

Structure

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5.0 OBJECTIVES

After going through this unit, you will be able to:

- describe the function of tables, charts, and graphs;
- interpret and analyse the data presented in the form of tables, charts and graphs; and
- apply the knowledge of these devices to communicate information more effectively.

5.1 INTRODUCTION

We have, in the various units so far, discussed some of the skills of written communication. In this unit, we shall discuss a method of communication, which is slightly different i.e. communication by means of tables, charts, and graphs. These devices supplement the information presented through words and help the reader to understand the facts and figures more easily.

5.2 THE FUNCTION OF TABLES, CHARTS AND GRAPHS

- a) When you decide to use tables, charts and graphs, you should know where you can incorporate them in your writing. Even when you are searching for information, identify concepts and data that will lend themselves to representation through tables, charts, etc. Pay special attention to those ideas or data which will present difficulties to your reader. It will be a good idea to present some of these difficult ideas through tables and charts. It is wise to use fresh illustration each time you need one. The use of ready-made graphs or photographs will not always be so relevant to the point you are making.
- b) Let us now try and understand the function of tables, charts and graphs.
 - The use of tables, charts and graphs enables you to highlight the main points of the information contained in the text.
 - It enables you to present the information more concisely. Writing on a complicated topic can take up several pages, while the same information can be presented in less space by a table or a chart.

- These devices enable you to make vivid comparisons and show the relations between facts.
- They help to summarise data and ideas, and simplify and arrange complicated details, so that the reader can easily follow them.

5.3 TABLES

A table is a collection of figures, facts or other information arranged in columns and rows. The readers locate the information they need by reading across a row, and up or down a column. So when you design tables your major concern is to provide adequate spacing between columns and rows so that your readers can find the information easily. You will find that tables are useful for a number of things.

- They can show a number of specific data in a brief space. If such data were presented in the text itself, the reader would have to go through a succession of figures/sentences occurring in the text.
- Tables eliminate tedious repetition of words, phrases, and sentence patterns that can be put at the tops of columns, or at the side of rows in the table.

Because a table displays its information in rows and columns, it can be useful for juxtaposing data in two or more dimensions for easy comparison and contrast. Example 1, below, tells you what is meant by a column and a row.

Example 1

Main Types of Viral Hepatitis

	Viral hepatitis type A (infectious hepatitis)	Viral hepatitis type B (Serum hepatitis)
Transmission of infections	Virus is present in the faeces of infected people and transmitted to others by faecal contamination of water and food (e.g. through infected people handling food). Faeces are infective from two to three weeks before until eight days after the onset of jaundice. Local epidemics can occur.	These viruses are present in the blood and other body fluids of infected people, many of whom appear to be in normal health. Infection is spread sexually or by sharing hypodermic needles. In the past it was spread by use of contaminated blood and blood products.
Incidence	Worldwide. In some parts of the world, where hygiene is poor, almost everyone has been exposed to this type of hepatitis.	In some parts of Africa and Asia upto 20% of the population are carriers of one or both viruses, often without symptoms.
Groups at particular risks	Travellers to areas where hygiene standards are poor and prevalence of the virus is high (i.e. parts of Asia, Africa, or South America).	Male homosexuals, people with multiple sexual partners, intravenous drug abusers, health care personnel or children born to carrier mothers.
Incubation period	Three to six weeks after virus has entered the body.	A few weeks to several months after infection.
Illness	In many cases there is no illness. Otherwise, typical acute hepatitis (flu-like illness with jaundice), usually mild and never progressing to chronic hepatitis.	Typical acute hepatitis often more severe than with type A virus. Progression to chronic hepatitis and other liver disease may occur. Sometimes, no illness.

	Viral hepatitis type A (infections hepatitis)	Viral hepatitis type B (Serum hepatitis)
Prevention	Recommended for frequent travellers to Africa and Asia. Two doses of vaccine, 2-4 weeks apart. Then a booster six to 12 months later, gives around ten years protection.	Screening of blood donors and treatment of donated blood; safe sex and avoidance of blood exchange by drug users. A vaccine is available against hepatitis B for high risk groups.

(From Complete Health Encyclopedia, The British Medical Association, 1996)

As is made amply clear by the example given above, tables allow easy comparisons which might be difficult to understand if they appeared in the form of paragraphs.

Tables can be divided into two broad types: **dependent tables** and **independent tables**. A dependent table is an integral part of the text. It needs no title or caption because it is given in continuation of the text. Such a table contain a small amount of information, probably a maximum of three columns and rows, and a dozen or so numbers.

An independent table may be placed physically within the text but is to be clearly distinguished from it. Example 2 proves the point.

Example 2

Resurgence in Bihar

In 1977, a sample survey conducted by the National Institute of Communicable Diseases (NICD), estimated the number of Kala-azar cases to be 70,000 with 4,500 estimated deaths. However, 16,589 cases and 229 deaths were detected through searches while during 1978 and 1979, 41, 953 and 25, 172 cases respectively were detected. In the later years, the figures relate to only those which came to Health Centres/hospitals for treatment, hence the figures are low. The number of cases and deaths recorded due to Kala-azar since 1977 are given below.

Table 1: Number of Kala-azar Cases and Deaths in Bihar Stage

Year	No. of cases	No. of deaths
1977	16589	229
1978	41953	62
1979	25172	28
1980	13620	23
1981	14165	35
1982	11120	35
1983	11832	128
1984	12983	128
1985	12029	37
1986	14029	47
1987	17471	74

(From Kala-Azar: Re-emergence of Dreaded Diseases, VHAI)

In an independent table, you are inviting your readers to look at the tabular information separately while reading the text. Generally, such tables can present a large amount of information. They require the reader to stop and reflect on the details about the facts and their arrangement. Such a table usually has a table number and a caption. The caption should be carefully written so that you focus the reader's attention on the significant facts presented in the table. Of course, a written summary of the facts presented in the table should also be given, highlighting the important facts.

In some cases a summary of the table is given in the text, and the full table is placed in the appendix.

It will be useful to keep certain points in mind when you prepare tables of your own.

- If you are using several independent tables, you should assign each table a table number. (Look at example 2 again). In the text itself, each table should be referred to by the table number rather than by a phrase such as *'the table above....'* If your text has more than five tables, they should be listed in a separate page after 'Table of Contents,' labeled as 'List of Tables'.
- The title of the table can be placed either above or below the table. It should describe in very precise language the contents of the table.
- Each column should have a heading. This heading should be brief and accurate. Units of measurement, if required, are enclosed in brackets beneath the heading. You may use standard abbreviations, if you like.
- In the left-hand vertical column of the table, we list the items about which information is given in the table.
- The main body of the table comprises the data below each heading in the column. It is very essential to present the information in the body as clearly as possible. The presentation of information is dependent to a large extent on the way lines are drawn in independent tables. You can have a choice of an open design, a semi-closed design or a closed design. An open design is one which has no vertical or horizontal lines in it. A semi-closed design has some vertical and/or some horizontal lines. A closed design has both vertical and horizontal lines separating virtually all the items.

Example 2 has a closed design while the table in Check Your Progress 1 has a semi-closed design.

Check Your Progress 1

On the basis of the information given in the following table, answer the questions given below:

Recommended daily intakes of energy and nutrients for humans in the UK for both sexes (Adapted)

Age range	Body Wt. Kg.	Energy Kcal	MJ	Protein g	Calcium mg	Iron mg
Boys and Girls						
0 up to 1 year	7.3	800	3.3	20	600	6
2 up to 4 years	13.5	1400	5.9	35	500	7
4 up to 7 years	20.5	1800	7.5	45	500	8
Boys						
9 up to 12 years	31.9	2500	10.5	63	700	13
2 up to 15 years	45.5	2800	11.7	70	700	14
15 up to 18 years	61.0	3000	12.6	75	600	15
Girls						
9 up to 12 years	33.0	2300	9.6	58	700	13
12 up to 15 years	48.6	2300	9.6	58	700	14
15 up to 18 years	56.1	2300	9.6	58	600	15

- 1) What is the ideal body weight for a boy of 14 years?
.....
- 2) How much calorie does a child of 6 years need?
.....
- 3) What is the difference in the recommended calorie intake of a boy of 9 to 18 years and girl of 9 to 18 years?
.....
.....
- 4) How much calcium does a boy of 12 years need?
.....
- 5) Does a girl of 16 years need more iron than a boy of the same age?
.....

5.4 CHARTS AND GRAPHS

The term chart is used to refer to i) a detailed map of a sea area, and ii) information presented in the form of a picture or a graph to make it easily understood. We shall use it here in the latter sense. This presentation through diagrams and graphs can take various forms, including what is known as a flow diagram or a flowchart. These charts simplify the detailed information that is presented and help in its interpretation. Trends, movements, and distributions can be presented in a more comprehensive manner in graphs than in tables.

5.4.1 Line Graphs

A graph is usually a straight or curved line which is drawn between a vertical (that is, an upright) line and a horizontal (that is, a level line) across the page, to connect a series of points representing the varying values of two related things. It, thus, primarily shows the relationship between two sets of figures or two variables. The fixed lines — horizontal and vertical — used as reference points are known as axis, each representing one set of figures or one variable. (See Example 3)

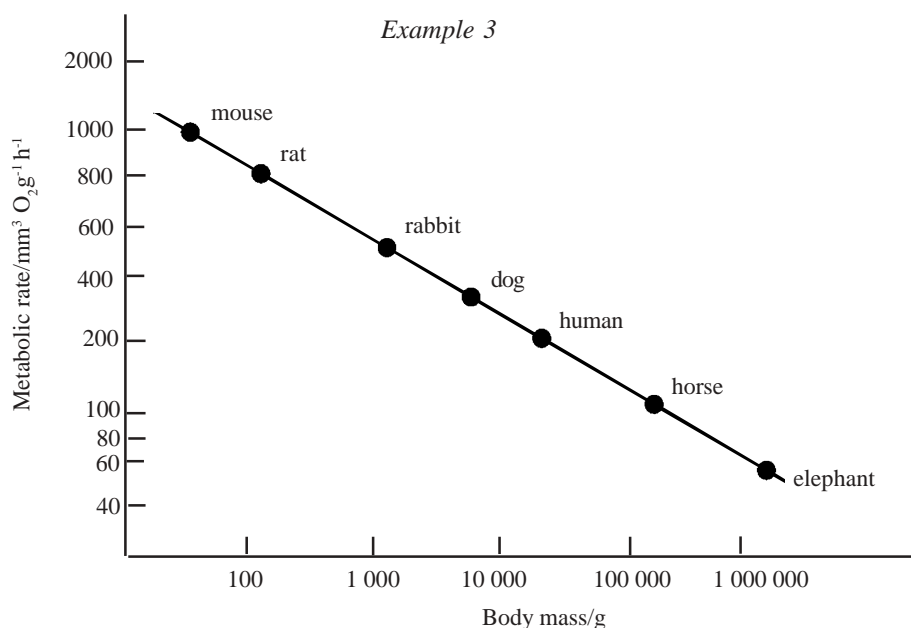
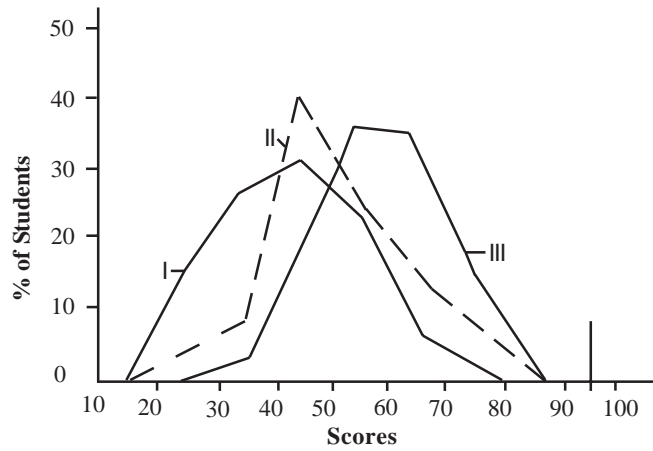


Fig. 5.1: Metabolic rate of animals, calculated per gram body mass, plotted on logarithmic coordinates

(From Biological Sciences CUP ELBS)

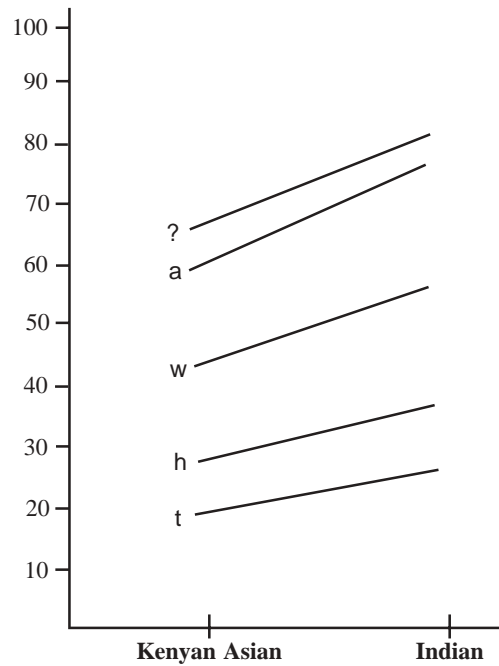
Example 4

Below shows the use of a number of lines in the same graph. In preparing such graphs each line has to be given a label. You can emphasize the difference between two lines by shading the space that separate them. In order to differentiate between the different lines, you can use different colours, or a dotted line, a broken line, a semi-broken line, a thick line, a thin line, etc.



Example 5 (From Testing Communicative Performance by B.J. Carroli)

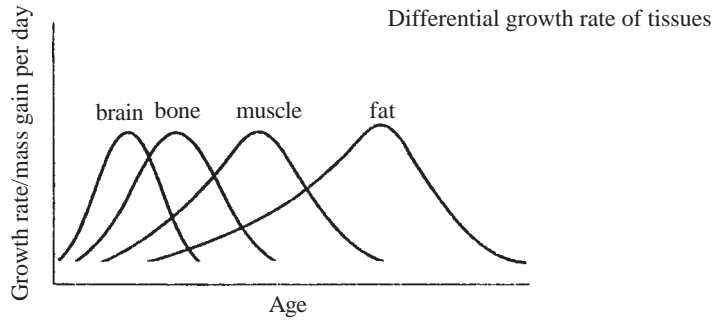
The question that arises is, how many lines is it possible to accommodate comfortably in a graph? There can be no single correct answer. For instance, the graph in Example 5 below has five lines in it, and yet it is not too cluttered. Why? Because the principal objective of presenting that graph is to show that the lines all move in a parallel direction. However, you will realize that if those lines had begun to move across one another, the load of information would be too great for a reader to absorb.



	a	w	?	t	h
Kenyan Asian	58.91	42.73	65.35	18.36	27.14
Indian	74.10	54.31	79.62	24.36	35.80

Leeds Variants by place of origin
(From Crisis of Identity by R.K. Agnihotri)

These line graphs are most useful for showing changes that have taken place (or are predicted) over a period of time. When this is the purpose of the chart, the horizontal scale usually represents a time line, and the vertical scale represents the quantity being



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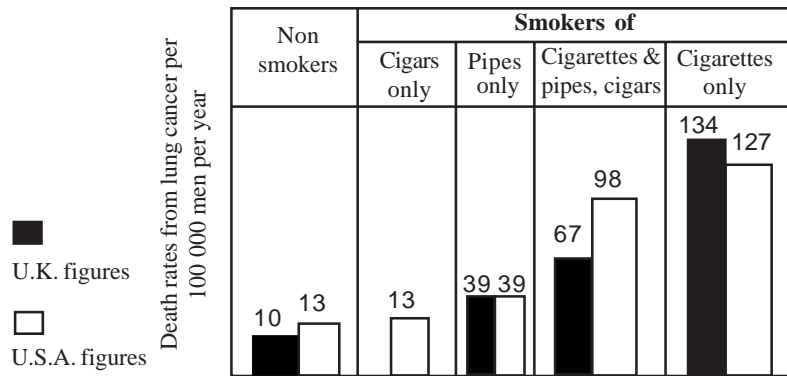
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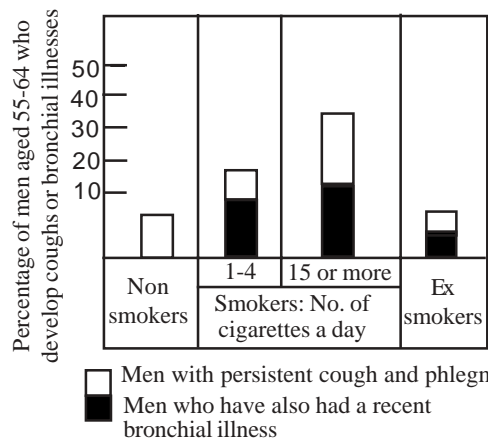
5.4.2 Bar Charts

Bar charts consist of a series of horizontal or vertical bars drawn parallel to each other along a scale of measurement. Each bar can represent a different item or the same item at different times, and the scale can be either a scale of percentage or one of absolute quantities. Therefore, bar graphs are useful for showing comparisons between the figures for the same item for different periods of time or for different items for the same period of time.

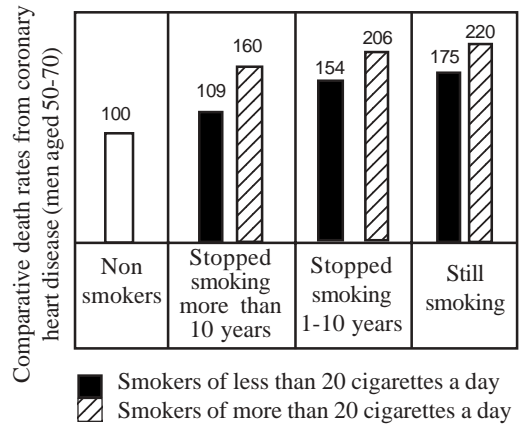
It is helpful for your reader if you label the tops of the bars in your chart. Since it is the tops of the bars that interest readers, that is naturally the first place they look at.



a The effect of smoking tobacco in different ways



b The effect of smoking on the chance of developing bronchitis or coughing with phlegm

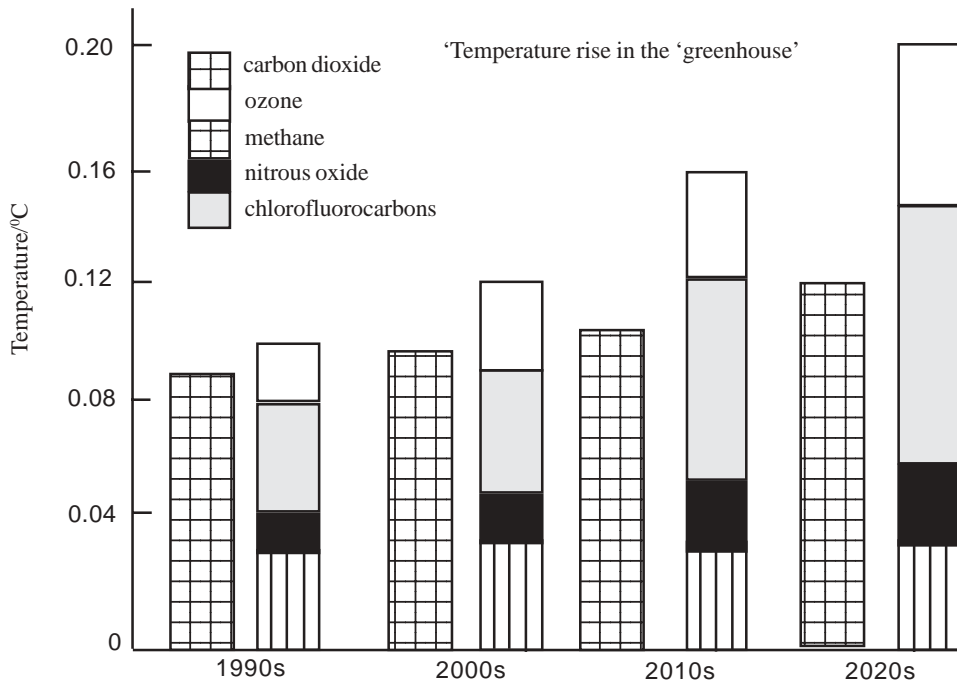


c The relationship between smoking and coronary heart disease

Effects of smoking on health (figures taken in relation to smoking: ten years, observations by R. Doll and A.B. Hill, *British Medical* 1964)

Check Your Progress 3

What is the predicted rate of temperature rise because of the different greenhouse gases between 1990s and 2020s?



Contributions of different greenhouse gases to predicted rise in global temperatures between now and the 2020s. (From M. McElroy (1988) *The challenge of global change*. New Scientist. 119, 1623-34-6.) (From *Biological Science*, Cambridge University Press)

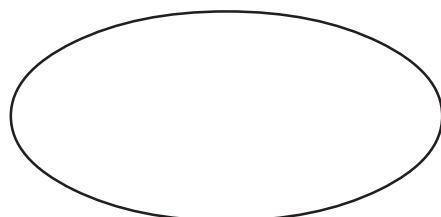
5.4.3 Flow-charts

Not all charts represent quantitative information. For example, you may wish to illustrate the stages of a process, point out locations, give directions, or show relationships. You can do this by using flow charts, diagrams, and maps.

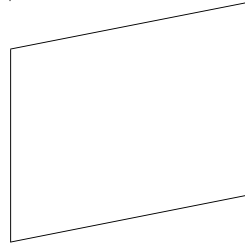
A flow-chart (or flow diagram) is a drawing in which particular shapes and connecting lines are used to show how each particular action in a system is connected with the others.

Flow-charts are an excellent way of illustrating the stages or the steps of a process, or the pathways along which information of components is to travel during specific operations. Flow-charts can show a series of steps that occur in a sequence, or they can show a number of steps or processes that occur simultaneously. They are drawn using a set of conventional symbols that represent various operations. The symbols are connected by arrows to indicate the order in which the activities will occur. We give below a small selection of symbols which will be sufficient to demonstrate their use in flow-charts.

A terminal symbol. It is a symbol used to denote the beginning and end of a flow-chart. Within the symbol you write START, STOP, END.



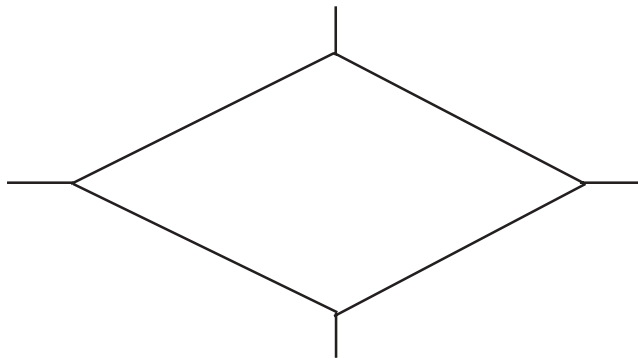
An input symbol. It is used to denote the input that is used to trigger off a decision or a process.



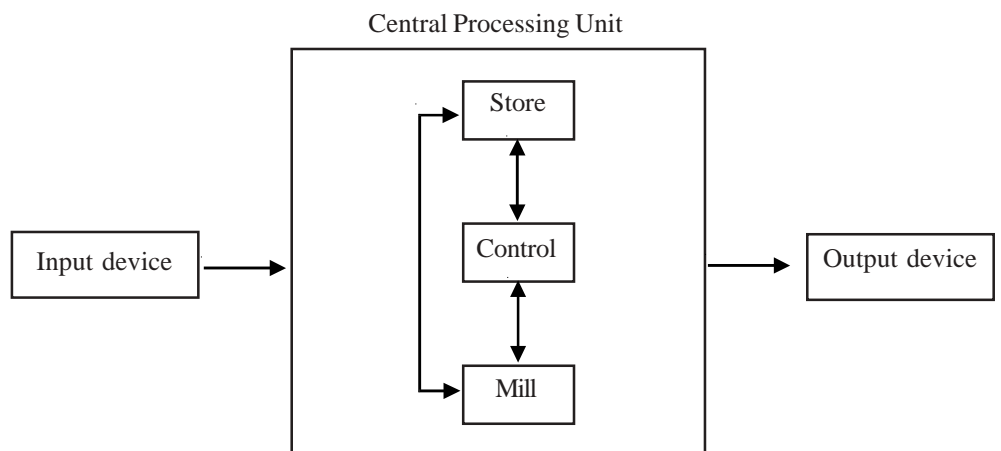
A process symbol. It is used to define the execution of an operation or event. The meaning of the operation or event can be given within the symbol.



A decision symbol. It is used to ask a specific question, the answer to which should be yes or no.



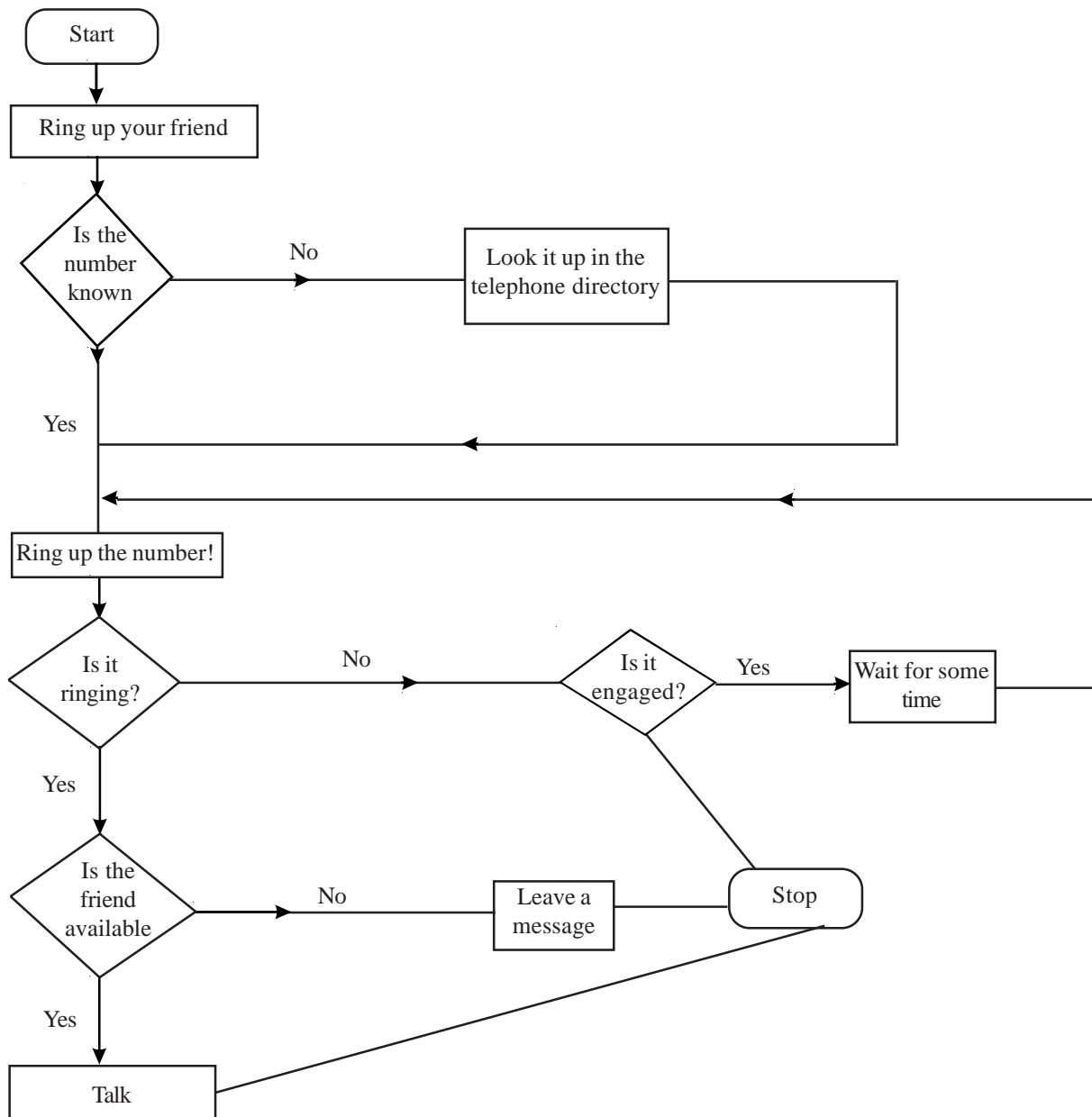
Using flow-charts is particularly useful if you wish to simplify your descriptions and provide an easy-to-use visual reference for your readers. For example, a well designed flow-chart will help you guide your readers through complex descriptions because they present the entire process at once, and thus serve as a guideline to indicate where you are going and how you are getting there. Another important use of flow-charts is that they prevent readers from visualizing complex processes on their own, and thus making mistakes.



(Source: *Computer and Commonsense*, 3rd Edition, Roger Hunt and John Shelley, Imperial College of Science and Technology, Prentice-Hall of India Private Limited 1985.)

The figure shows these five parts in an arrangement which closely resembles the basic anatomy of today's computers. The three parts consisting of the Store, Mill and Control units are collectively known, in current terminology, as the Central Processing Unit (CPU). It is this to which we really refer when talking about the computer. The other two units, the Input and Output devices (I/O), are concerned with entering information (instructions and data) into the CPU, and with outputting the results once processing has taken place.

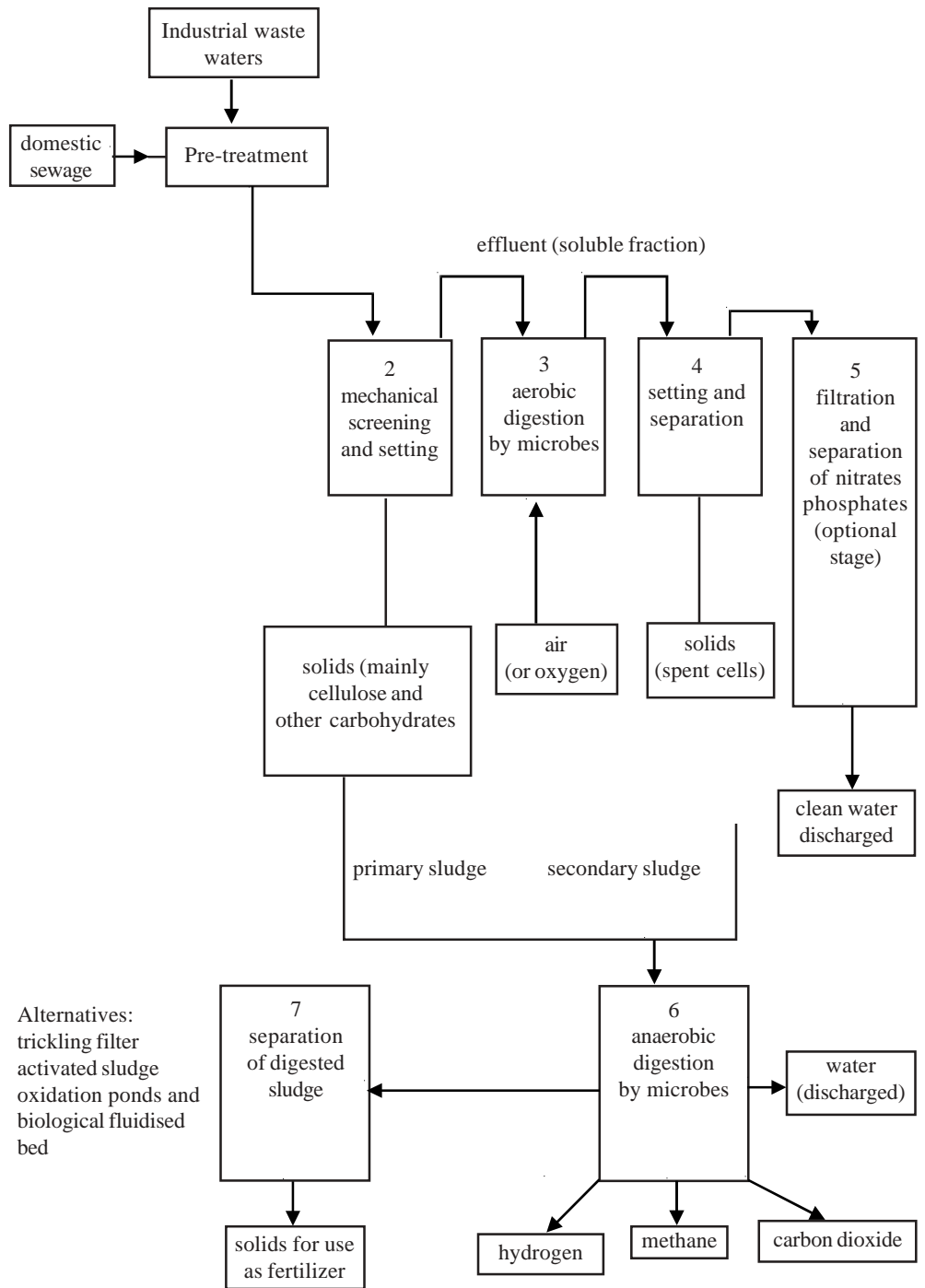
In order to understand the basis of flow-charts, it is better to begin with simple real-life problems. For instance, you want to ring up a friend and give him/her a message. How would you go about doing so?



Check Your Progress 4

Look at the flow chart given below and write the steps involved in the working of a modern sewage treatment plant.

A flow diagram of a modern sewage treatment works



.....

.....

.....

.....

.....

5.5 LET US SUM UP

In this unit, we made you aware of the communication of the information by means of tables, charts and graphs, so that you can interpret them in the text you read and use them in your own writings.

5.6 KEY WORDS

Axis	:	A line on a graph to show the position of a point. (E.g. Vertical Y axis; horizontal X axis)
Bar Charts	:	A mathematical picture in which different amounts are represented by thin vertical or horizontal rectangles, which have the same width but vary in height or length.
Charts	:	Information given in the form of graph, diagram or pictures.
Columns and Rows	:	A column is a vertical block of words or numbers while in a row the words or numbers are given horizontally next to each other.
Graphs	:	A picture, which shows how one or more sets of information or variable amounts are related usually by lines or curves.
Flow Charts or Flow Diagrams	:	Show the stages of a process.
Symbols	:	A sign, which is used to represent something else.
Tables	:	An arrangement of fact and numbers in rows and columns.

5.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) 45.5 kg
- 2) 1800
- 3) While for a boy an increasing intake (i.e. from 2500 to 3000 calorie) is recommended, for a girl there is no change in the 2300 calorie requirement from 9 to 18 years.
- 4) 700 mg
- 5) No. Both boys and girls are recommended a daily intake of 15 mg iron.

Check Your Progress 2

- 1) The following conclusions may be drawn from the curves:
 - a) In humans the absolute growth curve shows four distinct phases of increased growth.
 - b) The relative growth is greatest during embryological development.
 - c) Rate of growth is greatest during infancy and adolescence.
 - d) Maximum growth in terms of a particular parameter, such as height, is greatest in the adult.
- 2) While the growth rate of the brain is maximum in the early years, fat grows faster in the later years. The bones and muscles, however, steadily grow during childhood and adolescence.

Check Your Progress 3

Carbon dioxide levels (and those of other green house gases, notably carbon monoxide, methane and chlorofluorocarbons (CFCs) are rising at an alarming rate unprecedented in the recent earth history and their increased presence will logically favour an increasingly warmer surface environment.

While in the 1990s, carbon dioxide raised the Earth's surface temperature by 0.08°C, by the 2020s, the temperature would rise up to 0.12°C. Similarly the increased presence of CFCs has undisputed effects on the ozone layer and the surface temperature would rise to 0.20°C.

Check Your Progress 4

The industrial waste and domestic sewage is pretreated together. The first step is the mechanical screening of solids and its separation into solid waste and effluents. The solids are further separated for primary and secondary sludge. The effluents or soluble fraction is then aerated for aerobic digestion by microbes, which is once again screened for solids. This effluent or soluble fraction is once again filtered and separated for nitrates and phosphates so that the clear water could be discharged.

The secondary sludge, which is procured after the first mechanical screening, is simultaneously processed for anaerobic digestion by microbes, after which the hydrogen, methane and carbon dioxide are separated. The water content is discharged while the solids of the digested sludge are used as fertilizers.

Another alternative to the aerobic and anaerobic digestion by microbes is the trickling to filter activated sludge oxidation ponds and biological fluidized bed.