Chapter 19

STATISTICS

Introduction

A programme to decorate the classroom was to be organized in the school. The students of class 7 could not decide the colour to be used to paint the walls of the class room. Only 4 colours viz light yellow, pink, light green and sky blue were available in their school. The class monitor asked all the students to write their names and their favorite colour on a paper. This is represented in the following table.

No.	Name of the student	Colour
1	Rajesh	Light yellow
2	Ruchi	Pink
3	Meena	Light Yellow
4	Raheem	Sky blue
5	Hameeda	Light yellow
6	Julie	Light green
7	Anita	Light green
8	Francis	Sky blue

No.	Name of the student	Colour
9	Keshav	Light Yellow
10	Basant	Sky blue
11	Shekhar	Light green
12	Reeta	Pink
13	Sunil	Light yellow
14	Anamika	Light yellow
15	Balwant	Pink
16	Raghu	Light yellow

On the basis of this data, can you decide the colour to use on the walls of the classroom? Rita got an idea, she wrote all the colours on the board and asked each student to write his or her name in front of his or her favorite colour.

Now, the following list was formed:-



Colour	Students Name
Pink	Ruchi, Reeta, Balwant
Light Yellow	Anamika, Rajesh, Meena, Hameda, Keshav, Sunil, Raghu
Light Green	Julie, Anita, Shekhar
Sky blue	Raheem, Basant, Francis

Since light yellow was the favorite colour for more students, it was decided to paint the walls with this colour.

Have you ever adopted this method to take a decision in your daily life?

Now, you construct a list classifying students scoring above and below 34% marks in each subject. On the basis of this data, can you say in which subject is the result the best and in which subject the result is the worst?

Data

We always require some information to take a decision. This necessary quantitative information is called data.

Suppose you have to buy a newspaper for the students of your class. Which newspaper will you buy so that the largest number of students read it? How will you take this decision?

All the students of the class made a table in which they wrote their name in front of their favorite newspaper. The newspaper that the largest number of students liked was selected.

While looking at the tables again and again Julie kept thinking that there was no point writing their names in the table. They only needed the number of students in favour of a particular newspaper. So instead of writing names in the table a symbol could be used to indicate the choice.

Do you agree with Julie? Can you think of a way to count the data using only a symbol instead of having to use names in the table?

Basant suggested that in place of each name we can use a small vertical line to represent the student and then these lines could be counted. Everyone agreed with Basant's suggestion.

Anita said, "Let us find out the order of popularity of some games". She wrote the names of 4 games on the board and asked each student to draw a small vertical line in front of their favourite game. The following table was generated:-

Name of the game	Tally sign (Vertical line)	No. of students
Football		3
Cricket		7
Vollyball		1
Kabaddi		5

But in such tables, it is inconvenient to count a very large number of vertical lines. So, as in earlier classes while learning counting, we made bundles of 10 units, in the same way if we make bundles of 5 vertical lines here then it will become much easier for us to count the lines. We draw 4 vertical lines and represent the 5th line by a slanted line which cuts these 4 lines (as shown below). E.g. for 5:-

This makes counting easier.

According to the data in the table above, the number of students liking Cricket is

III i.e. 7 This is called **frequency**. The procedure of representing each data by a vertical line is called **marking a Tally** and the method is known as collection of data using **Tally method**. The table constructed by this, is called the **Frequency Table**.

Use this method to collect data for quantities around you.

Example 1: The number of children in 20 houses of a village are represented by the following table:-

House No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
No. of children	2	3	2	1	3	2	0	1	3	4	2	2	1	1
House No.	15	16	17	18	19	20								
No. of children	2	4	3	2	0	3								

Construct an appropriate frequency table for the above data using Tally method.

Solution: Let us make columns for the number of children in the house, for tally marks and for the frequency. Mark the tally sign for each house. For convenience we represent the 5th sign by a slanted line cutting the 4 previously drawn vertical lines.

No. of Children	Tally sign	Frequency
0	II	2
1	IIII	4
2	или	7
3	IIII	5
4	II	2

In the above table why have we chosen the no. of children to be between 0 to 4 only? What would happen if we start with 1 ?

What happens, if we were to write the number of children in the table to be from 0,1,2,3 — upto 7?

Pictograph

Rajesh was reading the newspaper. The newspaper said that -"Girls score over boys"

In the class 8th board examinations of this year, girls are ahead of boys in all areas. While looking at the figures, Rajesh thought that-"this is a good method of data display. By looking at these figures, it is very easy to see that the girls have scored over boys in all aspects of the result". A similar picture can be seen when we stand in queues during prayer, the number of



students in a class can be compared by the length of the queues. Rajesh asked his friends, "Why do we not represent the popularity of games in the same form using the data collected in table 3?"

The total No. of students in table 3 was 16. In this, 3 students liked Football, 7 liked Cricket, 1 liked Volleyball and 5 liked Kabaddi. How can this be represented in the form of a figure?

Julie said, "If we make a picture for each student, then 3 pictures in front of football, 7 in front of cricket, 1 in front of volleyball and 5 in front of Kabaddi will have to be made.

Football	<u>₹</u> ₹ ₹	
Cricket	<u>፟</u>	
Volleyball	£	
Kabaddi	***	Fig 3

The representation of data with the help of pictures in this form is called a Pictograph.

Bar Graph

Pictograph is easy to understand and conclusions can be drawn by looking at the pictures. But this method requires a lot of pictures to be drawn which sometime becomes impractical. If we take a bar of length 1 cm for each student, then the representation of data becomes even more easy. These bars can be drawn in both horizontal and vertical form.

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Note that width of the bars is kept equal in the above graphs. It is easy to estimate the extent of the popularity of these games by looking at these bar graphs. Since the number of students in the above example is small, the data can be easily represented on a notebook using a bar of 1 cm. length for each student. But in case the number of students is large, how can we depict it on the notebook? In such a situation, the main problem is to choose the height of the bars. Let us think this over-

There are 750 men, 660 women and 140 children in the locality where Rajesh resides. We are required to represent this data in a graph.

What should be the height of the bars in order to represent the above data? If we take 1cm for each person, then we need to draw 750 cm high bar for men, 660 cm bar for women and 140 cm bar for children. But it is impossible to draw such bars in our notebooks.

If we take 1cm bar for every 10 people, then we need to draw bars of 75 cm, 66 cm and 14 cm for men, women and children respectively. Even these heights cannot be represented in our notebooks. But, if we take 1cm bar for every 100 people, then we need to draw bars 7.5 cm, 6.6 cm and 1.4 cm long for men, women and children respectively. These bars can be easily represented on our notebooks. So, let us see how we will represent this data using a Bar graph.



This data is represented by vertical bars. This is called a **vertical bar graph**. Bars can also be drawn horizontally.



Fig 6

If the bars are drawn horizontally, then the graph obtained is called a **horizontal bar graph** (Fig. 6). Anita was wondering about the use of these bar graphs. She thought we get the same information from the graphs as we get from the frequency tables.

Let us find a solution to Anita's question.

Following table gives the production of wheat from year the 1991 to 2000:-

Year	Wheat Production (in lakh tones)
1991	72
1992	90
1993	82
1994	103
1995	110
1996	94
1997	99
1998	88
1999	90
2000	78

The above data can be represented in the form of a bar graph in the following way:-



By looking at this bar graph, can you tell which year had the minimum wheat production and which year had the maximum production? What other information can you obtain from this graph? Write down.

You will observe that the maximum wheat production was in the year 1995 and the minimum was in the year 1991. We can also observe that the years 1992 and 1999 had equal wheat production; can you make the same observations using a frequency table?

Clearly, it is difficult to draw conclusions just by looking at the data in the table. For this, one needs to examine the data minutely, whereas with just a glance at the bar graphs we can see which year had the maximum and which year the minimum production. Thus, the major advantage of a bar graph is that it can be easily understood just by looking at it and it can be easily compared with other data.

EXERCISE 19.1

Q1. In a class 20 students obtained the following marks out of 5, in their mathematics test:-

3	2	5	4	0	1	2	3	5	2	2	3	5
4	1	0	3	2	3	4						

Construct a table for the above using the Tally method.

Q2. The maximum daily temperature of a city in degree Celsius between 1st April 2005 to 15th April 2005 was recorded as follows:

37.8, 37.8, 37.9, 38.0, 37.9, 37.9, 38.0, 38.1, 38.1, 38.2, 38.3, 38.3, 38.2, 38.1, 38.2

Construct a table for the daily temperature from the above data using the Tally Method.

Q3. The following table represents the results of students of class VI according to divisions obtained. Observe the table and answer the following questions:

Division	No. of students
I st Division	12
II nd Division	14
III rd Division	10
Failed	04

- (a) In which division do the maximum number of students fall?
- (b) How many students appeared for the exams?
- (c) How many students passed the examination?
- Q4. The following table represents the yearly income of a company for 5 years. Represent the data by a bar graph.

Year	1996	1997	1998	1999	2000
Yearly income	10	20	15	12	22
(in Lakhs)					

Q5. The following table represents the percentage of people buying different TV sets. Represent the data in a bar graph.

Brand	% purchased
р	25
q	30
r	15
S	10
Т	10
Others	10

Q6. The following table represents the percentage of average marks obtained by the students of a school, in their annual examinations. Represent the data in a bar graph.

Subject	Average Marks obtained by students (%)
English	55
Maths	60
Science	65
Social Science	90
Hindi	70

What Have We Learnt?

- 1. Depiction of quantitative data in the form of pictures is called a pictograph.
- 2. A bar graph, is a representation of quantitative data using bars of equal width taken at equal distances either horizontally or vertically.
- 3. It is easy to infer many things by observing a bar graph.