Data Handling

- In a pictograph, pictures of objects are used for representing data. Tally marks cannot be used for representing huge numbers. However, these numbers can be represented with the help of pictographs.
- Data can also be represented by using bar diagram or bar graph. In a bar graph, bars of uniform width are drawn horizontally or vertically. These bars are placed at equal distance from each other. The length of each bar gives the required information.
- The data in an unorganised form is called raw data. In order to draw meaningful inferences from a data, we need to organise the data systematically.

  We can organise a data in the following ways:

  - Frequency distribution table
  - Histogram
  - Pie chart

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**.

For example, let us consider the following data.

Name of the student	Marks obtained (out of 100)
Manasi	81
Praveen	73
Pradeep	98
Kartik	61
Mamta	96

Vinod	83
Salma	69
Jyoti	83
Amardeep	67
Suraj	52

This data gives information about the marks obtained (out of 100) by 10 students.

By observing this data, we can say that Mamta obtained the highest marks and Suraj obtained the least marks among all the students.

We can also say that Jyoti and Vinod obtained the same marks.

- We arrange any data in tabular form using tally marks to obtain particular information in very little time.

For 1, we use the tally mark |

For 2, we use the tally mark ||

For 3, we use the tally mark |||

For 4, we use the tally mark ||||

For every 5, we use the tally mark 𝍸

Example: In order to understand the concept of tally marks, let us arrange the following data using tally marks. The given data represents the number of blood donors of different blood groups in a blood donation camp.

We can represent the given data using tally marks.

Blood group	Number of donors
O	28
A	19
B	16
AB	12

Solution: Using tally marks, the given data can be arranged as:

Blood group	Tally marks	Number of donors
O	𝍸 𝍸 𝍸 𝍸 𝍸 |||	28
A	𝍸 𝍸 𝍸 ||||	19
B	𝍸 𝍸 𝍸 |	16
AB	𝍸 𝍸 ||	12

This is known as a **tally chart**.

- Data can also be represented by using **bar diagram** or **bar graph**.

  In a bar graph, bars of uniform width are drawn horizontally or vertically. These bars are placed at equal distance from each other. The length of each bar gives the required information.

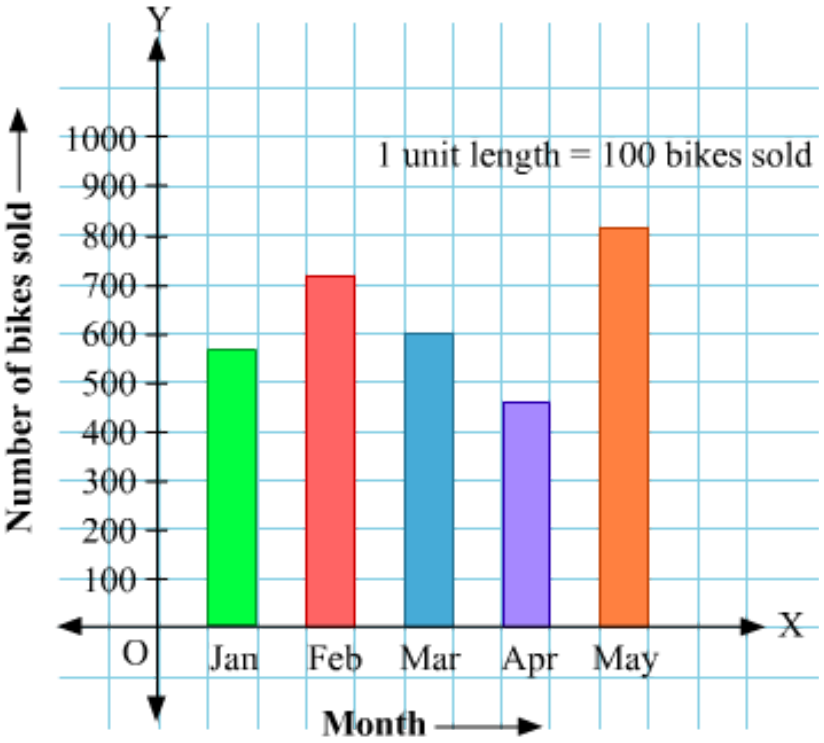
  Example:
  The given data represents the number of bikes sold by a retailer in the first five months of a year. Construct a bar graph of this data.

Month	Number of bikes sold
January	560
February	720
March	600
April	450
May	820

  Solution:
  To draw the bar graph for the given data, we proceed as follows:

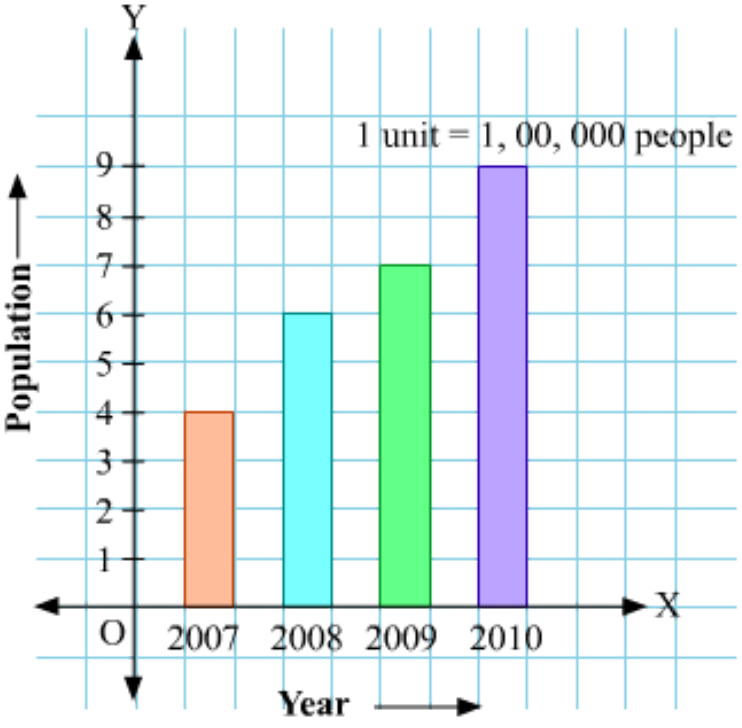
  - Draw two perpendicular lines, one vertical and one horizontal
  - Mark the months along the horizontal line and mark the corresponding number of bikes along the vertical line.
  - Draw bars of same width and maintain uniform gaps between them.
  - Choose a suitable scale along the vertical line. Let 1 unit length = 100 bikes sold and mark the corresponding values.

  Hence, the bar graph of the given data can be drawn as:



- We can interpret a bar graph by reading and analyzing it.

  For example, the given bar graph represents the population of a small town in four consecutive years.



We can analyze the given bar graph and answer the following questions.

1. What is the population of town in 2010?

Solution: The population of town in 2010 = 1,00,000 × 7 = 7,00,000

2. In which year was the population of town maximum?

Solution: Population of town in 2007 = 1,00,000 × 4 = 4,00,000

Population of town in 2008 = 1,00,000 × 6 = 6,00,000

Population of town in 2009 = 1,00,000 × 7 = 7,00,000

Population of town in 2010 = 1,00,000 × 9 = 9,00,000

So, population of town was maximum in 2010.

3. By how much does the population increased from 2007 to 2010?

Solution: Difference between the population of 2010 and 2007 = 9,00,000 – 7,00,000 = 2,00,000

So, population of the town is increased by 2,00,000 from 2007 to 2009.

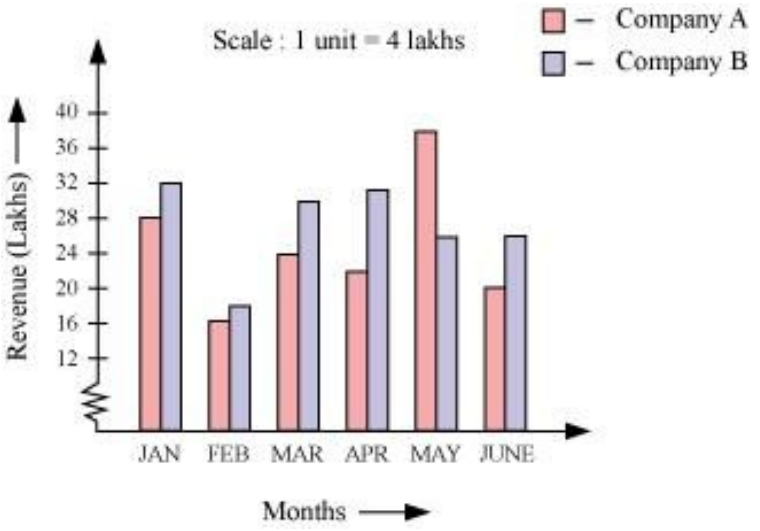
- **Bar graphs**
  1. Bar graph is another way of representing the data using bars of uniform widths. The lengths of the bars depend upon the frequency and scale chosen.
  2. Double bar graphs are also drawn as bar graphs. It is the collection of two sets of data on the same graph. It is helpful in comparing the two sets of data.

Example: The given data shows the revenue incurred (in lakhs) by two companies, A and B, in 6 months.

	January	February	March	April	May	June
A	28	16	24	22	38	20
B	32	18	30	31	26	26

Construct a double bar graph representing the given data. Find in which particular month is the revenue incurred by company A more than company B.

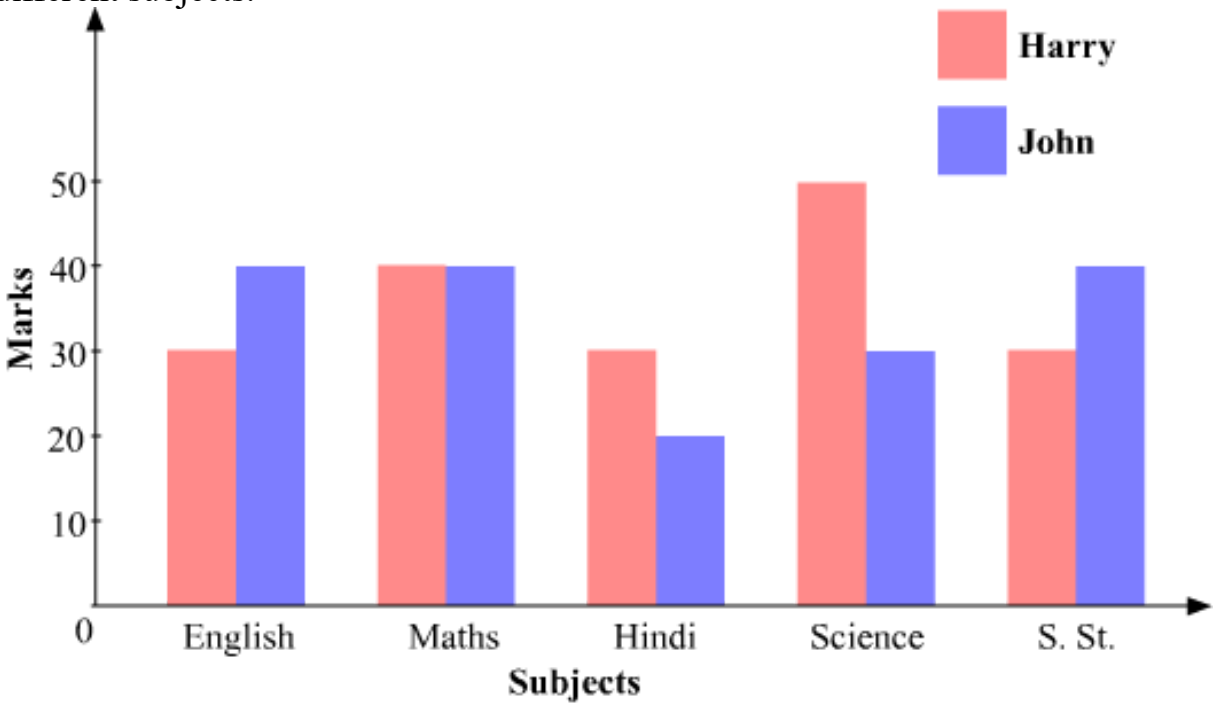
Solution: In the given data, the lowest value of observation is 16. Therefore, choosing the scale as 1 unit = 4 lakhs and drawing bars of corresponding lengths for each month, we obtain the bar graph as:



It can be seen that the height of the bar for the month of May is more for company A than for company B. Therefore, in the month of May, company A incurred more revenue than B.

- We can interpret the double bar graph by reading and analyzing it.

Example: The given double bar graph represents the marks obtained by Harry and John in different subjects.



We can analyze the given double bar graph and answer the following questions.

1. What is the differnce between the marks scored by Harry and John in Science?

Answer: Marks scored by Harry in science = 50

Marks scored by John in science = 30

Difference = 50 – 30 = 20

2. In which subject both the students got equal marks?

Answer: Both the students got equal marks in Maths.

3. Who is better in studies among Harry and John?

Answer: Total marks obtained by Harry = 30 + 40 + 30 + 50 + 30 = 180

Total marks obtained by John = 40 + 40 + 20 + 30 + 40 = 170

Total marks obtained by Harry is more than John. So, Harry is better in studies than John.

- **Pie chart**

  A pie chart or a circle graph shows the relationship between a whole and its parts.

- **Construction of pie charts**

  Example:

  Construct a pie chart for the following data which gives the brands of laptop preferred by the people of a locality.

  Brand A : 100

  Brand B : 120

  Brand C : 180

  Solution:

  The total number of people is 100 + 180 + 120 = 400.

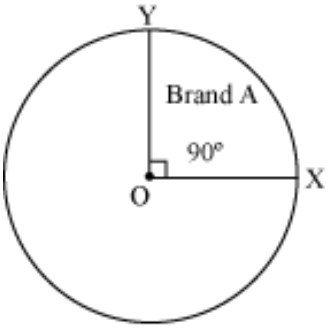
  We can form the following table to find the central angle of each sector:

Brand of laptop	Number of people	Fraction	Central angle
A	100	$\frac{100}{400} = \frac{1}{4}$	$\frac{1}{4} \times 360° = 90°$
B	180	$\frac{120}{400} = \frac{3}{10}$	$\frac{3}{10} \times 360° = 108°$
C	120	$\frac{180}{400} = \frac{9}{20}$	$\frac{9}{20} \times 360° = 162°$

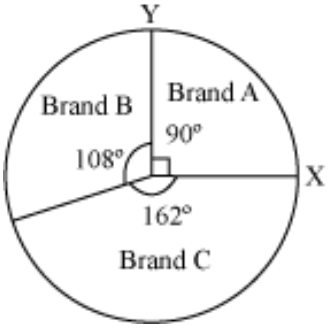
  Steps of construction:

  - Draw a circle with any convenient radius. Let O be the centre of the circle and OX be its radius.

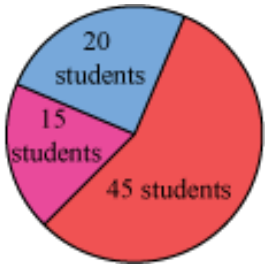
- Draw the angle of the sector for brand A, which is 90°. Using protractor, draw $\angle XOY = 90^{\circ}$.



- Now, draw the angle of the sectors for brands B and C.



- For example: Consider the given pie chart which shows the favourite colours of the class-VIII students of a school.



In this pie chart, the portion of the sector for the colour red is given by,

$$\frac{\text{Number of students whose favourite colours is red}}{\text{Total number of students}}$$

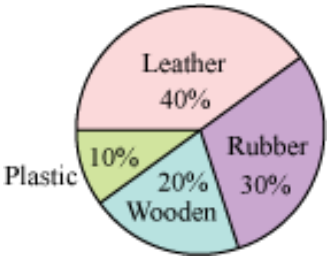
$$= \frac{45}{80}$$

$$= \frac{9}{16}$$

Therefore, the sector representing red colour is $\left(\frac{9}{16}\right)^{th}$ part of the circle.

- **Interpretation of a pie chart**

The given pie chart shows the footwears preferred by the people of a locality.



From the above pie chart, we can infer that most people of the locality prefer wearing leather footwears. Also, we can infer that the least number of people prefer wearing plastic footwears.

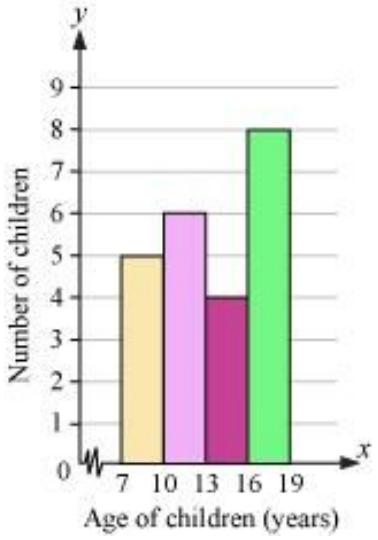
Now, suppose the total number of people in the locality is 1000. Then, we can say that the number of people who prefer wearing rubber footwears is 30100×1000 = 300

- **Histogram**

  A histogram is a bar graph that is used to represent grouped data. In a histogram, the class intervals are represented on the horizontal axis and the heights of the bars represent frequency. Also, there is no gap between the bars in a histogram.

Class interval (Age of children)	**Tally mark**	**Frequency (Number of children)**
7 – 10	𝍸	5
10 – 13	𝍸 |	6
13 – 16	||||	4
16 – 19	𝍸 |||	8

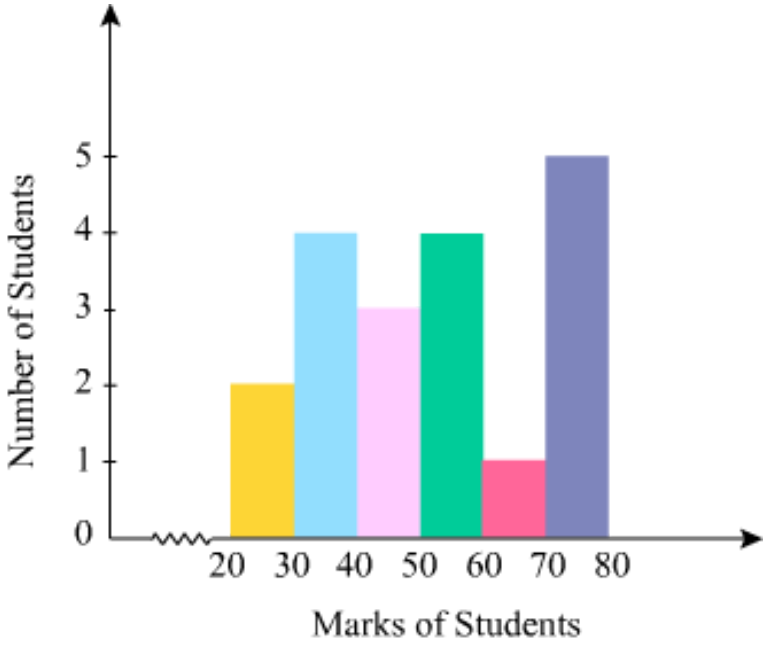
The above frequency distribution table can be displayed in a histogram as follows:



In a histogram, a broken line can be used along the horizontal axis to indicate that the numbers between 0 to7 are not included.

- We can interpret a histogram by reading and analyzing it.

For example, the given figure represents the marks of various students in a class.



We can analyze the given histogram and answer the following questions.

1. How many students got more than 50 marks?

Solution: Number of students who got more than 50 marks = 4 + 1 + 5 = 10

2. How many students got marks between 20 and 40?

Solution: Number of students who got marks between 20 and 40 = 2 + 4 = 6

3. In which group students got the maximum marks?

Solution: Students got maximum marks in the group 70 – 80.