petroleum	392.21	419.06
Tide Water Oil Co(I)	120.84	128.76

1. Find the percentage change in the M-Cap of SAIL during the period.
2. Find the percentage change in the share price of HMT during the period. (Assume no additional share issued between the two dates.)
3. Find the percentage point difference between the percentage change of BEML and ONGC during the period.
4. Find the percentage point difference between the percentage change of HOC and Chennai Petroleum during the period.
5. Find the total M-Cap of these 25 companies on 06/09/05.
6. Find the total M-Cap of these 25 companies on 20/09/05.
7. Find the percentage erosion in M-Cap of these 25 companies between the two dates.
8. The ratio of the M-Cap on 20/09/05 to the M-Cap on 06/09/05 is:
9. The M-Cap on 06/09/05 is what percentage more/less than the M-Cap on 20/09/05.
10. M-Cap of ONGC on 20/09/2005 is how many times the M-Cap of Tide Water Oil Co(I) on 20/09/05?
11. Find the percentage change in the M-cap of all the companies which have lost more than 10 per cent market Cap during the two week period.
12. M-Cap of Chennai Petroleum on 06/09/05 is how many times the M-Cap of Tide Water Oil Co(I) on 20/09/05?
13. Represent the data above in the form of a set of:
    (a) bar charts.
    (b) pie charts.
    (c) line graphs.

Notes on Interpretation Market cap or market capitalisation or M-Cap is defined as:

No. of shares of the company × the stock price of the company.

Since the stock price of every company changes every day, so will the market cap change. Further it must be understood that normally the number of shares of a company rarely changes. Hence the market cap change is a reflection of the change of the share price only. Also the percentage change in the share price will be equal to the percentage change in the market capitalisation (if the number of shares is constant).

Due to this reason, stock analysts often talk about changes in market cap to be a direct indicator of the changes in the stock price.

Note: For the table shown, there is no information about whether we can assume that the number of shares of the companies shown is constant. Since this assumption is not available to us, we cannot assume that the percentage change in market cap is equal to the percentage change in the share price. Hence, a question about the percentage change in the share price of any of the 25 companies shown can only be solved if it is accompanied with the information about the change in the number of stocks.

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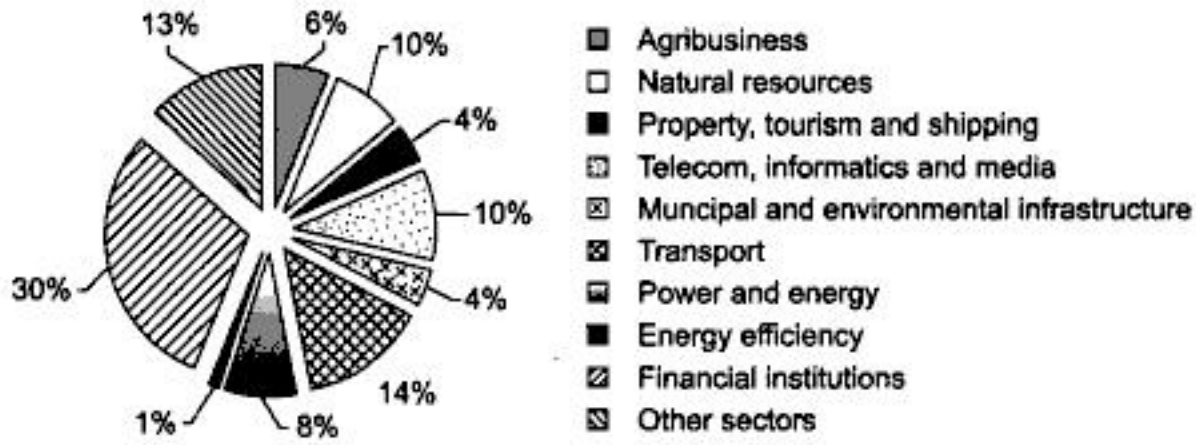
XXIV.

Study the following figure (Figure 1.11) and answer the questions given below that.

FIGURE 1.11 EBRD Commitments by Sector



Total expenditure ® Rs 7200 crores (Year 2006–07)

1. What is the expenditure on power and energy?
2. What percentage of the expenditure on other sectors is the expenditure on transport?
3. What is the value of the maximum difference between the expenditure of any two of the sectors?
4. Find the average expenditure per sector of the four biggest sectors.
5. If all the sectors are divided into two groups A and B containing five sectors each, then what can be the maximum difference in the expenditures of group A and group B?
6. If the objective is to find a triplet in which the sum of expenditures of two sectors equals the expenditure of the third sector, how many such triplets can be found?
7. What is the ratio of the sum of expenditures on natural resources and energy efficiency to the expenditure on financial institutions?
8. How many sectors show an expenditure of more than Rs 1,010 crore?
9. Find the ratio of the sum of expenditures of the two biggest sectors to the sum of expenditures of the two smallest sectors.
10. If we have to convert the above pie chart into a bar graph with sectors and their expenditures on the x-axis and the y-axis respectively, what will the chart look like?
11. If the expenditure in 2007–08 rises by 10 per cent over 2006–07 keeping the percentage distribution of expenditure of all the sectors same, what will be the expenditure on property, tourism and shipping in 2007–08?
12. By what percentage should the total expenditure be raised in 2007–08 over 2006–07 so that the expenditure on agribusiness in 2006–07 becomes equal to the expenditure on energy efficiency in 2007–08, keeping all the other factors the same?

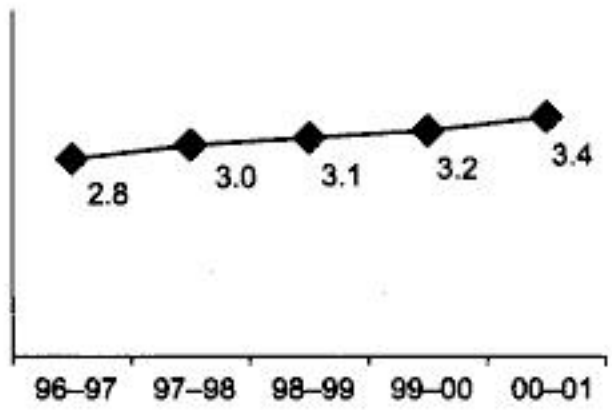
Notes on Interpretation The total commitments made by an organisation EBRD for the year 2006–07 are divided into their component sectors. Each sector accounts for a chunk of the Rs 7200 crores shown.

The data given in the pie chart can be linked to the same data for subsequent/previous years and comparisons with respect to absolute value changes and percentage changes made between the commitments for different sectors for different years.

XXV.

Study the following figure (Figure 1.12) and answer the questions given below that.

FIGURE 1.12 Tata Steel's Annual Production of Steel (In Million Tonnes)



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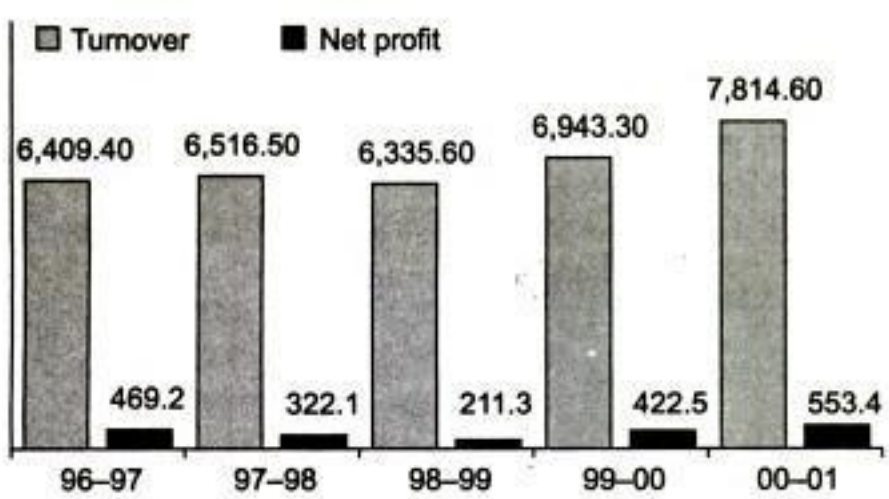
1. What is the average production of steel during the whole period?
2. Which year witnessed the maximum percentage increase in the production of steel over the previous year?
3. How many times does the production over the previous year increase by more than 3 per cent?
4. If the increase in the price of steel is 10 per cent per year, find the ratio of the value of steel produced in 96–97 to the value of steel produced in 2000–01.
5. For the above question, if the total value of the steel produced in 1998–99 is Rs 341 crore, then what is the total value of the steel produced in 1996–97?
6. Using the data given in Questions 4 and 5, if the increase in the production in 2001–02 is the same as the increase in the production in 1999–2000, then what is the value of the total production in 2001–02?
7. What is the average annual growth rate of steel produced over the period shown?
8. In how many years, is the production of steel more than the average production of steel during the whole period?
9. Convert the above data into:
   (a) a pie chart.
   (b) a bar chart.

XXVI.

Based on data given in Figure 1.13, answer the questions following that.

FIGURE 1.13 Tata Steel's Turnover and Net Profit (in Rs Crore)



Cost = Turnover – Net profit

1. In which year is the ratio of turnover to net profit the maximum?
2. In how many years is the turnover more than the average turnover over the period shown in the figure?
3. In which year is the cost maximum?
4. What is the average net profit over the period shown in the figure?
5. In which year is the profit as a percentage of cost the maximum?
6. What will be the percentage point difference between the profit percentage calculated by two distinct methods in 97–98: In case 1 profit percentage is calculated over turnover and in case 2 profit percentage is calculated over cost?
7. In which year is the increase in the net profit over the previous year maximum?
8. If the cost of producing one tonne steel is Rs 4,680 in 2000–01, then what is the total production of steel (in million tonnes) of Tata Steel in 00–01?
9. Convert the above data into:
   (a) a set of Pie charts (b) a table

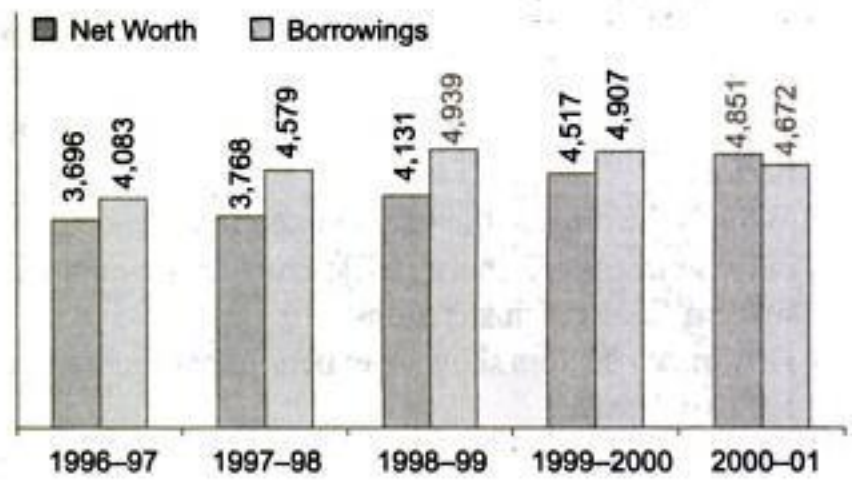
Notes on Interpretation: The ratio of net profit to turnover is called the profitability of the company.

Also, as defined in the question itself, the difference between turnover (also known as sales turnover or revenues) and net profit gives the cost of the company.

XXVII.

Study Figure 1.14 and answer the questions given below that.

FIGURE 1.14 Tata Steel's Net Worth and Borrowings (in Rs Crore)



1. In which year is the ratio of net worth to borrowings the highest?
2. What is the sum total of the difference between the borrowings and the net worth for the whole period?
3. In which year is the difference between the borrowings and the net worth as a percentage of net worth the maximum?
4. If we rank all the years on the basis of the ascending order of the sum total of net worth and borrowings, which year will be ranked at no. 3?
5. In the above question, what will be the rank of the year 1999–2000?

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6. Taking the sum of all the years together, what percentage of the total borrowings is the total net worth?
7. If we convert the bar graph to a new bar graph with the difference between the borrowings and net worth on y-axis and the years on the x-axis, then the bar of which year will be of the maximum height?
8. In which year is the net worth closest to the average net worth during the given period?
9. By what minimum percentage should the net worth be increased in 2000–01 so that even if the borrowings increase by the same percentage as in 98–99 over the previous year, the net worth should exceed the borrowings by at least Rs100 crore?
10. The closing value of shares of Tata Steel at BSE (Bombay Stock Exchange) is a direct function of the net worth of the company. Table 1.19 shows the average closing values for any particular year of Tata Steel:

TABLE 1.19

Year	Average closing value
96–97	Rs 1074
97–98	Rs 1092
98–99	Rs 1182.75
99–00	Rs 1279.25

What will be the average closing value of Tata Steel in 2000–01?

Notes on Interpretation: Net worth and borrowings are two interrelated measures of a company which are related to each other. Although their difference does not stand for any third variable, from their difference it can be concluded as to how much above the net worth are the company's borrowings—An indicator of how much risk the lenders are exposed to.

XXVIII.

Study the following table (Table 1.20) and answer the questions given below that.

1. What percentage of the unique visitors of ford.com are the unique visitors of carclub.com?
2. For which site is the number of unique visitors nearest to the average number of unique visitors?
3. Of the sites given above, what can be the maximum difference between the number of unique visitors of pool A and pool B if each of pool A and pool B can contain any 5 distinct sites with no site common?

TABLE 1.20 Top 10 Research-related Automotive Sites in the US

Rank	Site	Unique Visitors (in 000s)
1	KBB.com	2,402
2	CarPoint.com	2,144
3	Auto Trader.com	1,792
4	Edmunds.com	1,421
5	Ford.com	1,300
6	Cars.com	1,192
7	EbayMotors.com	1,156
8	CarClub.com	1,107
9	Autobytel.com	1,015
10	AutoWeb.com	930

4. If the objective is to maximise the average unique visitors of all the sites by discarding any one site, then which site should be discarded?
5. How many sites contain more than three vowels in their name?
6. If all the sites names are taken together then what is the average number of letters per site (to the nearest integer)?

Directions for Questions 7–11 *Read the passage given below and solve the questions based on it.*

A new kind of ranking system is devised to rank all the sites. According to this system, sorting is done by giving priority to the 1st letter of the site according to their occurrence in alphabet and then the number of unique visitors in descending order.

7. What will be the new rank of Cars.com?
8. Which site will be ranked 8th?
9. How many sites will have a change in their ranks when the new system of ranking is adopted?
10. Which two companies show the maximum difference in the number of unique visitors?
11. The ratio of number of visitors between which two sites will be closest to 1 (& greater than 1)?

Notes on Interpretation: The popularity of web sites are often measured on the basis of parameters like number of clicks, number of page views, number of search requests , number of unique visitors etc. The ratio of the number of clicks to the number of unique visitors will give the number of times an average visitor accesses the site over a given time period.

The table given is low on complexity as the information is very limited.

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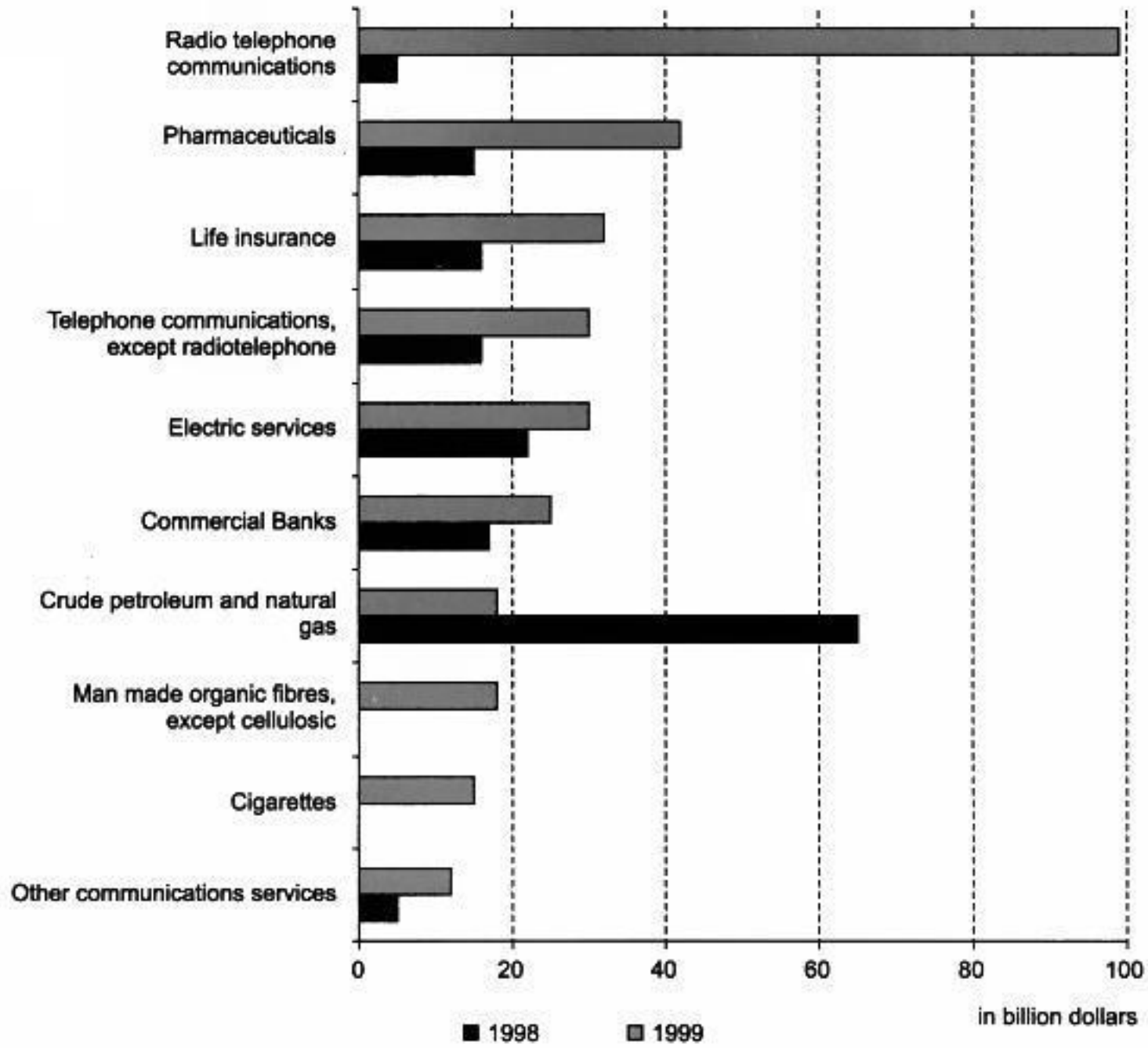
XXIX.

Study Figure 1.15 and answer the questions given below that.

FIGURE 1.15 Cross-Border M&A Sales



1. Which sector has witnessed the maximum percentage change in 1999 over 1998?
2. Which sector has witnessed the minimum percentage change in 1999 over 1998?
3. What is the difference (in billion $) in between the total sales of 1998 and the total sales of 1999?
4. How many sectors have witnessed an increase in the sales in 1999 over the sales in 1998?
5. What is the average sales (in billion $) in 1998 (consider all the sectors represented in 1998)?(Approximately)
6. According to a new policy enforced in 1999, all kinds of communication are required to be put under one sector. What percentage of Pharmaceuticals sales in 1999 is the combined total sales of all kinds of communication in 1999?
7. What percentage of the life insurance sales in 1999 is the cigarette sales in 1999?
8. "Smoking is injurious to health." And owing to this government imposed a blanket ban over the selling of cigarettes. By what percentage will the total sales value decrease due to this in 1999?
9. If all the sectors are assigned the ranks on the basis of the total sales value in both the years in descending order, which sector will occupy the 5th position?
10. In the above question, what will be the rank of the "Crude Petroleum and natural gas" sector?

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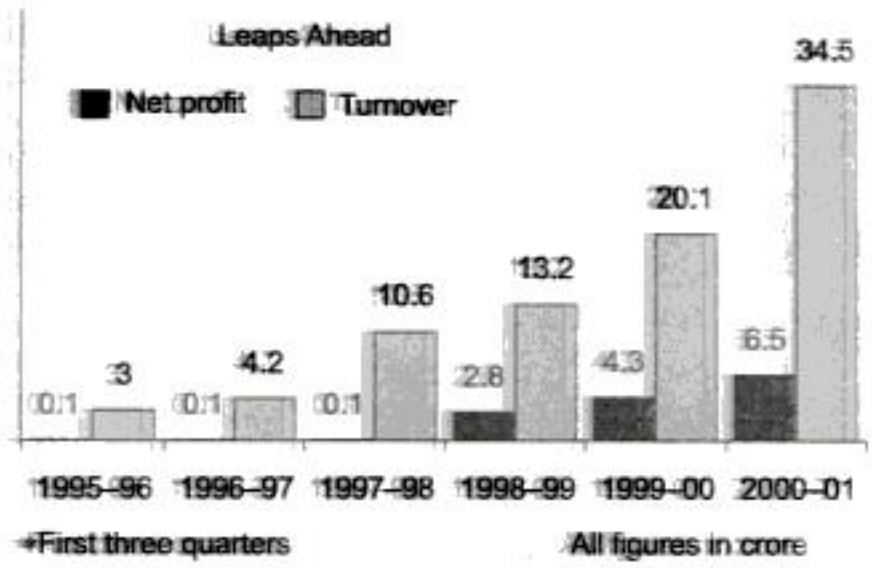
XXX.

FIGURE 1.16



Cost = Turnover–Net profit.

1. In which year is the ratio of net profit to turnover the maximum?
2. In which year is the cost the maximum?
3. Cost over turnover is known as cost percentage. For which year is the cost percentage maximum?
4. If the percentage rise in turnover in 2001–02 over 2000–01 is the same as the percentage rise in 2000–01 over 1999–00 with the net profit in 200–02 being the same as in 2000–01, then what will be the cost in 2001–02?
5. Using the data given in the above question, what percentage of the turnover is the cost in 2001–02?
6. For how many years is the turnover as a percentage of net profit more than 700 per cent?

Notes on Interpretation: The bar chart is exactly the same as for Chart no.XXVI and is depicting the relationship between net profit and turnover.

XXXI.

TABLE 1.21 Polaris vs Orbitech

(All figures in Rs crore)

	Polaris	Orbitech	Combined
Revenue	293.8	321	614.8
Net profit	58.86	107	165.86
Equity	25.59	20	55
Offshore Revenue:			
Onsite Revenue	63:37	85:15	—
Products Revenue:			
Services Revenue	2:98	40:60	—
Employee strength	2544	1256	3800

1. What is the revenue per employee of Polaris?
2. What is the difference between revenue per employee and profit per employee of Orbitech?
3. If the utilisation percentage is defined as the net profit as a percentage of revenue, then what is the utilisation percentage of Orbitech?
4. What is the value of the offshore revenue of Polaris?
5. What percentage of the total revenue of Orbitech is services revenue?
6. Which of the following is greater:
   i. utilisation percentage of Polaris
   ii. utilisation percentage of Orbitech
7. What is the ratio of the combined net profit of both the companies to the total employee strength of both the companies?
8. Convert the above data into a set of pie and bar charts.

Notes on Interpretation: The table shows a typical comparison between two software companies and their business profile. The relevant interpretations based on this table are:

Revenue per employee and profit per employee—These are standard measures of company performance used to benchmark and compare the performance of different companies.

XXXII.

Study Table 1.22 and answer the questions given below that.

TABLE 1.22 Power Rankings of Career Management Sites: Reach (Share) × Avg Pages/Visitor = Power Rank

Sites pages/visitor	Reach	Average Pages/visitor
Techies.com	0.2	6.0
Monster.com	7.3	31.1
Net-temps.com	0.6	7.5
Jobs.com	0.4	5.6
Dice.com	0.4	19.5
Nationjob.com	0.4	6.8
Headhunter.net	1.9	18.2
Careerbuilder	2.5	4.8
Compterjobs.com	0.3	17.2
Hotjobs	4.5	7.6
Jobsonline.com	5.2	4.4

1. Which company has the highest power rank?
2. What is the average reach per site?
3. If all the sites are ranked on the basis of power ranks, which site will be ranked 4th?

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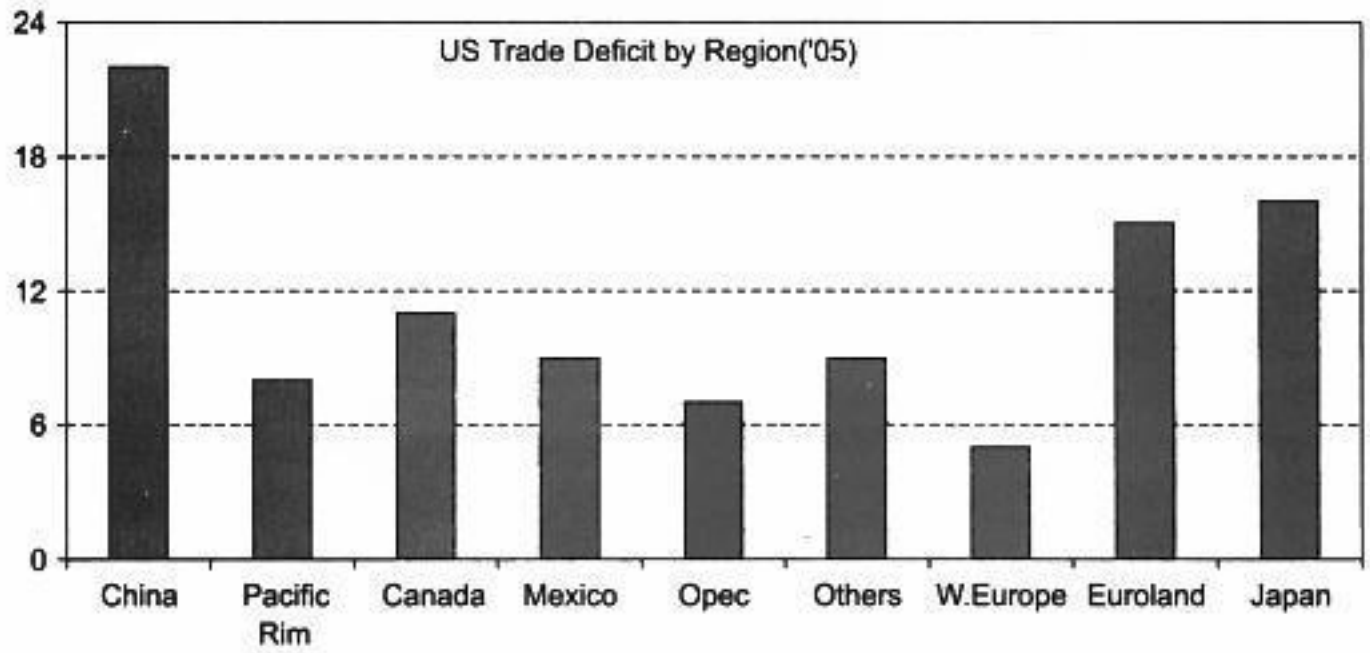
4. In the above question, what will be the rank of dice.com?
5. Which site is visited by the maximum number of visitors?
6. How many pages are visited at nationjob.com?
7. What percentage of the number of pages visited at careerbuilder is the number of pages visited at jobsonline.com?
8. What is the overall average number of pages visited at all the sites?
9. What is the difference in the number of pages visited at jobs.com and techies.com?
10. How many site names have starting and ending letters as consonants and at least two vowels in between them?

Notes on Interpretation: The interpretation of this table is self-explanatory. The higher the product of reach and average pages/ visitor the higher will be the power rank.

XXXIII.

FIGURE 1.17 US Trade Deficit by Region ('05)



1. What is the average US trade deficit per region?
2. What percentage of US trade deficit in Canada is the US trade deficit in China?
3. How many different (unique) values are there in the above bar graph?
4. Trade deficit is defined as the difference in the values of goods/services exported and the goods/services imported. What is the value of goods/services exported to China from US?
5. What will be the percentage change in total US trade deficit if the US trade deficit in China got eliminated? (Assume that these are the only regions in the world which exhibit a US trade deficit.)
6. What is the maximum difference in the US trade deficit between any two regions?
7. What is the maximum percentage difference in the US trade deficit between any two regions?
8. Which region's US trade deficit is equal to the sum total of US trade deficits in Mexico and OPEC?
9. If we rank all the regions on the basis of the value of US trade deficits in that region (in the ascending order), then what will be the rank of Mexico?
10. In the above question, which region will rank seventh?
11. How many regions have a US trade deficit more than the average US trade deficit per region? (Assume that these are the only regions in the world which exhibit a US trade deficit)
12. Convert the above data into a pie chart.

Notes on Interpretation: The bar chart shows the information about trade deficit of the US with different regions of the world. Trade deficit is defined as the difference between imports and exports. When exports are greater than imports we get a trade surplus.

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XXXIV.

Based on information from Table 1.23 answer the following questions.

TABLE 1.23

	Coking Coal	Non-coking Coal	Total (Million tonnes)
Demand			
Power		254.80	254.80
Steel & Metallurgical	51.60	Nil	51.60
All others	Nil	98.60	98.60
Total	306.4	353.40	405.00
Production			
CIL	27.55	275.45	303.00
SCCL	Nil	36.00	36.00
TISCO/SAIL	7.20	Nil	7.20
DVC/Captive	Nil	13.40	13.40
Total	34.75	324.85	359.6
Imports	15.00	4.80	19.80
Total Availability of Coals	49.75	329.65	379.40
Demand–Supply Gap	1.85	23.75	25.60

1. What percentage of the production of non-coking coal was accounted for by CIL?
2. The percentage of the total availability of coals that was accounted for by the coking coal production.
3. The highest ratio of demand–supply gap to total availability of coals was for which category (coking, non-coking, total)?
4. Represent the data in Table 1.23 using:
   (a) Bar charts.
   (b) Pie charts.
5. What was the percentage of CIL production from coking coal?
6. Amongst the numbers appearing in the table, find the ratio which is closest to 3.
7. What percentage of the total demand is met?
8. What percentage of the total non-coking demand is met?
9. What percentage of the total coking coal demand is met?

Notes on Interpretation: The information provided gives the break-up of demand and production of two types of coal—coking and non-coking coal. The demand is broken up into it's components, viz., power, steel and metallurgical, and all others.

Similarly, availability is broken up into production from CIL, SCCL, TISCO/SAIL and DVC/Captive and imports.

The difference between demand and availability is called the demand–supply gap.

Note: In the real world, prices of any goods/services are determined on the basis of the demand supply equation. When demand is greater than supply, price of the item rises while the reverse happens when supply exceeds demand.

XXXV.

Study Table 1.24 and answer the questions given below that

TABLE 1.24 Nutrient Composition of Cereal, Coarse Cereal and Pseudocereal Crops

Crop	Proteins (g)	Carbohydrates(g)	Fat (g)	Mineral matter (g)
Rice	6.8	78.2	0.5	0.6
Wheat	11.8	71.2	1.5	1.5
Barley	11.5	69.6	1.3	1.2
Maize	11.1	68.2	3.6	1.5
Sorghum	10.4	72.6	1.9	1.6
Pearl millet	11.6	67.5	5.0	2.3
Finger millet	7.3	72.0	1.3	2.7
Prosomillet	12.5	70.4	1.1	1.9
Foxtailmilet	12.3	60.9	4.3	3.3
Barnyard millet	11.6	74.3	5.8	4.7
Little millet	8.7	75.7	5.3	1.7
Kodomillet	8.3	65.9	1.4	2.6
Amaranth	16.0	62.0	8.0	3.0
Buckwheat	13.0	72.9	7.4	2.1
Chenopod	14.0	65.0	7.0	3.0

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The figures in Table 1.24 are on a per 100 gram basis.

1. Arrange the crops from highest to lowest with respect to:
   (a) proteins / 100 grams.
   (b) carbohydrates / 100 grams.
   (c) fat / 100 grams.
   (d) mineral matter / 100 grams.
   (e) proteins + carbohydrates.
   (f) proteins + fat.
   (g) proteins + mineral matter.
   (h) carbohydrates + fat.
   (i) carbohydrates + mineral matter.
   (j) proteins + carbohydrates + fat.
   (k) proteins + fat + mineral matter.
   (l) proteins + carbohydrates + mineral matter.
   (m) carbohydrates + fat + mineral matter.
   (n) proteins + carbohydrates + fat + mineral matter.
2. Find the highest ratio amongst any two numbers in the table.
3. How many crops show a higher value of (proteins + carbohydrates) than rice.
4. The third highest ratio for carbohydrates/ proteins is for which crop?

Note

- The student is advised to concentrate on the visualisation skills to be required for each sub-part of this question.
- The highest ratio will be obtained by spotting the highest number (78.2) and the lowest number (0.5). Hence, 78.2/0.5= 156.4.
- Two (buckwheat and barnyard millet).
- Little millet.

XXXVI.

Based on information given in Table 1.25, answer the questions following that.

TABLE 1.25 State-wise Industrial Investment Proposals (August 1991–December 2000)

	Total proposals (IEM + LOI)	Industrial Entrepreneur Memoranda (IEMs)					
		Numbers filed	Proposed investment (Rs Cr)	Proposed Employment (Numbers)	Numbers Issued	Proposed Investment (Rs Cr)	Proposed Employment (Numbers)
Maharashtra	8854	8338	197909	1471949	516	2315	123669
Gujarat	5878	5464	46458	889627	414	20148	63116
Uttar Pradesh	4326	3966	68740	632586	360	9919	103100
Tamil Nadu	4278	3632	54564	57539	646	10679	119254
Andhra Pradesh	3032	2644	59045	43225	388	10344	758
Haryana	2724	2511	27681	375756	213	4231	60198
Madhya Pradesh	2441	2286	63849	473144	155	3673	33421
Rajasthan	2208	2113	35117	295393	95	1621	15368
Punjab	2125	1969	36969	465700	156	4699	50857
West Bengal	1899	1816	30094	299029	83	3959	18681
Karnataka	1732	1515	39676	248836	217	9320	69495
Dadra & Nagar Haveli	1281	1256	17436	141253	25	158	2910
Daman & Diu	604	586	3726	45221	18	72	3405
Bihar	486	442	3350	70628	44	1808	15723
Kerala	481	426	7462	67475	55	2513	13447
Delhi	481	460	5450	46711	21	30	1652
Pondicherry	481	424	5905	40326	17	1254	2868
Himachal Pradesh	412	380	8460	86366	32	476	6140
Goa	393	357	5028	36033	36	5444	3526
Orissa	326	289	20135	103662	37	2430	11882
Assam	119	108	3596	16492	11	66	4278
Jammu & Kashmir	80	76	591	35276	4	5	1705
Meghalaya	37	36	372	4789	1	0	62.00
Chandigarh	1	0	433	5317	1	5	9
Sikkim	12	1	28	849	0	0	204
Andaman & Nicobar	9	9	332	2610	4	1	0
Arunachal Pradesh	7	3	40	172	1	0	522
Nagaland	6	5	.58	972	0	0	0

(Contd.)

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	Total proposals (IEM + LOI)	Industrial Entrepreneur Memoranda (IEMs) Numbers filed (Rs Cr.)	Proposed investment (Numbers)	Proposed Employment	Numbers Issued	Proposed Investment (Rs Cr)	Proposed Employment (Numbers)
Tripura	5	5	1041	1372	0	0	0
Lakshadweep	1	1	4	278	0	0	0
Uttaranchal	1	1	0	0	0	0	0
Jharkhand	0	0	0	0	0	0	0
Mizoram	0	0	0	0	0	0	0
Chattisgarh	0	0	0	0	0	0	0
Manipur	0	0	0	0	0	0	0
Total	44726	41159	854708	6965438	3567	105715	804670

1. The states, which showed the following:
   (a) Highest proposed employment per IEM filed.
   (b) Lowest proposed investment per IEM filed.
   (c) Highest proposed investment per IEM filed.
   (d) The highest ratio of LOI in the total proposal.
2. How many states accounted for less than 5 per cent of the national total proposed investment figure.
3. How many states showed a ratio of proposed investment to the IEM's filed above the national average ratio?
4. What is the minimum number of states required to be taken into account in order to account for 80 per cent of the IEM proposals filed in the country?

ANSWER KEY

I

1. 25
2. 80%
3. 68.18%
4. Madagascar, Thailand, China, Sri Lanka, Malaysia, Brazil, Indonesia, Vietnam, India.
5. 1000% more than Vietnam
   450% more than Thailand,
   266.67% more than China.
   175% more than Sri Lanka,
   120% more than Malaysia.
   8.33% less than Indonesia,
   26.66% less than India
   57.14% more than Brazil
6. 85% less than for Madagscar,
   70% less for Thailand
   55% less for China, 65% more for Vietnam
   40% less for Sri Lanka 25% less for Malaysia
   80% more for Indonesia, 125% more for India.
   5% more for Brazil
7. 5000 t
8. 70,000 t
9. 14 : 1
10. 7.14%

II

1. Castor
2. Soybean, Sunflowers (A). Linseed
3. 68.33%
4. 44.58%
5. 40.09%
6. 83.04%
7. Can't be determined
8. 39.54%
9. 74.93%
10. Can't be determined

III

1. Chilli
2. 0.3031 t/ha
3. Garlic
4. Cardamon (small)
5. Can't be determined
6. Can't be determined
7. 0.125 t/ha
8. 0.530 t/ha
9. 4.049 t/ha
10. 4.329 t/ha
12. Can't be determined

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IV

1. Rice < Pulses < Coarse Cereals < Wheat
2. 78.92%
3. 160.92%
4. –7.57%
5. 4.27%
6. –27.23%
7. 701.85
8. –15.48%
9. 1396.13%
10. 3.435:1

V

1. 40.17%
2. 113990
3. 1995–96
4. 2000–01
5. 437741
6. 618497
7. 43.39%
8. 2000–01
9. 1993–94
10. 162346

VI

1. Six → Assam, Maharashtra, Tamil Nadu, West Bengal, Lakshwadeep, Pondicherry
2. Maharashtra
3. Tripura
4. Tamil Nadu
5. A & N Islands
6. Four states/Union territories
7. Ten states/Union territories
8. Tripura, A&N Islands, Goa, Karnataka, Orissa, Kerala, Assam, Lakshwadeep, Andhra Pradesh, Tamil Nadu, West Bengal, Pondicherry, Maharashtra.
9. Reverse as in the above question
10. Assam

VII

1. 7.02%
2. 8.36%
3. 5.41%
4. 9.51%
5. 4.83%
6. 3.59%
7. 9.38%
8. Can't be determined
9. Can't be determined

VIII

1. Six
2. One
3. Three
4. Three
5. 90 mt
6. 0.12 mt
7. 40.8 mt
8. 42.86%
9. 11.66%
10. Can't be determined

IX

1. 2000
2. 3000
3. 37.5%
4. Full Page (37.5%) = Strip(37.5%) < Quarter page (40%) < Half page (50%)
5. 40% (Back Cover) < 42.85% (Full Page) < 50% (Inside, Front Cover) = 50 (Inside Back Cover)
6. Full page → 25%
   Half page → 40%
   Quarter page → 30%
   Strip → 25%
7. Inside Front Cover → 33.33%
   Inside Back Cover → 40%
   Back Cover → 24%
   Full Page → 28.57%
8. 12.5% (Full Page) = 12.5% (Strip) < 20% (Half Page) = 20% (Quarter Page)
9. 12% (Back Cover) < 14.28% (Full Page) < 16.66% (Inside Front Cover) < 20% (Inside Back Cover)
10. 12% Back Cover Colour
    12.5% Full Page B&W
    12.5% Strip B&W
    14.28% Full Page Colour
    16.66% Inside Front Cover Colour
    20% Inside Back Cover Colour
    20% Half Page B&W
    20% Quarter Page B&W

X

1. 1951–60 → 6.65 mt
   1961–70 → 8.32 mt
   1971–80 → 12.65 mt
   1981–90 → 17.05 mt
   1990–2000 → 24.19 mt
2. 1951–60 to 1961–70 → 25.11%
   1961–70 to 1971–80 → 52.04%

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1971–80 to 1981–90 → 34.78%
1981–90 to 1990–2000 → 41.87%
3. 1989
4. 1960
5. Two years
6. Thirteen years
7. Thirteen years
8. 31 years
9. 68.86 mt
10. Two decades
11. Twenty nine years
12. Twenty three years

XI

1. Rs 218.25 Lakh
2. Rs 16.8 Lakh
3. Rs 125.755 Lakh
4. Rs 3495 Lakh
5. Cannot be determined
6. Rs 500 Lakh
7. Rs 71.99 Lakh
8. Rs 14 Lakh
9. Rs 86 Lakh
10. 17.2%

XII

1. 1999–2000
2. 75036
3. 4.53%, – 3.88%, 11.62%, 17.26%
4. 43.40%, 43.46%, 38.62%, 44.73%, 32%
5. 4.57%, – 7.12%, 16.48%, 7%
6. 3.06, – 4.84%, 6.11%, –12.73%
7. 262326
8. 187290
9. 1999–2000
10. 2000–01

XIII

1. Zimbabwe
2. China
3. Turkey
4. India
5. 12 times approx.
6. 9 times approx
7. 21.55%
8. 3560%
9. 26.31%
10. Zimbabwe, Turkey, Brazil, USA, India, China

XIV

1. 28.57%
2. 60%
3. Rs 10,2000
4. 87.5%
5. 14.28%
6. 21.42%
7. 21.42%
8. Rs 6000 Cr.
9. Rs 4500 Cr.
10. Rs 3000 Cr.
11. 100%

XV

1. 52.17%
2. 50%
3. 14.28%
4. 32.81%
5. 47.75%
6. 38.66%
7. 114.28%
8. 138.09%
9. Brinjal
10. Citrus

XVI

1. Six
2. Eggplant 2.74%
   Cauliflower 7.89%
   Chilli 6.12%
   Onion 2.85%
   Pea 19.84%
   Radish 0.36%
3. 59.4 g/ha
4. Chilli (green)
5. Cucumber
6. Chilli (green)
7. Cucumber
8. 31.96%
9. 62.16%
10. 59.20%
11. (a) Cannot be determined (b) 16.22%

XVII

1. 1998–99
2. 8.61%
3. 1998–99
4. 6.1 million litres
5. 1987–88
6. 1.30%
7. 1987–88
8. 1.30%
9. 180.37%
10. 5.03% approx
11. 1247.3 million litres

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XVIII

1. 4 US dollars
2. 315 US dollars
3. 121.1 US dollars
4. 10 litre of milk in Australia
5. 9 litre of milk in USA
6. 1.7 times approx.
7. 11.2 US dollars
8. 29.61 US dollars
9. Rs 1421.48

XIX

1. 1997
2. 1997
3. 2002
4. 2002
5. 4048
6. 1888
7. 5968
8. 1297
9. 21.87%
10. 32.25%

XX

1. 25%
2. 12.16%
3. 20.98%
4. 11.48%
5. 25.27%
6. 20.32%
7. 9586659
8. 9594613
9. 0.995
10. 0.994

XXI

Erratta

Consumption = Production + Imports – Exports

1. 11011
2. 13563
3. 16482
4. 49.68%
5. 21.52%
6. 23.17%
7. 19288
8. 2117
9. 58.17%
10. 46.97%

XXII

1. 41.26, 45.14, 53.99, 80.32,103.72, 115.24
2. 3.88, 8.85, 26.33, 23.4, 11.52
3. –18.3%
4. –2.7%
5. 11.59
6. Four
7. Zero
8. 1996–97
9. 2000–01
10. Import
11. 892.38

XXIII

1. 17.47% down
2. 27.3% down
3. 12.99%
4. 7.93%
5. Rs 122141.71 Cr.
6. Rs 106508.82
7. 12.79%
8. 0.872
9. 14.67%
10. 402 times
11. 20.08%
12. 3.46 times

XXIV

1. 576 crore
2. 107.6%
3. 2088 crore
4. 1206 crore
5. 3888 crore
6. 12
7. 11:30
8. 1
9. 44/5
11. 316.8 crore
12. 500%

XXV

1. 3.1
2. 97–98
3. 4
4. 0.56
5. Rs 254.54 mm
6. Rs 512.435 mm
7. 5%
8. 2

XXVI

1. 98–99
2. 2
3. 00–01
4. 395.7
5. 96–97

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6. 0.25
7. 99-00
8. Cannot be determined

XXVII

1. 00-01
2. 2217
3. 97-98
4. 98-99
5. 2nd
6. 90.43%
7. 97-98
8. 1998-99
9. 19.5%
10. 1373.84

XXVIII

1. 85.15%
2. Edmunds.com
3. 3659
4. Autoweb.com
5. 5
6. 10
7. 5th
8. EbayMotors.com
9. 10
10. KBB.com and Autoweb.com
11. Cars.com & EbayMotors.com

XXIX

1. Radio Telephone Communication
2. Electric Services
3. 149
4. 9
5. 20.125
6. 331% approx.
7. 50% approx.
8. 5% approx.
9. Life Insurance
10. 2nd

XXX

1. 99-00
2. 00-01
3. 97-98
4. 52.71
5. 89.01%
6. 3

XXXI

1. Rs. 11.54 lakh
2. Rs. 17.03 lakh
3. 33.33%
4. 185.09 crore
5. 60%
6. ii
7. 0.043

XXXII

1. Monster.com
2. 2.15
3. Jobsonline.com
4. 6th
5. Can't be determined
6. Can't be determined
7. Can't be determined
8. Can't be determined
9. Can't be determined
10. 11

XXXIII

1. 11.33
2. 200%
3. 8
4. Can't be determined
5. 21.56%
6. 17
7. 340%
8. Japan
9. 4th
10. Euroland
11. 3

XXXIV

1. 84.79%
2. 9.15%
3. Non-coking coal
4. 9.09%
5. Coking Coal imports/Non-coaking coal imports
7. 93.67%
8. 93.27%
9. 96.41%

XXXV

2. 156.4
3. Two
4. Little millet

XXXVI

1. (a) Sikkim (b) Uttaranchal (c) Tripura (d) Chandigarh
2. 29
3. 11
4. 10

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EXPLANATORY NOTES

I

1. ***India's production***
   Production of all 9 countries

Note: In my experience, I have seen students have problems identifying individual values that have not been marked clearly. For example: In the given bar chart the value of pepper production for China in 2004 is not exactly marked. Visualising the value by observation does not give a clear idea of the values—it could be anything between 14–16. Then how does one deal with such uncertainty? In the context of DI, there is nothing to worry about. A correctly created question will have options such that whatever value you take, it will not have an effect on the option to be marked. As far as you assume a value in the correct range, the option to be marked as the correct answer will be clearly identifiable.

2. $\dfrac{\text{Production of (Madagascar + Thailand + Sri Lanka + Malaysia)}}{\text{Production of India}}$

3. You are required to find out the percentage value of the ratio: (Land for pepper production in India / Land for pepper production in Vietnam). Assume India's productivity as 2000 tonnes/hectare and Vietnam as 1000 tonnes/hectare.
   Then, Area of production in India = $\dfrac{\text{Production of India}}{2000}$
   Similarly, Area of production in Vietnam = $\dfrac{\text{Production in Vietnam}}{1000}$
4. Visual question.
5. You have to compare with the value of Vietnam the value of production of each of the other countries: Thus, Madagascar is 5 and Vietnam is 55
   The required percentage difference = $\dfrac{55-5}{5} \times 100$
   = 1000%
6. Average production = $\dfrac{\text{Total production}}{9} = \dfrac{300}{9} =$ 33.33
   Thus percentage deviation for Madagascar = $\dfrac{33.33-5}{33.33} \times 100$
7. Visual question— (5000 tonnes).
8. Visual question —Highest—least will give you the answer.
9. and 10. Use the answers of (7) and (8).

II

1. Visually observe that India's productivity in castor is equivalent to the world's highest productivity in castor.
2. Self-explanatory solution.
3. – 5. $\dfrac{\text{India's productivity in the crop}}{\text{World's productivity in the crop}}$
7. Cannot be determined since information is not available about relative productivities of different nations of the world.
8. $\dfrac{1221-875}{875} \times 100 = 39.54\%$
9. $\dfrac{2136-1221}{1221} \times 100 = \dfrac{915}{1221} \times 100$
   Use percentage rule to calculate.
10. The weighted average of the world's highest productivity in castor and the world's highest productivity in sunflower depends on the value of the area under production for the countries showing these highest productivities. This information is not available.

III

1. Largest value of the 3rd column.
2. 58.3/192.3 t/ha
3. The highest ratio between production and area. (clearly for garlic)

Note: If others had not been excluded this answer could not have been determined.

4. Lowest ratio between production and area.
5. and 6. Cannot be determined since the spice whose productivity is the highest/lowest in India cannot be found—(It may form some component amongst others).

7–11. $\dfrac{\text{Production}}{\text{Area}}$ of the respective spice.

12. Tests an important calculation skill of ratio comparison. Please ensure that you work out metjofs in your mind for the same.

IV

1. Look at the absolute difference between the percentage values.
   Thus rice = 42.79 – 39.45 = 3.34
   pulses = 11.01 – 6.96 = 4.05
   wheat = 34.83 – 22.02 = 12.81
   coarse cereals = 27.52 – 1542 = 12.10

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2–5. $\dfrac{42.79 \times 3865.73 - 39.45 \times 2343.34}{39.45 \times 2343.34}$ = For rice

6. $\dfrac{(42.79 + 34.83) \times 3865.73 - (39.45 + 22.02) \times 2343.34}{(39.45 + 22.02) \times 2343.34}$

7. $\dfrac{34.83 \times 3865.73 - 27.52 \times 2343.34}{27.52 \times 2343.43}$

10. $\dfrac{\text{Highest production in 1970}}{\text{Least production in 2000}}$.

V

1. $\dfrac{631 - 450}{450}$
2. All increase – decrease (note that decrease is shown in brackets in the last column).

3–4. Visual question to spot the highest percentage growth and the least percentage growth in consumption.

5. P + 19940 = 450480 + 186 + 7015
6. P + 20207 = 628110 + 5989 + 4605
7. $\dfrac{\text{Production 2000–01} - \text{Production 93–94}}{\text{Production 93–94}}$

8–9. Compare the ratios for the eight years to get the highest and the least values.

10. Addition of import of 8 years–export of 8 years.

VI

1. India's productivity is $\dfrac{12251}{1777}$

   Compare the productivities of the state given and count the number of states for which the ratio is higher than the above.

2–3. From the calculations of the above questions, take out the required states. (Maharashtra is highest and Tripura is least.)

4–5. With a minimum qualification of 1% of the area, 17.777 thousand hectares will be the cut-off figure. The states of Maharashtra, Tripura, Lakshwadeep and Pondicherry get disqualified. Amongst the remaining West Bengal is the highest ratio and Andaman and Nicobar is the least ratio.

6–7. The all India average is $\dfrac{12251.6}{13} = 6.89$

Compare the individual productivities of each state/union territory and count the number above and the number below.

9. Increasing order of productability, is the reverse of decreasing order of productivity.
10. The seventh highest productivity is also the seventh lowest productivity (or the seventh highest productability).

VIII

1. RSS accounts for 71% of 150 mt, while the consumption percentages are given out of 120 mt. Hence, you need approximately 90% of the total consumption to cover for the total production. (Since, 120 is 80% of 150 and 80% of 90 is 72).
2. Follow the same process for solid black's figures.

3–4. The only modification for NY rubber and for latex concentrates is that, since we are looking for the maximum number of modes, we need to add the consumption modes having the least share of the consumption pie.

5. (71–11)% = 60% of 150 = 90mt
6. (5.1–5) = 0.1% of 120 = 0.12mt
7. 34% of 120
8. If other types of natural rubber have grown by 10%, then there is an increase of 10% on 29% of 150. Then 71% of 150 (RSS rubber's share) has to account for the balance increase.

   Thus, increment in natural rubber production other than RSS = 4.35

   Then, increment in natural rubber production for RSS = 45.65.

   And percentage increment = $\dfrac{45.65}{71\% \text{ of } 150} = \dfrac{45.65}{106.5}$

   = 42.86% (approx.)

   The same answer can be got by using allegation as:

10	33.33	X
29		71

   [Refer to the process of allegation in my book QA for CAT.]

   $71 \rightarrow 23.33$

   $29 \rightarrow x - 33.33$

   Therefore $x = \dfrac{29 \times 23.33}{71} + 33.33$
9. The percentage increment in the total consumption of natural rubber

   Assume initial consumption to be 100. Then, consumption of auto tires and tubes + cycle tires and tubes = 58.3

   This increases by 20%, i.e. 5.83 × 2 = 11.66.

   Hence overall % increment = 11.66%.
10. Cannot be determined since we have no idea about how many types of rubber are produced under the other's category.

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IX

From the table: A single insertion of a full page black and white advertisement costs Rs 4000, while the same advertisement would cost only Rs 2500 if it is booked under an annual scheme of 12 insertions.

1. The cost difference would be:
   $4000 \times 8 - 2500 \times 12 = 2000$
2. Cost difference $= 6 \times 2500 - 3000 \times 6 = 3000$.
3. Percentage annual saving (full page black and white)
   $$= \frac{12 \times 4000 - 12 \times 2500}{12 \times 4000} \times 100 = \frac{1500}{4000} \times 100$$
   $= 37.5\%$
4. Full page $= 1500/4000 \times 100 = 37.5\%$
   Strip $= 150/400 \times 100 = 37.5\%$
   Quarter page $= 400/1000 \times 100 = 40\%$
   Half page $= 1250/2500 \times 100 = 50\%$
5. Back cover $= 5000/12500 = 40\%$
   Full page $= 3000/7000 = 42.85\%$
   Inside front cover $= 6000/12000 = 50\%$
   Inside back cover $= 5000/10000 = 50\%$

6–10. will have to be done on a similar pattern.

X

1–2. Plain additions and percentage change calculations.

3. Visually find 88–89 to show the highest growth (absolute) asked here.
4. For the annual percentage growth, visually shortlist 1959–60, 1972–73 and 1988–89. Out of these find out the value of percentage growth for 59–60 = 30/58 to be the highest.
5. The benchmark figure is 2.65.

6–8. Depends totally on your ability to calculate percentage quickly.

9. Plain additions.
10. Use calculations of Q.1.
11. Visual question based on counting.
12. The benchmark figure is $68.96/50 = 1.3792$.

XI

1. The value of pepper exported: 43.65% of 500 crore.
2. $(5.08 - 1.72) = 3.36\%$ of Rs 500 crores.
3. $0.5 \times 0.4365 \times 500 + 0.2 \times 0.0158 \times 500 + 0.5 \times 0.0602 \times 500$.
4. Find the exported value in 2000 for each spice, then multiply by 10 (for 10%), by 5 (for 20%) by 4 for 25%, by 3 for 33.33%, by 2 for 50% to get the production value of each spice.
   Add all these values to get the answer.
5. The trap here is that production– exports + imports = consumption + rise in stock.
   Since, we have no information about the imports or the rise in stock, this cannot be answered.

7–11. Pepper, chilli, oils and oleo resins belong to category A, all others belong to category B.
   Category A accounts for: $43.65+12.39+15.95 = 71.99\%$ of the total spice exported.

7. Absolute increase in category A $= 1.2 \times 71.99/100 \times 500$.
   Follow a similar process for 8–10.

XII

1. Ignore the last two digits while solving this.
   Thus compare: 489–341 with 511–356 with 475–342 with 553–382 with 592–448 for the highest value.
2. The sum of the above values will give the total trade deficits in hundreds of crores. To this value add: $(48-33)+(87-80)+(44-98)+(83-85)+(64-94) = -74$.
   Thus the total value will be: $75{,}100-74 = 75{,}036$.

3–5. For effective calculations ignore the tens and the units digit of imports and exports. Given the kind of options that will appear in CAT and other exams, this will not effect the answer choice.

6. Find absolute changes between the FD percent for two consecutive years.

7–8. Add this as:
   Exports: $341 + 356 + 342 + 382 + 448 = 1869$
   Read as 186,900
   To this add: $33 + 80 + 98 + 85 + 94 = 390$
   Total exports = 187,290
   Use a similar process for imports.

9. For maximum ratio, maximise the numerator and minimise the denominator.
10. For minimum ratio, minimise the numerator and maximise the denominator.

XIII

1. For maximum export ratio, you need the achievement of two simultaneous goals—exports maximisation and production minimisation, i.e. maximise numerator and minimise denominator. Normally, in such cases both these goals will be achieved for different countries. Hence, the objective is to look for the maximum net effect of the two objectives.
2. You will try to achieve the opposite of the first question's objectives.

3–4. The per capita consumption will be defined as: (Production–Exports) Population.
   To maximise this ratio, you will need the simultaneous achievement of — maximum production, minimum exports and minimum population. We do the opposite for minimising the ratio.

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Note: Very often the data is so clear that such questions can be answered visually. The process of solving such questions is that you try to shortlist the possible answers and check amongst them.

5. 2161/178 approximately.
6. 2161–113/408–182 = 2048/226
7. Total exports/Total production.

XIV

Based on the above interpretation, all the questions are essentially calculations of percentage.

XV

1. 87.5 – 57.5/57.5

2–5. To be solved similarly for the remaining crops.

6. Required answer = savings/original usage = 300–184/300.
7. Loss / original usage = 48/42

8–10. To be solved similarly.

XVI

1. Visual questions.
2. The required calculation would be:

$$\frac{\text{Difference of productivity [India—World]}}{\text{World's average productivity}}$$

3. $$\frac{\text{World's average productivity of cabbage} - \text{India's productivity of cabbage}}{\text{India's productivity of cabbage}}$$

4–7. Use principals of maximisation and minimisation of ratio.

11. (a) The absolute value increase cannot be determined since we do not have any data about the amount of land under usage for the production of beans.
    (b) The required value will be given by:

$$\frac{80-68.83}{68.83} \times 100 = \frac{11.17}{68.83} \times 100$$

XVII

1. The maximum increment between two consecutive years will be given by the steepest slope. (clearly seen in 1998–99)
2. The percentage increment = $\frac{76.9-70.8}{70.8} \times 100 = \frac{6.1}{70.8} \times 100$.
3. A close inspection will make you compare between 1981–82 and 98–99. The ratios are $\frac{2.7}{31.6}$ for 1981–82 and $\frac{6.1}{70.8}$ for 98–99.

You will need to calculate in the 0.1% range (for the percentage equivalents of these ratios).

4– 8. The pattern of questioning is repetitive.

9. 88.6–31.6/31.6 × 100
11. You will be required to calculate an approximate percentage value which will yield 88.6 from 31.6 in 21 years. Such calculations will not be required to be done in an examination context, so you need not worry about this question. Even if such a calculation is seemingly posed in the paper, there will definitely be a logical process to get to the correct answer.

XVIII

1–9. The questions are self-explanatory.

10. The required pie chart will be obtained by calculating the value of the milk consumption in Rupees. This value will be derived by price/*litre* × no. of litres consumed.
    The sum of these values obtained for all the six countries will give the total value of the milk consumed in the six countries. Take this value as 100% and create a pie chart for this 100% divided into six sectors.

XIX

All the questions are regular calculation-based questions.

XX

All the questions are regular calculation-based questions. The student is advised to go through the calculations for practice.

XXI

1–3. production + imports – exports = consumption for each of the three years asked.

4–10. All the questions are self-explanatory and calculation based.

XXII

1. For the year 1995–96:
   Closing inventory = 20 + 167.45 + 0.5 – 138.29 – 8.40 = 41.26
   For the year 1996–97
   Closing inventory = 41.26 + 178.70+ 0.3 – 158.30 – 16.82 = 45.14
   Similarly calculate the closing inventories for all other time periods.
2. The difference between closing inventories of two consecutive years is given by:
   closing inventory in Year 2 – closing inventory in year 1

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Calculate these for all the five consecutive years. Thus for 1995–96 to 1996–97 it will be: 45.14 – 41.26 = 3.88.
Note here that even if the difference is negative we will take the absolute value of the difference.

3. The required answer will be given by 21.45/167.45.
4. This will have to be calculated in the context of compounded annual growth rate.
   In this case, given options, you will have to follow approximations to solve the question.
5. The absolute increase in consumption over the period is 149.88 – 138.29 = 11.59.
6. The condition is met for the years 1997–98, 98–99, 99–00 and 2000–01.
7. The condition is met for the years 1995–96, 1996–97, 1997–98 and 1998–99.
8. Production has grown only for two years viz: 1996–97 and 1998–99. Visual inspection shows that 1996–97 is clearly showing higher growth than 1998–99.
9. Since percentage change is being talked about, all the years have to be considered irrespective of whether the year shows an increase or a decrease.
10. It's very obviously for imports.
11. (138 + 158+ 149 + 145+150+ 149) = 889 + (29 + 30 + 78 + 53 + 60 + 88) = 892.38
    integers decimals
    Alternately the calculation can be done by:
    600 + (38+ 58+ 49 + 45 + 50 +49) = 889 + decimals.

XXIII

1–2. Are simple percentage calculation questions. The degree of accuracy that you should aspire for while calculating the required percentage change would depend on the options available in the question.

3–4. The required answer would be given by:

3. Percentage change in BEML M-Cap – Percentage change in ONGC M-Cap.
4. Percentage change in HOC M-Cap–Percentage change in Chennai Petroleum M-Cap.

5–6. Plain additions based questions. For speed, add two digits at a time. Answers:122141.71 and 106508.82.

7. Percentage change between total market cap as on 06/09/05 to the total market cap as on 20/09/05.
   You will get a close answer by considering the first four digits. (156/1221 will give you 12.77%).
   If you had calculated only considering three digits you would get 16/122 = 13.11%.
   Again in a real life test, you would calculate this answer with an eye on selecting the correct option only. (the exact answer required is 12.79%).
8. Given the answer to the question above, the required answer will be given by 1– 0.1279 = 0.8721.
9. The reverse of the calculation for Question 7,. i.e. $\frac{1221-1065}{1065}$.

10–12. Are plain ratio and percentage calculations.

XXIV

1. 8% of 7200 = 72 × 8 = 576
2. 14/13 = 107.69%
3. Maximum difference will be given by:
   Sector with the maximum share – Sector with the minimum share.
   = 30 – 1 = 29% of 7200 = 72 × 29 = 2088 crores.
4. $\frac{30+14+13+10}{4}$ = 16.75% of 7200 720 + 360 + 72 + 54 = 1206
5. The maximum difference possible would be if Group A is maximised and group B minimised.
   Hence put the 5 biggest sectors in group A and the 5 smallest sectors in Group B.
   The result would be: (30 + 14+13+10 + 10) – (1 + 4 + 4 + 6 + 8)
   54% of 7200 = Rs 3888 crores
6. The possible triplets are:
   4 + 4 = 8 (twice) , 6 + 4 = 10 (four times), 6 + 8 = 14 (once), 10 + 4 = 14 (four times) and 13+1 = 14 once.
7. 7.11:30
8. For a sector to show an expenditure of over Rs 1010 crore, it should account for just above 14% of the total expenditure. There is only one sector which meets the condition.
9. (30 + 14):(1 + 4) = 44:5.
11. The required answer will be given by 4% of 7920 = 316.8.

XXV

1. Simple calculations in this case.
   However, if the numbers had been more complex the answer could have been found by calculating the net surplus/deficit above/below an assumed average, dividing it by the number of years to get the average surplus/deficit and adding/ subtracting the average surplus/deficit from the assumed average to get the required answer. These steps are illustrated below.
   Assume the average to be 3.
   Then 2.8 will give a deficit of 0.2,
   3.1,3.2 and 3.4 will give surpluses of 0.1, 0.2 and 0.4 respectively.
   The net surplus will be: (0.1+0.2 + 0.4) – (0.2) = 0.5.
   The average surplus is: 0.5/5 = 0.1.
   Hence the required average is 3 + 0.1 =3.1.

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2. For the highest percentage increase on a line graph, always focus on locating the part of the graph with the highest slope.
3. All the four years show an increase greater than 3%.
4. If the percentage change in price is 10% consecutively for 4 years, then the overall percentage change can be calculated on the percentage change graphic (explained earlier).
   $100 \rightarrow 110 \rightarrow 121 \rightarrow 133.1 \rightarrow 146.41$ (i.e. a 46.1% increase in the price)
   Besides there is a 6/28 = 21.4% (approx. increase in the production)
   The percentage change in the product will be:
   100 + 46.1% > 146.1 + 21.4% > 177 (approx.).
   Then the required ratio = 100/177 = 0.56 (approx.)
5. $2.80 \times 90.9090 = 254.54$
6. The production for the year 2001– 02 will be 3.5 million tones. Further, when the production was 3.1 million tones, the value was Rs 341 crore, i.e. the price was Rs 110 per ton. Hence with the same price the new value would have been Rs 385 crore. According to Q. 4 the price will rise by 10%. Hence the value will be 385 + 10% of 385 = 423.5. Repeat the 10% increase thrice to get 512.435.
7. As already explained, you should solve this question through options. In this case since options are not there, try to assume different average annual growth rate values and go through trial and error. The required rate should give an increase from 2.8 to 3.4 in 4 years.
8. Since the average is 3.1, the answer will be 2 years.

XXVI

1. Visual question.
2. In this case you can afford to neglect the last two digits to get the answer.
   The calculation will simplify to:
   Average turnover = $\frac{64+65+63+69+78}{5}$ = 339/5 = 67.8

Note: You can also further simplify this calculation with the methods explained in the previous question set by assuming the average as 60 and calculating the average surplus.

3. Visual question.
4. Average calculation. Do it by assuming the average at 300 and calculating deviations.
5. For this question, there is no point calculating the cost for each year. The answer for the maximum ratio will also be got by checking for the maximum profit as a percentage of turn over. (The student is advised to think about why this happens?) After this adjustment the question becomes one of visual checking of ratios.
6. The required answer will be given by: (322.1/6294.4) – (322.1/6516.5)
7. 1999–2000.
8. This cannot be determined since there is no indication of the other costs like overheads, taxes etc. Hence, the equation [Cost/Cost per ton] cannot be used.

XXVII

1. Visually solvable.
2. Calculation based question.
3. The difference should be maximum and the net worth should be minimum. Alternately, it can also be solved by looking at the ratio between borrowings and net worth.

4, 5–6. Approximate the calculations to two digits.

7. The highest height will be for the year 1997–98.
8. Calculate average net worth by assuming 3600 as the average and finding out the deviations. Then compare the average of the net worths with the actual values for the years shown.
9. The percentage increase in borrowings in 98–99 was approximately:36/457 = 8% (*approx.*). Thus, if borrowings had increased by 8%, it would have been 4907 +8% of 4907 = 5297 (*approx.*). Thus, net worth should be at least 5397 (an increase of 5397– 4517 = 880 on 4517 = 19.5% (approx.))
10. The percentage difference between the net worth between 99–00 and 00–01 will be replicated in the average closing value of the stock.
    Thus, the required answer will be given by: $\frac{4851 \times 1279.25}{4517}$.
    An approximate calculation would be: $\frac{485 \times 1280}{451}$.

XXVIII

1 & 2. Are direct calculation based questions — involving ratios and averages.

3. One of the two pools will have to contain the top five sites and the other will have to consist of the bottom five sites, for the required condition.
4. Obviously the lowest ranked site having the least number of uniques visitors should be discarded.

5 & 6. Visual Question (The skills required for solving such questions essentially consist of quick and accurate visual interpretation of the data. Such questions have been very popular in the CAT after 2001).

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7. Cars.com will come after the three sites starting with the letter 'A'. Also, later than the site Carpoint.com since that site has a higher number of unique visitors than Cars.com.
8. 3 sites starting with A and 3 sites starting with C will occupy the first six places. Edmunds.com will be seventh, hence EBayMotors.com will be eighth.
9. All the ten sites can be seen to have a change in their ranks.
10. The first and the last ranker in the original list.
11. Visual ratios calculation.

XXIX

1. The answer is visually clear.
2. A closer look is needed between electric services, commercial banks and crude petroleum and natural gas. These are short listed visually and then an accurate comparison is made between them.
3. Estimate approximate values of each of the sectors and add for the two years independently to get the required answer.
4. Visual
5. For getting the required average you will need to add up the individual sales of each of the sectors and divide by the number of sectors(8 only, since man-made fibres and cigarettes are not represented in 1998.)
6. The total communications are defined as
   Radiotelephone communications+ Telephone communications except radiotelephone + other communication services.
   Calculate the required ratio.
7. Simple percentage calculation = 16/35 = 46% approx.

8–10. Are all calculation specific questions testing your ability to add, subtract, calculate percentages and ratios.

XXX

1. The main comparison is between the years 1998–99, 1999–00 and 2000–01. The values of 1998–99 and 1999–00 are very close. Calculation through percentage rule gives 1999–00, greater than 1998–99.
2. Visual interpretation question.
3. The required ratio will be the highest when the net profit as a percentage of revenues is minimum.1997–98 is the obvious answer.
4. Turnover will rise by approximately 71.6%.
   $1.716 \times 34.5 - 6.5$ will give the required answer.
5. Percentage value of the fraction (52.71/59.21) = 89%.
6. The ratio has to be greater than 7 times. This is true from 1995–96 to 1997–98.

XXXI

1. 293.8/2544
2. (321 – 107)/1256
3. (107/321)
4. 63% of 293.8.
5. 60 % since the ratio of products to services is 40:60.
6. Between 58.86/293.8 and 107/321 the second is obviously greater.
7. 165.86/3800

XXXII

1. The highest power rank is obviously for monster.com since it has the highest reach as well as the highest average.
2. Add the total of the first column and divide by 11.
3. Hotjobs will be behind headhunter.net and Jobsonline.com apart from monster.com
4. Careerbuilder will be ranked fifth and dice.com will come in sixth.

5–9. There is no data about the number of visitors on each site. Hence Q.5 cannot be answered. Besides nothing can be said about the number of pages visited on any site since this depends on the number of visitors to the site which is unknown [even though the average number of pages per visitor is known]. Hence 6–9 cannot be answered.

10. Visual question.

XXXIII

1. Add and divide by the number of regions.
2. 22/11=200%
3. Out of nine regions the trade deficit for Mexico and others is the same. Hence, 8 is the answer.
4. Cannot be determined since the data provided does not give us any information about the break up of the trade deficit in terms of imports and exports.
5. The total trade deficit is : (22+8 + 11 + 9 + 7 + 9 + 5 + 15 + 16) = 102. Out of this the trade deficit to China (22) is eliminated. Thus the percentage change will be the percentage equivalent of the fraction 22/102 = 21.56%.
6. 22 – 5 = 17
7. 17/5 = 340%
8. Trade deficit [Mexico + OPEC] = 9+7 =16. This is equal to Japan's trade deficit.
9. Mexico will be joint fourth with others after W.Europe, OPEC and Pacific Rim.
10. Canada will rank sixth and Euroland will be seventh. Note that there will be no fifth rank as the fourth rank is jointly shared by two regions.
11. The average trade deficit is 102/9 =11.3333.
    There are three regions which exhibit a trade deficit higher than 11.333.

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XXXIV

1. 275.45/324.85
2. Total availability of coal = 379.40. Coking coal production = 34.75.
   Required percentage will be the percentage equivalent of the ratio 34.75/379.40.
3. Visual inspection will show the answer to be non-coking.
5. Percentage equivalent of the ratio 27.55/303 = 9.09%.
6. Find out the possible candidates for the ratio to be closest to 3 and compare these ratios. For this purpose shortlist the possible values of the denominator. Thus, 254.8 cannot be taken in the denominator since there is no value close to 750 in the table.
   The possible denominator options are: 7.2,4.8,1.85, 13.4 and 15. The ratio closest to 3 will be 15/4.8.
7. Percentage equivalent of the ratio 379.4/405 = 93.67%.
8. Percentage equivalent of the ratio 329.65/353.40 = 93.27%.
9. Percentage equivalent of the ratio 49.75/51.6 = 96.41%.

XXXVI

1–2. are calculations based questions.
3. The national average is 8547/411=20.8. There are eleven states above this figure.
4. The total number of IEMs filed is 41159. To cross 80% of this figure using the minimum number of states, start adding the states in reducing order of the number of IEMs filed.

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PART 3

Ten Minute Test Papers

In this Part You will Learn:

- To solve DI tests under time pressure.
- To take DI tests effectively by finding out ways
  - To further improve the depth of your understanding **and interpretation of data**
  - To further improve your anticipation of questions **when you see a data set**
  - To improve the depth and breadth of your exposure to **DI questions as well as your DI problem solving skills**
  - To improve your accuracy while solving DI Questions
  - To further improve your speed of solving and **understanding of DI questions**

This Part Contains:

- Ten Minute Test Papers containing good quality **questions (with options) that cover the breadth and depth of** questions that could be asked in Data Interpretation
- An actual examination paper would be **nothing but 3 to 4 of these papers to be taken together.**

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1. For each ten minute test first take the test under a strict ten minute time frame. Ideally, you should be able to solve anywhere between 8 to 10 questions in fifty minutes.

2. **AFTER YOU FINISH SOLVING A TEN MINUTE TEST:**

   (a) Check your errors and closely analyse the reasons for these errors. You would need to work on eliminating the error sources to become better at DI.

   (b) In case there are any unsolved questions and/or questions that you have not understood, go back and solve these questions.

   (c) Keep a chart of your scores as you progress through the tests in this part.

   Your score would be given by:

   No. of correct answers $\times$ 4 – no. of wrong answers

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1

Ten Minute Test Papers

TEN MINUTE TEST-1

Directions for Questions 1–7 *Study the table (Table 1.1) and solve the questions given below that.*

All countries that have reported more than five hundred cancer cases to the WHO in 2007 are listed here. The left column gives the total number of cases reported by each country for 2006, the middle column gives the 2006 rate (cancer cases per 10,000 population) and the last column shows the number of cases reported in early 2007.

Most of the 2007 reports were for only the first quarter or a third of the year. Owing to reporting delays of six months or more, cases reported in 2007 actually were diagnosed in 2006.

TABLE 1.1 Number of Cancer Cases over Two Years for Selected Countries

Country	2006 (In'00 cases)	2006 (Rate per cent)	2007 (In'00 cases)
A	53	0.1	46
B	345	2.1	145
C	87	1.1	39
D	81	33.9	26
E	84	0.8	23
F	1365	0.9	209
G	661	13.0	239
H	516	1.9	236
J	36	0.2	16
K	95	1.8	23
L	262	3.9	156
M	19	0.0	18
N	1862	3.3	563
P	47	56.2	11
Q	49	0.5	18
R	337	5.0	235
S	61	1.2	35
T	17	0.3	12
U	896	1.5	235
V	39	1.4	14
W	31	0.0	5
X	501	0.6	12
Y	217	1.4	73
Z	31	0.9	22
AA	39	0.8	13
AB	46	0.4	35
AC	48	0.1	21
AD	71	0.8	32
AE	162	2.4	83
AF	655	1.1	241
AG	21,861	8.9	6445
AH	869	1.4	219
AJ	19	0.0	13

(Contd.)

1. What is the population of AD on the basis of the reported cases of cancer in 2006 (in thousands)?
   (a) 810,000 (b) 812,500
   (c) 825,000 (d) 887,500
2. Which country has reported the second highest number of cancer cases to WHO during 2006?
   (a) F (b) AG
   (c) N (d) U
3. The countries which have reported less than 2000 cases both in 2006 and early 2007 are
   (a) W, M, and T (b) V, AJ and W
   (c) M, J and P (d) M, T and AJ
4. The ratio of cancer cases reported in early 2007 is 7:6 for
   (a) V and T (b) T and X
   (c) AC and V (d) None of these

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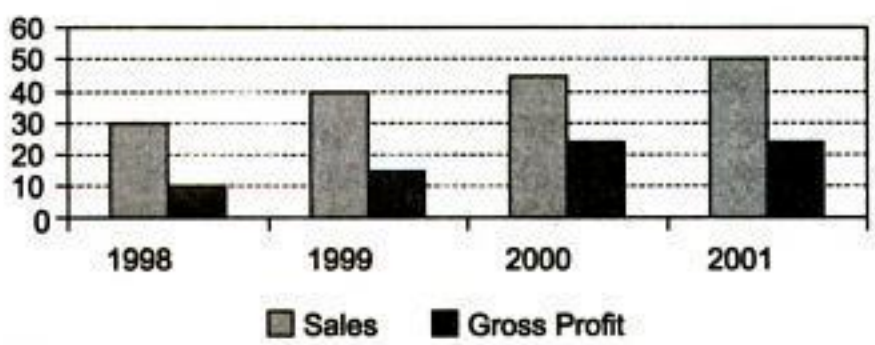
5. How many countries have reported 25000+ cancer cases in early 2007?
   (a) Two (b) One
   (c) Three (d) None
6. The number of countries for which the number. of cancer cases (in thousand) in 2006 is more than five is
   (a) 26 (b) 23
   (c) 22 (d) 24
7. Which of the following are true from the table?
   I. The reported cancer cases of M, W and AJ as compared to their population are negligible.
   II. The 2006 rate is highest for P though the reported cases are only 4700.
   III. The population of R is 664,000 in 2006.
   IV. P reported more than 20,000 cases of cancer in early 2007.
   (a) I and II (b) II and III
   (c) I, II and III (d) I, II and IV

Directions for Questions 8–12 *Study the figure (Figure 1.1) and solve the questions given below that. Assume that all numbers end in either 5 or 0.*

FIGURE 1.1 Sales and Gross Profit for the Period 1998–2001 (In Rs Crore)



8. The year in which the gross profit is half of the sales is:
   (a) 1999 (b) 1998
   (c) 2001 (d) 2000
9. The ratio of gross profit to sales for the entire period is:
   (a) 17:18 (b) 5:11
   (c) 6:11 (d) 4:9
10. What is the average gross profit as a percentage of sales for the entire period?
   (a) 45.6% (b) 45.45%
   (c) 40% (d) None of these
11. Average annual growth of sales is:
   (a) more than Rs 6 crore
   (b) less than 5 crore
   (c) exactly 6 crore
   (d) exactly 5 crore.
12. The year in which the increase in gross profit is greater than that in sales is:
   (a) 1998 (b) 2000
   (c) 1999 (d) 2001

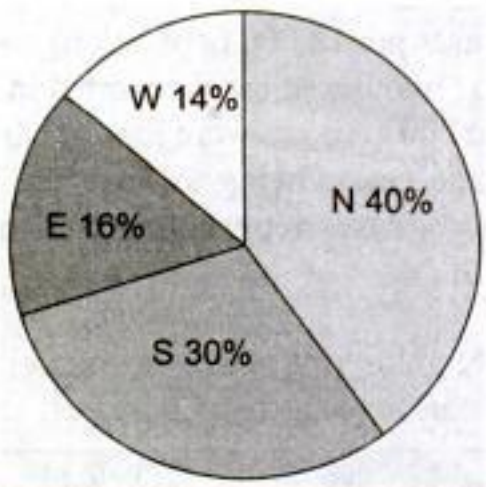
TEN MINUTE TEST-2

Directions for Questions 1–4 *Study the table (Table 1.2) and solve the questions below that. Total number of respondents is 5000, with percentage distribution among the different zones as shown below.*

TABLE 1.2 Results of a Survey on Worries that People Have

(in percentage)

S.No.		North	East	West	South
1.	Rising prices	87	56	74	83
2.	Joblessness	57	58	69	69
3.	Stagnating salaries	18	14	6	11
4.	Rental house	7	6	7	6
5.	Scarcity of essential times	9	11	4	2
6.	Bad/Very bad standard of living	4	11	3	2
7.	Savings rate	17	21	19	13
8.	Pollution	33	28	19	39
9.	Education	41	32	49	25
10.	Not living better than 5 years ago	41	44	48	24
11.	House ownership	45	46	45	51



1. The number of persons surveyed having house ownership worries is minimum in the _____ zone.
   (a) North (b) South
   (c) West (d) East
2. What is the percentage of persons surveyed who do not have worries about increase in saving or about pollution?
   (a) 9 (b) 19
   (c) 29 (d) Cannot be determined
3. What is the number of persons having worries regarding rising prices in the four zones put together?
   (a) 3652 (b) 3862
   (c) 3753 (d) 3951

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4. What percent of persons with job have worries of 'stagnating salaries' in the South?
   (a) 35.5 (b) 38.2
   (c) 25.7 (d) Cannot be determined

Directions for Questions 5–10 *From the data given in Table 1.3, solve the questions given below that.*

TABLE 1.3 Present and Past Users of Different Toilet Soaps.

Present Users (Number of people)

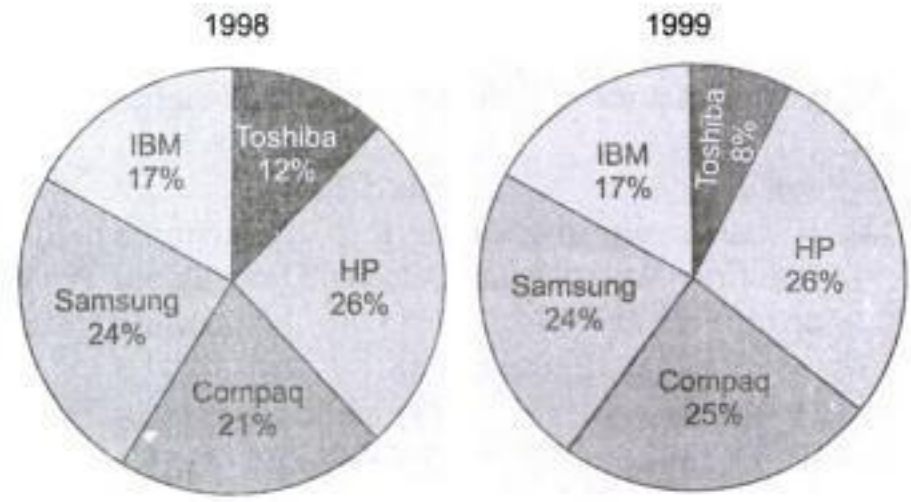
		Lux	Liril	Dove	Nivea	No soap usage	
Past users (Number of people)	Lux	300	75	90	60	45	570
	Liril	60	240	45	60	30	435
	Dove	90	45	90	15	00	240
	Nivea	135	30	00	60	30	255
	No soap usage	210	15	00	30	210	465
		795	405	225	225	315	1965

5. The percentage increase in the number of people using any kind of soap is:
   (a) 10% (b) 15%
   (c) 20% (d) Cannot be determined
6. How many brands of soap have shown a decrease in their market shares?
   (a) One (b) Two
   (c) Three (d) Four
7. If from the present users, the total soap usage increases by 20% and Lux users increase by 25%, approximately what per cent of the soap using market would be Lux users?
   (a) 39% (b) 47%
   (c) 50.2% (d) 55%
8. If a consumer uses 1.5 kg of soap a month (on an average), what is the present soap usage amongst the consumers surveyed?
   (a) 22 tonnes/month
   (b) 22.5 tonnes/month
   (c) 24.75 tonnes/month
   (d) Cannot be determined
9. What is the decrease in the usage of Liril as a percentage of the total present soap users from the sample population?
   (a) 1.7% (b) 1.81%
   (c) No change (d) 18.1%
10. If a new brand Palmolive is introduced into the market, and the brand shift to Palmolive from the present users is Lux 10%, Liril 10%, Dove 8% and Nivea 6%, how many users will Palmolive have (round off all decimal values of number of people to the higher integer)?
   (a) 151 (b) 152
   (c) 153 (d) 154

TEN MINUTE TEST-3

Directions for Questions 1–5 *Based on the data given on the pie-chart (Figure 1.2), solve the questions which follow:*

FIGURE 1.2 Percentage Sales of Different Models of Computers in Allahabad in Two Different Years



Total sales—7890 % Increase—16.5

1. The percentage change in the sales of Toshiba in 1999 is approximately:
   (a) 16% (b) 61%
   (c) 22% (d) 68%
2. Which brand of computers among those shown, exhibited the second highest rate of growth in the two years and had less sales in 1999 than 1998?
   (a) HP (b) Compaq
   (c) Samsung (d) All of these
3. What is the ratio between the Compaq sales in 1998 and those of IBM in 1999?
   (a) 0.94 (b) 1.06
   (c) 1.13 (d) 0.89
4. For which brand of computers, did the sale increase the maximum in terms of absolute value between the two years?
   (a) IBM (b) Samsung
   (c) HP (d) Compaq
5. IBM's sales in 1998 is what percentage of the sales of Samsung in 1999?
   (a) 46.34% (b) 52.34%
   (c) 57% (d) 60.8%

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Directions for Questions 6–10 *Refer the information given to answer the following questions.*

The demand function for a product is described as

$$Q = 25 - P$$

Where Q = quantity demanded,

P = price,

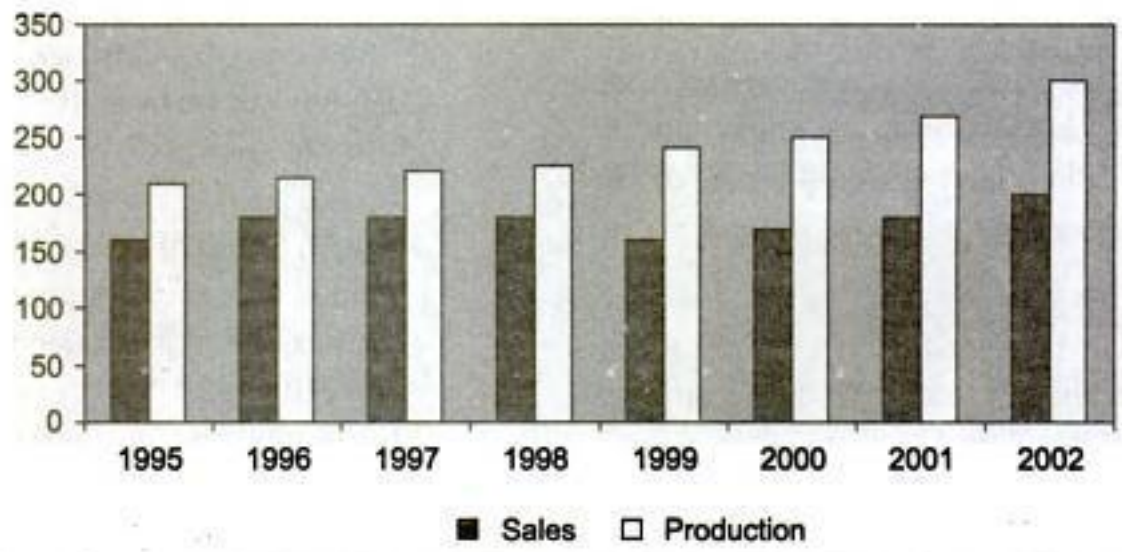
The revenue R is given by the product of Price and Quantity.

6. If the price is increased by 25% from a price of Rs 12, what will be the percentage change in the revenue?
   (a) – 4% (b) + 4%
   (c) – 3.7 (d) None of these
7. For what price will the revenue be the highest?
   (a) 14.5 (b) 14
   (c) 13 (d) 12.5
8. If due to the liberalisation of the economy, the functional relationship between Quantity and Price changes to Q = 125 – P, the quantity at which total revenue is the highest. will:
   (a) increase (b) remain the same
   (c) decrease (d) not exist
9. To get a minimum revenue of Rs 156, a possible price (in Rupees) is:
   (a) Rs 12 (b) Rs 13
   (c) Rs 12.5 (d) all of the above
10. Which of the following statement (s) is/are true?
    I. As the quantity of goods sold increases, the price decreases.
    II. As the price decreases, quantity decreases, then increases.
    III. As price increases, revenue decreases then increases.
    (a) (I) and (II) only (b) (II) and (III) only
    (c) (I) only (d) None of these

TEN MINUTE TEST-4

Directions for Questions 1–5 *Based on the figures in the bar chart (Figure 1.3), answer the following questions. (Assume all numbers in the bar graph above end in ten thousands.)*

FIGURE 1.3 Nokia's Cell Phone Production and Sales



1. The sales of cell phones for 1999 is:
   (a) 160,000 (b) 16,00,000
   (c) 16,000 (d) None of these
2. What is the percentage increase in sales between 1995 and 2002?
   (a) More than 40% (b) Less than 20%
   (c) 25% (d) None of these
3. What percentage of the total production has been sold during the year 1999?
   (a) Less than 70% (b) More than 75%
   (c) 75% (d) 80%
4. The year in which there was the maximum percentage change in production was:
   (a) 1999 (b) 2000
   (c) 2001 (d) 2002
5. In which of the following years has the sale of Cell phones shown a negative trend?
   (a) 1999 (b) 2000
   (c) 2001 (d) 1998

Directions for Questions 6–8 *Each of the letters P, Q, R and S represent a non-equal digit. The questions are independent of each other.*

6. If Q > P and PR × QR = SSS. Then $(PR)^2$ =
   (a) 676 (b) 441
   (c) 625 (d) 729

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Directions for Questions 8–12 *Study the following table (Table 1.5) and answer the question given below that.*

TABLE 1.5 Marks (out of 50) Obtained by Five Students Anil, Barun, Chaman, Dhannu and Ella in Five Sections in Five Concise Tests

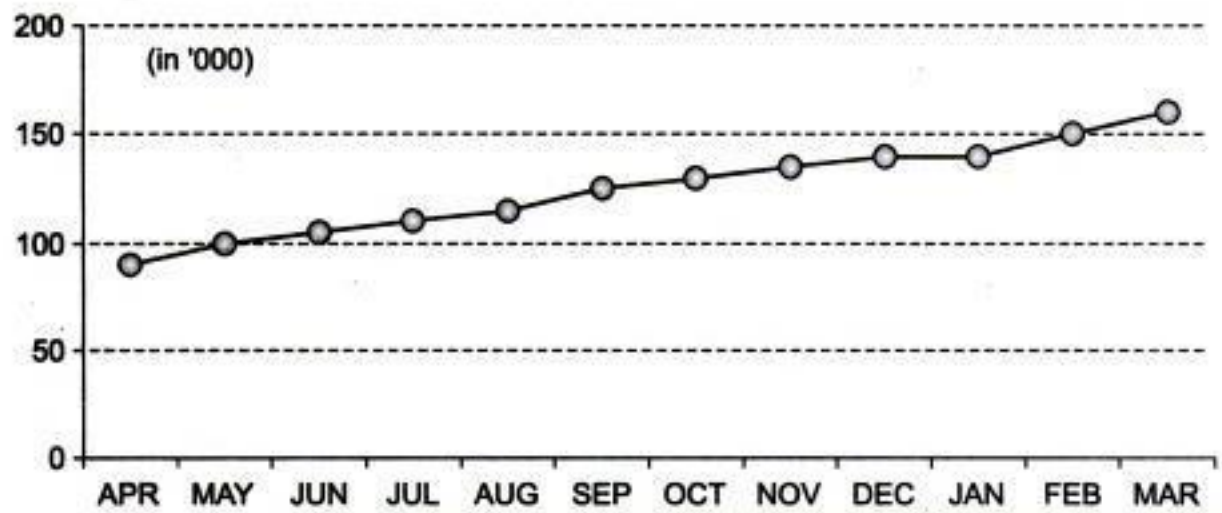
Subjects	Anil I	II	III	IV	V
Maths	42	32	47	22	37
DI	32	42	27	32	22
VA	37	27	17	32	42
REASONING	47	49	34	41	39
ENGLISH	26	30	38	41	45
Barun					
MATHS	32	22	37	47	42
DI	27	47	32	39	30
VA	35	29	42	36	28
REASONING	44	45	42	45	47
ENGLISH	32	30	39	36	33
Chaman					
MATHS	33	34	37	44	39
DI	44	42	35	42	38
VA	36	43	42	40	39
REASONING	26	37	46	34	35
ENGLISH	27	29	35	35	43
Maths	4				
Dhannu					
MATHS	29	36	37	42	43
DI	33	39	37	29	31
VA	44	45	39	49	45
REASONING	31	36	48	43	43
ENGLISH	35	38	36	41	45
Ella					
MATHS	35	34	43	45	46
DI	47	33	44	39	47
VA	47	44	39	43	42
REASONING	39	37	36	42	43
ENGLISH	32	33	38	41	44

8. What was the total of the marks of Anil in V A in all the concise tests?
   (a) 148 (b) 135
   (c) 155 (d) 145
9. In which of the following concise tests did Ella obtain the highest percentage of marks in Maths?
   (a) II (b) III
   (c) IV (d) V
10. The average percentage of marks obtained by Dhannu in Maths in five concise tests was exactly equal to the average percentage of marks obtained by Chaman in five concise tests in which of the following sections?
    (a) English (b) Reasoning
    (c) DI (d) Maths
11. What was the average marks of five sections of Dhannu in the first concise test?
    (a) 32.8 (b) 34.4
    (c) 38.2 (d) 30.6
12. In which of the following sections was the average percentage of marks obtained by Barun the highest?
    (a) Maths (b) DI
    (c) VA (d) Reasoning

TEN MINUTE TEST-6

Directions for Questions 1–5 *Study the following figure (Figure 1.5) and answer the questions given below that. (Assume all values end in 5 or 0)*

FIGURE 1.5 Circulation Figures of *Indian Times* Magazine for the Given Months of the Year 2001–02



1. The percentage growth in monthly circulation between April 2001 and March 2002 has been closest to:
   (a) 55.55% (b) 77.77%
   (c) 83.33% (d) 80%
2. The least percentage growth in circulation between any two months has been in the month of:
   (a) May (b) August
   (c) September (d) January

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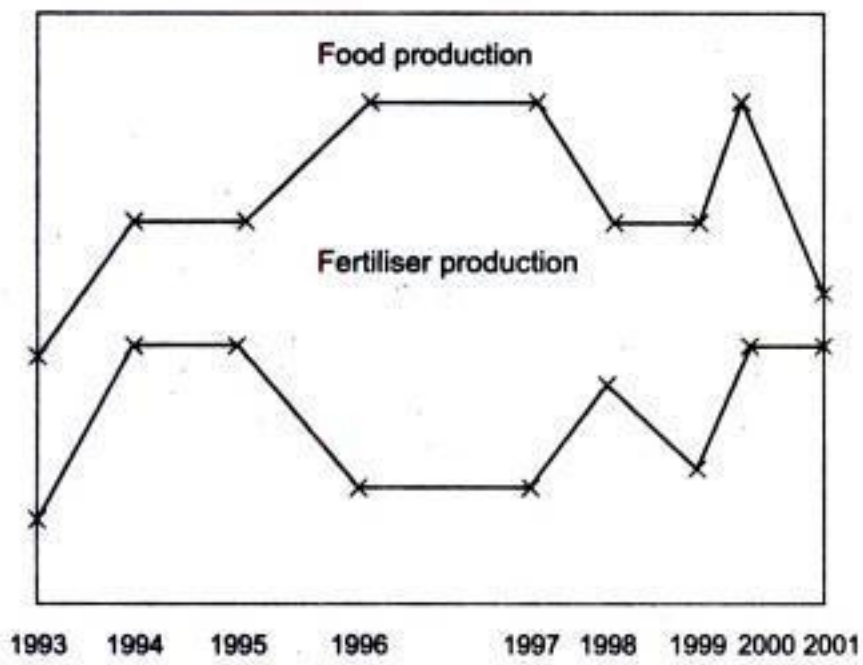
3. How many different figures(values) of circulation does the above graph give.
   (a) Twelve (b) Eleven
   (c) Ten (d) Nine
4. What is the average monthly circulation (in '000s) of the magazine for the year 2001–02? (approximately)
   (a) 115 (b) 125
   (c) 135 (d) 150
5. The average monthly circulation during Oct–Mar exceeds the average monthly circulation during Apr–Sep. (in '000)?
   (a) 41.6 (b) 40.2
   (c) 45 (d) 35

Directions for Questions 6–10 *Study the following graph (Figure 1.6) carefully and answer the given questions.*

FIGURE 1.6 Trends in Food and Fertiliser Production



6. If food production is related to the previous year's fertiliser production, then the food production is most puzzling for the year:
   (a) 2001 (b) 1997
   (c) 2000 (d) Both '00 and '01
7. Looking at the trend in the graph, food production in the year 2002 is expected to:
   (a) go up
   (b) go down
   (c) remain the same as for the previous year
   (d) indeterminate
8. Fertiliser production in the year 2002 is expected to:
   (a) go up
   (b) go down
   (c) remain the same as that for the previous year
   (d) indeterminate
9. Based on the data for four years, Mr Rishi concluded that food production is inversely related to fertiliser production. This conclusion was based on the data for the years:
   (a) 1993–96 (b) 1995–98
   (c) 1997–2000 (d) 1998–01
10. Which of the following statements is true?
   (a) Food production in any given year depends on the fertiliser production in the previous year.
   (b) Food production in any given year depends on the fertiliser production in the year before the previous one.
   (c) There is no clear relationship between food and fertiliser production.
   (d) Food production is inversely related to the fertiliser production.

TEN MINUTE TEST-7

Directions for Questions 1–10 *The questions are based on the following graph (Figure 1.7), which give the value of the total marks scored in the given years by the candidates appearing for the CAT as also the number of candidates (Figure 1.8).*

FIGURE 1.7 Value of Total Marks

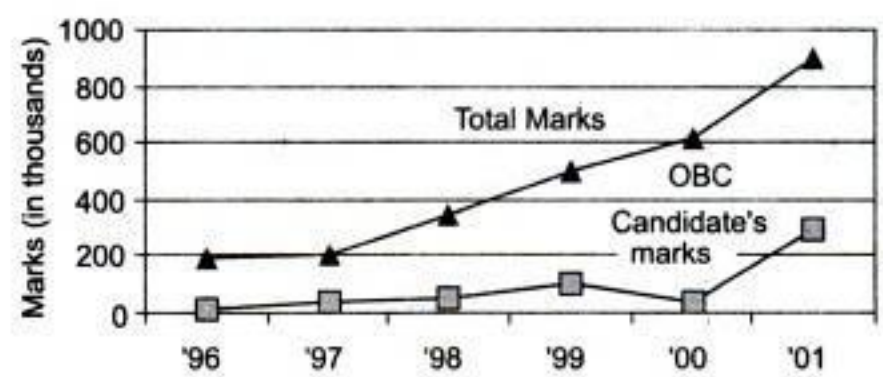
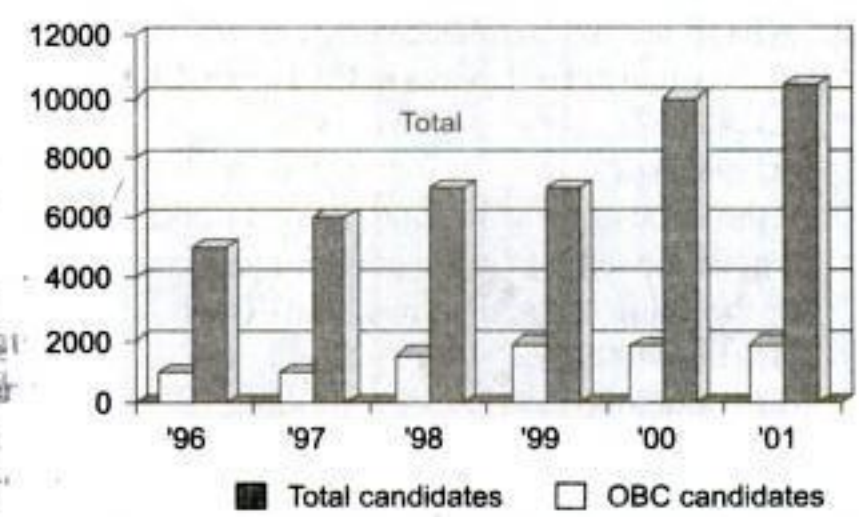


FIGURE 1.8 Number of Candidates



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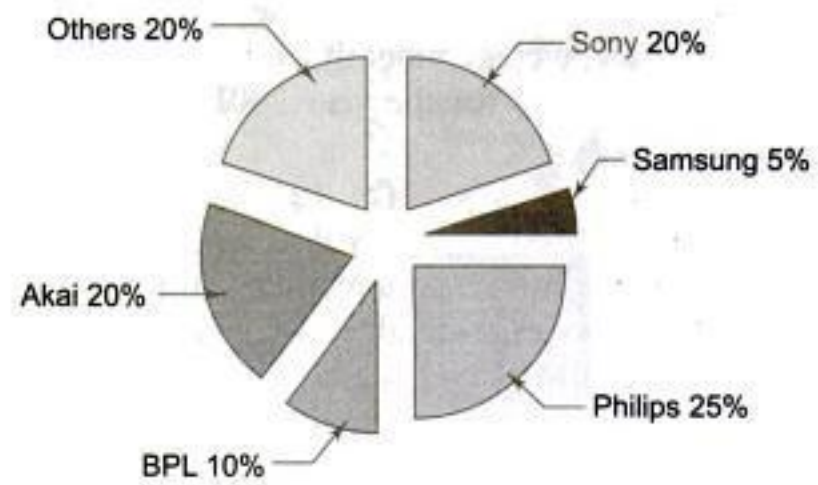
1. What is the average marks per candidate in the CAT in 2001?
   (a) 91 (b) 84
   (c) 77 (d) Cannot be determined
2. The average marks per candidate of CAT from 1996 to 2001:
   (a) has remained almost the same
   (b) has increased
   (c) has decreased
   (d) has almost doubled
3. The average marks per student in 1996 of candidates other than the OBC category was
   (a) 57 (b) 47
   (c) 37 (d) Cannot be determined
4. What were the average marks in 1998 of candidates other than the OBC candidates (approx.)?
   (a) 55 (b) 65
   (c) 75 (d) 85
5. What are the average marks per student in the OBC category in 1996? (approx.)
   (a) 25 (b) 23
   (c) 7 (d) 33
6. Which of the following statements is not true?
   (a) The total marks of all candidates has increased every year from 1996 to 2001.
   (b) There has been a steady consistent increase in the number of OBC candidates from 96–01.
   (c) The number of deals has almost doubled in 2001 over 1996.
   (d) None of the above.
7. What is the average marks per student in the OBC category in the year 2000?
   (a) 16 (b) 48
   (c) 37 (d) 26
8. What has been the percentage growth in the number of candidates in CAT from 1997 to 2000?
   (a) 54% (b) 29%
   (c) 33.33% (d) 66%
9. What is the approximate average annual growth rate of the value of total marks in CAT from 1996–2001?
   (a) 471% (b) 35%
   (c) 94% (d) 66%
10. If the trend in the value of total marks is expected to remain the same as in the previous year, what would be the value of the total marks in 2002?
   (a) 1,240,000 (b) 1,540,000
   (c) 1,600,000 (d) 1440000

TEN MINUTE TEST-8

Directions for Questions 1–3 *Study the following pie chart (Figure 1.9) and answer the given questions.*

FIGURE 1.9 Colour TV Market in 2002 (Total 6-lakh sets)



1. Which one of the following brands of color TV sales is one-fourth of all other sales?
   (a) Samsung (b) Sony
   (c) BPL (d) Philips
2. Among the sales of other brands, if it is known that the sales of Videocon is 20% of the total sales of other brand sales, then find the number of color TVs sold by Videocon.
   (a) 24,000 (b) 12,000
   (c) 48,000 (d) None of these
3. If next year CTV sales were to increase by 50% and the increase in Sony, Akai and BPL are 90% respectively, find the percentage change in the sales of Philips. (Assume there is no change in the sales of Samsung and others CTV.)
   (a) 20% (b) 30%
   (c) 60% (d) 50%

Directions for Questions 4–7 *From the following data answer the question given below that.*

Roads P, Q and T run from south to north and roads R and S run from north to south. The order of the roads, from left to right, is P, Q, R, S and T. Road U runs from west to east and road V runs in a south-eastern direction. U, V and T intersect at B. Road W run from east to west. W, V and R intersect at A.

All roads are one-way roads and the traffic is allowed only in the direction of the road. In going from one point to another no intersection is crossed more than once.

4. How many routes connect the intersections of roads U and R, and T and V?
   (a) 8 (b) 4
   (c) 6 (d) None of these
5. How many different routes can one take in going from A to B?
   (a) 1 (b) 2
   (c) 3 (d) None of these

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6. How many routes can one take in going from the intersection of roads W and Q to the intersection of roads T and V?
   (a) 2 (b) 4
   (c) 6 (d) None of these
7. In taking the longest route from B to A, what is the maximum number of intersections, excluding B and A that one has to cross?
   (a) 8 (b) 6
   (c) 2 (d) None of these

Directions for Questions 8–12 *Study the following figure [Figures 1.10 (A) and 1.10 (B)] and answer the questions given below that.*

FIGURE 1.10(A)

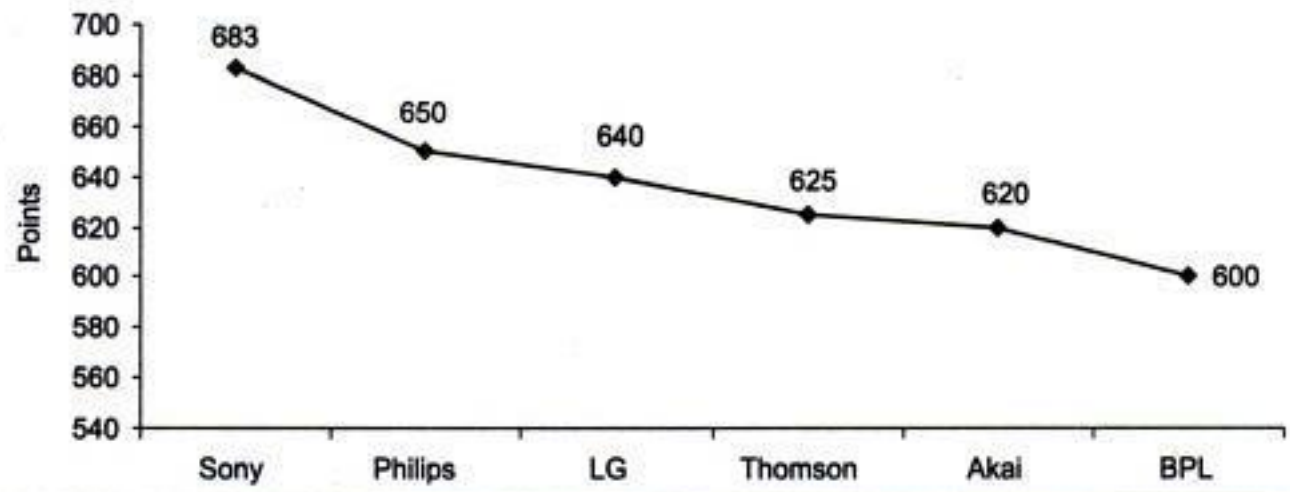
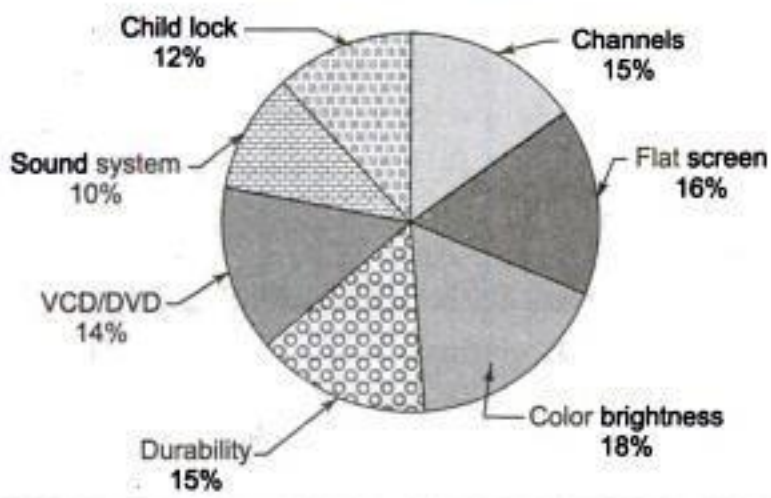


FIGURE 1.10(B)

(Of the total points received assume that the following is the break-up of points received due to each of the parameters listed below.)



8. The points obtained by Thomson for durability is equal to which of the following?
   (a) LG—sound system
   (b) Akai—color brightness
   (c) BPL—flat screen
   (d) Thomson—channels
9. What is the total number of points earned by all the TVs for channels?
   (a) 490.42 (b) 513.72
   (c) 553.70 (d) 572.70
10. What are the average points per CTV earned for chi lock?
   (a) 80.34 (b) 76.36
   (c) 70.42 (d) 86.89
11. The sound system of L.G. is approximately wh percentage of the flat screen of Sony?
   (a) 52% (b) 171%
   (c) 59% (d) 64%
12. The points earned by Philips for VCD/DVD is wh percentage more/less than the points earned by BF for color brightness?
   (a) 15.74% (less) (b) 15.74% (more)
   (c) 22.84% (more) (d) 22.84% (less)

TEN MINUTE TEST-9

Directions for Questions 1–6 *The following graph (Figures 3.11 and 3.12) give the production and con sumption of coal in certain countries of the world, a well as their reserves.*

Shortfall/ excess between production and consump tion is met by imports/exports.

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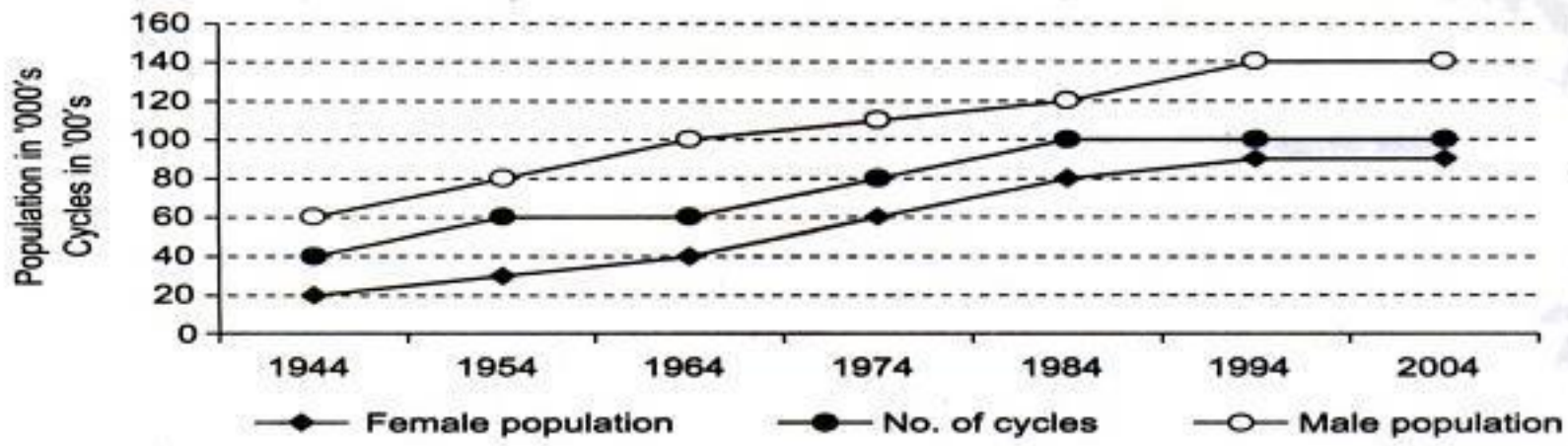
FIGURE 1.13 Population Trends and Cycle Usage Trends in a Village over the Period 1994–99



9. What is the average ten year percentage increase in the number of cycles over the period 1944 to 1994?
   (a) 25% (b) 15%
   (c) 20% (d) None of these
10. In 1994, if females used 40% of the total number of cycles used, then what is the per capita usage of cycles by females in 1994?
   (a) 0.0444 (b) 0.04888
   (c) 0.05 (d) 0.055
11. In which one of the following years was the ratio of male population to female population the lowest?
   (a) 1964 (b) 1974
   (c) 1984 (d) 1994
12. The highest percentage increase in the total population has been shown by the decade ended
   (a) 1954 (b) 1964
   (c) 1974 (d) 1994
13. What is the per capita usage of bicycles (number of cycles/total population) in 1994?
   (a) 0.043 (b) 0.048
   (c) 0.046 (d) 0.041

TEN MINUTE TEST-11

Directions for Questions 1–4 *From the data given below solve the questions:*

Two brothers, Harish and Sanjay bought four acres of land in 1990 and started cultivating it in 1991. They produced 1,000 kg of jowar per acre that year. Being the elder brother, Harish decided the proportion in which the total production would be shared. He retained 1,800 kg and gave the rest to Sanjay. In 1994, when the production was twice that in 1991, Harish gave 60% of the production to Sanjay. Sanjay found that Harish was more considerate in that year than in 1992, when he had received 2,700 kg which was only 200 kg more than what Harish would have retained , had the production been divided equally. In 1995, when the production was twice that of 1993, Harish retained 9,000 kg, which was 75% of the total production in 1995.

1. In 1991 Harish and Sanjay had shared the production in the ratio:
   (a) 1 : 1 (b) 9 : 11
   (c) 11 : 9 (d) none of the above
2. The increase in production between 1993 and 1994 was:
   (a) 1,000 kg (b) 1,500 kg
   (c) 2,000 kg (d) 3,500 kg
3. The quantity of jowar received by Harish in 1991 as a ratio of quantity received in 1995 is closer to:
   (a) 1 : 2 (b) 1 : 3
   (c) 1 : 5 (d) 1 : 4
4. The quantity received by Sanjay in 1994 was:
   (a) four times the production of 1993
   (b) one–fourth the production of 1993
   (c) twice the production of 1992
   (d) 40% of the production of 1995

Directions for Questions 5–8 *From the data given in Table 1.8 solve the questions.*

TABLE 1.8 Election Turnout Ratio from 1901 to 1981 in India

Election Turnout rates (%) from 1901 to 1981			
Years	Voters	Females	Males
1901	51.2	38.7	60.8
1911	53.6	41.2	63.6
1921	49.7	40.7	50.9
1931	47.3	51.6	39.6
1941	41.8	56.7	32.7
1951	43.8	54.2	38.6
1961	39.1	59.6	33.7
1971	34.7	48.4	31.6
1981	38.6	51.4	37.3

5. On how many occasions did the total turnout rate increase?
   (a) 4 (b) 3
   (c) 2 (d) 5
6. In the given data, the total turnout rate was the maximum in:

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(a) 1911 (b) 1921
(c) 1961 (d) 1931

7. The maximum increase in the total turnout rate during any decade over the previous one is:
   (a) 1.5 (b) 2.4
   (c) 4.0 (d) 3.9
8. Which of the following is true?
   (a) The increase in the rate of turnout for any decade over the previous one during the pre- independence period is lower than that during the post-independence period. (Assume independence was achieved in 1947)
   (b) The total turnout rate decreased continuously.
   (c) Male turnout was less than one-third of the female population for the entire data.
   (d) None of the above

Directions for Questions 9–13 *Study the information given (Figures 1.14 and 1.15) and answer the following questions.*

FIGURE 1.14 Number of Factories (thousands)

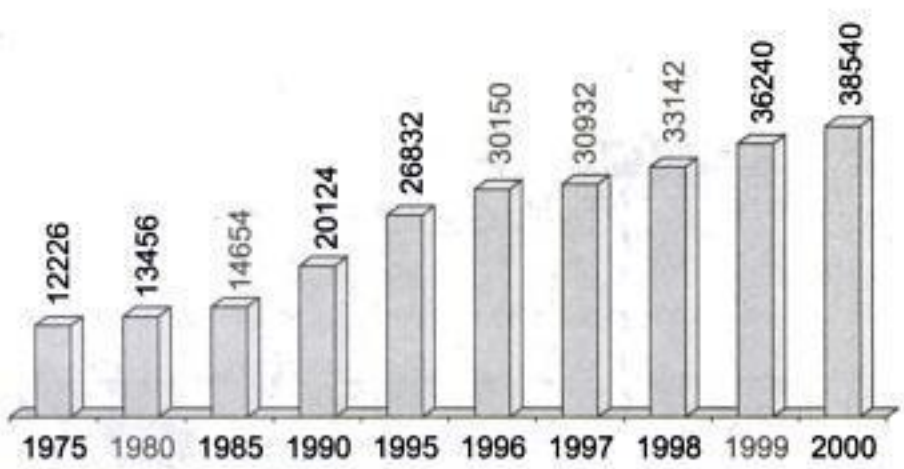
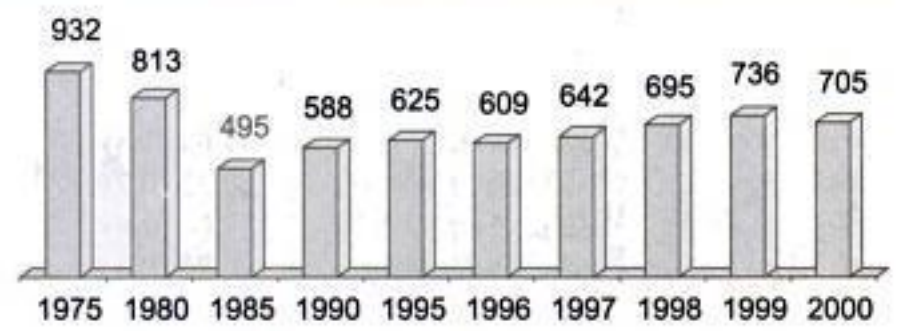


FIGURE 1.15 Average Employment per Factory

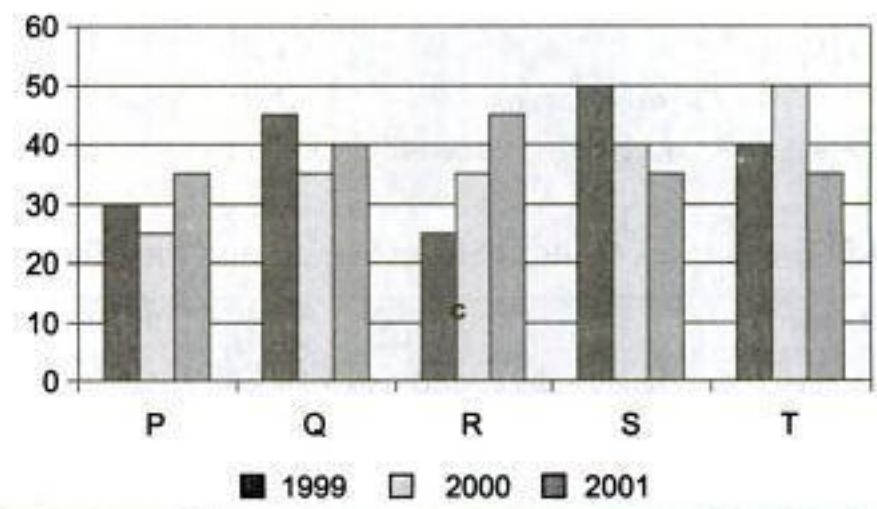


9. Between 1995 and 2000, in which year has the average employment per factory shown an increment compared to previous year, but decreased in the next year?
   (a) 1996 (b) 1997
   (c) 1998 (d) 1999
10. If in 1996, 20,100 factories had 659 employments on an average, the remaining factories had an average employment of:
   (a) 559 (b) 509
   (c) 584 (d) 534
11. The total employment in 1999 is how many times to that in 1996?
   (a) 1.45 (b) 1.48
   (c) 1.6 (d) 1.42
12. In which of the following five year period, number of factories has shown maximum increase?
   (a) 1980–85 (b) 1985–90
   (c) 1990–95 (d) 1995–00
13. Among the given period, in how many years has the trend of the average employment per factory not changed with respect to the previous year's change?
   (a) Two (b) Three
   (c) Four (d) Can't be determined

TEN MINUTE TEST-12

Directions for Questions 1–7 *Study the graph and answer the questions following that.*

FIGURE 1.16 Production of Five Different Fertiliser Companies (in lakh tonnes)



1. The production of which company has changed the most between 1999 to 2001?
   (a) P (b) Q
   (c) R (d) T
2. What is the ratio between the average production by company R in three years to the average production by company S in three years?
   (a) 6 : 7 (b) 8 : 7
   (c) 7 : 8 (d) 7 : 6
3. The average production for three years was the maximum for which of the following companies?
   (a) Q only (b) S only
   (c) T only (d) S and T both
4. The companies that didn't change their trend of production over the given time period are
   (a) P and Q (b) Q and R
   (c) R and S (d) S and T

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5. For which of the following companies, the percentage rise or fall in production of fertilisers from 1999 to 2000 was the maximum?
   (a) P (b) Q
   (c) R (d) S
6. The total production of the five companies in 2001 is what percent of the total production by companies Q and S in 1999?
   (a) 190% (b) 150%
   (c) 180% (d) 200%
7. What is the per cent drop in production of company S from 1999–2001?
   (a) 30 (b) 43
   (c) 50 (d) 35

Directions for Questions 8–12 *Study the data given below and answer the questions following that.*

In a test of 400 students at IIM Ahmedabad, the number of students who pass in three different areas is given below.

Finance only	*80*
Finance but not marketing	*100*
Finance and HR	*30*
Finance	*130*
Marketing and HR	*35*
HR	*130*
None of the three areas	*120*

Finance–F; Marketing–M; HR–H.

8. The frequencies of which of the following are equal?
   (a) F and M
   (b) F only and H only
   (c) F and H but not M and F and M but not H
   (d) None of the above
9. The number of students who pass in marketing but not in finance
   (a) 75 (b) 50
   (c) 85 (d) 105
10. The number of students who didn't pass in any of the area is how many times to that of who pass in all the three areas?
   (a) 12 (b) 10
   (c) 6 (d) 15
11. The percentage of students who pass in marketing only
   (a) 12.5 (b) 20
   (c) 16 (d) 10
12. The number of students who pass in only two areas is
   (a) 75 (b) 65
   (c) 50 (d) 45

TEN MINUTE TEST-13

Directions for Questions 1–5 *Study the table (Table 1.9) and answer the questions following that.*

TABLE 1.9 Sick Units in Select Sectors and their Bank Overdues

Industry	1989		1991	
	No. of Sick Units	Bank overdues	No. of Sick Units (Rs in crore)	Bank overdues (Rs in crore)
Engineering	19474 (10.4)	416 (18.6)	24941 (11.3)	476.92 (17.1)
Cotton Textiles	4123 (2.2)	97.42 (4.3)	6057 (2.7)	134.16 (4.8)
Electricity	15308 (8.2)	151.12 (6.7)	16149 (7.3)	171.78 (6.2)
Sugarcane	203 (0.1)	12.75 (0.6)	287 (0.1)	6.18 (0.2)
Paper	1881 (1.0)	46.02 (2.1)	2634 (1.2)	36.51 (1.3)
Copper	953 (0.5)	36.50 (1.6)	2063 (0.9)	39.63 (1.4)
CR Steel	405 (0.2)	13.61 (0.6)	737 (0.3)	20.35 (0.7)
HR Steel	2356 (1.3)	110.49 (4.9)	2952 (1.3)	129.68 (4.6)
Cement	371 (0.2)	14.27 (0.6)	384 (0.2)	14.06 (0.5)
Petroleum	6751 (3.6)	206.45 (9.2)	8208 (3.7)	262.15 (10.1)
Miscellaneous	134616 (72.3)	1138.00 (50.8)	157075 (71.0)	1480.61 (53.1)
Total	186441 (100.0)	2243.31(100.0)	221472(100.0)	2792.04 (100.0)

Note: Figures in parentheses are a percentage of the totals.)

1. Which of the following statements is true?
   (a) There has been a net increase in the number of sick units between 1989 to1991.
   (b) While the number of sick units under the miscellaneous category has gone up, the bank overdues of such sick units as a percentage of the total bank overdues have gone down.
   (c) Cement companies have been doing worse during the period.
   (d) Both (a) and (b).

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(a) TISCO (b) RIL
(c) L&T (d) Hero Honda

12. Which one of the groups could be termed as lean and thin (in the context of total assets) as well as performing better in terms of profits as compared to Bajaj Auto?
(a) ITC (b) HLL
(c) Hero Honda (d) None of these

TEN MINUTE TEST-14

Directions for Questions 1–8 *Study the table (Table 1.11) and answer the questions following that.*

TABLE 1.11 Number of AIDS Cases and Deaths in Seven States based on IMA Figures (between 1993 and 2000)

(Figures in brackets show the number of deaths)

	1993	1994	1995	1996	1997	1998	1999	2000
Punjab	0	0	0	0	103	70	0	0
	(0)	(0)	(0)	(0)	(0)	(3)	(0)	(0)
U.P.	129	360	356	647	31	364	293	0
	(32)	(67)	(44)	(43)	(14)	(42)	(70)	(0)
Gujarat	0	0	482	319	0	0	227	224
	(0)	(0)	(165)	(96)	(0)	(0)	(38)	(90)
Kerala	71	68	56	38	37	42	23	38
	(7)	(11)	(0)	(0)	(0)	(0)	(0)	(0)
Bihar	27	22	31	26	18	7	15	27
	(4)	(2)	(11)	(0)	(0)	(0)	(0)	(4)
Bengal	46	12	8	12	37	11	127	568
	(0)	(12)	(0)	(0)	(4)	(0)	(3)	(8)
Assam	147	134	141	206	385	425	104	448
	(16)	(12)	(12)	(7)	(48)	(30)	(7)	(23)
India Total	521	1009	1060	1371	760	1254	1996	1528
	(58)	(115)	(215)	(153)	(103)	(133)	(133)	(138)

1. In the two states where the incidence of death was the maximum over this period, the ratio of number of deaths was approximately:
(a) 12:7 (b) 2:1
(c) 5:4 (d) 3:2
2. In which year was the ratio of deaths to the AIDS cases the maximum?
(a) 1993 (b) 1995
(c) 1997 (d) 1999
3. In which year was there the maximum drop in the percentage of deaths as compared to the preceding year?
(a) 1996 (b) 1998
(c) 1997 (d) 1994
4. In which year was the percentage of deaths to the cases in Bihar more than the average of the seven states mentioned in the table?
(a) 1994 (b) 1993
(c) 2000 (d) It was always lower
5. In which year was there a maximum increase in the percentage of deaths as compared to the previous year?
(a) 1994 (b) 1995
(c) 1997 (d) 2000
6. In which year was the ratio of deaths to AIDS cases the second highest?
(a) 1993 (b) 1995
(c) 1997 (d) 1999
7. In which state was there the minimum number of deaths as a percentage of cases?
(a) Punjab (b) Kerala
(c) Bihar (d) Bengal
8. In which two years was the percentage of deaths to the cases approx. equal?
(a) 1993 & 1994 (b) 1993 & 1996
(c) 1995 & 1996 (d) 1996 & 1998

Directions for Questions 9–13 *Four newspapers were evaluated on four parameters and their scores listed (Table 1.12). The net score on which the rankings are based, is calculated as a weighted average of the four scores (based on weights provided in the bar charts below (Figure 1.17) Read the data carefully and answer the questions that follow.*

TABLE 1.12 Score Card

	Price News	International	Sports News	Political
HT	5	7	6	7
TOI	8	6	5	5
Telegraph	7	7	6	6
Indian Express	6	7	7	5

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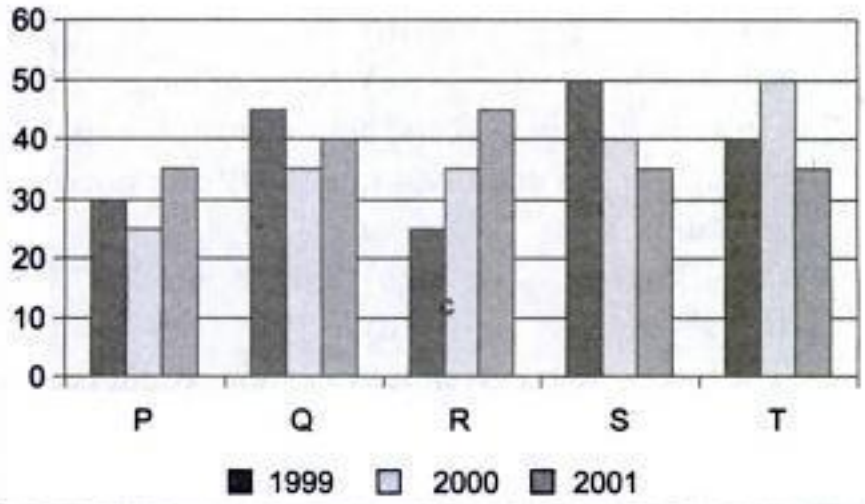
FIGURE 1.17



9. What would be HT's rank if equal weightages were given to all the four parameters?
   (a) 2nd (b) 1st
   (c) 4th (d) Cannot be determined
10. If a new newspaper offers sports like TOI, price like Indian Express, international news as good as Telegraph and political news equal to that of HT, then what would be its rank?
   (a) 2nd (b) 3rd
   (c) 4th (d) 5th
11. Which newspaper was ranked second best?
   (a) HT (b) TOI
   (c) Telegraph (d) Indian Express
12. If price is not a consideration and equal weights are given to the other parameters, which newspaper should be chosen?
   (a) HT (b) TOI
   (c) Telegraph (d) Indian Express
13. In how many parameters does TOI get the least score among all newspapers?
   (a) One (b) Two
   (c) Three (d) Four

TEN MINUTE TEST-15

Directions for Questions 1–5 *Refer to the information given below to answer the following questions.*

The modern Alladin has a charm which has 6 switches A, B, C, D, E and F in that order arranged in a row. They can be switched on in various combinations to call different animals to his service. We also know that:

When all the switches are off, no animal appears.

When only one switch or two alternate switches are on, a cat appears.

When only two adjacent switches are on, a dog appears.

When three consecutive switches are on, a tiger appears.

For all other combinations, a squirrel appears.
At a time, only one animal appears.

1. If C is kept on as a constraint, how many ways are there of calling a tiger?
   (a) 1 (b) 2
   (c) 3 (d) 4
2. In how many ways can a cat be called?
   (a) 8 (b) 10
   (c) 11 (d) 12
3. Alladin is in a difficult situation where only a tiger or a dog can help him. In how many ways can he save himself?
   (a) 8 (b) 9
   (c) 10 (d) 11
4. In how many ways can a dog be called if F is kept on?
   (a) 6 (b) 1
   (c) 2 (d) 5
5. If A is always on, in how many ways can a cat be called?
   (a) 3 (b) 2
   (c) 0 (d) 1

Directions for Questions 6–10 *Study the following table (Table 1.13) carefully and answer the questions given below it.*

TABLE 1.13 Sugarcane Production by Six Major States During 1996–2000

(in lakh tonnes)

State	Maharashtra	Gujarat	Bihar	Delhi	Sikkim	Bengal	Total
1996	150	75	58	48	49	32	412
1997	137	68	67	61	45	28	406
1998	160	65	82	59	46	37	449
1999	168	70	45	75	43	35	436
2000	180	55	80	67	47	28	457

6. Which of the following states shows a constant rise in sugarcane production every year?
   (a) Maharashtra (b) Bihar
   (c) Delhi (d) None of the above
7. In which year during the given period did Maharashtra exhibit it's highest share in the total production?
   (a) 1996 (b) 1997
   (c) 1998 (d) None of the above
8. In which year is Maharashtra's share of the total production closest to 35 percent of the total sugarcane production?
   (a) 1996 (b) 1997
   (c) 1998 (d) 1999

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9. What was the approximate percentage increase in sugarcane production in Delhi from 1997 to 2000?
   (a) 5% (b) 7%
   (c) 10% (d) 12%
10. The states which shows the maximum and the minimum percent increment in the sugarcane production over the given period are
   (a) Bihar & Bengal
   (b) Maharashtra & Sikkim
   (c) Maharashtra & Bengal
   (d) Delhi & Gujarat

TEN MINUTE TEST-16

Directions for Questions 1–6 *On the basis of information available on these graphs (Figures. 1.18 and 1.19) answer the questions that follow.*

The graphs below give the GDP and the percentage of GDP in education for the given years.

FIGURE 1.18 GDP in Rs '000 Crore

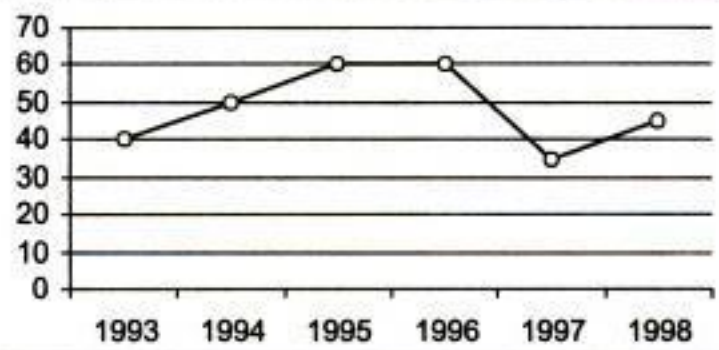
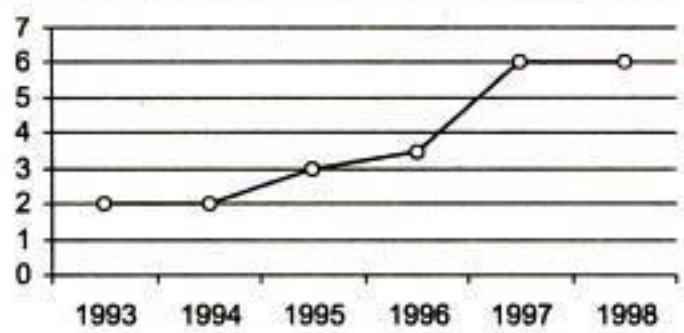


FIGURE 1.19 Percentage of GDP for Education



1. In how many years has actual educational spendin reduced as compared to that of the previous year?
   (a) 0 (b) 1
   (c) 2 (d) None of these
2. Between the given years, both inclusive, what per centage of the country's total GDP has gone int education?
   (a) 4.3% (b) 3.6%
   (c) 3.4% (d) 3.1%
3. The total amount given to education would be hov many times the total amount given to defence, every year 2 per cent of the GDP is given to defenc (for the entire period)?
   (a) 2.15 times (b) 1.55 times
   (c) 1.7 times (d) 1.8 times
4. If due to an HR Ministry report it is obligatory for th government to allocate at least Rs 3,200 crore for edu cation in 1999, provided educational spending, as percentage of the GDP, does not exceed 6.5 per cen what is the least desirable GDP for 1999 (in Rs '00 crore)?
   (a) 51.52 (b) 48.24
   (c) 49.23 (d) 42.72
5. In which year was the spending on education th lowest?
   (a) 1996 (b) 1995
   (c) 1994 (d) 1993
6. If percentage of GDP allocated to education in 199 increases by twice as much percent from 1998 allo cation as the 1995 increase over 1994, what is th increase likely to be in percentage terms?
   (a) 2% (b) 33.33%
   (c) 6.48% (d) Cannot be determined

Directions for Questions 7–11 *Study the following table (Table 1.14) and answer the questions that follow.*

TABLE 1.14 Rate of Savings and Capital Formation

(All figures as % of GDP

Year	Gross Domestic Savings	Gross Domestic Capital Formation	Net Domestic Savings	Net Inflow of Foreign capital	Net Domestic Capital Formation
1995–96	25.1	26.8	16.8	2	18.8
1996–97	23.2	24.5	14.6	1.5	16.1
1997–98	23.5	25	15	3.7	18.7
1998–99	22	23	13.8	1.2	15
1999–00	22.3	23.3	14.3	1.2	15.5

Gross Domestic Savings + Gross Inflow of Foreign Capital = Gross Domestic Capital Formation

7. In which year was the gross inflow of foreign capital as a percentage of GDP the highest?
   (a) 1995–96 (b) 1996–97
   (c) 1997–98 (d) None of these
8. In which year was the net inflow of foreign capita the highest?
   (a) 1995–96 (b) 1996–97
   (c) 1997–98 (d) Cannot be determined

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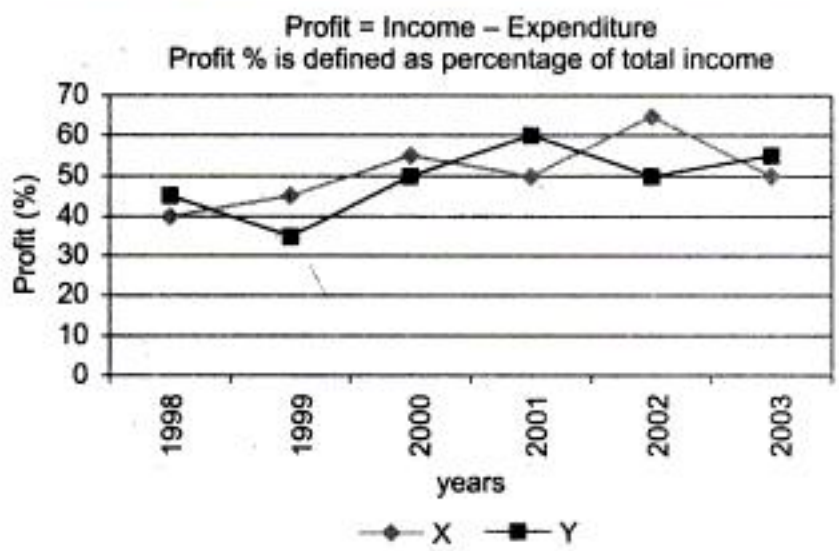
9. Assuming that GDP grew at a constant rate of 5 per cent per year for the entire period, which year has shown the highest percentage change in gross domestic capital formation?
   (a) 1996–97 (b) 1997–98
   (c) 1999–00 (d) Cannot be determined
10. Assuming that GDP grew at a constant rate of 5% per year for the entire period, which year has shown the highest difference between the net domestic capital formation and the net domestic savings?
   (a) 1996–97 (b) 1997–98
   (c) 1998–99 (d) Cannot be determined
11. For which year did most of the parameters in the table above show their highest value (as a percentage of GDP)
   (a) 1995–96 (b) 1996–97
   (c) 1997–98 (d) None of these

TEN MINUTE TEST-17

Directions for Questions 1–5 *Study the following graph carefully and answer the questions which follow. Assume that all the values either end in 0 or 5.*

FIGURE 1.20 Profits for Companies X and Y



1. If the profit of Company Y in the year 1999 was Rs 108,000, what was its approximate expenditure in that year?
   (a) Rs 900,000 (b) Rs 80,000
   (c) Rs 185,000 (d) Rs 200,000
2. If Company X spent Rs 350,000 in the year 2000, the income of Company X in that year was approximately equal to:
   (a) Rs 542,500 (b) Rs 525,000
   (c) Rs 525,800 (d) None of these
3. If the expenditures of both the Companies X and Y in the year 2002 were equal, then what was the ratio between the income of Company X to Company Y?
   (a) 5 : 4 (b) 10 : 7
   (c) 16 : 5 (d) 15 : 6
4. In which of the following years was the second highest percentage change in profit percentage over the previous year in the case of Company X?
   (a) 2002 (b) 2000
   (c) 2001 (d) None of these
5. If the expenditure of Company X in the year 2000 was Rs 250,000 and the income of 2000 was the expenditure in the year 2001, find out its percentage change in income for the year 2001.
   (a) 50% (b) 100%
   (c) 75% (d) None of these

Directions for Questions 6–10 *From the information given below answer the questions.*

In a certain code, the symbol for 0 (zero) is A and for 1 is B. There are no other symbols for all other numbers greater than 1. The numbers greater than 1 are to be written only by using the two symbols given above. Some examples have been done for you.

0 is written as A.
1 is written as B.
2 is written as BA.
3 is written as BB.
4 is written as BAA and so on.

6. Which of the following will represent 13?
   (a) BBAA (b) BBAB
   (c) BABA (d) BAAB
7. Which of the following will represent the value of the expression $4 \times 3 + 2 \times 2 + 1$?
   (a) BABAA (b) BABAB
   (c) BAABA (d) BAAAB
8. Which of the following numbers will be represented by: BABAABB?
   (a) 82 (b) 81
   (c) 85 (d) 83
9. Which of the following numbers will be represented by BAAABBBA?
   (a) 144 (b) 142
   (c) 140 (d) None of the above
10. Which of the following will represent 18?
   (a) BABAA (b) BABBA
   (c) BAABA (d) BAAAB

TEN MINUTE TEST-18

Directions for Questions 1–5 *From the data available in the figure (Figure 1.21) answer the questions which follow.*

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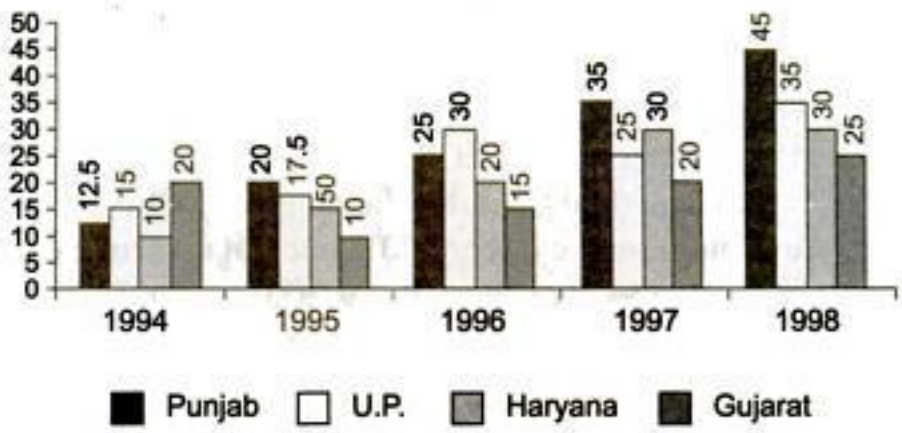
FIGURE 1.21 Production of Rice in Three States: Punjab, U.P and Haryana over the Years (in lakh tonnes)



1. In which of the following state/states did the production of rice increase every year?
   (a) Punjab (b) UP
   (c) Haryana (d) Punjab & Haryana
2. What is the percentage rise in rice production in Gujarat in 1998 over the previous year?
   (a) 25% (b) 20%
   (c) 33.33% (d) None of the above
3. What is the difference between the average production of rice in the states of Haryana and Gujarat over the period?
   (a) 30,000 tonnes (b) 10,00,000 tonnes
   (c) 45,000 tonnes (d) 450,000 tonnes
4. The production of rice in Gujarat in 1998 is what percent less than the production of rice in U.P. in 1997?
   (a) 16.66% (b) 20%
   (c) 40% (d) 0%
5. For which of the following years is the production closest to the average yearly production for the entire period?
   (a) 1995 (b) 1996
   (c) 1997 (d) 1998

Directions for Questions 6–9 *Based on the information available in Table 1.15, answer the questions.*

TABLE 1.15 Income Patterns of the African Republic of Hara Kiri over 4 Years

Period	Direct Taxes	Indirect Taxes	Loans	Total
2001	352.5	214.8	637.9	1205.2
2002	710.1	700.4	1037.9	2448.4
2003	1196.0	1302.9	2151.2	4650.1
2004	4547.5	3846.7	2585.1	10979.3

6. More than one third of the total amount generated in the year 2004 was due to:
   (a) Direct taxes
   (b) Indirect taxes
   (c) Loans
   (d) Direct taxes & indirect taxes
7. Which of the following is/are true?
   I. Value of the total income in every year was more than twice that of the previous year for every year.
   II. Over the period shown more than 50% of the total income was contributed by direct taxes.
   III. Value of total income generated by the country of Hara Kiri increased by more than 800% in the given four years.
   (a) I and III (b) II and III
   (c) I and II (d) III only
8. The highest percentage growth in income was shown in which year?
   (a) 2002 (b) 2003
   (c) 2004 (d) 2002 & 2004
9. Percentage of contribution by which of the following in the year 2004 was less than that of the year 2001?
   (a) Direct Taxes (b) Indirect Taxes
   (c) Loans (d) None of the above

TEN MINUTE TEST-19

Directions for Questions 1–6 *Study the following table (Table 1.16) and solve the questions based on it.*

TABLE 1.16 Marks Obtained by Seven Students in Different Subjects in the AMS Open CAT Challenge

Students' Subject	A	B	C	D	E	F	G
Reading comprehension (out of 100)	65	58	73	75	68	56	51
Data interpretation (out of 100)	59	63	69	52	71	49	72
Maths (out of 150)	132	105	141	128	119	120	135
Reasoning (out of 200)	138	126	162	144	150	118	132
English (out of 150)	32	27	33	41	29	35	37
Corporate awareness (out of 150)	105	98	112	106	119	107	96
Total (out of 750)	531	477	590	546	556	485	523

1. Approximately what is the maximum difference between the percentages of total marks obtained by any two students?
   (a) 15 (b) 10
   (c) 12 (d) 20

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ANSWER KEY

Question	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10
1	D	C	C	A	D	B	B	B	C	D
2	C	D	D	B	A	D	D	A	D	A
3	D	D	B	A	C	B	B	A	A	A
4	A	D	D	D	A	B	B	B	B	B
5	A	A	D	A	C	D	C	C	B	A
6	C	C	D	D	D	D	B	D	C	D
7	A	C	D	A	D	A	A	C	C	D
8	C	C	A	B	C	D	D	D	D	A
9	B	B	D	D	D	B	B	D	D	D
10	B	C	A	B	D	B	A	B	C	A
11	B			B	B			C	C	C
12	B			B	D			A	D	A
13				A						A
14										
15										

Question	Test 11	Test 12	Test 13	Test 14	Test 15	Test 16	Test 17	Test 18	Test 19	Test 20
1	B	C	A	C	C	A	D	A	A	A
2	C	A	D	B	B	B	D	A	C	B
3	C	D	D	A	B	D	A	B	D	B
4	D	C	D	B	B	C	B	D	C	D
5	B	C	B	B	B	D	B	A	D	B
6	A	D	C	C	D	B	B	D	A	B
7	D	A	A	A	D	A	D	D	D	C
8	D	C	B	B	C	D	D	C	A	D
9	D	A	A	A	C	B	B	C	D	C
10	B	A	D	B	D	B	C		B	C
11	A	A	A	D		A			C	
12	D	B	D	A					C	
13	C			C						
14										
15										

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4

Test-IV

Directions for Questions 1–5 *The following table (Table 4.1) shows the prices and the P–E ratio of the shares of a number of companies. Refer to it and answer the questions that follow.*

TABLE 4.1 P–E Ratio of Shares of Select Companies

Share	Price (Rs)	P–E Ratio
VI	35.95	1.7
IOB	25.55	2.4
BOI	46.20	2.6
KR	108.35	2.6
JKB	217.80	2.9
FB	168.75	3.0
AB	34.40	3.1
SB	25.10	3.2
CP	69.65	3.4
VB	28.60	4.0

Note: P–E Ratio is the price earning ratio of a share and is defined as the ratio between the market price of, and the earnings (EPS) from, the share.

1. For which of the following is the EPS the lowest?
   (a) AB (b) IOB
   (c) SB (d) VI
2. What are the total earnings from shares of VB, if the number of VB shares is 25000?
   (a) Rs 175,750 (b) Rs 178,750
   (c) Rs 182,250 (d) None of these
3. What is the ratio of EPS of CP to EPS of AB?
   (a) 20.5:11.1 (b) 18.5:12.3
   (c) 19.8:14.5 (d) None of these
4. By what percentage should market price of IOB increase to make its P–E Ratio equal to that of FB?
   (a) 25 (b) 33.3
   (c) 20 (d) 12.5
5. What would be the EPS of KR if its P–E ratio were increased by 50%?
   (a) 25.6 (b) 27.8
   (c) 23.4 (d) None of these

Directions for Questions 6–13 *Refer to Table 4.2 and answer the questions that follow. Profit earned is either paid out as dividend or ploughed back in business as retained earnings (RE). Interest is paid on borrowings.*

TABLE 4.2 Rate of Interest, Dividend Payout Ratio and the Retained Earnings of Five Companies

Company	Interest (Rs 000)	Rate of Interest (%)	Dividend Payout Ratio (%)	Retained Earnings (Rs Lakh)
A	234	18	22.50	155
B	576	24	19.60	402
C	129.6	16	8.75	365
D	144	9	32.50	270
E	180	15	28.00	216

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Table 7.9 (C) Estimated Time and the Actual Time Required for Each Phase of the Project (in months)

	Design	Foundation	Construction	Finishing	Painting
Actual	5	3	8	4	2
Estimated	3	2	6	3	2

37. What was the phase in which there was the highest absolute increase between the estimated and the actual cost?
    (a) Foundation (b) Design
    (c) Construction (d) Cannot be determined
38. For which phase of the project was there the highest percentage increase in cost (as compared to the estimated cost).
    (a) Foundation (b) Design
    (c) Construction (d) Cannot be determined
39. What is the value of the percentage overflow in costs during construction? (approximately)
    (a) 50% (b) 33.33%
    (c) 66.66% (d) None of these
40. If internal finishing and painting can be started simultaneously at the end of construction, then what is the overflow of the project as a percentage of the estimated total time of completion of the project?
    (a) 27.27% (b) 33.33%
    (c) 42.85% (d) Cannot be determined

ANSWER KEY

1. (c)	2. (a)	3. (c)	4. (d)	5. (c)
6. (d)	7. (d)	8. (b)	9. (c)	10. (a)
11. (d)	12. (c)	13. (a)	14. (c)	15. (c)
16. (d)	17. (a)	18. (b)	19. (d)	20. (b)
21. (a)	22. (b)	23. (b)	24. (b)	25. (d)
26. (d)	27. (c)	28. (d)	29. (a)	30. (a)
31. (b)	32. (d)	33. (a)	34. (b)	35. (d)
36. (a)	37. (c)	38. (a)	39. (b)	40. (c)

EXPLANATORY NOTES

1. The maximum age at expiry is 70 years (Birla Sunlife). Hence a 50-year-old can insure his life for a maximum of 20 years.
2. ICICI prudential offers the least premium for the required profile. Hence, it is the correct option.
3. ICICI, HDFC and LIC are the three options offering a 6-year tenure.
4. Kalkaji, Gurgaon Grade A and Noida Grade A are the three options possible.
5. His budget will now become Rs 1 crore. With this budget it is possible that he might not be able to buy a flat at Malabar Hill, Cuffe Parade or Jor Bagh. Hence, the required answer is 3.

6–7. There is no information about the rent value per square feet. Hence, these questions cannot be answered.

8. Kalkaji or Gurgaon since the rate per square feet is Rs 2400.
9. Visually 1994–95 is the highest growth rate.
10. $100 \times 1.009 \times 1.053 \times 1.06 \times 1.072$. Calculate by percentage change.
11. No comments can be made about the absolute value of industry growth.
12. Assume GDP in 1990–91 as 100. Calculate the relative values of the GDP based on the growth of GDP as per the table. Gross Fiscal deficit is given as a percentage of GDP (use these values with the relative values of the GDP calculated above). The required answer is for 1993–94.
13. Visually 1993–94 is the required answer.
14. Find the highest value of the ratio.
    (Foreign exchange reserves/relative values of the GDP calculated in Question 12.)
    1994–95 gives the answer.
15. Visually the answer is Brazil.
16. Cannot be determined since the values are given in real terms and there is no mention of inflation.
17. It is clearly evident that only statement (i) is true.
18. Argentina has grown by 2400% while Mexico has grown by 4600%. The required answer is 22/24= 92%.

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3. The number of households in 1991 was nearly
   (a) 147.31 Mn (b) 141.21 Mn
   (c) 153.26 Mn (d) 159.72 Mn
4. The year which showed the lowest number of females per thousand males was:
   (a) 1971 (b) 1981
   (c) 1991 (d) 2001
5. The highest growth rate of urban population as a percentage of the total population was for the decade ending:
   (a) 1971 (b) 1981
   (c) 1991 (d) 2001
6. The number of decades in which the growth rate of the rural population is higher than that of the urban population is:
   (a) 0 (b) 1
   (c) 2 (d) Cannot be determined
7. The death rate as a percentage of birth rate was maximum for:
   (a) 1971 (b) 1981
   (c) 1991 (d) 2001
8. The difference between the number of literates in 2001 and the number of literates in 1971 is:
   (a) 461 Mn (b) 482 Mn
   (c) 612 Mn (d) 523 Mn

Directions for Questions 9–13 *Table 10.2 given below shows the density of population defined as the population per unit area across 10 states. Refer to it and answer questions 9–13.*

TABLE 10.2 Population Density in 10 States (Population per Unit Area)

State	Capital	Population	Area (sq. km)
Jammu & Kashmir	Srinagar & Jammu	10,069,917	222,236
Himachal Pradesh	Shimla	6,077,248	55,673
Punjab	Chandigarh	24,289,296	50,362
Uttaranchal	Dehradun	8,479,562	53,331
Haryana	Chandigarh	21,082,989	44,212
Delhi	Delhi	13,782,976	1,483
Rajasthan	Jaipur	56,473,122	342,239
Uttar Pradesh	Lucknow	166,052,859	241,006
Bihar	Patna	82,878,796	94,180
Sikkim	Gangtok	540,493	7,096

9. The state with the highest population density is:
   (a) UP (b) Bihar
   (c) Rajasthan (d) None of these
10. The state with the lowest population density is:
   (a) J&K (b) Sikkim
   (c) Haryana (d) None of these
11. The number of states whose population density is higher than the all India population density is:
   (a) 3 (b) 4
   (c) 5 (d) Cannot be determined
12. Amongst the states whose name starts with a consonant other than 'H' and whose capital's name starts with a consonant other than 'S', the state with the highest population density is:
   (a) Delhi (b) Rajasthan
   (c) Bihar (d) None of these
13. For Question 12 above, the state with the least population density is:
   (a) Rajasthan (b) Sikkim
   (c) Delhi (d) None of these

Directions for Questions 14–18 *The tables below [Table 10.3 (a)–(d)] refer to a mutual fund and its performance under various options. Analyse the data carefully and answer questions 14–18 based on your analysis.*

TABLE 10.3 (a) Income Plan—Investment Profile Percentage to NAV

AAA & Equivalent		
GOI securities	49.24%	
NCDS/Bonds	39.17%	
Cash, Call &Other Assets	3.30%	
Treasury Bills	1.31%	
AA+/-&Equivalent		
AA+ NCDs /Bonds	0.87%	
AA-NCDS /Bonds	0.70%	
AA NCDs /Bonds	4.80%	
Unrated#	0.4 1%	0.41%
B NCDs/Bonds	0.2%	0.20%

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12

Test-XII

Directions for Questions 1–5 *Table 12.1 shows the requirements of different professionals by RIL for its Petrochemicals and Infocomm (I) operations, over different years. Study the information and answer questions 1–5.*

TABLE 12.1

Categories	2005		2006		2007		2008		2009		2010	
	P	I	P	I	P	I	P	I	P	I	P	I
Engineers	276	473	252	717	234	758	251	822	293	886	388	816
MBAs	152	127	103	176	84	167	109	209	101	316	102	222
Accountants	162	202	131	245	99	254	93	202	98	298	100	205
Scientists	123	148	146	177	141	316	342	535	333	520	213	577
Lawyers	106	100	75	130	62	131	69	138	48	127	34	124
Others	507	734	556	862	541	867	612	1006	811	1008	907	1101
Total	1326	1784	1263	2307	1161	2493	1476	2912	1684	2955	1744	3045

1. Which of the following categories shows a more than 50% share of the total Petrochemicals requirement of RIL over the entire period 2005–10?
   (a) Others (b) Engineers
   (c) Accountants (d) None of these
2. Over the entire period 2005–10, the petrochemicals requirements of which category as a percentage of its Infocomm requirements for the same year has shown a steady growth?
   (a) Others (b) Engineers
   (c) Lawyers (d) None of these
3. The total petrochemicals requirement shows the maximum percentage growth over the previous year in the year:
   (a) 2006 (b) 2008
   (c) 2007 (d) 2009
4. The maximum value of petrochemicals requirement of lawyers as a percentage of Infocomm requirement for lawyers for the same year is seen in the year:
   (a) 2007 (b) 2005
   (c) 2009 (d) 2010
5. The average percentage growth rate of Total requirements over the entire period 2005–10 turns out to be(approximately)
   (a) 10% (b) 21%
   (c) 56% (d) 103%

Directions for Questions 6–11 *AMS learning systems Ltd. has created a revolutionary learning device that will help improve learning efficiencies by 200% in its users. It is now at a stage where it has to decide on the scale of production. It has three options:*

1. *If the company goes for medium scale manufacturing, the fixed cost and variable cost shall be Rs 1.5 crore and Rs 2000 per unit respectively.*

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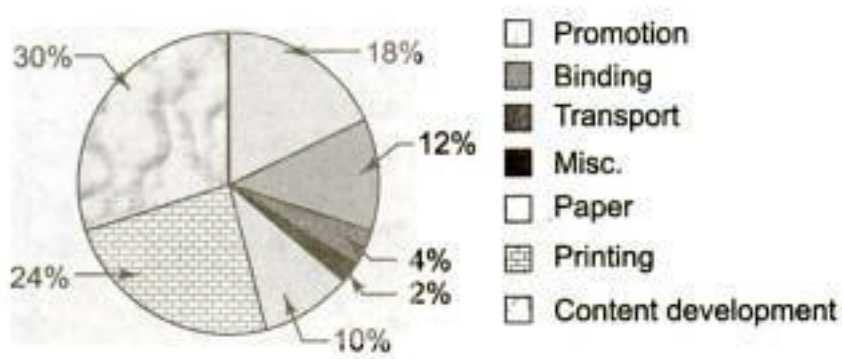
5. How many people have identical rankings in both the tests?
   (a) Three (b) Two
   (c) One (d) None
6. Who holds the fifth rank in the section tests?
   (a) Shekhar (b) Vinay
   (c) Ravi (d) None of them
7. What rank does Sanjay have in the section test?
   (a) Second (b) Third
   (c) Sixth (d) Seventh
8. How many people figure above Manish in section test?
   (a) None (b) One
   (c) Two (d) Six
9. Whom does the chief guest, Harsha, award the first prize in the Catalyst test?
   (a) Neeraj (b) Kislay
   (c) Vinay (d) Shekhar

Directions for Questions 10–15 *The following pie chart (Figure14.1) gives the expenditure incurred in printing a magazine. It shows the break-up of costs at 10,000 units. Analyse the pie chart and answer Questions 10–15.*

Of the costs enlisted, paper and binding are variable costs, while printing and transport are semi-variable and vary uniformly after every 10,000 units.

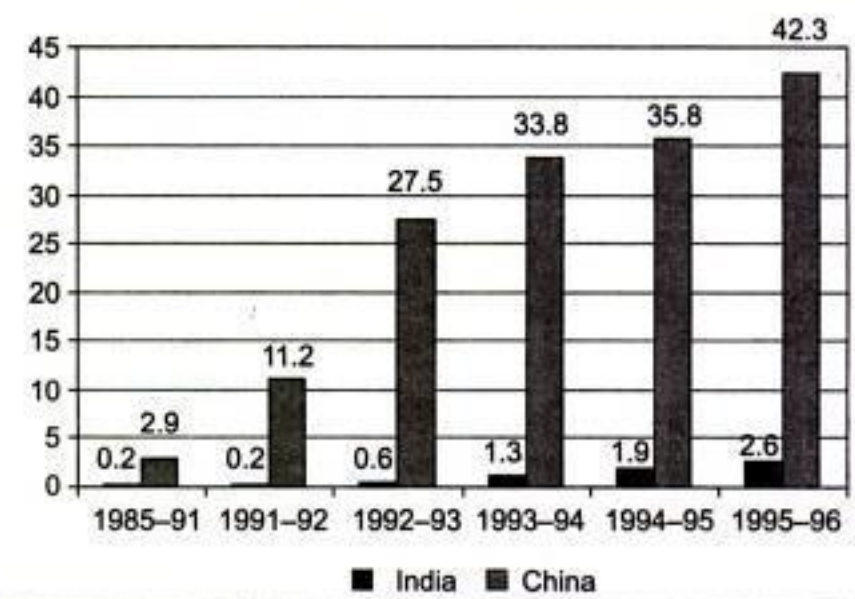
FIGURE 14.1 Break-up of Printing Costs of a Magazine



10. The publisher desires to make a profit of 25% and it is assumed that he is able to sell 80% of the copies that he produces. If the cost of the binding is Rs 6000 for a print run of 12500, at what price in rupees should he sell each magazine? (Assume he sells 10000 copies)
    (a) 6.25 (b) 5
    (c) 3.6 (d) None of these
11. What will be the percentage contribution to the total costs of transportation for a print run of 15000 copies, if the total cost of the magazine for 10000 copies is Rs 200000?
    (a) 58.37% (b) 5.755%
    (c) 5.992 (d) None of these
12. If the editorial content development cost is Rs 30,000, then the cost of transportation for 12000 units can be expected to be?
    (a) Rs 4000 (b) Rs 8000
    (c) Rs 12000 (d) Rs 2000
13. If for a given issue of the magazine, the miscellaneous cost is Rs 2000 and the print-run is 15000 copies, what should be the selling price if the publisher desires a profit of 5%? (Assume all copies were sold)
    (a) Rs 9.73 (b) Rs 8.40
    (3) Rs 10.5 (d) None of these
14. If for the same data given in the previous question, the print run were to be 50000 copies, the sale price per copy would be?
    (a) Rs 5 (b) Rs 6.3
    (c) Rs 2.10 (d) None of these
15. If the promotional cost for a given issue of the magazine is Rs 9000, then the total expenditure bringing out 25000 issues of that magazine is
    (a) Rs 50,000 (b) Rs 94,500
    (c) Rs 108,500 (d) None of these

Directions for Questions 16–19 *The following bar graph (Figure 14.2) gives the FDI inflow for India and China. Study the graph and answer the questions given below.*

FIGURE 14.2 India and China — FDI Inflow



16. Which time period showed the highest percentage of India's annual FDI inflows as a percentage of China's FDI inflows and what was the value of the same?
    (a) 1985–91, 6.4 (b) 1985–91, 6.9
    (c) 1995-96, 6.5 (d) None of these
17. India's net FDI inflow as a percentage of China's net FDI inflow during the period 1985–96 was:
    (a) 4.58 (b) 4.51
    (c) 4.42 (d) 4.37

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Test-XV

15

Directions for Questions 1–5 *Alladdin said to his master, "Welcome to my maze . The maze has 5 stations and you can start from any one of the five and go in any order. All you have to do to pass my test is collect one coin from all five stations."*

TABLE 15.1

	A	B	C	D	E
A	0	36	48	54	42
B	36	0	42	48	45
C	48	42	0	36	30
D	54	48	36	0	48
E	42	45	30	48	0

Note: Distance (in feet) from one station to another. No pre-determined movement plan is necessary. Any station can be visited at any point in time.

1. Which of the following sequence of stations involves the least amount of travel?
   (a) A,B,C,D,E (b) B,C,D,A,E
   (c) D,A,C,B,E (d) D,E,B,A,C
2. Coffee stations are proposed to be set up in the maze. Each station has to be not more than 42 feet from a coin station. The minimum number of stations that need to be set up (for coffee) is:
   (a) 2 (b) 3
   (c) 1 (d) 4
3. If coin station A houses the dollar unit and it is mandatory to go to A after every coin station. From A then you can go to the next station. What is the least total distance travelled before the process is completed?
   (a) 210 ft. (b) 240 ft.
   (c) 246 ft. (d) 258 ft.
4. The most 'central' coin station is (in terms of location)
   (a) A (b) B
   (c) C (d) D
5. A man has to fill coins in all the coin stations. He starts with station E. What is the least distance he will have to travel to cover all the remaining departments?
   (a) 147 ft. (b) 150 ft.
   (c) 174 ft. (d) 180 ft.

Directions for Questions 6–12 *Study the following table (Table 15.2) and bar chart (Figure 15.1) and answer questions 6–12.*

TABLE 15.2 Air India's Performance Indicators

	2001–02	2002–03	2003–04	2004–05
Total revenue (Rs crore)	893.88	925.46	1023.95	1205.11
Net profit/Loss (Rs crore)	66.00	30.16	43.41	3.41
Available tonne kms (million)	2842.565	2919.512	3180.207	3176.00
Capacity utilisation (million)	2109.959	2206.287	2386.111	2372.300
Overall load factor (%)	74.2	75.6	75.0	74.7
Passenger load factor (%)	56.0	68.6	69.3	66.4

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Statement I: At least 1 Cyclist breaks the individual record in this event.
Statement II: At Most 3 Cyclists break the individual record in this event.

(a) I is true while II is false.
(b) II is true while I is false.
(c) Both I and II are false.
(d) Both I and II are true.
(e) Cannot be determined

297. If two of the teams managed to break the team record, then what can be said about these statements?

I. At least 1 Cyclist of Colvin Taluqdars breaks the individual record for the rally.
II. 1 Cyclist of St. Fideles breaks the individual record for the rally.

(a) I is true while II may be true.
(b) II is true while I may be true.
(b) Both I and II are false.
(c) Both I and II are true.
(e) None

298. If St. Anthony's secured the first position in the event where Cyclist IV of St. Anthony gets 4(d).30 penalty points, then what can be the maximum number of cyclists (of all 6 teams) who can break the individual record mentioned above?

(a) One (b) Two (c) Three
(d) Four (e) Five

299. If St. Francis secured the first place with Cyclist II of St. Francis getting 43.16 penalty points and was the only Cyclist to break the individual record of 400 meters in all the 6 teams then which of the following statements is definitely false?

(a) St. Fideles secured Second Place.
(b) St. Anthony secured Second Place.
(c) Colvin Taluqdars secured Fourth Place.
(d) National secured Third place
(e) None

ANSWER KEY

1. (a)	2. (e)	3. (c)	4. (b)	5. (c)	6. (b)	7. (c)
8. (c)	9. (b)	10. (c)	11. (d)	12. (c)	13. (c)	14. (b)
15. (b)	16. (b)	17. (c)	18. (a)	19. (c)	20. (c)	21. (b)
22. (c)	23. (a)	24. (b)	25. (b)	26. (a)	27. (b)	28. (a)
29. (d)	30. (e)	31. (d)	32. (b)	33. (c)	34. (d)	35. (c)
36. (b)	37. (a)	38. (c)	39. (d)	40. (d)	41. (d)	42. (c)
43. (e)	44. (b)	45. (a)	46. (b)	47. (c)	48. (a)	49. (a)
50. (a)	51. (c)	52. (c)	53. (a)	54. (c)	55. (b)	56. (b)
57. (c)	58. (b)	59. (a)	60. (a)	61. (c)	62. (a)	63. (e)
64. (a)	65. (a)	66. (e)	67. (e)	68. (a)	69. (e)	70. (e)
71. (a)	72. (d)	73. (c)	74. (d)	75. (c)	76. (d)	77. (b)
78. (d)	79. (d)	80. (a)	81. (c)	82. (c)	83. (b)	84. (a)
85. (c)	86. (e)	87. (a)	88. (b)	89. (c)	90. (c)	91. (a)
92. (b)	93. (e)	94. (b)	95. (e)	96. (e)	97. (c)	98. (d)
99. (b)	100. (c)	101. (a)	102. (b)	103. (b)	104. (e)	105. (b)
106. (e)	107. (e)	108. (b)	109. (d)	110. (a)	111. (c)	112. (e)
113. (c)	114. (a)	115. (b)	116. (c)	117. (e)	118. (e)	119. (a)
120. (c)	121. (e)	122. (d)	123. (c)	124. (b)	125. (d)	126. (b)
127. (a)	128. (c)	129. (c)	130. (a)	131. (a)	132. (e)	133. (c)
134. (c)	135. (c)	136. (a)	137. (e)	138. (e)	139. (e)	140. (a)
141. (a)	142. (e)	143. (b)	144. (b)	145. (e)	146. (b)	147. (e)
148. (d)	149. (a)	150. (e)	151. (e)	152. (c)	153. (c)	154. (b)
155. (a)	156. (b)	157. (c)	158. (d)	159. (d)	160. (a)	161. (c)
162. (e)	163. (c)	164. (b)	165. (e)	166. (a)	167. (b)	168. (a)
169. (c)	170. (d)	171. (c)	172. (b)	173. (a)	174. (e)	175. (d)
176. (a)	177. (e)	178. (d)	179. (c)	180. (e)	181. (b)	182. (d)
183. (a)	184. (a)	185. (c)	186. (b)	187. (e)	188. (a)	189. (d)
190. (a)	191. (d)	192. (a)	193. (e)	194. (c)	195. (a)	196. (b)

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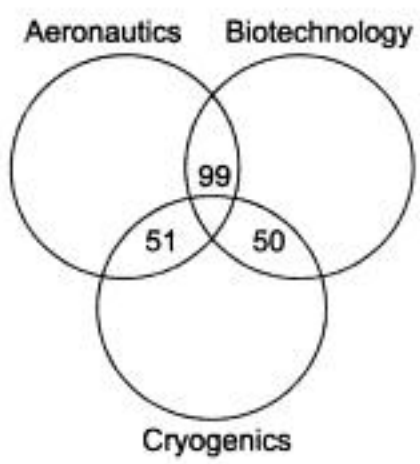
197. (d)	198. (c)	199. (c)	200. (d)	201. (b)	202. (e)	203. (b)
204. (c)	205. (c)	206. (e)	207. (c)	208. (e)	209. (d)	210. (d)
211. (c)	212. (d)	213. (e)	214. (c)	215. (c)	216. (e)	217. (a)
218. (d)	219. (e)	220. (b)	221. (a)	222. (b)	223. (c)	224. (b)
225. (b)	226. (e)	227. (c)	228. (b)	229. (e)	230. (c)	231. (d)
232. (c)	233. (c)	234. (e)	235. (a)	236. (e)	237. (c)	238. (e)
239. (b)	240. (a)	241. (e)	242. (d)	243. (b)	244. (a)	245. (a)
246. (c)	247. (c)	248. (d)	249. (d)	250. (b)	251. (c)	252. (b)
253. (e)	254. (d)	255. (e)	256. (c)	257. (b)	258. (e)	259. (c)
260. (d)	261. (b)	262. (a)	263. (e)	264. (b)	265. (e)	266. (b)
267. (c)	268. (b)	269. (d)	270. (a)	271. (c)	272. (c)	273. (d)
274. (d)	275. (d)	276. (c)	277. (e)	278. (c)	279. (c)	280. (d)
281. (b)	282. (b)	283. (b)	284. (b)	285. (c)	286. (c)	287. (e)
288. (d)	289. (a)	290. (b)	291 (a)	292. (c)	293. (c)	294. (a)
295. (e)	296. (d)	297. (a)	298. (c)	299. (d)		

EXPLANATORY NOTES

SET THREE

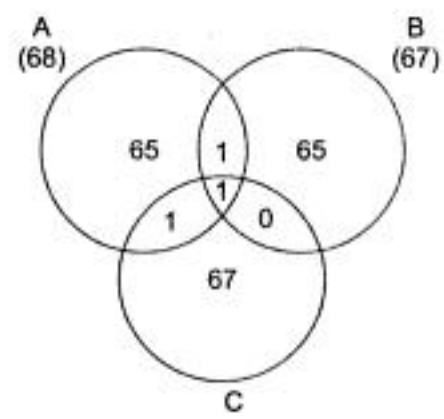
6. The maximum condition for all the three subjects would occur when the value for all three is maximized. Since, Only 2 is greater than all three, we can easily say that all three can be maximised at 99. In that case, the remaining 101 can be easily distributed between the areas for Aeronautics and Cryogenics only AND the area for Biotechnology and Cryogenics only. In this case, if we put 51 in the area for Aeronautics and Cryogenicsonly, while we put the remaining 50 in the area for Biotechnology and Maths only we will get the required values as (See Figure 1 below):
All three = 99
Exactly two = 101
Biotechnology = 99+50=149, Aeronautics = 99+51=150 and Cryogenics = 99+51+50=200.This condition maximizes all values and at the same time satisfies all conditions.

FIGURE 1:



7. For minimising Cryogenics, we need to reduce the number in the middle (i.e for all three) to the minimum possible value. This can be done by taking all three as 1 (as we have been given this constraint), only 2 as 2 (as it has to be greater than all three), and the remaining 197 can be distributed as shown in the Figure 2.

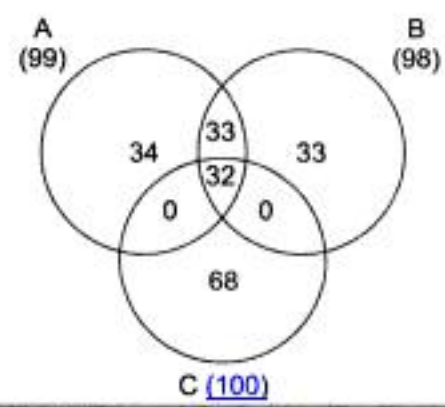
FIGURE 2:



This gives us a minimum value of 69 for Cryogenics, while Aeronautics becomes 68 and Biotechnology is 67.

8. The given conditions are satisfied by the following Figure 3:

FIGURE 3:



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