

GRAPHICAL REPRESENTATION OF STATISTICAL DATA

35.1 REVIEW

As compared to written statement, the graphical representation of statistical data has a more lasting effect on the mind. Of course, a graphical representation should be properly titled and labelled so as to convey what it is about.

Out of various types of graphical representations, the followings are discussed in this chapter :

1. Bar graph or Bar chart
2. Pie graph or Pie chart
3. Histogram

1. Bar graph (Bar chart)

It is the simplest and the most widely used graph, in which the numerical data is represented by the height of rectangular bars of equal width.

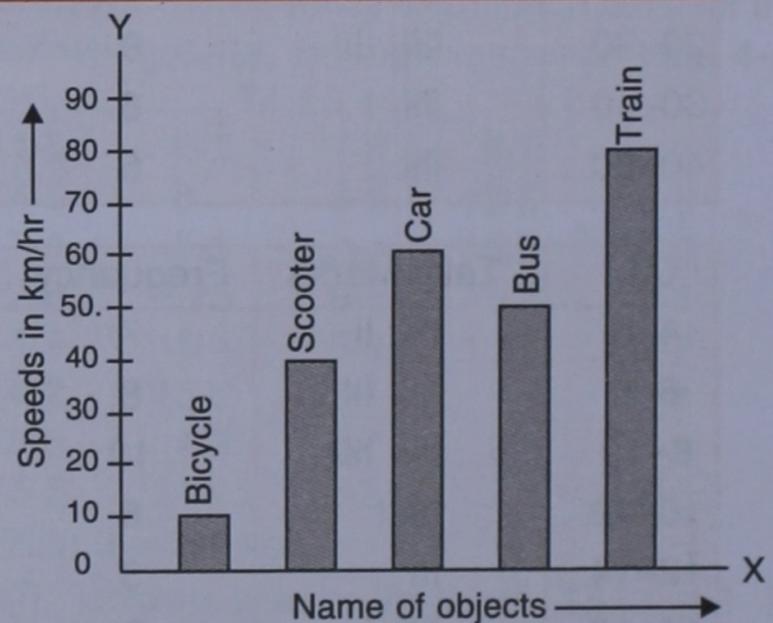
Example 1 :

The approximate speeds of some objects are given below. Draw a bar graph to represent them.

Name of objects	Bicycle	Scooter	Car	Bus	Train
Speed (in km/hr)	10	40	60	50	80

Solution :

The required bar graph is as given alongside :



Steps :

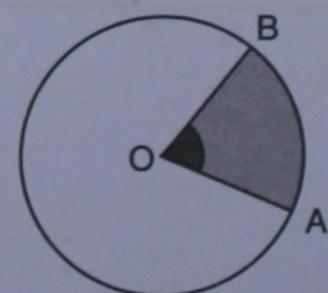
1. Take the names of objects along X-axis and velocities along Y-axis.
2. All the bars drawn should be of the same width.
3. Same spaces should be left between the consecutive bars.

2. Pie graph (or Pie chart)

When the numerical data is represented by the sectors of a circle, the graph obtained is called a **pie graph** or **pie chart**.

An angle, whose vertex is the centre of a circle, is called **central angle** and the region of the circle enclosed by the arms of the angle is called **sector**.

In the adjoining figure, $\angle AOB$ is the central angle and shaded portion of the circle is the sector.

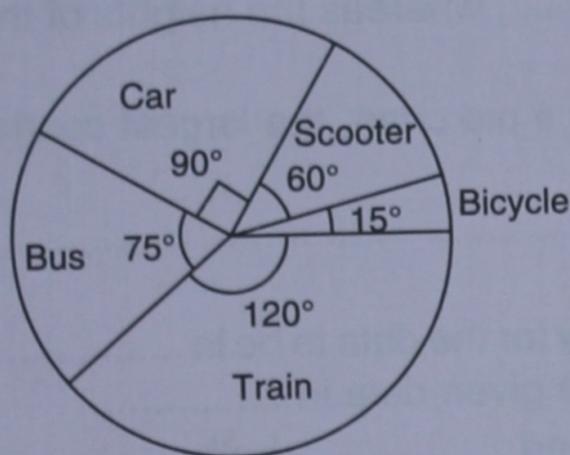


Example 2 :

Use the information given in example 1, to draw a pie-graph.

Solution :**Steps :**

1. Since the angle about the centre of circle is 360° , divide 360° in proportion of given data. In this example, divide 360° in proportion 10 : 40 : 60 : 50 : 80 to obtain the corresponding central angle.
2. Make a table as given below.
3. Draw a circle of any suitable radius.
4. For each central-angle, draw a sector.



Name of object	Speed in km/hr	Central angle
Bicycle	10	$\frac{10}{240} \times 360^\circ = 15^\circ$
Scooter	40	$\frac{40}{240} \times 360^\circ = 60^\circ$
Car	60	$\frac{60}{240} \times 360^\circ = 90^\circ$
Bus	50	$\frac{50}{240} \times 360^\circ = 75^\circ$
Train	80	$\frac{80}{240} \times 360^\circ = 120^\circ$
	240	360°

3. Histogram :

Histogram is a graphical representation of grouped frequency distributions.

In this case, the bars (rectangles) are drawn with class-intervals as bases along X-axis and their heights along Y-axis, proportional to the frequencies of respective classes.

Example 3 :

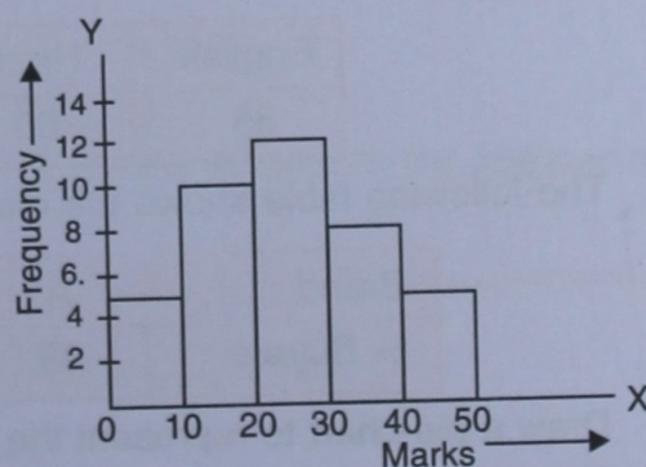
In a class of 40 students, the marks obtained (out of 50) are as given below :

Marks	0-10	10-20	20-30	30-40	40-50
No. of students (Frequency)	5	10	12	8	5

Draw a histogram to represent the given data.

Solution :**Steps :**

1. Taking suitable scales, mark the class-intervals (marks) on the X-axis and frequency (the no. of students) on Y-axis.
2. Construct rectangles with class-intervals as bases and the corresponding frequencies as heights.

**Example 4 :**

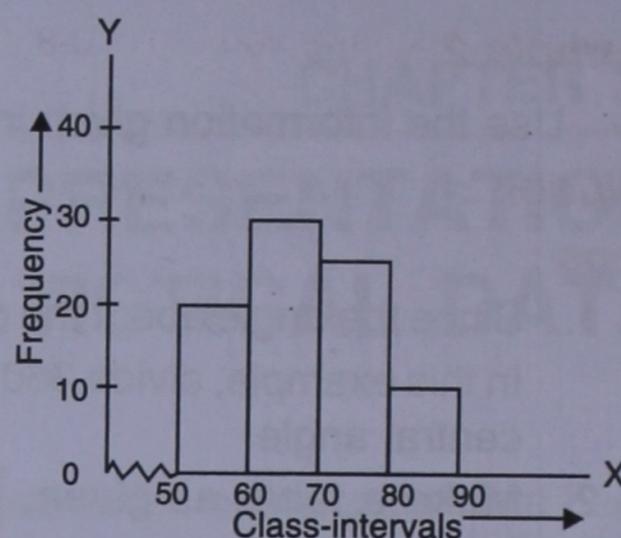
Draw a histogram to represent the following data :

Class-intervals	50-60	60-70	70-80	80-90
Frequency	20	30	25	10

Solution :

Since, the lower limit of first class-interval is 50; therefore, the scale on X-axis starts at 50.

To reduce the size of the graph, leave some suitable space between the origin and marking of 50 on X-axis, and draw a zig-zag line in this space.



The zig-zag line between the origin and the first marking (50 in this example) shows that the graph is drawn to scale beginning at 50, and not at the origin itself.

TEST YOURSELF

- In a bar graph, the widths of the bars represent , whereas the heights of the bars represent
- When ₹ 170, ₹ 210 and ₹ 160 are to be represented by a pie chart, the largest central angle drawn is =
- In a histogram, heights of different bars depend on
- For drawing a bar-graph and a pie chart, it is not necessary for the data to be in form; but for drawing a histogram, it is necessary for the given data in
- An ungrouped data can be represented by and both.

EXERCISE 35

- Hundred students from a certain locality use different modes of travelling to school as given below. Draw a bar graph.

Bus	Car	Rickshaw	Bicycle	Walk
32	16	24	20	8

- Mr. Mirza's monthly income is ₹ 7,200. He spends ₹ 1,800 on rent, ₹ 2,700 on food, ₹ 900 on education of his children, ₹ 1,200 on other things and saves the rest.

Draw a pie-chart to represent it.

- The percentage of marks obtained, in different subjects by Ashok Sharma (in an examination) are given below. Draw a bar graph to represent it.

English	Hindi	Maths	Science	Social Studies
85	60	35	50	70

- The following table shows the market position of different brands of tea-leaves.

Brand	A	B	C	D	others
% Buyers	35	20	20	15	10

Draw a pie-chart to represent the above information.

- Draw a histogram to represent :

(i)

Class-intervals	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	15	35	20	40	50	30

(ii)	Class-intervals	0-8	8-16	16-24	24-32	32-40
	Frequency	7	12	15	9	6

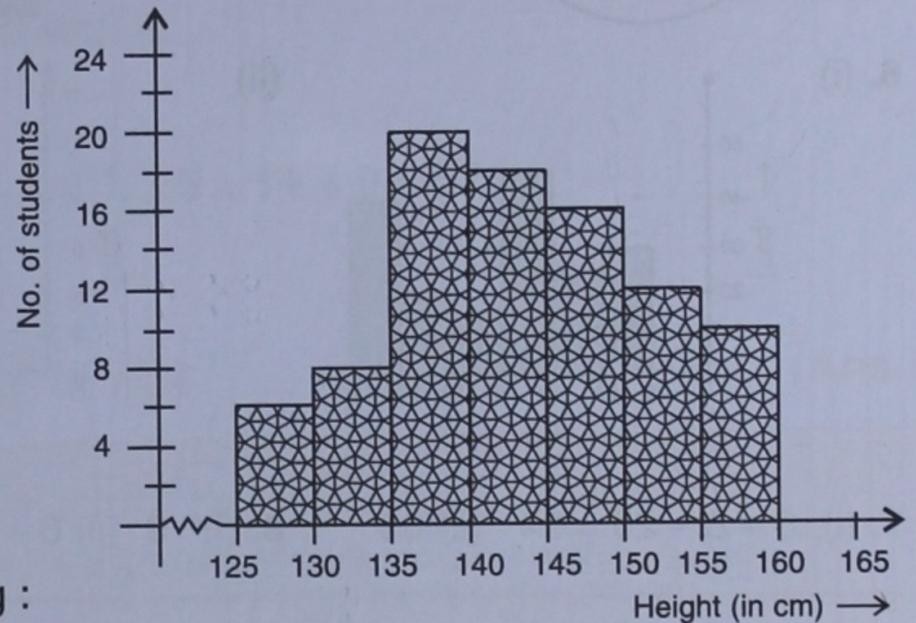
6. Draw a histogram to represent :

(i)	Class-intervals	50-60	60-70	70-80	80-90	90-100	100-110
	Frequency	30	25	45	15	20	40

(ii)	Height (cm)	40-45	45-50	50-55	55-60	60-65
	No. of boys	12	18	15	9	8

(iii)	Age (in years)	20-28	28-36	36-44	44-52	52-60	60-68
	No. of pupils	14	18	16	24	10	20

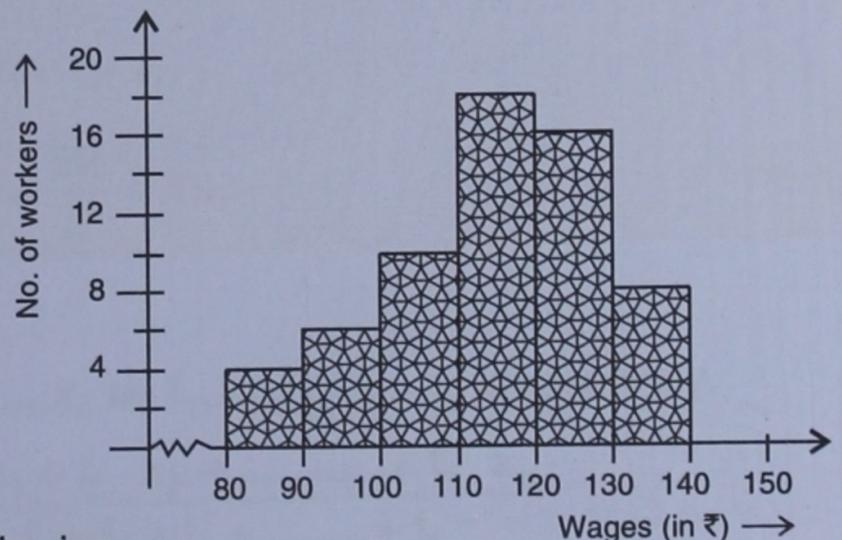
7. The histogram, given alongside, shows the heights of students (in centimetre) and their numbers.



Use the given histogram to answer the following :

- How many students have their height less than 140 cm ?
- How many students have their height more than 135 cm and less than 155 cm ?

8. The given histogram shows per day wages of workers in a factory.



With the help of the given histogram, answer the following :

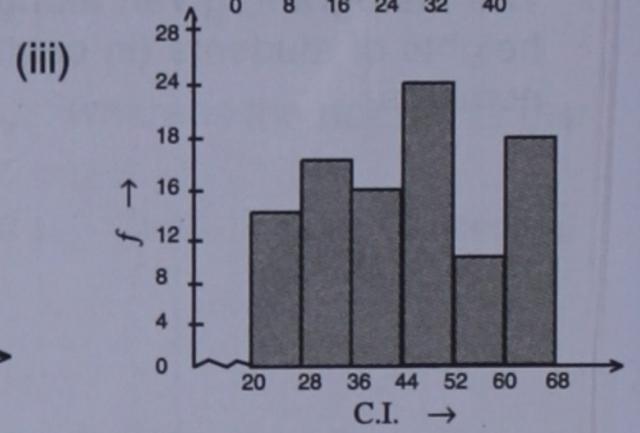
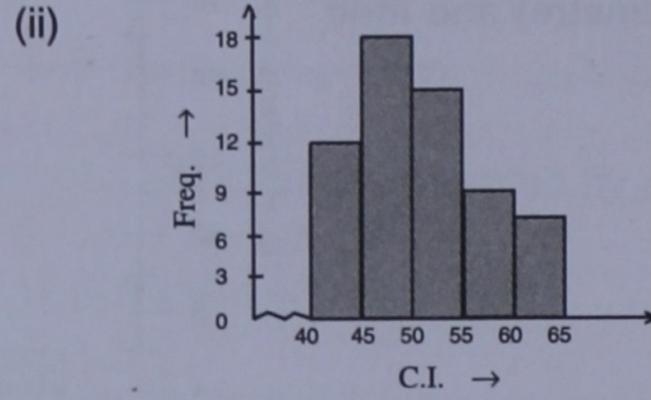
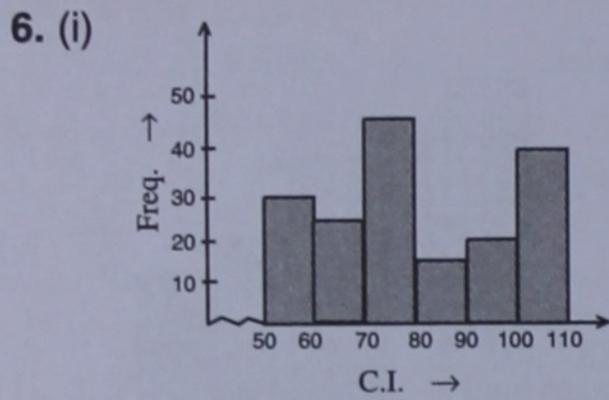
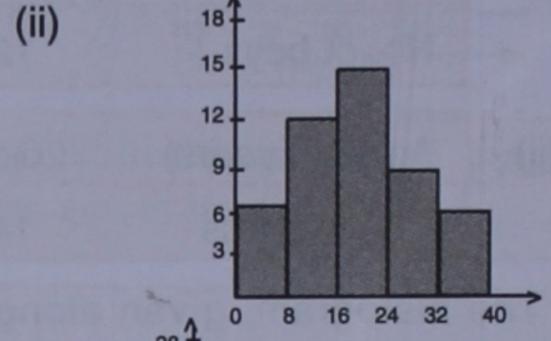
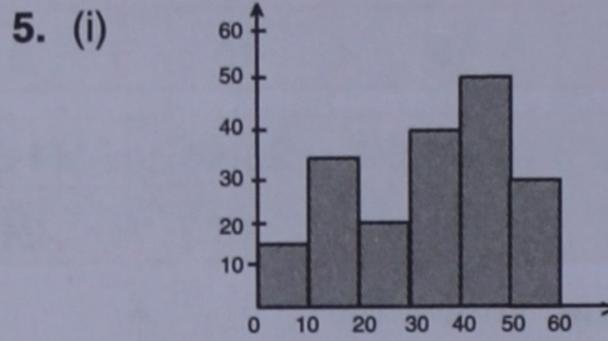
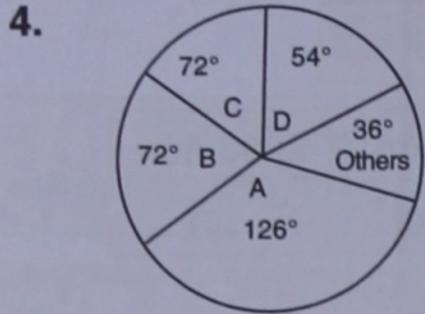
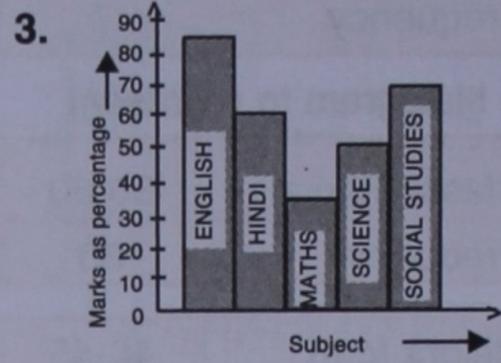
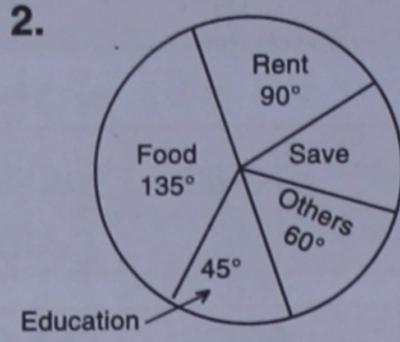
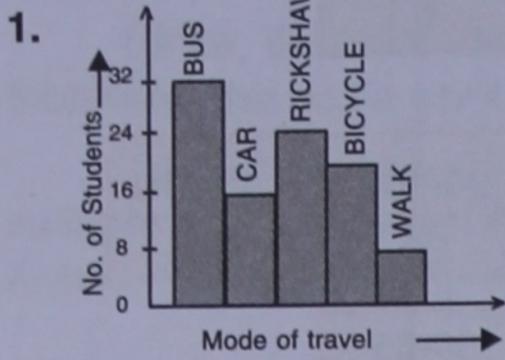
- How many workers get maximum wages ?
- How many workers have their wages between ₹ 90 and ₹ 120 ?
- Express the number of workers with wages less than ₹ 110 as the percent of the number of workers with wages more than ₹ 100.

ANSWERS

TEST YOURSELF

- nothing; values of different data
- $\frac{210}{540} \times 360^\circ = 140^\circ$
- the frequencies of respective classes
- class-interval; class-interval form
- bar-graph; pie-chart

EXERCISE 35



7. (i) $6 + 8 + 20 = 34$ (ii) 66 8. (i) 8 (ii) $6 + 10 + 18 = 34$ (iii) $38 \frac{6}{13} \%$.