



- Statistical data and their properties
- To collect data, arrangement of data and classification of data
- To make frequency table of unclassified data.
- To make pictograph of unclassified data.
- To make Bar graph of unclassified data.
- To make mixed Bar graph of unclassified data and explanation of those data.

4.1 Introduction

You would have seen the score board of cricket on television or in a news paper. The full detail of the match is shown in this score board. Apart from the fact that who won or lost the match, many other useful informations are obtained. The scoreboard of a one-day cricket match published in a newspaper is shown below telling the fact that which player scored how many and highest scorer player scored in how many balls taking how much time etc.

Baller	Over	Maiden over	Run given	Wicket taken
Brekan	10	3	54	2
Bretaly	10	1	58	1
Ishant	10	2	45	2
Malinga	10	2	61	0
Johnson	10	1	7	1

Batsman	Run	Number of balls played	Time taken (in minute)
Gambhir	71	62	55
Sachin	70	76	65
Sehwag	28	35	60
Sangakkara	78	81	60
Gilchrist	36	32	65
Dhoni	03	08	07
Jadhav	02	06	05
Extra	06		
Total run	294		



If you see the score board you can find that which bowler threw highest maiden over and which batsman scored highest.

You must have seen the teacher of your class by marking attendance of students in a register daily also noting down the marks obtained by students after the examination in a register. Different types of data are presented by newspaper, magazines, T.V. and other means of communication daily. You also know that every data must give us some information.

Similarly you would have also seen in your daily life, the goods and its prices, time table of arriving and departing of rails and buses in the form of table. These tables provide us data.

- **Data are group of numbers that is collected to give some information.**
- **Data are collected for some purpose.**

4.2 Characteristics of Data :

Think, discuss and conclude :

- We know that production of wheat per hectare is not the same every year in a state. There may be difference in production of wheat per hectare in different states, i.e., data are variable.
- Taking another example. Suppose if we want to compare the marks of one student of a class in maths, with the marks of second student in science, and marks of third students in English. Then we will not get any result, with respect to the students, but if we compare the number obtained by three students in any one subject as Maths, Science or English, it can be concluded about performance of which student is good. Thus we see that if the data are of same type we reach on some conclusion.
- Suppose we want to study the height of students of any class, for this we will have to find the height of all students of that class. Doing so we can get some result. From the height of one student or from one data we can not compare, for comparison, data should always be in group.
- In statistics we can not study those facts which can not be represented (expressed) in numbers. e.g. honesty, character, truth etc.

Result :

- Data are variable
- Only from data of same type, we can find out the conclusion by comparison.
- Data are always collected in groups.
- Data are always in numerical form.

4.3 Collection of Data :

For the study of any problem, first task is to collect data. Before collection of data it is necessary for us to know the purpose for which we are going to use this data.

Activities :

Divide the students of your class in two groups. Collect data of same type from each group from the following information.

- (i) Height of ten students of your class.
- (ii) Number of students present in every working day of one month.

Students of first group collected the data themselves for example to find out the height of the students, the student of second group collected the data from other sources, for example they got the number of present students, from the attendance register.

So, collection of data are done in two ways —

- (i) Primary Sources
- (ii) Secondary Sources

The sources from which data are collected first time, are called primary source and that are called secondary source in which data are obtained from already present data.

Thus data are also of two type:

Primary Data :

When a researcher collects the data himself for the purpose of any objective, then this data are called Primary data.

Secondary Data :

When a researcher uses a data which is already collected for any other purpose, then these data are called secondary data.

- Data obtained from primary sources is called primary data.
- Data obtained from Secondary sources is called Secondary data.

4.4. Collection of Data :

Only by collection of data, we can not get any important information. So to know the desired information, first of all it is necessary to collect data as per our need. To understand this, see the following example :

Mathematics teacher Kavita wanted to know the progress of 10 students of class VI in Mathematics. Class teacher Namita gave the list of marks obtained in the examination in which numbers were written as following :

38, 42, 45, 40, 30, 50, 48, 26, 27, 32. How was the performance of students? The above information was not much useful by this form of marks written. So Kavita herself wrote the marks from marksheet as following in the form of table :-

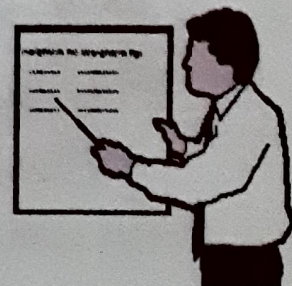
Serial Number	Name	Marks obtained out of 50 Number	Serial Number	Name	Marks obtained out of 50 Number
1.	Ashish	50	6.	Salma	38
2.	Amita	48	7.	Rehman	32
3.	Manish	45	8.	Ajaya	30
4.	Neeraj	42	9.	Arman	27
5.	Deepti	40	10.	Neha	26

From this table Kavita knew about whose performance was the best in the class. Amongst other children who obtained how many marks and who has to work hard for better performance, etc.

Do this :

Write down the weight in Kg. and height in metre of twenty students of your class. Discuss with your friends and try to give the answer of the following questions :

- Whose weight is highest ?
- What is difference of weight in you and your friends ?
- What is the weight of most of the students?



4.5 Documentation of Data :

There is a plan to give sweets with mid day meal to twenty students of a class. Teacher asked students to tell their liking of any one sweet out of four sweets- Barphy, Pera, Gulab Jamun and Jalebi. The task of making a list of favourite sweets of all students is given to class monitor Deepika. Deepika made a list of name of students and wrote their favourite sweet against the names.

This table will help in giving favourite sweets to the students:

Name of Students	Name of Sweets	Name of Students	Name of Sweets
1. Amita	Barphy	11. Bhavana	Gulab Jamun
2. Anuradha	Pera	12. Salma	Gulab Jamun
3. Uma	Barphy	13. Kavita	Barphy
4. Priti	Barphy	14. Farida	Jalebi
5. Radha	Gulab Jamun	15. Reshma	Jalebi
6. Amar	Barphy	16. Raghava	Gulab Jamun
7. Raman	Pera	17. Keshav	Gulab Jamun
8. Manoj	Pera	18. Javed	Barphy
9. Ahmad	Gulab Jamun	19. Saleem	Gulab Jamun
10. Raju	Pera	20. Karim	Gulab Jamun

How many Barphy or Pera will be required to give the students of the class, to know this the teacher will have to count the number of barfy and peda by reading the names one by one. Similarly to know the number of Jalebi or Gulab Jamun, this process will have to repeat. If the number of students is large in the list this process may be difficult and will take more time.

Deepika thought a new idea, she drew four rectangular box and wrote the name of sweets above the box as shown in the following table.

She marks a sign (●) in the box according to sweets liked by the student. According to list of names following sign were written.



Barphy	Pera	Gulab Jamun	Jalebi
● ● ● ● ● ● ●	● ● ● ●	● ● ● ● ● ● ● ●	● ●
6	4	8	2

Deepika can tell number of each sweets by counting the symbols of each box.

Data, recieved by Deepika from her table. Teachers got the same information from the following table :

Table made by teacher :

Barphy	✓ ✓ ✓ ✓ ✓ ✓	6
Pera	✓ ✓ ✓ ✓	...
Gulab Jamun	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	...
Jalebi	✓ ✓	...

Try it :

See the above table and give answer of the following questions :

- What does one sign (✓) indicate ?
- How many students did like Pera ?
- How many students did like Gulab Jamun ?
- Which sweet is liked by fewest students ?
- How many students are in the class ?

There are some other convenient method also to collect the data. Let us understand it.

There were 64 students living in a hostel. According to the choice of every students we have to arrange meal of one day. This work was given to the monitor. Monitor wrote down the name of food liked by the student in one column and in other column he wrote line (|) after asking the choice of food by the students, and he made the following table.

Food liked by student	Perpendicular line drawn	number of line
Only bread		12
Only rice		05
Bread and rice		21
Puri		15
Paratha		11

To see this table teacher gave a new idea that it would be better if we write these lines in group of 5 and in every group fifth line be written in transverse direction, as shown in fig. (|||||). The sign of these line are called tally marks. Thus ||||| shows that on counting five and two are seven. And ||||| ||||| || shows that five, five and two are twelve.

On taking tally marks in group of five the above table will be as follows :

Food liked by student	Tally marks	Number of students
Only bread		12
Only rice		05
Bread and rice		21
Puri		15
Paratha		11

Now take an other example :

In a mohalla the colour of Fridge liked by 50 person are given together with tally marks in the following table.

Colour	Tally marks	Number of Fridge
Blue		06
Red		12
White		14
Slety		18

With the help of above table we can give the answer of following questions:

- What is the number that liked red colour fridge ? (12)
- Which colour of fridge was liked mostly ? (Slaty 18)
- How many persons did like white colour fridge ? (14)
- Which colour of fridge was liked by fewest people? (Blue) 6

Similarly, other activities can be done by the use of tally marks?

4.6 To arrange the data :

Consider description of marks in maths of twenty students out of 50 marks in class VI.
37, 23, 16, 30, 21, 27, 45, 42, 17, 25, 24, 22, 25, 28, 38, 26, 21, 32, 42, 28.

1. If students having marks more or equal to 17, is supposed to be passed, then on seeing these marks can it be said quickly that
 - (i) How many students passed ?
 - (ii) How many students failed ?
2. How many students have obtained thirty or more than thirty marks ?

Note it, we can not get directly any conclusion easily to see from the basic data directly. Usually basic data are not arranged properly. These type of data are called as unclassified. In above example, data of twenty student of class VI are unclassified. To find out any conclusion, first of all, we have to arrange the data.

Data are unorganised in original form. These are known as unclassified or raw data. To get any objective conclusion from these, it has to be organised first of all.

To arrange the data we use two methods.

- (i) To write data in ascending or descending order.
- (ii) To classify the data.

Ascending order :

To write the data in ascending order, first of all we write the smallest number. After that comes the number equal to or just greater than that, after that just greater than or equal to that ... and at the end we write the greatest number. If there are not many numbers in the data then we can easily arrange the data in ascending order. For in the above example, the number of data is only 20, hence ascending order will be—

16, 17, 21, 21, 22, 23, 24, 25, 25, 26, 27, 28, 28, 30, 32, 37, 38, 42, 42, 45.

Descending order :

The reversal of ascending order is descending order i.e., to write the data in descending order first of all we write greatest number, after that the number which is equal to or just smaller than that number, and then just smaller number and in the last we write the smallest number.

In above example the descending order will be :

45, 42, 42, 38, 37, 32, 30, 28, 28, 27, 26, 25, 25, 24, 23, 22, 21, 21, 17, 16.

Thus if data are arranged in ascending or descending order then information about marks will be more clear and convenient. As, if we want information about those students who obtained more than 30 marks, then these number can be found out easily. Together with above, maximum and minimum marks can be found quickly.

4.7. Classification :

If the number of data be large, then it is very difficult to arrange them in ascending or descending order. In this situation we classify the data in two ways.

- (i) Classification on the basis of properties of data.
- (ii) Classification on the basis of class interval.

4.7.1. Classification on the basis of properties of data

In this classification all data with same properties, are put in one group and those with other properties, are put in another group. For example population of different Indian states according to their residential place can be divided in two groups.

- (i) Rural
- (ii) Urban

State	Rural	Urban	Total

Classification on the basis of properties is that method in which collected data are divided in different groups on the basis of similarity and dissimilarity .

4.7.2. Classification on the basis of Class Interval

When the number of data is very large and the classification based on only properties do not fulfil our objective then for representing data more effectively, this data are arranged by putting in class intervals or groups.

4.8. Tabulation of Un-classified data

To find out quick result data are arranged. For example, marks of 20 students in first paper of mathematics of class VI are given by

22, 26, 22, 38, 40, 40, 28, 28, 22, 16, 27, 27, 16, 22, 36, 38, 38, 16, 28, 26.

We know that above data is unclassified. To see this data we can not know easily that how many students have passed, how many student have failed, how many passed in first class etc.

To arrange the data we put them first of all in ascending order, if numbers are large then it is not easy to put in ascending order only by inspection. So to put them in ascending order, a simple method is given below.

To put the above data in ascending order :

Data :

~~22 26 22 38 40 40 28 28 22 16 27 27 16 22 36 38 38~~
~~16 28 26~~

First of all from the unclassified data find the smallest number 16 and greatest number 40. From this we get the information that range of data is from 16 to 40. Now write the number 16 to 40 in vertical form.

16	III	21		26	II	31		36	I
17		22	IIII	27	II	32		37	
18		23		28	III	33		38	III
19		24		29		34		39	
20		25		30		35		40	II

Now see first number of unarranged data. This number is 22, Now cut this number from here and put a tally marks 'I' near to 22 in numbers written in sequence. Cut next number 26 of non arranged data and put tally marks 'I'. Similarly proceed like this. If in given data any number is repeated two or more than two time, same number of tallymarks are put corresponding to that number. For example near 26 put two tally marks and near 28 put three tally marks. Thus put tally marks till last number in non-arrange data, After that write in ascending order, the numbers written in vertical form. Note the number will be written in as many time as there are tally marks written near for that number.

So the ascending order of the data is :

16, 16, 16, 22, 22, 22, 22, 26, 26, 27, 27, 28, 28, 28, 36, 38, 38, 38, 40, 40.

Similarly the descending order of data can be found by writing vertically the numbers 40 to 16 in decreasing order.

Data put in this form, is called arranged or tabulated data. On putting the data in this form, we can get information easily. For example, minimum mark is 16, there are three student who got less than 17 marks, 6 student gained more than 35 marks etc.

Exercise 4 (a)

1. The number of members in 10 families in any locality is found as follows :
6, 8, 3, 2, 4, 5, 9, 7, 3, 6
arrange the data in ascending order.
2. Put the following data in ascending order.
4, 6, 8, 2, 12, 22, 29, 23, 25, 24, 32, 37, 42, 44, 9
3. The percentage of marks of 10 girls in any class, is as follows.
67, 55, 57, 42, 73, 75, 62, 61, 74, 33
arrange the data in ascending order.
4. Under the plan of Manrega in a Gram-Sabha for 20 persons (having Job card) the number of working days per person is as following. Write down these data in ascending order and find out how many person worked for less than 10 days.
11, 8, 12, 12, 19, 16, 17, 24, 25, 21, 9, 11, 8, 12, 15, 9, 16, 8, 7, 3

4.8.1. Frequency Distribution Table :

It is also difficult to understand the marks of 20 student of Class VI which is in table form on page 76. So move it easy and clear, the table can be put in following form.

Mark	Tally Marks	No. of Students
16		3
22		4
26		2
27		2
28		3
36		1
38		3
40		2
Total		20

Table—1

In this table opposite to each marks, the number of students is given who scored the that mark. As 3 students earn 16 marks. 4 students scored 22 marks.

It is also clear from the table the range of marks is from 16 to 40. These marks are called variable quantity.

So

The quantity which can be measured in different observations is called variable quantity.

In above table the number of students who earn the marks is given. As, marks of two students are 26. Marks of three students is 28 etc. From frequency of marks it is clear that how many times a particular number is repeated.

Frequency is that number by which we know that how many times a particular number is repeated in the data.

Thus the above table is called frequency distribution table or frequency table of unclassified data.

Conclusion :

- After we arrange the unarranged data, it is called **tabulated data**.
- That quantity is called **variable quantity** which can be measured in different observations.
- Frequency of a number is that number by which we know that how many times the number is repeated in the data.
- To represent the data by tabulating with their frequency, is known as frequency distribution.

4.8.2 To Make Frequency Table :

Example 1

The minimum temperature in a day of a city over a month of 30 days is as follows :

10.6	10.6	10.4	10.6	10.2	10.2
10.7	10.7	10.7	10.8	10.7	10.7
10.9	10.8	10.9	10.9	10.5	10.3
10.3	10.5	10.5	10.5	10.6	10.6
10.2	10.2	10.3	10.2	10.2	10.2

Make a frequency table of the data.

To make frequency table steps are as follows :

1. For this first of all make a format of the table. In the format of table there will be four columns. First column will be for serial number, second column for temperature, third and fourth column will be for tally marks and frequency respectively. Write serial of column as 1, 2, 3, 4.

Table 2

(1)	(2)	(3)	(4)
Serial Number	Temperature	Tally marks	Frequency
1	10.2		7
2	10.3		3
3	10.4		1
4	10.5		4
5	10.6		5
6	10.7		5
7	10.8		2
8	10.9		3
			30

2. Range of temperature in the table is from 10.2 to 10.9. So we in total 8 numbers from 10.2 to 10.9. Now in column write 1, serial number form 1 to 8.
3. In column 2 write temperature in ascending order.
4. Make a tally marks in column 3, for the temperature of different days. For making tally marks follow the following process :
 - (i) First temperature in data is 10.6. So in column 3 of table make a tally marks (|) opposite to 10.6.
 - (ii) Second temperature in data is 10.6 also. Hence again make a tally marks (|) opposite to 10.6 in column 3.
 - (iii) On completing the making of tally marks, count the marks and write in column 4. The sum of all frequency of data is equal to sum of all the data. In above example sum of frequency is 30, while the data are also the temperature of 30 days. The above table represents the frequency distribution of unclassified data. Above table represent frequency table of unarranged data.

In above example frequency table is made only for data of 30 days temperature. But if the data are much larges then it is very difficult to make unclassified table. So in place of unclassified table it is easy to make classified frequency table.

Example 2 : Make a frequency table using tally marks from the following data.

6, 7, 9, 14, 9, 15, 9, 12, 15, 14, 9, 12, 14, 15, 7, 6, 12, 14, 6, 9

Solution

Frequency Table

Serial	Number	Tally marks	Frequency
1	6		3
2	7		2
3	9		5
4	12		3
5	14		4
6	15		3
Total			20

Exercise 4(b)

- Find the frequency of numbers to make the tally-marks from the following data.
5, 6, 8, 13, 8, 5, 14, 11, 9, 13, 8, 11, 11, 6, 5
- Make the frequency table of the following numbers to mark tally-marks.
(i) 5, 2, 3, 4, 5, 3, 2, 4, 5, 4, 3, 2, 5, 5.
(ii) 16, 15, 16, 12, 13, 15, 14, 16, 13, 15, 12, 15

4.9. Demonstration of Data by Line-Diagram or Pictograph :

In our daily life, often the different type of data are heard and read. As according to census of year 2011 the population of India became more than 121.05 crores. Here 67% population is involved in agriculture. The area of India is only 2.4% of the world, while the population is more than 17.5% of the world population. According to census of 2011, total 73% persons are literate in India in which the rate of literacy of female is 64.9% and that of male is 80.9%.

In future it is necessary to make appropriate arrangement of food, cloth, residence, drinking water, medical treatment, education and employment etc. for all. A well deliberated policy will have to be made for all these. The data are collected for policy making. How can these data be expressed ? Generally, data are represented groupically. Such type of representation are called **ray-diagram representation** or **Pictograph**.

Ray-diagram :

There are five shelves in a almirah. In each shelf, the books are placed in the form of row. Information in detail is given as following :

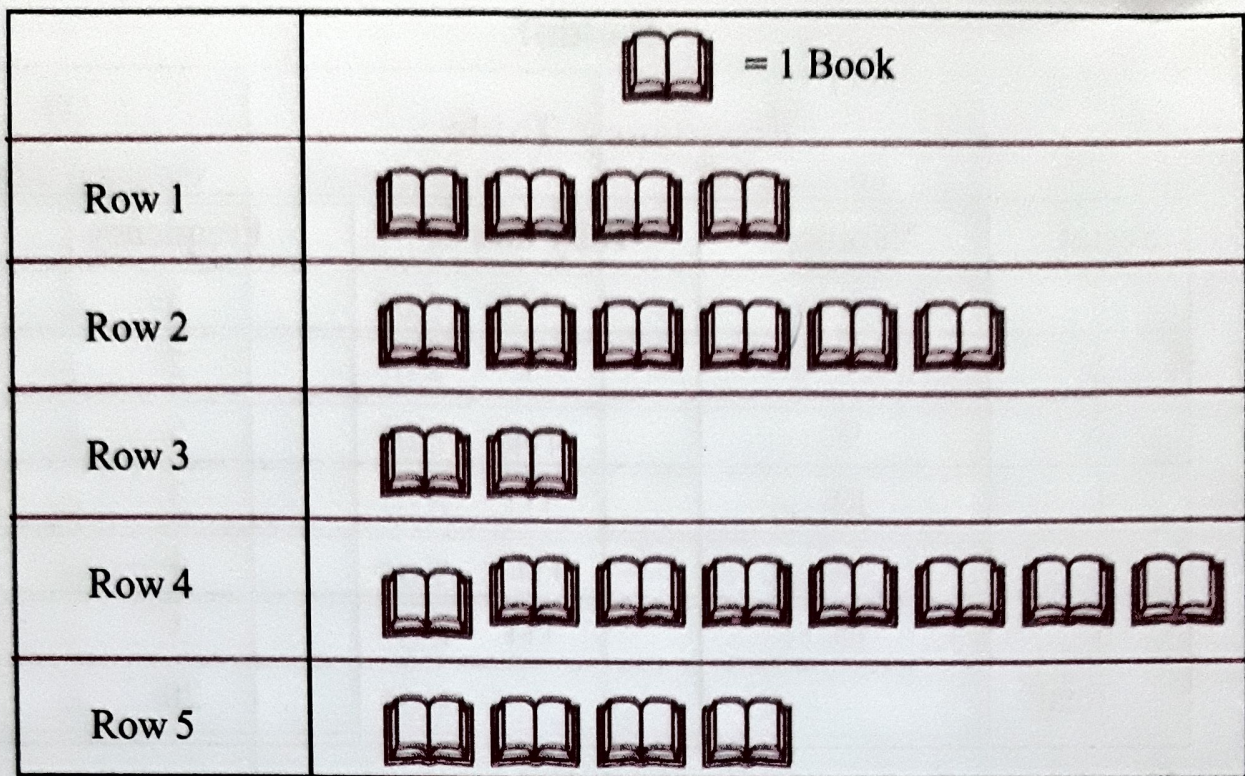


Fig. 1

Try:

- In which row the highest number of books are there ?
- In which row the least number of the books are there ?
- In which row there are three books ?

You can give the answers of above questions after a look at the above ray-diagram only. The figure used in these are helpful in understanding the data.

A ray-diagram represents the data in the form of diagrams, things are the parts of things. The answers of the questions related to data can be given only by seeing this.

The demonstration of data by diagrams is called Ray diagram or Pictograph.

Do these :

Collect the ray diagrams published in newspapers and magazines. Try to understand that what is demonstrate by these rays-diagrams.

Example 3. The information was obtained for the 30 students of a class relating to means to reach school daily. The obtained information is demonstrated by Pictograph.

Motorcycle	Public Bus	School Bus	Cycle	On foot
3	4	10	6	7

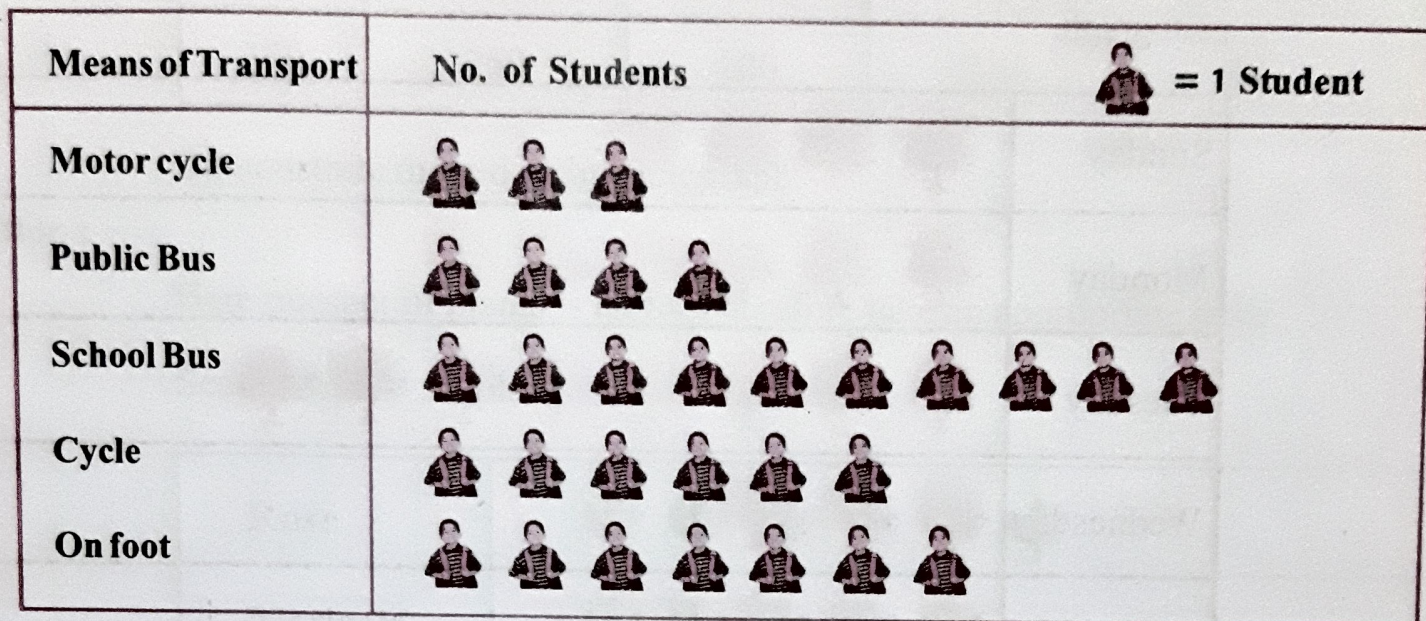


Figure 2

From this ray-diagram, we can get the following conclusion.

- Only 6 students use the cycle.
- Maximum numbers of students go to school by bus.
- The number of students, who come by motorcycle, is 9.
- The number of students who come on feet is 7.

Similarly the information of other means can be found.

Try it :

On the occasion of forest festival week, the number of plants planted by Neha are following :

Day	Number of Plants
Sunday	4
Monday	6
Tuesday	8
Wednesday	3
Thursday	5
Friday	10
Saturday	2

Steps for making the pictograph.

1. First of all write the name of days vertically in serial to demonstrate the data by pictograph.

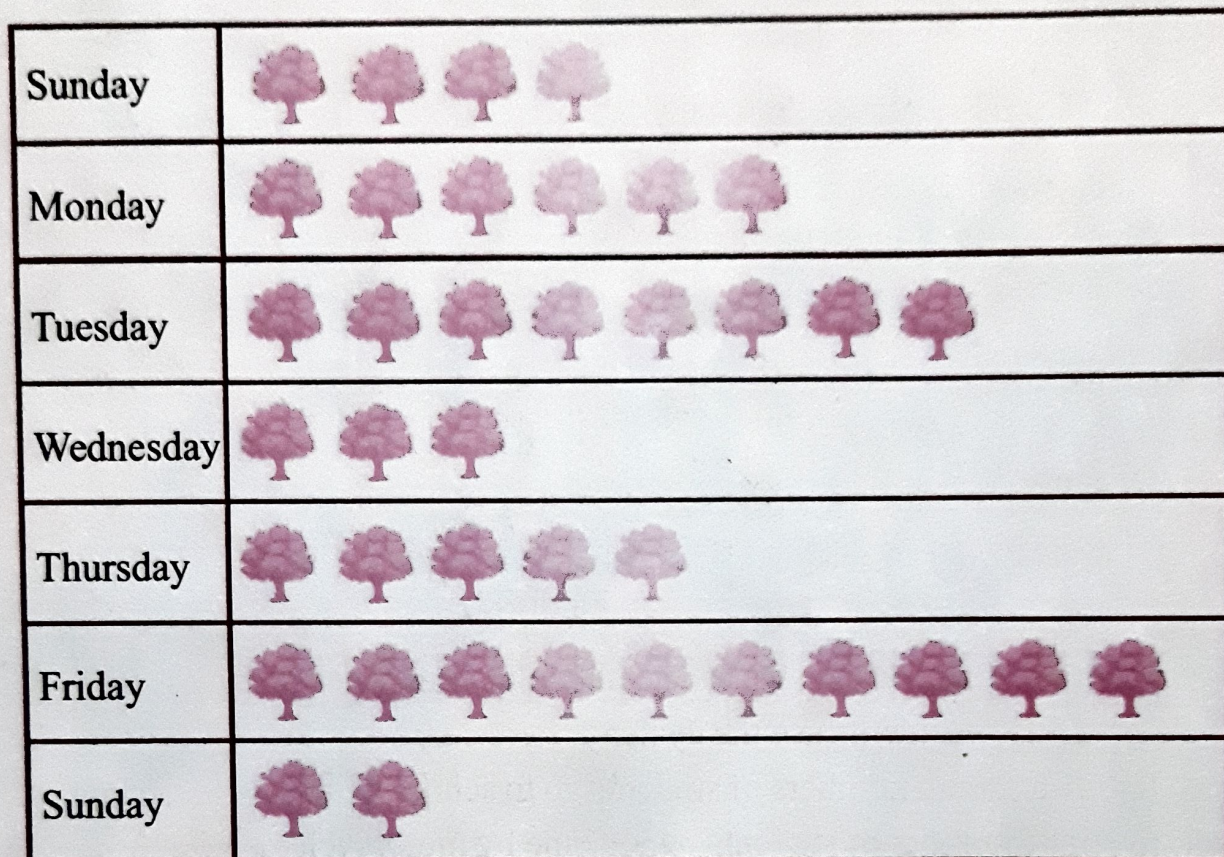


Fig. 3. Pictograph of plants planted on forest festival

2. Make rows for days in a big rectangular shape.
3. Make the picture of plants against each day, taking appropriate scale.

 = 1 plant.

4. Write the heading of pictograph above or below.

Here one diagram is made for one plant, but for huge number, the pictograph is made by an appropriate scale.

Example 4. In a garden different species of flowers are planted. The number of these plants are given in the following table.

Rose	Marigold	Jasmine	Dahlia	Tuberose
300	250	100	150	450

Demonstrate these data by pictograph.

Solution :

Here number of plants is large. Therefore take an appropriate scale.

Scale :  = 50 plants.

Rose	     
Marigold	    
Jasmine	 
Dahlia	  
Tuberose	        

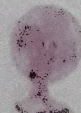
Figure 4.

In the above pictograph, $\frac{300}{50} = 6$ flowers are represented for 300 plants of rose. Similarly $\frac{250}{50} = 5$ flowers are shown for marigold. There are two flowers for 100 plants of Jasmine. Now you can estimate what three and nine flowers shown against dahlia and tuberose represent.

Exercise 4 (c)

- The number of fans sold from March to August at the shop of Ramesh is given in the table.

March	April	May	June	July	August
30	50	60	70	50	40

Demonstrate the data by pictograph while one  = 10 fans.

2. The number of watches sold in different days of any week are shown below :

 = 1 Watch

Monday	     
Tuesday	       
Wednesday	   
Thursday	    
Friday	       
Saturday	   
Sunday	        

Answer the following questions to see the pictograph :

- On which day the maximum number of watches are sold ?
 - How many watches are sold on Tuesday ?
 - How many total watches are sold in a week ?
 - If a watch is sold for ₹ 200, what is the sold amount on Sunday ?
 - On which day least number of watches is sold and how many ?
3. The number of students of a school having interest in different games are given in the following table :

Game	Football	Hockey	Cricket	Kabaddi	Chess
Number of Students	200	140	100	80	20

Demonstrate the data by pictograph.

Hint :  = 20 students.

4. The number of students present in a week of a class of 35 students are shown in detail by following pictograph.

Day	Presence of Students	 = 5 Students
Monday	      	
Tuesday	      	
Wednesday	    	
Thursday	     	
Friday	      	
Saturday	  	

- How many students were present on Tuesday ?
 - On which day there was complete presence ?
 - On which day least number of students were present ?
 - How many students were present on Wednesday ?
5. The total number of students of a school in different years are shown in the following table :

Year	2000	2002	2004	2006	2008
Number of Students	400	500	70	600	800

Construct a pictograph taking one marker  = 100 students and answer the following questions.

- How many markers are representing the total students in year 2000 ?
- How many markers are used for total students of year 2006 ?
- If one marker  represents 50 students, then construct another pictograph.

4.10. Bar graph

In representing the data by pictograph, more time is consumed and also is difficult to make them. In addition it is also difficult task to draw an attractive figure. Therefore other diagrammatical representation can be used for representing the data. In another method, the bar-graph is used in place of symbolic diagrams. In bar-graph the horizontal or vertical bars of a same breadth are drawn. Thus the length of each bar drawn represents the given number (value). This diagrammatical representation of the data is called bar diagram or bar graph.

4.10.1 To Draw Bar-graph

Let us understand it by an example.

The total marks obtained out of maximum marks 600 by 6 students of class six are shown below.

Represents these by a bar diagram.

Student	Amita	Namita	Dipti	Ajay	Amar	Naziya
Marks	450	300	400	350	500	550

Draw a horizontal line OX and a vertical line OY intersecting at right angle on your exercise book. Write the name of students and the marks obtained represent on vertical line OY. If we represent 1 cm = 10 marks, then the bar graph will not be drawn on exercise book. For appropriate scale we can represent 1 cm. = 100 marks on vertical axis.

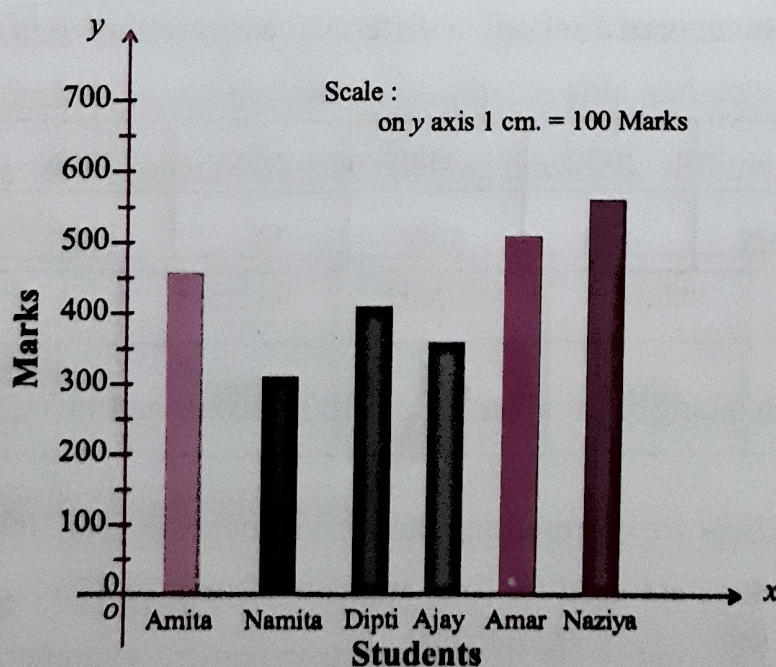


Fig. 5

Note it that in data the bar also can be represented in horizontal direction to write the students on vertical axis and the marks obtained in the horizontal direction. But generally vertical bars are liked more.

4.10.2. Bar Diagram Drawn in the Horizontal Direction

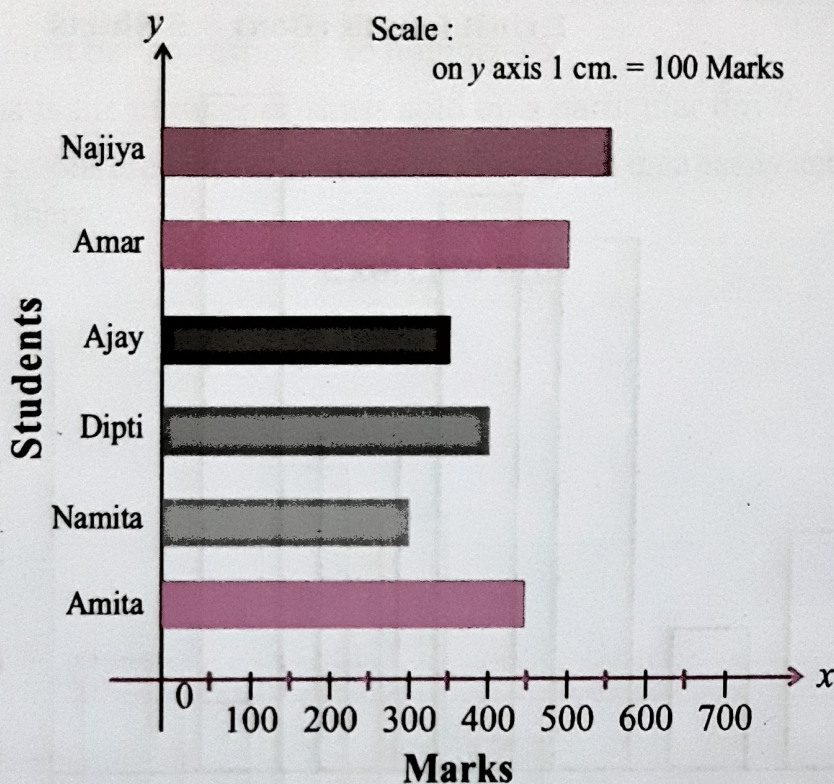


Fig. 6

Thus we saw that the bar diagram is a diagrammatical representation of statistical data by horizontal or vertical bars of same breadth constructed on a base line at equal distance. Length or height of each bar represents the value of one statistical data at any appropriate scale.

Do these :

Discuss with students in the class and obtain the data of any game, production of food grain and literacy rate. Represent them by bar diagram by making the tables from data.

Note it :

Following rules should be taken in mind at the time of drawing bar graph :

1. The subject matter of bar-graph should be written at the top of the graph in the form of a Heading.
2. The scale of graph must be written. The scale should be such that neither the size be very big and nor so small that the clarity of the diagram is destroyed.
3. The breadth of all bars should be equal.
4. The distance between bars should be equal.
5. Each bar should be on the same base.

4.10.3. Interpretation of Bar-graph

Let us study the sale of shirts from Monday to Saturday in a shop of readymade garments.

The sale of shirt is shown in the following bar graph.

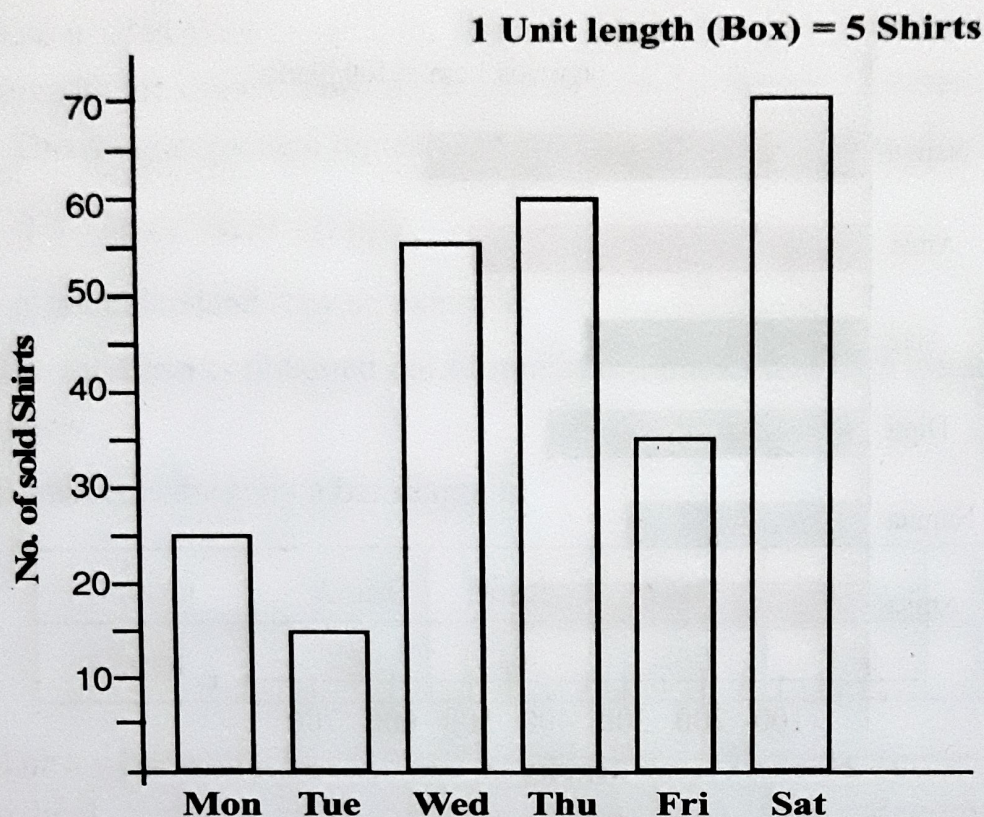


Fig. 7

Now answer the following questions :

1. On which day the maximum number of shirts were sold ?
2. On which day the least number of shirts were sold ?
3. How many shirts were sold on Thursday ?

Answer

1. Saturday, 70 2. Tuesday, 15 3. 60

When the numbers of data is large, then separate scale is needed. For example, take the case of population of India. This number is in crores, therefore on appropriate scale will have to choose as 1 unit = 10 crores population.

4.10.4 Study of the Bar-graph

To study a bar graph special attention must be given to some points very carefully. For example in figure 4, reading the Bar-graph we find that :

1. The Bar-graph shows the number of shirts sold from Monday to Saturday of any week.
2. Days from Monday to Saturday are shown on the horizontal line and considering an appropriate scale. Sales of shirts are mentioned on the vertical line.
3. Height of any bar indicate its sales on the corresponding days.

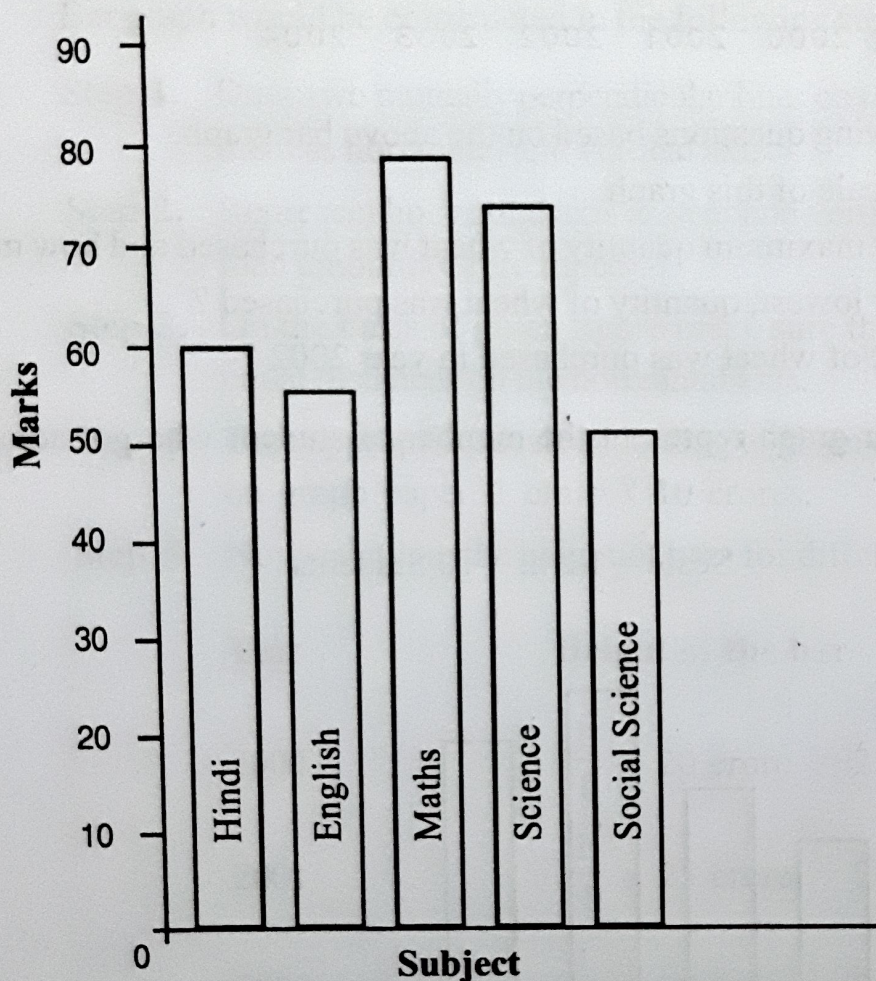
4.10.5 Meaning of Bar-graph :

Interpreting any given bar-graph means to draw conclusions from it. Following conclusions can be drawn from figure 4.

- (i) Bar-graphs give the number of shirts sold from Monday to Saturday of any week.
- (ii) The largest bar represents the maximum number of shirts sold.
- (iii) Smallest bar corresponds to number 15.
- (iv) What is the number of shirts sold on a particular day ?

Hence bar-graphs are helpful in understanding given data easily and results can be drawn by just looking of them.

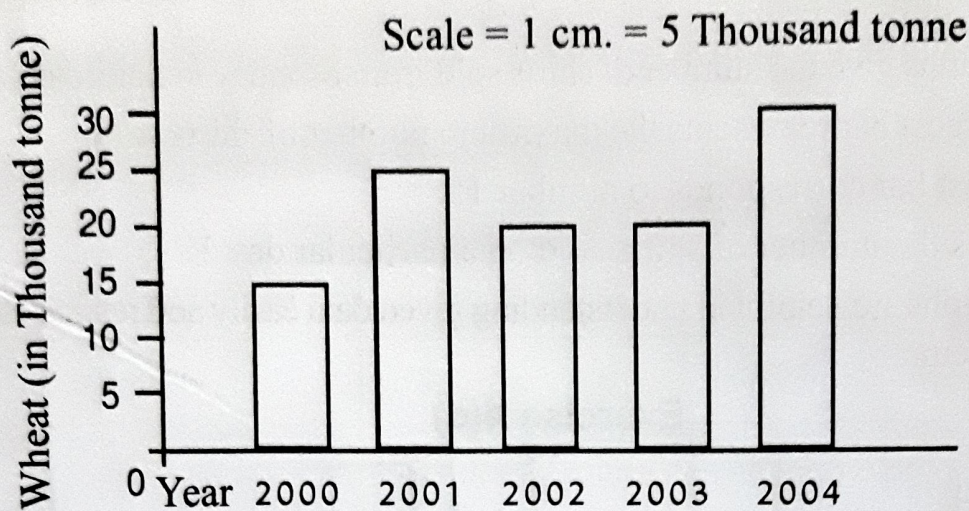
Exercise 4(d)



Look at the above bar-graph, which represents marks obtained in different subjects by Mohit in his annual examination.

- (i) What information does this bar-graphs show ?
- (ii) In which subject did Mohit score highest marks ?
- (iii) In which subject he scored lowest marks ?
- (iv) Write the name of every subject and also the marks obtained in it.

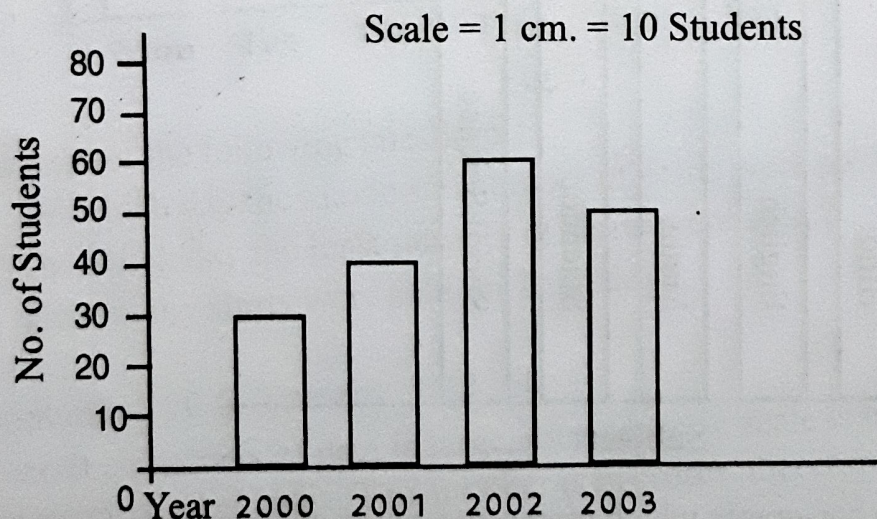
2. Following graph shows the quantity of wheat purchased by government in the year 2000-2004.



Answer the following questions based on the above bar graph.

- What is the scale of this graph.
- In which year maximum quantity of wheat was purchased and how much ?
- In which year lowest, quantity of wheat was purchased ?
- What amount of wheat was purchased in year 2002 ?

3. Following bar graph represent the number of student who got admission in a residential school.



Answer the following question based on above bar-graph.

- What was the number of student in year 2001 ?
- By what number the number of student in year 2002 was more than the number of students in year 2001 ?
- In which year the number of student is maximum ?

4.10.6 Drawing Bar-graph on graph paper.

Now we will learn to draw, bar-graph by using graph paper. For convenience and precision drawing bar-graph on graph paper is more suitable.

Sketching bar graph on graph paper can be understood from the following example :

Example 6. The amount of money (in crores) loaned by a bank in a few years is given in the following table. Draw a bar graph representing this information.

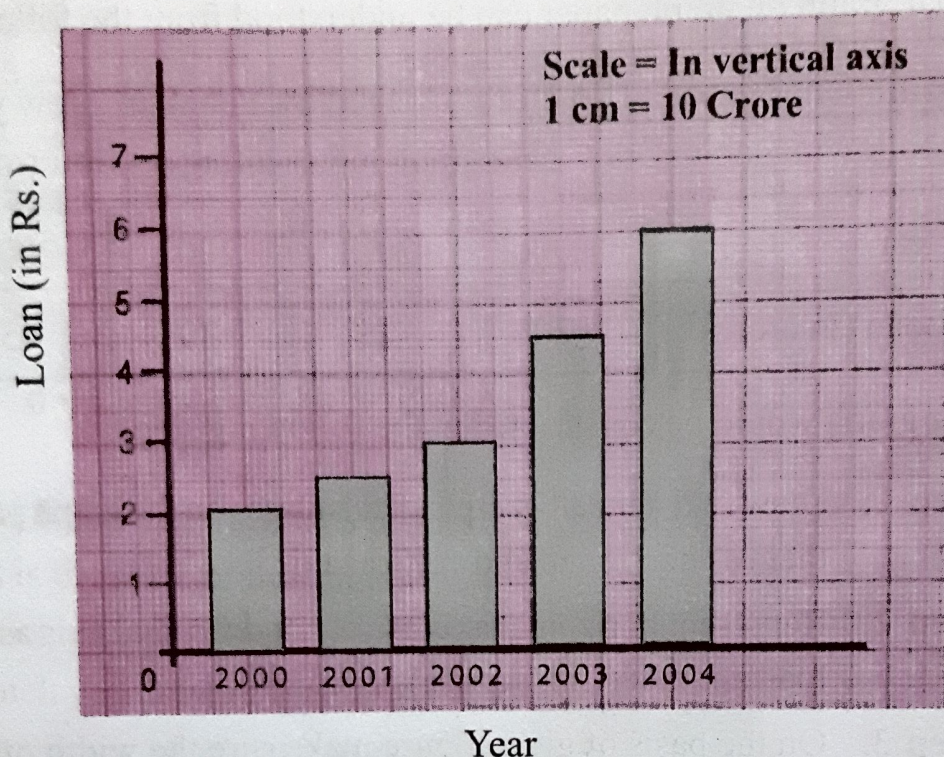
Year	2000	2001	2002	2003	2004
Loan (in crores)	20	25	30	45	60

Bar graph would be constructed in the following steps.

- Step 1.** Draw two mutually perpendicular lines on the graph paper and labeled them as horizontal and vertical axis.
- Step 2.** Represent horizontal axis as year and vertical axis as corresponding loan amount (Crore rupee).
- Step 3.** On the basis of given figure make sure the width of the bars at the equal distances on the horizontal axis.
- Step 4.** Take appropriate scale according to given data on vertical axis. Here on graph paper, 1 cm = ₹ 10 crores.
- Step 5.** Now calculate the height of bars for different years as follows :

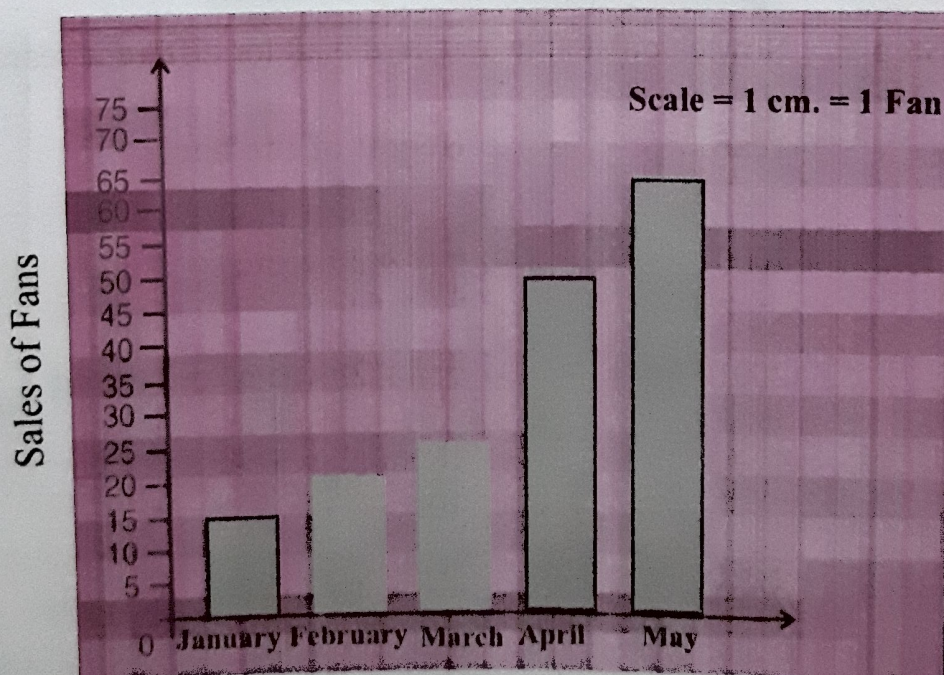
Year	Height of the bar
2000 :	$\frac{1}{10} \times 20 \text{ crore} = 2 \text{ unit}$
2001 :	$\frac{1}{10} \times 25 \text{ crore} = 2.5 \text{ unit}$
2002 :	$\frac{1}{10} \times 30 \text{ crore} = 3 \text{ unit}$
2003 :	$\frac{1}{10} \times 45 \text{ crore} = 4.5 \text{ unit}$
2004 :	$\frac{1}{10} \times 60 \text{ crore} = 6.0 \text{ unit}$

Step 6. Now according to following figure make 5 bars of equal width at equal distances on the horizontal axis. In steps 5 heights of bars has been calculated. Every bar should be on the top of its corresponding year on the horizontal axis.



Bar representation of amount loaned by a bank.

Look at the following bar graph.



Bar representation electric fan sold by Rashmi's Shop.

Fig. 8

In the given figure, the number of electric fans sold on the Rashmi's shop from month January to May is represented. Looking at these figures we conclude the following :

- In the Bar-graph on the horizontal axis, the months and on the vertical axis, number of sold fans are represented.
- Observe that sleeping line as horizontal line and standing line as vertical line.
- Sales of fan has increased from January to May in every month.
- In the month of January least number 15 of fans were sold.
- In month May highest number 65 of fans were sold.
- A total of 175 fans were sold in five months.
- Sale of fans decreases in winter and increases in Summer.

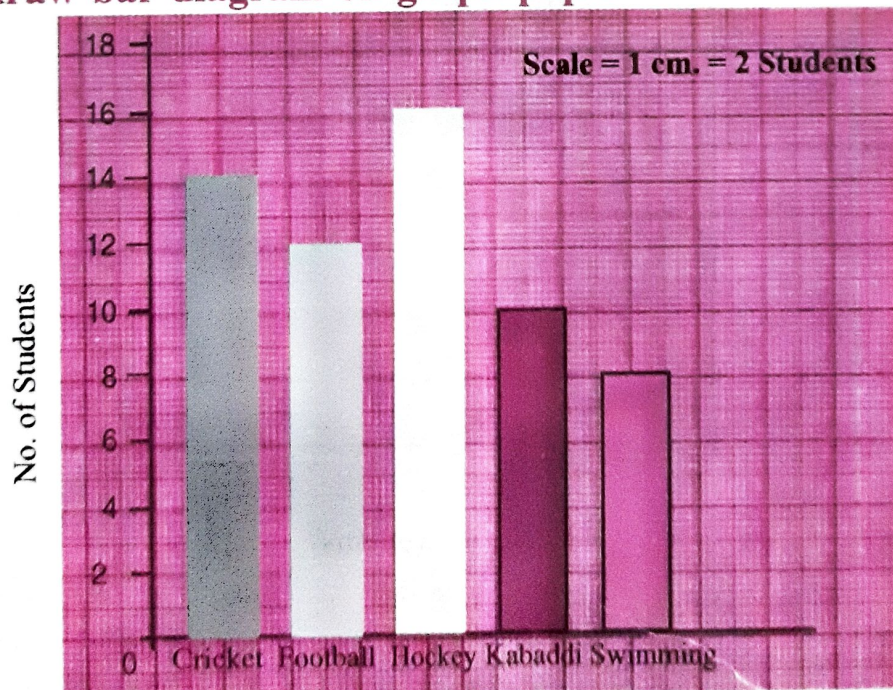
We observe that when figure are represented in bar pictures then it is easier to interpret them and their effect is also stronger.

Example 7. Favorite sports of 60 students of a schools are described as follows.

Sports/Games	Cricket	Football	Hockey	Kabaddi	Swimming
No. of Students	14	12	16	10	8

Represent the above figures with the help of Bar-diagram.

Algorithm to draw bar diagram on graph paper



Representation of favorite games of students by bar-graph.

Fig. 9

1. Take a graph paper or plane paper sheet. On the paper draw line OA and OB as in figure 9, which are mutually perpendicular. OA is horizontal and OB is vertical axis.
2. Write sports on horizontal axis and number of students in vertical axis.
3. On the vertical axis draw bars of equal thickness or width at equal distances as per convenience. Here it must be taken care that the area on the paper must be utilized according to the given figures.
4. Take a scale, 1 cm. = 2 student on vertical axis. Now mention numbers 2, 4, 6, 8, ... etc. at the distance of one cm. on this axis. If the paper is plane then for convenience draw dotted lines parallel to OA at the one cm. distance from OB axis.
5. Now looking at the numbers of students, draw the bars on the top of sports on the horizontal axis. Here keep the width of bars or rectangular strips as 5 mm. or more.
6. Colour the strips to make them attractive.

Bar figures can be made horizontally or vertically in both ways. It does not affect the nature of data or conclusions.

Above figures can also be represented as follows :

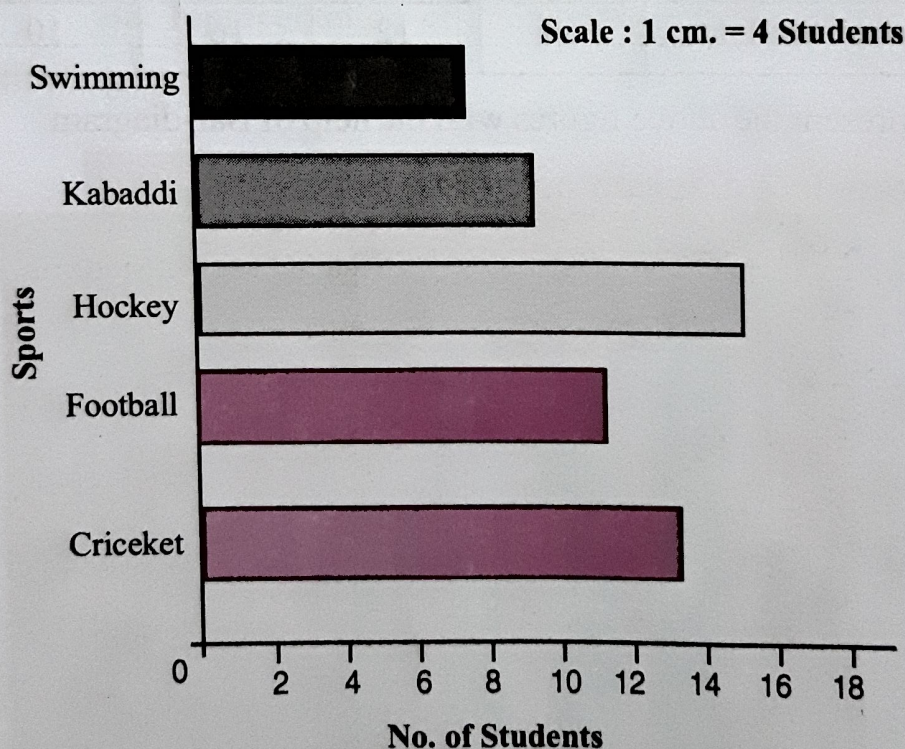


Fig. 10

Instructions

1. To make bar figures more attractive, figures can be represented in ascending order or in descending order.

2. The scale considered for horizontal and vertical axis depends on the size of paper sheet.
3. Scale can be small or large as per convenience.
4. The width or thickness of the rectangular strips (Bar) can be made less or more as per convenience.

4.11. Mixed Bar Graph :

Till now we have represented data of only one quality in the bar graph. Like a strength of the number of students in a class can be represented with bar diagram but if the students of the class have to be represented as girls, boys and total student separately, then it is represented with multi-quality bar graph or mixed Bar representation.

The number of student in a Junior High School is given as follows :

	Class-6	Class-7	Class-8
Girls	20	25	20
Boys	35	20	30
Total	55	45	50

Representation of data with the help of mixed Bar.

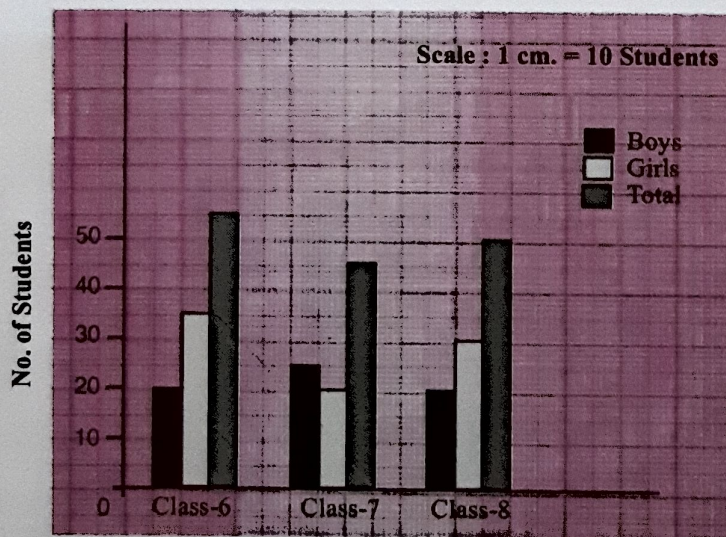


Fig. 11

Answer the following question by looking to the above figure.

- (i) What is represented by Bars ?
- (ii) For the number of girls in class 7, what is the height of Bar ?
- (iii) Which class has least student ?

(iv) If a bar has height 5 cm. then what is the number of students in that class ?

Solution :

- (i) Girls, boys and total number of student of Class 6, 7 and 8 have been represented with the help of bars separately.
- (ii) Height of Bar is equal to 2 cm.
- (iii) Class 7th has least student.
- (iv) Number of students is 50.

Example 8. The different favourite subject of 50 students of Class 6 has been shown below.

Subject	Number of Students		
	Boys	Girls	Total
Music	3	7	10
Swimming	8	4	12
Sports	8	6	14
Dance	2	12	14

Represent the data through mixed Bars.

Solution :

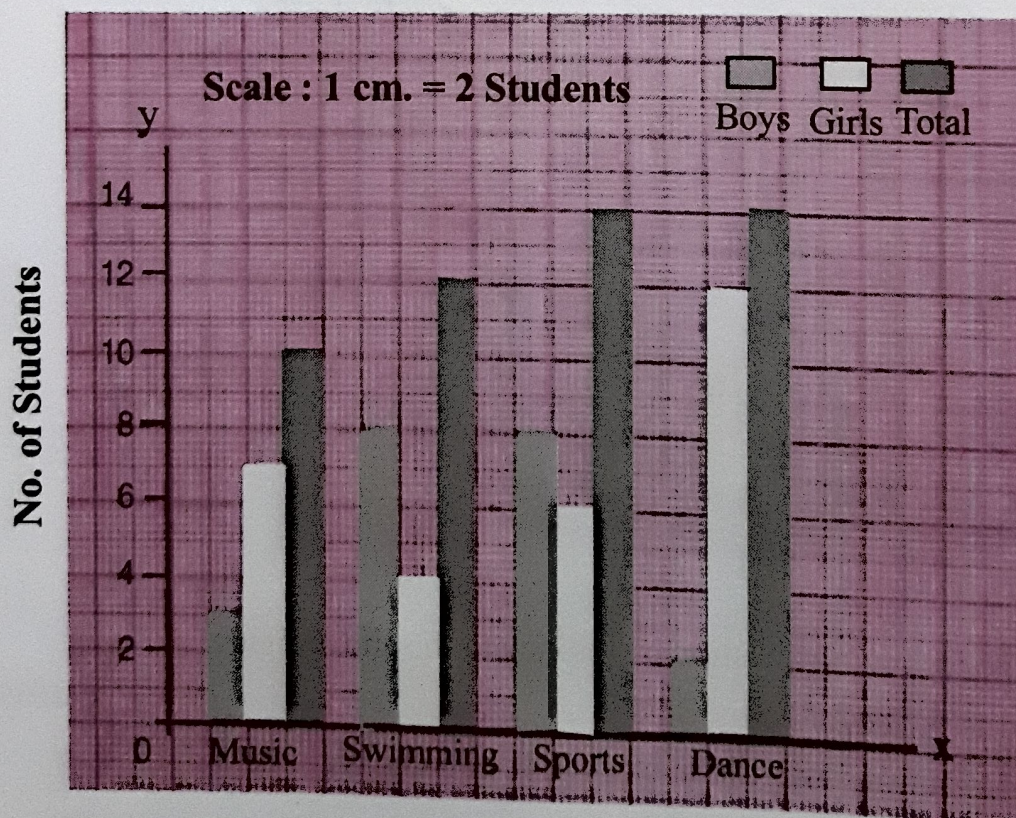


Fig. 12

Algorithm to make the bar diagram.

- (i) Take a graph paper.
- (ii) Draw mutually perpendicular x axis and y axis from origin O on the graph paper.
- (iii) Represent favorite subject on x axis and number of student on y axis.
- (iv) Write subject names at the difference of suitable distances on X axis.
- (v) On the y axis by taking a suitable scale as 1 cm. = 2 students, write the number of student.
- (vi) Above the subjects on x axis, draw bars of definite height, for the corresponding number of student on y axis for the boys, girls and for total. Bar should be close to each other of same width.

Try it

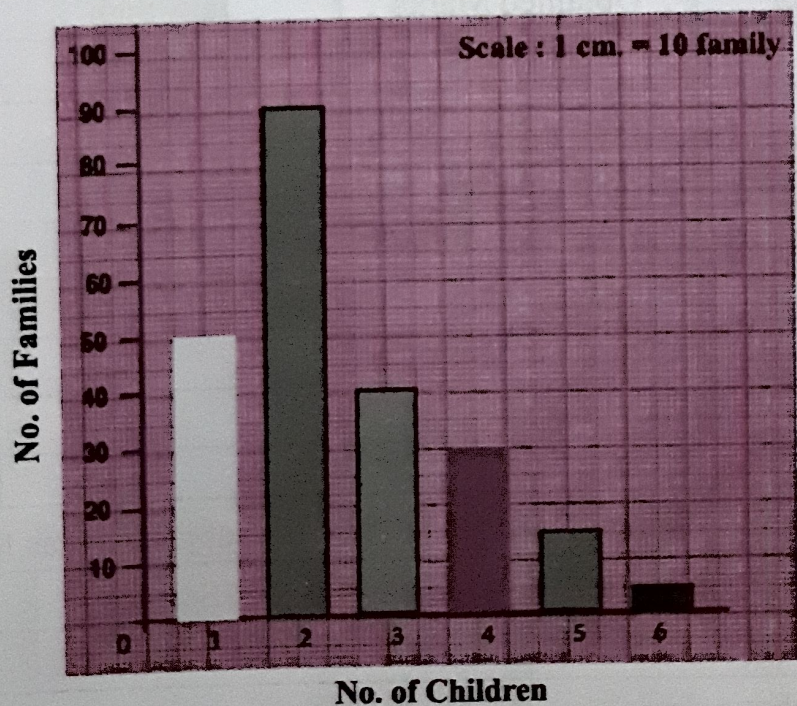
The decadewise admission rate of a school from year 1961 to 2000 is as follows :

Year	1961	1971	1981	1981	2001
Admission rate	20	30	35	40	45

Represent the data through Bar-graph.

Exercise 4(e)

1. Looking at Bar graph, answer the following questions.



Bar graph of number of families and their children of an area

Tell :

- (i) What information is being obtained from the figure ?
- (ii) How many families have only one child ?
- (iii) How many families have two children ?
- (iv) How many families have less than three children ?
- (v) What is the number of families having more than three children ?
- (vi) How many families are there with the highest no. of children ?

2. The number of scooties manufactured by a factory between year 2002-2006 is shown through the following table—

Year	2002	2003	2004	2005	2006
Number of Scooties	800	600	900	1100	1200

Represent these data through a Bar-graph and answer the following questions :

- (i) In which year maximum number of scooties were manufactured ?
- (ii) In which year minimum number of scooties were manufactured ?

3. Find the frequency of obtained marks in the following given number table with the help of tally sign.

7, 9, 8, 5, 5, 6, 9, 4, 10, 8, 7, 4, 3, 5, 6, 6, 6, 8, 10, 3, 3, 4, 5, 7, 7, 8, 8, 6, 6, 7.

1	2	3	4
Serial Number	Obtained Marks	Tally Sign	Frequency
1	7		5
2	9		2
3			
4			
5			
6			
7			
8			

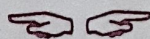
4. Percentage of marks obtained by Ajay in different subjects are as follows :

Hindi	English	Maths	Science	Social Science
35	35	60	40	70

Represent the above data through a bar diagram.

In this unit, we have learnt

1. The collection of numbers with a definite purpose is known as data—
 - (i) Data are variable.
 - (ii) Only similar data can be compared to draw conclusions.
 - (iii) Data are collected in groups.
 - (iv) Data are always in numerical quantities.
2. Data are originally unorganised, these are known as unrefined or raw data.
3. Data are collected by two ways.
 - (i) From Primary sources
 - (ii) From Secondary sources
4. Unrefined data are organized by the use of the two methods :
 - (i) Data are written in ascending or descending sequence (order).
 - (ii) Data are classified.
5. Data are classified on the basis of the qualities or class-interval.
6. In ascending order the smallest value (number) is written first and then the value equal to or greater to it is written in sequence. Opposite to this in descending (order), longest value is written first, then the value equal to it or smaller to it is written.
7. To obtain some important information from the data immediately, they can be represented in the form of table using the tally mark (sign).
8. Diagram represents data in the pictorial form. Interpreting these answers of various (many) questions can be obtained.
9. Data are also represented in the form of Bar-graph (diagrams). In a bar-graph (diagram) bars of same width at same distances in horizontal and vertical way are drawn, height of every bar indicates the desired information. For bar diagram scale must be chosen keeping in view the number of figures.



ANSWERS

Exercise 4(a)

1. 2, 3, 3, 4, 5, 6, 6, 7, 8, 9, 2. 2, 4, 6, 8, 9, 12, 22, 23, 24, 25, 29, 32, 37, 42, 44, 3. 75, 74, 73, 67, 62, 61, 57, 55, 42, 33, 4. 25, 24, 21, 19, 17, 16, 16, 15, 12, 12, 12, 11, 11, 9, 9, 8, 8, 8, 7, 3; 7 persons worked less than 10 days.

Exercise 4(b)

1.

S.N.	Number	Tally Sign	Frequency
1	5		3
2	6		2
3	8		3
4	9		1
5	11		3
6	13		2
7	14		1

2. I

Number	2	3	4	5
Frequency	3	3	3	5
Tally Sign				

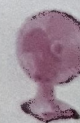
2. II

Number	12	13	14	15	16
Frequency	2	2	1	4	3
Tally Sign					

Exercise 4 (c)

1.

March	  
April	    
May	     
June	      
July	    
August	   



= 10 Fans

2. (i) Sunday (ii) 8 (ii) 44 (iv) 1800 rupees (v) Wednesday and Saturday, 4 clocks

3.



= 20 Students

Football	         
Hockey	      
Cricket	    
Kabaddi	   
Chess	

4. (i) 35 (ii) Monday, Tuesday, Friday, (iii) Saturday, (iv) 25

5.



= 100 Students

Year	Students
2000	   
2002	    
2004	      
2006	     
2008	       

(i) 4 (ii) 6

(iii)



= 50 Students

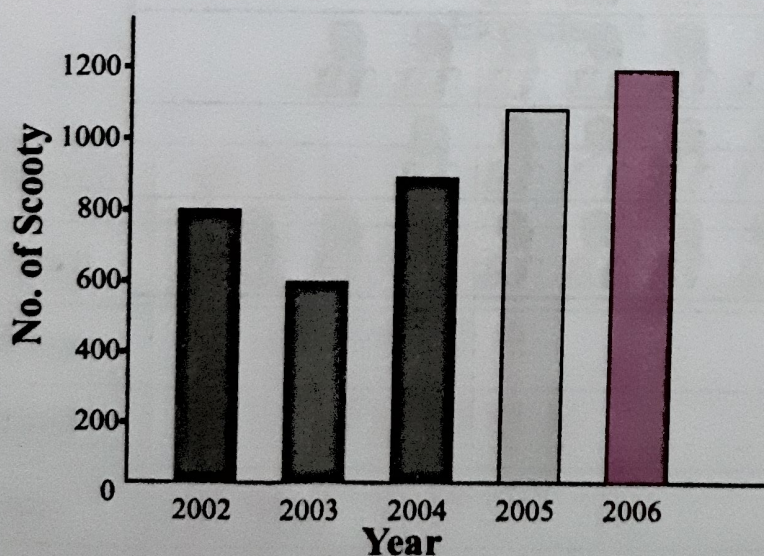
Year	Students
2000	
2002	
2004	
2006	
2008	

Exercise 4(d)

1. (i) Marks obtained in subjects (ii) Maths (iii) Social Science, (iv) Hindi 60, English 55, Maths 80, Science 75, Social Science 50. 2. (i) 1 cm = 5 thousand ton (ii) Year 2004, 30000 Ton. (iii) In year 2000, (iv) 20 thousand Ton. 3. (i) 40 (ii) 20 (iii) In year 2002.

Exercise 4(e)

1. Family and number of their children—(i) 50, (iii) 90 (iv) 140 (v) 50 (vi) 5
2.



(i) 2006 (ii) 2003

3.

1 S.N.	2 Marks	3 Tally Sign	4 Frequency
1	7	≡	5
2	9		2
3	8	≡	5
4	5		4
5	6	≡	6
6	4		3
7	10		2
8	3		3

4.

