Data Handling

Representation Of Data Using Tally Marks

Data is defined as a collection of numbers which give the required information. For example, marks scored by the students in a class, number of members in a family, number of books sold etc.

Data are of two types:

(i) **Primary data:** It is the data collected by the person directly for a specific purpose without referring any source. Primary data is collected through surveys, local sources etc.

(ii) **Secondary data:** It is the data collected through other sources like research organizations, financial institutions etc.

The original form of data is called **raw data**. But when the data is arranged in ascending or descending order, it is referred to as **array**.

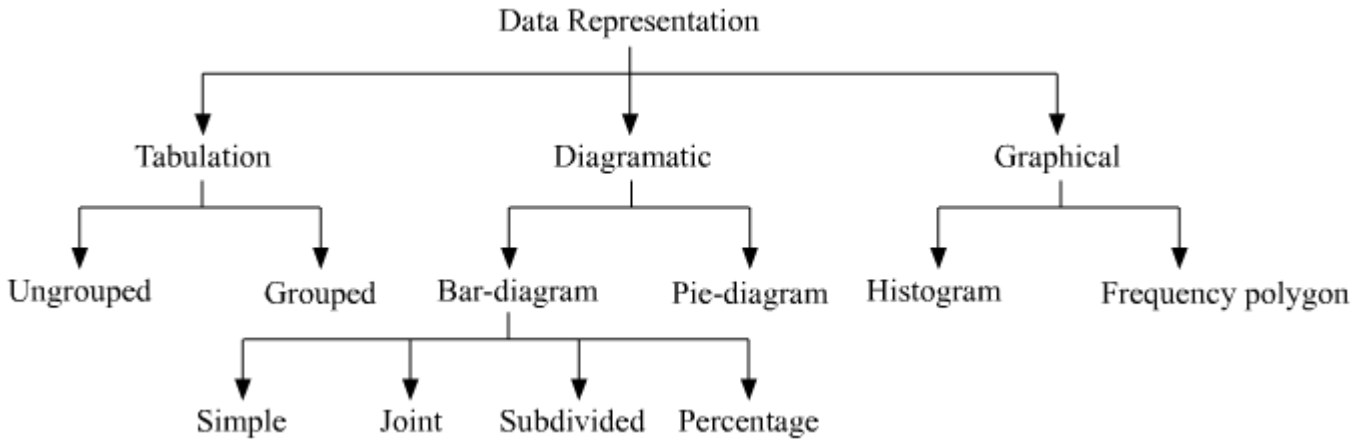
Example: The marks obtained by 10 students in a test out of 30 are as follows:

10, 15, 25, 22, 12, 18, 28, 29, 17, 18

This data is in the form of raw data or ungrouped data.
Now, after arranging the given data in ascending order we get 10, 12, 15, 17, 18, 18, 22, 25, 28, 29 and on arranging them in descending order we get 29, 28, 25, 22, 18, 18, 17, 15, 12, 10.
Such arrangement of the data in ascending or descending order is called an array.

There are different ways of representing the data.

Below given chart explain the same.



In this video we have seen that the use of tally marks has made the data simpler to understand.

Let us now discuss some examples based on representation of a data through tally marks.

Example 1:

A survey was conducted in a village of 80 people. The blood groups of 80 people are as follows.

A, AB, A, B, O, AB, A, AB, O, B, A, O, O, B, A, A, B, AB, O, AB, O, B, A, O, B, O, A, O, A, AB, A, B, AB, O, B, O, O, B, AB, O, A, A, B, AB, AB, O, B, O, O, B,

O, O, B, A, A, O, O, B, O, O, AB, O, B, O, AB, O, A, O, O, B, A, AB, AB, A, B, AB, O, B, O, O.

Represent this data using tally marks.

Solution:

The given data is represented by using tally marks as follows.

Blood Group	Tally Marks	No. of people

A	𝍸 𝍸 𝍸 ||	17
B	𝍸 𝍸 𝍸 |||	18
AB	𝍸 𝍸 𝍸	15
O	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	30
Total		80

Example 2:

Neha threw a dice 150 times and noted the number appearing each time. This data is represented by the following table containing tally marks. Fill in the blanks in this table.

Observation	Tally Marks	No. of Observations
1	____	28
2	𝍸 𝍸 𝍸	____
3	____	42

4	𝍸 𝍸 𝍸 𝍸 ||	____
5		13
6	____	____
Total		150

Solution:

We easily fill the first four blanks by counting the number of tallies.

Observation	Tally Marks	No. of Observations
1	𝍸 𝍸 𝍸 𝍸 𝍸 |||	28
2	𝍸 𝍸 𝍸	15
3	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||	42
4	𝍸 𝍸 𝍸 𝍸 ||	22

5	𝍸 𝍸 | | |	13
6	____	____
Total		150

Now, let us find the last two blanks.

Total number of observations = 150

Number of observations excluding the 6th observation = 28 + 15 + 42 + 22 + 13 = 120

Hence, number of observations for the 6th observation 6 = 150 – 120 = 30

Observation	Tally Marks	No. of Observations
1	𝍸 𝍸 𝍸 𝍸 𝍸 | | |	28
2	𝍸 𝍸 𝍸	15
3	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 | |	42
4	𝍸 𝍸 𝍸 𝍸 | |	22

5	𝍸 𝍸 |||	13
6	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	30
Total		150

Interpretation Of Tally Charts

The following tally chart shows the number of students in each class from class VI to class X of a school.

Class	**Tally marks**
VI	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||
VII	𝍸 𝍸 𝍸 𝍸 𝍸 ||||
VIII	𝍸 𝍸 𝍸 𝍸
IX	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 |
X	𝍸 𝍸 𝍸 𝍸 𝍸 |||

Can we find the numbers of students in different classes of the school?

Let us see how to interpret the information given in the tally chart and how to find the number of students in each class.

In the above tally chart, the number of students of class VI is represented by the tally marks 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||.

Thus, number of students in class VI = 5 + 5 + 5 + 5 + 5 + 5 + 2 = 32.

In this way, we can find the number of students in each class.

The numbers of students in the classes VII, VIII, IX, and X are 29, 20, 36, and 28 respectively.

What is the total number of students in the school?

Total number of students of the school is the sum of the number of students in classes VI, VII, VIII, IX, and X = 32 + 29 + 20 + 36 + 28 = 145.

Which class has the highest number of students?

We have already calculated the total number of students in each class.

The highest number of students in a class is 36. These 36 students belong to class IX.

Thus, class IX has the highest number of students.

How many classes contain more than 30 students?

Class VI and Class IX contain 32 and 36 students which are more than 30.

Thus, these two classes contain more than 30 students.

In this way, we can interpret the information given in the tally chart by reading and analyzing.

Let us discuss some more examples based on the interpretation of tally charts.

Example 1:

The following tally chart provides the information regarding the number of bottles of different blood groups collected in a blood donation camp.

Blood Group	Tally Marks
O	𝍸 𝍸 𝍸 ||
A	𝍸 𝍸 |
B	𝍸 𝍸 ||||
AB	𝍸 |||

Read the tally chart and give answers to the following questions.

(a) Write the number of bottles collected for different blood groups.

(b) How many bottles of blood were collected in the camp?

(c) If the most common blood group is called universal donor, then which blood group is called so?

(d) If the rarest blood group is called universal accepter, then which blood group is called so?

(e) What is the difference between the numbers of bottles in the above two categories, asked in parts (c) and (d)?

(f) Write the blood groups in pair whose mutual donation is half of the total number of bottles collected.

Solution:

(a) Number of bottles of Blood Group O = 17

Number of bottles of Blood Group A = 11

Number of bottles of Blood Group B = 14

Number of bottles of Blood Group AB = 8

(b) Total number of bottles of blood collected = Sum of bottles of blood of group O, A, B, and AB

= 17 + 11 + 14 + 8 = 50

(c) Maximum number of blood bottles of blood group O was collected. Thus, blood group O is the most common blood group.

Hence, we can say that blood group O is universal donor.

(d) Minimum number of blood bottles of blood group AB was collected. Thus, blood group AB is the rarest blood group.

Hence, we can say that blood group AB is universal acceptor.

(e) Difference between the number of blood bottles of blood group O and AB

= 17 – 8 = 9

(f) The total number of bottles collected was 50.

Now, half of total number of bottles = $\frac{1}{2} \times 50 = 25$

Mutual donation of bottles of blood group O and AB = 17 + 8 = 25, which is half of the total number of bottles of blood. Thus, blood group O and AB have mutual donation of half the total number of bottles.

Also, mutual donation of bottles of blood group A and B = 14 + 11 = 25, which is half of the total number of bottles of blood. Thus, blood group A and B have mutual donation of half the total number of bottles.

Example 2:

The following tally chart shows the information regarding the distance of houses of employees from an industry. Read the information carefully and answer the questions given below.

Distance of house from industry (in km)	Tally Marks
0	𝍸 𝍸 ||
1	𝍸 𝍸 𝍸 ||
2	𝍸 𝍸 𝍸 𝍸 |
3	𝍸 𝍸 𝍸 |
4	𝍸 ||||
5	|||
6	𝍸 𝍸 𝍸 𝍸 𝍸
7	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 |||

8	𝍸 ||
9	||||
10	|||

(a) How many employees are there in the industry?

(b) At what distance from the industry do the maximum numbers of

employees live?

(c) If transport facility is provided to the employees who are living 5 km or more than 5 km from the industry, then how many numbers of employees get this facility?

(d) Write the numbers of employees who live more than 3 km but less than 8 km from the industry?

(e) How many employees are there who live at a distance less than 4 km from the industry?

Solution:

(a) 12 + 17 + 21 + 16 + 9 + 3 + 25 + 33 + 7 + 4 + 3 = 150

Thus, there are 150 employees in the industry.

(b) Maximum number of employees in a group is 33 and these 33 employees are living at a distance of 7 km from the industry.

Therefore, the maximum numbers of employees live at a distance of 7 km from the industry.

(c) Numbers of employees who are living at a distance of 5 km or more than 5 km from the industry = 3 + 25 + 33 + 7 + 4 + 3 = 75

Hence, 75 employees will get the transport facility.

(d) Numbers of employees who are living more than 3 km but less than 8 km from the industry = 9 + 3 + 25 + 33 = 70

(e) Numbers of employees living at a distance less than 4 km from industry = 12 + 17 + 21 + 16 = 66

Representation Of Data Using Pictograph

he field of mathematics that deals with the study, collection, classification, analysis, interpretation and representation of any kind of data (for example, survey, experiments etc.) is known as statistics. It has a great importance in our daily life.

Representation of Statistical Data:
Diagrammatic representation of the statistical data is known as graph. There are various types of graphs like pictograph, line graph, bar graph and sector graph or pie chart.

Let us know about them one by one.

Pictograph:
Representation of the statistical data with the help of pictures in the graph is called as pictograph.
This graph has two columns.
One column has names of things, years, places etc. These are independent variables.
Other column has figure of related objects.

Let us learn more about pictograph by taking an example.
The following table shows the number of students of class VI who like different seasons.

Season	Number of students
Rainy	12

Autumn	5
Summer	10
Winter	13

Here, the data is given in a tabular form. Can we represent the same data in another way?
We can represent the above given data by a pictograph.

Let us discuss few examples on representation of a data using pictograph.

Example 1:

Total number of boys in seven different schools is listed in the following table.

School	Number of boys
A	120
B	135
C	45
D	165

E	90
F	150

Prepare a pictograph of the above data using one picture  **to represent 30 boys.**

Solution:

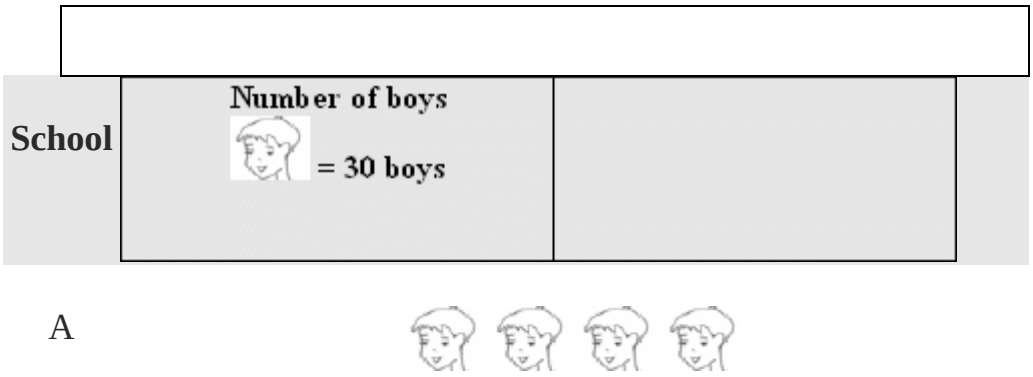
We will use the picture  to represent 30 boys.

Thus, 15 boys will be represented by the picture  .

The number of boys in schools A, E, and F are 120, 90, and 150 respectively. These numbers can be written as $120 = 4 \times 30$, $90 = 3 \times 30$, and $150 = 5 \times 30$.

The number of boys in schools B, C, and D are 135, 45, and 165 respectively. These numbers can be written as $285 = 30 \times 9 + 15$, $135 = 30 \times 4 + 15$, $45 = 30 + 15$, and $165 = 30 \times 5 + 15$.

We can now represent the given data using pictograph as follows.



B 

C 

D 

E 

F 

Example 2:

The number of houses destroyed in the previous five years in India due to cyclone is given below.

Year 2003 : 2250

Year 2004 : 3500

Year 2005 : 2500

Year 2006 : 2000

Year 2007 : 4000

Prepare a pictograph of the above data using the symbol  **to represent 500 houses.**

Solution:

We will use the symbol  to represent 500 houses.

Thus, 250 houses can be represented using the symbol  .

The number of houses destroyed in the years 2004, 2005, 2006, and 2007 are 3500, 2500, 2000, and 4000 respectively. These numbers can be written as $3500 = 7 \times 500$, $2500 = 5 \times 500$, $2000 = 4 \times 500$, and $4000 = 8 \times 500$.

The number of houses destroyed in the year 2003 is 2550. It can be written as,

$2250 = 4 \times 500 + 250$

Now, we can represent the given data using pictograph as follows.

Year	Number of houses  → 500 houses
2003	
2004	
2005	
2006	

2007 

Interpretation Of Pictographs

You already know that pictograph is a representation of data by means of pictures.

Let us now discuss one more example based on the interpretation of pictograph to understand this concept better.

Example:

The following pictograph represents the number of cars manufactured by a company in different years.

Year	Number of cars	= 1000 cars
2003		
2004		
2005		
2006		
2007		

Observe the pictograph and answer the following questions.

(a) In which year was the highest number of cars manufactured?

(b) In which year was the least number of cars manufactured?

(c) In which year, out of 2003 and 2004, were more cars manufactured?

(d) What is the total number of cars manufactured during all the above five years?

Solution:

From the graph, it is clear that the number of cars manufactured during the years 2003, 2004, 2005, 2006, and 2007 were 3000, 2500, 4000, 4500, and 2000 respectively.

(a) The highest number of cars manufactured in a year is 4500. These cars were manufactured in the year 2006.

Thus, in the year 2006, the highest number of cars was manufactured.

(b) The least number of cars manufactured in a year is 2000. These cars were manufactured in the year 2007.

Thus, in the year 2007, the least number of cars was manufactured.

(c) In the year 2003, 3000 cars were manufactured.

In the year 2004, 2500 cars were manufactured.

Thus, more cars were manufactured in the year 2003 than in the year 2004.

(d) Total number of cars manufactured during the given five years

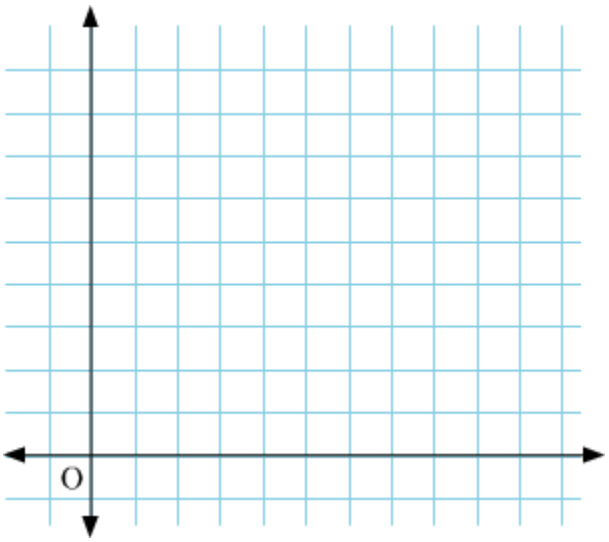
= Sum of the number of cars manufactured in all the five different years

= 3000 + 2500 + 4000 + 4500 + 2000

= 16000

Construction of Bar Graphs

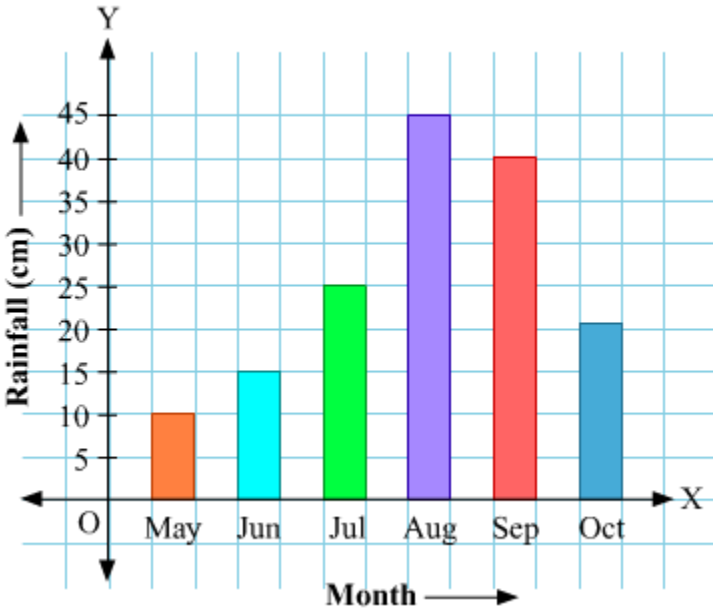
Look at the following figure.



This is a graph paper. A **graph paper** has various vertical and horizontal lines intersecting each other. Also, distance between every two lines is always equal. Thus, we get many small squares on the graph paper.

Graph paper is used to draw bar diagrams. A bar diagram drawn on such a graph paper is known as **bar graph**.

Look at the following graph given by meteorological department.



The above graph shows the rainfall in a place from the month of May to October of a year.

Here, the rainfall is shown by vertical bars of uniform width and with equal spaces between them. This type of representation of a data is known as **bar graph.**

How can we represent a data using bar graph?

In this method, bars of uniform width are drawn with equal spaces between them. The bars can be either vertical or horizontal. In a bar diagram, the values in the data are represented by the lengths of the bars.

Let us now look at one more example to understand this concept better.

Example:

The following information represents the amount of money earned by a trader in different months.

Month	Amount of money earned (Rs)
January	**9000**
February	**5000**
March	**7000**
April	**11000**
May	**10500**

June	**7000**

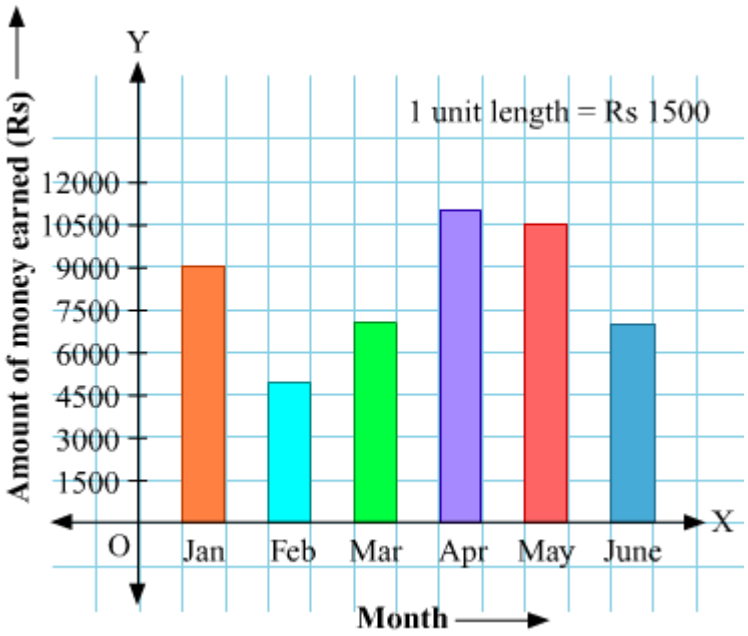
Represent this information with the help of a bar graph.

Solution:

We will represent the months on the horizontal line and the amount of money earned on the vertical line.

Here, we take the scale as 1 unit = Rs 1500

The bar graph of the given information is as follows:



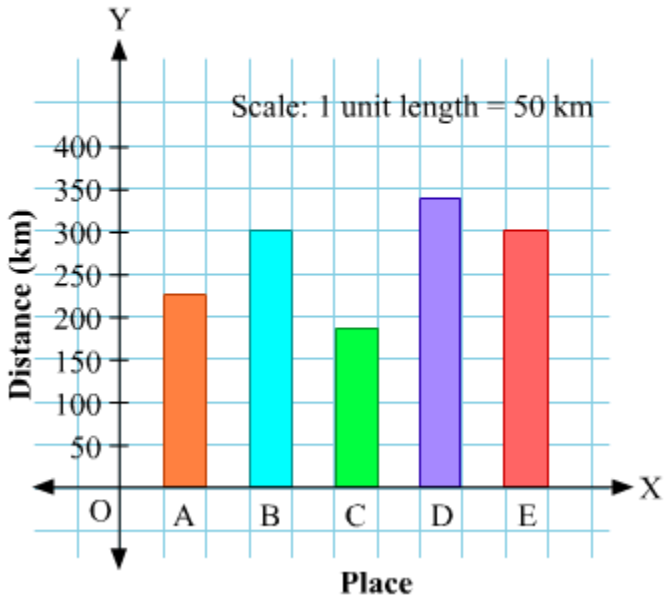
Interpretation of Bar Graphs

Bar graphs are one of the most common tools used to represent data. Therefore, to read bar graphs and extract the required information from them is an important part of data analysis.

Let us now look at one more example to understand this concept better.

Example:

The following bar graph shows the distance of a mall from five different places. Read the graph and answer the questions asked below.



1. **Which place is the farthest from the mall?**

2. **Which place is the nearest to the mall?**

3. **How far is place B from the mall?**

4. **The distance of which two places is the same from the mall?**

Solution:

1. The bar corresponding to place D is the highest. Thus, place D is the farthest from the mall.

2. The bar corresponding to place C is the shortest. Thus, place C is the nearest to the mall.

3. Place B is at a distance of 300 km from the mall.

4. The height of the bars corresponding to the places B and E are the same. Thus, the places B and E are at the same distance from the mall.