

BIOSTATISTICS - DIAGRAMS ILLUSTRATING FREQUENCY DISTRIBUTION

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- 1. LINE DIAGRAM
- 2. HISTOGRAM
- 3. FREQUENCY POLYGON
- 4. O GIVES OR CUMULATIVE FREQUENCY CURVES

- Frequency distribution is an organized tabulation/graphical representation of the number of individuals in each category on the scale of measurement.
- It allows the researcher to have a glance at the entire data conveniently.
- It shows whether the observations are high or low and also whether they are concentrated in one area or spread out across the entire scale
- Frequency distributions are visual displays that organise and present frequency counts so that the information can be interpreted more easily.
- Frequency distributions can show absolute frequencies or relative frequencies, such as proportions or percentages.

- **Frequency tables**

- A frequency (distribution) table shows the different measurement categories and the number of observations in each category. Before constructing a frequency table, one should have an idea about the range (minimum and maximum values).
- The range is divided into arbitrary intervals called “class interval.”
- If the class intervals are too many, then there will be no reduction in the bulkiness of data and minor deviations also become noticeable.
- On the other hand, if they are very few, then the shape of the distribution itself cannot be determined.

Line diagram - Example

Example :

The profits in thousand of dollars of an industrial house for 2002, 2003, 2004, 2005, 2006, 2007 and 2008 are 5, 8, 9, 6, 12, 15 and 24 respectively. Represent these data using a suitable diagram.

Solution :

We can represent the profits for 7 consecutive years by drawing either a line diagram as given below.

Let us consider years on horizontal axis and profits on vertical axis.

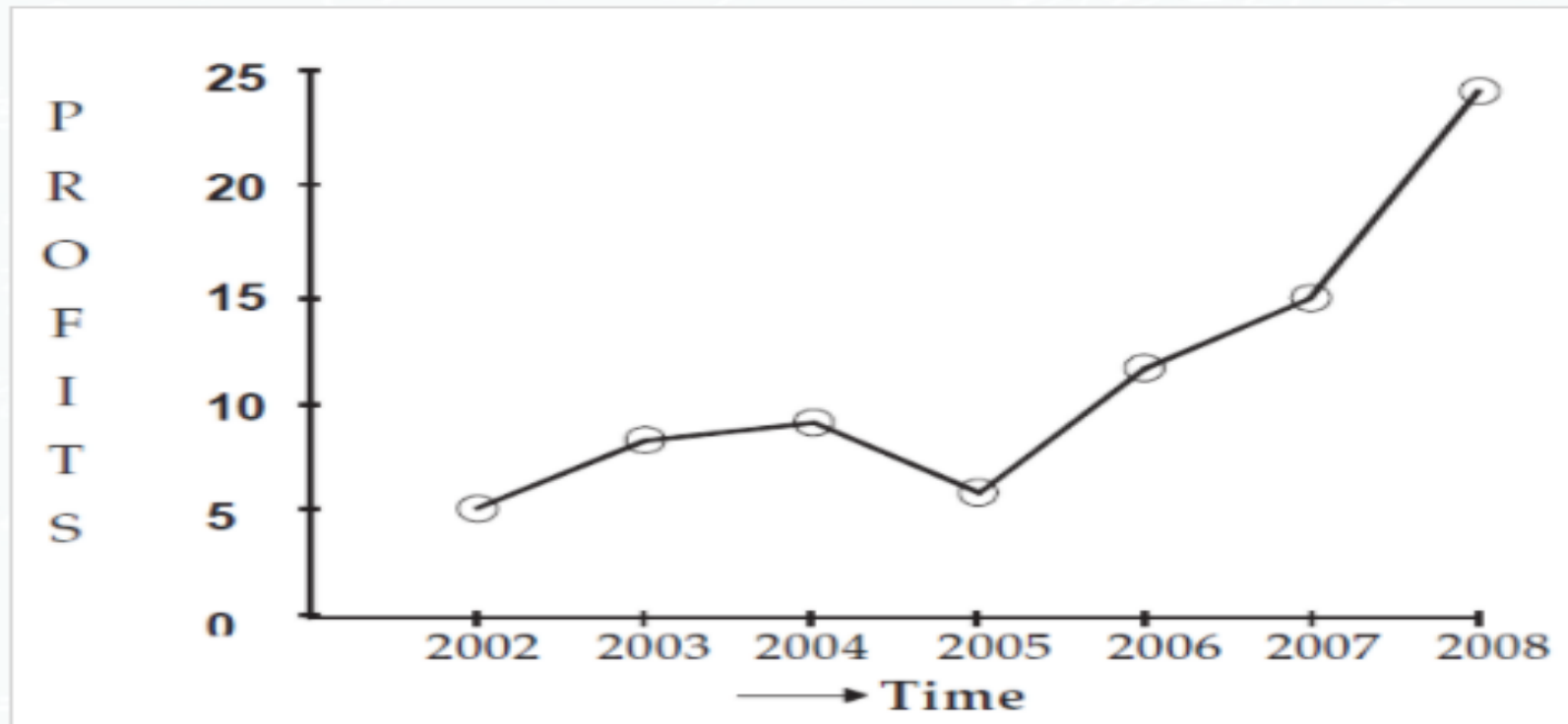
For the year 2002, the profit is 5 thousand dollars. It can be written as a point (2002, 5)

In the same manner, we can write the following points for the succeeding years.

(2003, 8), (2004, 9), (2005, 6), (2006, 12), (2007, 15) and (2008, 24)

Now, plotting all these point and joining them using ruler, we can get the line diagram.

Showing line diagram for the profit of an Industrial House during 2002 to 2008.



Histogram

A two dimensional graphical representation of a continuous frequency distribution is called a histogram.

In histogram, the bars are placed continuously side by side with no gap between adjacent bars.

That is, in histogram rectangles are erected on the class intervals of the distribution. The areas of rectangle are proportional to the frequencies.

Histogram - Example

Example 1 :

Draw a histogram for the following table which represent the marks obtained by 100 students in an examination :

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of students	5	10	15	20	25	12	8	5

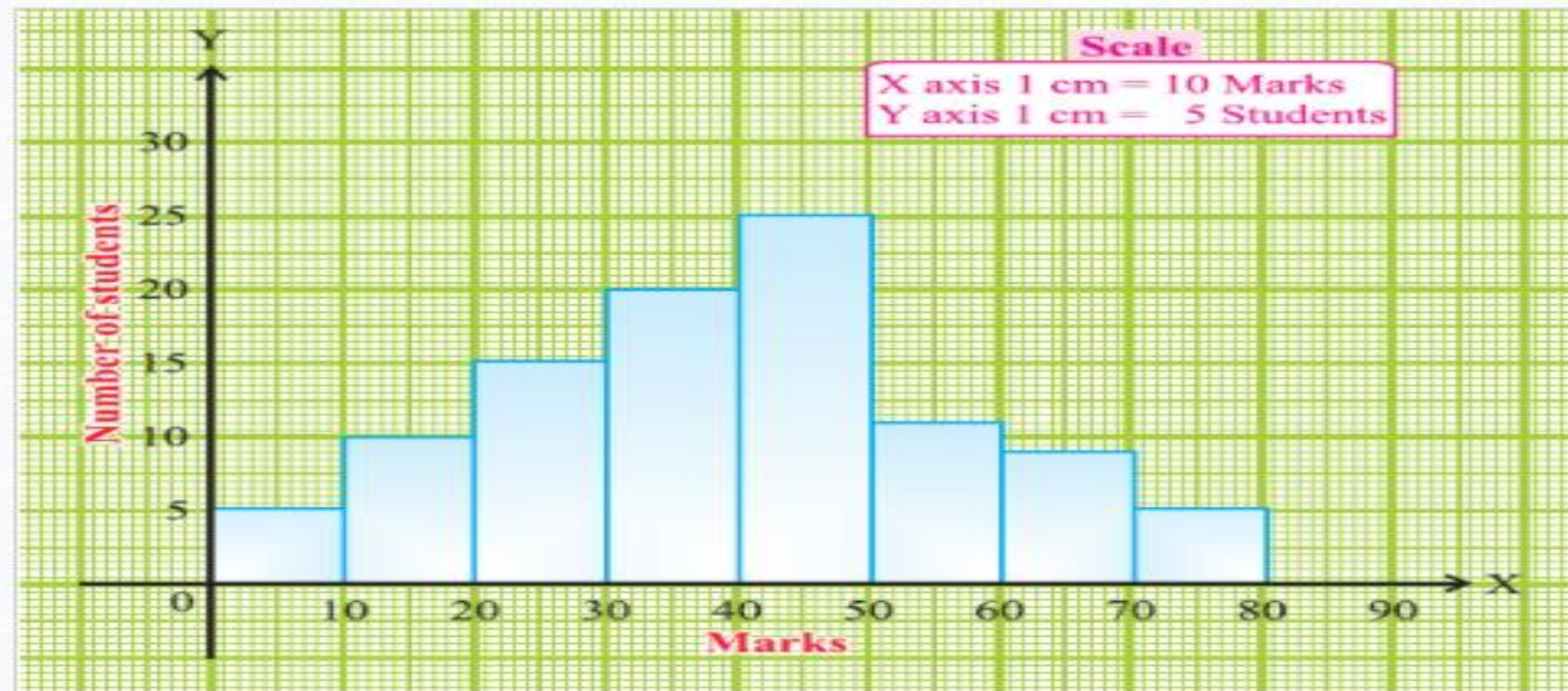
Solution :

The class intervals are all equal with length of 10 marks.

Let us denote these class intervals along the X-axis.

Denote the number of students along the Y-axis, with appropriate scale.

The histogram is given below.



Frequency polygon

Frequency Polygon is another method of representing frequency distribution graphically.

Obtain the frequency distribution and compute the mid points of each class interval.

Represent the mid points along the X-axis and the frequencies along the Y-axis.

Plot the points corresponding to the frequency at each mid point.

Join these points, by straight lines in order.

To complete the polygon join the point at each end immediately to the lower or higher class marks (as the case may be at zero frequency) on the X-axis.

Frequency polygon - Example

Example :

Draw a frequency polygon for the following data without using histogram.

Class interval	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	4	6	8	10	12	14	7	5

Solution :

Mark the class intervals along the X-axis and the frequency along the Y-axis.

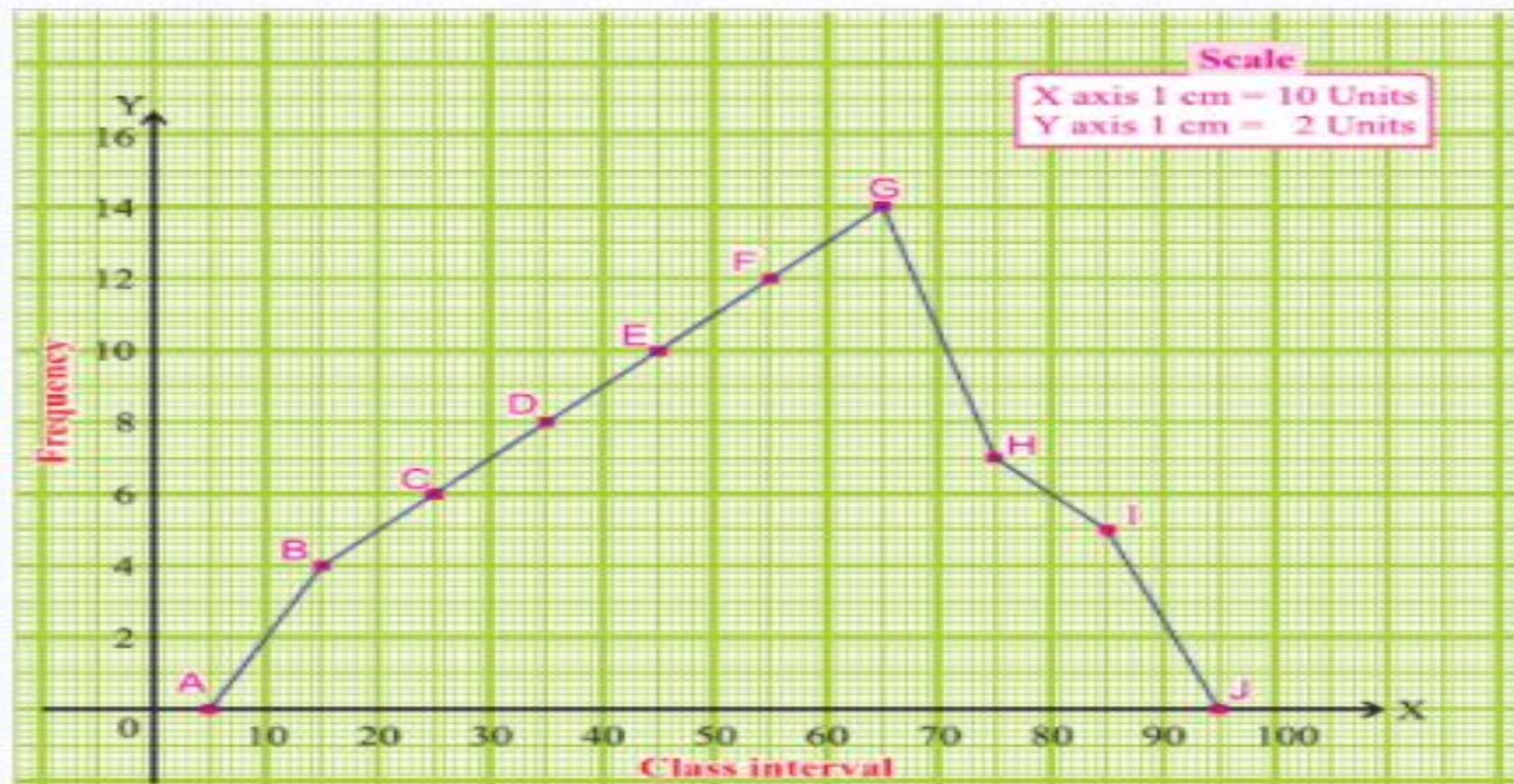
We take the imagined classes 0-10 at the beginning and 90-100 at the end, each with frequency zero.

We have tabulated which is given below.

Class interval	Midpoints	Frequency
0-10	5	0
10-20	15	4
20-30	25	6
30-40	35	8
40-50	45	10
50-60	55	12
60-70	65	14
70-80	75	7
80-90	85	5
90-100	95	0

Using the adjacent table, plot the points A (5, 0), B (15, 4), C (25, 6), D (35, 8), E (45, 10), F (55, 12), G (65, 14), H (75, 7), I (85, 5) and J (95, 0).

We draw the line segments AB, BC, CD, DE, EF, FG, GH, HI, IJ to obtain the required frequency polygon ABCDEFGHIJ, which is given below.



Ogives or Cumulative frequency graphs

By plotting cumulative frequency against the respective class boundary, we get ogives.

As such there are two ogives - less than type ogives, obtained by taking less than cumulative frequency on the vertical axis and more than type ogives by plotting more than type cumulative frequency on the vertical axis and thereafter joining the plotted points successively by line segments.

Ogives - Example

Example :

Draw ogives for the following table which represents the frequency distribution of weights of 36 students.

Weights in kg (Class interval)	No. of students (Frequency)
43.50 - 48.50	3
48.50 - 53.50	4
53.50 - 58.50	5
58.50 - 63.50	7
63.50 - 68.50	9
68.50 - 73.50	8

Solution :

To draw ogives for the above frequency distribution, we have to write less than and more than cumulative frequency as given below.

Weight in kg (CB)	Cumulative Frequency	
	Less than	More than
43.50	0	$33 + 3$ or 36
48.50	$0 + 3$ or 3	$29 + 4$ or 33
53.50	$3 + 4$ or 7	$24 + 5$ or 29
58.50	$7 + 5$ or 12	$17 + 7$ or 24
63.50	$12 + 7$ or 19	$8 + 9$ or 17
68.50	$19 + 9$ or 28	$0 + 8$ or 8
73.50	$28 + 8$ or 36	0

Now, we have to write the points from less than and more than cumulative frequency as given below.

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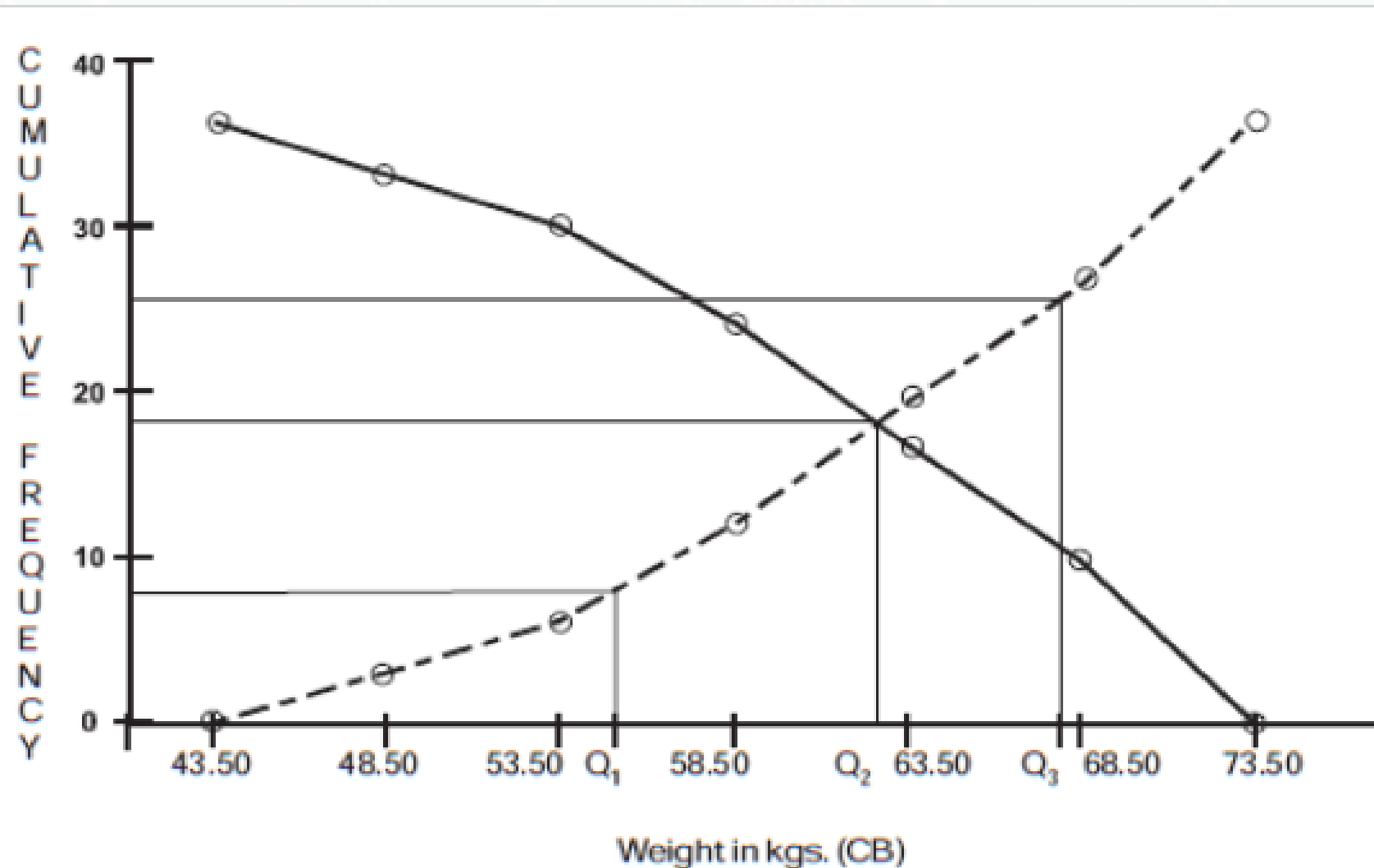
Points from less than cumulative frequency :

(43.50, 0), (48.50, 3), (53.50, 7), (58.50, 12), (63.50, 19),
(68.50, 28) and (73.50, 36)

Points from more cumulative frequency :

(43.50, 36) (48.50, 33), (53.50, 29), (58.50, 24), (63.50, 17),
(68.50, 8) and (73.50, 0)

Now, taking frequency on the horizontal axis, weights on vertical axis and plotting the above points, we get ogives as given



- A bar diagram and a histogram may look the same but there are three important differences between them
- In a histogram, there is no gap between the bars as the variable is continuous. A bar diagram will have space between the bars.
- All the bars need not be of equal width in a histogram (depends on the class interval), whereas they are equal in a bar diagram.
- The area of each bar corresponds to the frequency in a histogram whereas in a bar diagram, it is the height

- **CHARACTERISTICS OF FREQUENCY DISTRIBUTION**

- There are four important characteristics of frequency distribution. They are as follows:
 - Measures of central tendency and location (mean, median, mode)
 - Measures of dispersion (range, variance, standard deviation)
 - The extent of symmetry/asymmetry (skewness)
 - The flatness or peakedness (kurtosis).

1. ஒரு கம்பெனியின் கடந்த சில ஆண்டுகளில் இலாபம் தரப்பட்டுள்ளது. வரைபடம் வரைந்து காட்டுக.

ஆண்டு	1976	1977	1978	1979	1980	1981	1982	1983
இலாபம் ரூபாய் இலட்சத்	82	120	113	140	170	175	180	178

2. கீழ்காணும் விவரங்களுக்கு நேர்கோட்டு விளக்கப்படம் வரைக.

மதிப்பெண்	20-30	30-40	40-50	50-60	60-70	70-80
மாணவர்களின்	2	6	12	15	8	4