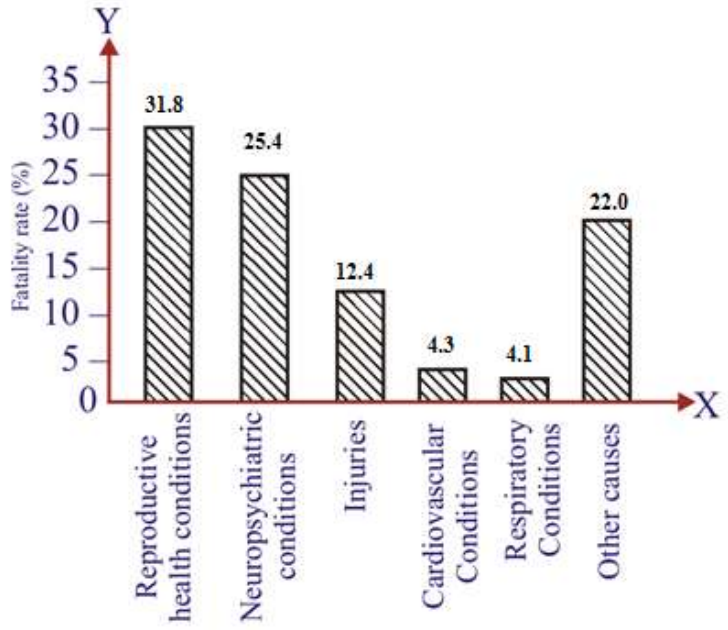
Statistics: Exercise 14.3

Q.1 A survey conducted by an organisation for the cause of illness and death among the women between the ages 15 – 44 (in years) worldwide, found the following figures (in %)

S.No.	Causes	Female fatality rate (%)
1.	Reproductive health conditions	31.8
2.	Neuropsychiatric conditions	25.4
3.	Injuries	12.4
4.	Cardiovascular conditions	4.3
5.	Respiratory conditions	4.1
6.	Other causes	22.0

(i) Represent the information given above graphically.
(ii) Which condition is the major cause of women's ill health and death worldwide?
(iii) Try to find out, with the help of your teacher, any two factors which play a major role in the cause in (ii) above being the major cause.

Sol. **(i)** To draw the graph of given data, the causes of illness and death among women between the ages 15 – 44 (in years) worldwide is denoted on X-axis and female fatality rate (%) is denoted on the Y-axis. Scale on y axis: 1 cm = 5%.



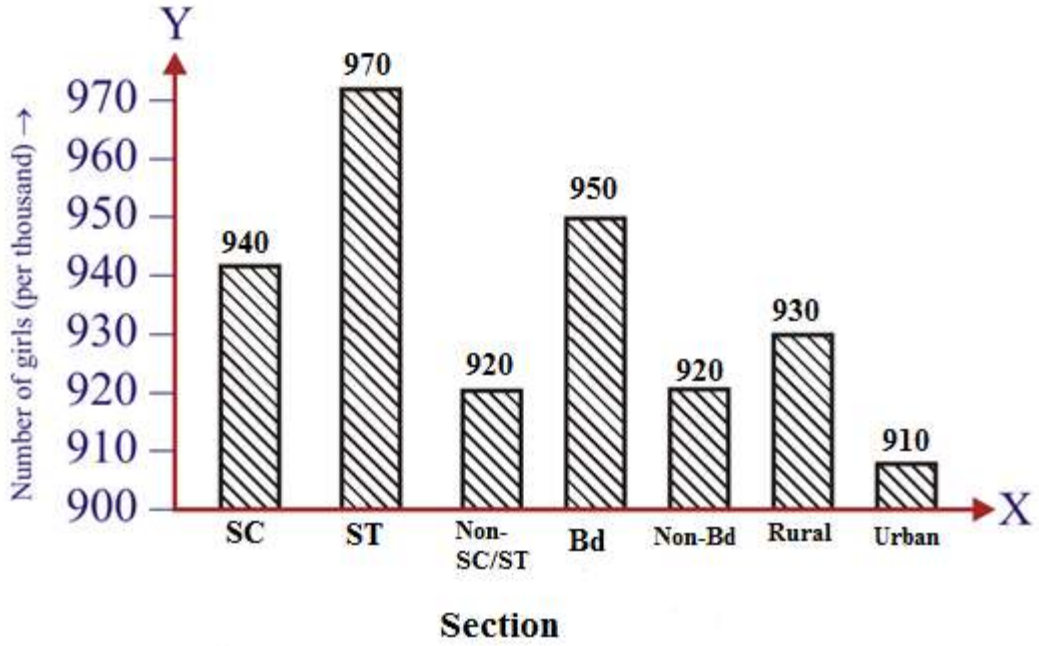
(ii) From the graph, major cause of women's ill health and death worldwide is reproductive health conditions (31.8%).
(iii) Two other factors which play a major role in the cause in (ii) above are:
(a) Neuropsychiatric conditions
(b) Other causes like- Lack of proper care and medical facilities.

Q.2 The following data on the number of girls (to the nearest ten per thousand) boys in different sections of the society is given below:

Section	Number of girls per thousand boys
Scheduled Caste (SC)	940
Scheduled Tribe (ST)	970
Non SC/ST	920
Backward districts	950
Non-backward districts	920
Rural	930
Urban	910

(i) Represent the information above by a bar graph.
(ii) Write two conclusions you can arrive at from the graph, with justification.

Sol. **(i)** To draw the graph of given data, the number of girls (to the nearest ten per thousand) boys in the society is denoted on X-axis and different sections are denoted on the Y-axis. Scale on y axis: 1 cm = 10 girls.



(ii) We find from the graph that the number of girls (to the nearest ten per thousand) boys are maximum in scheduled tribes (ST-970) whereas they are minimum in urban (910).

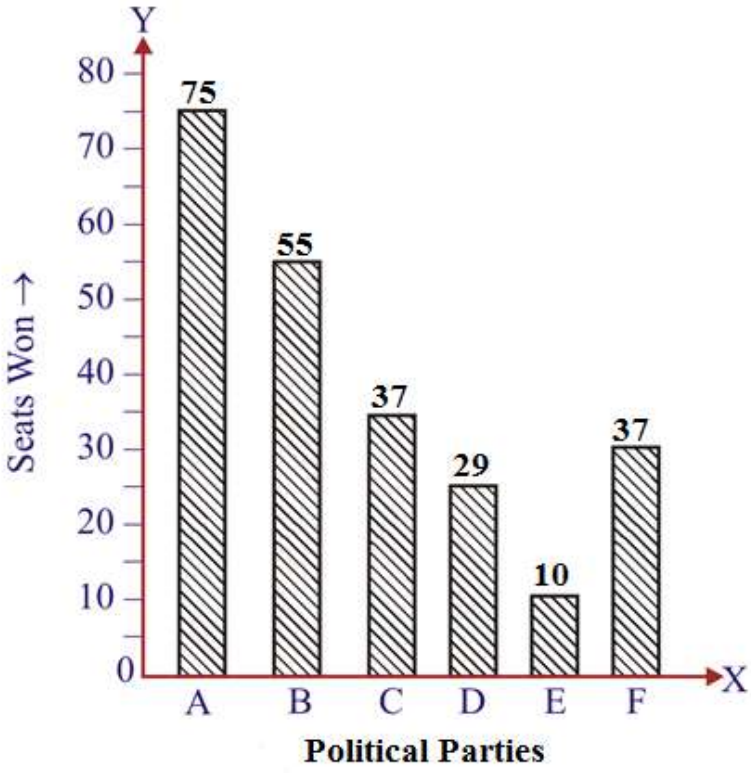
Q.3 Given below are the seats won by different political parties in the polling outcome of a state assembly elections:

Political Party	A	B	C	D	E	F
Seats Won	75	55	37	29	10	37

(i) Draw a bar graph to represent the polling results.
(ii) Which political party won the maximum number of seats?

Sol. **(i)** To draw the graph of given data, political party is denoted on the X-axis and the number of seat won on the Y-axis.

Scale on y-axis: 1 cm = 10 seats.
Thus required graph:



(ii) From the graph, party A won the maximum number of seats.

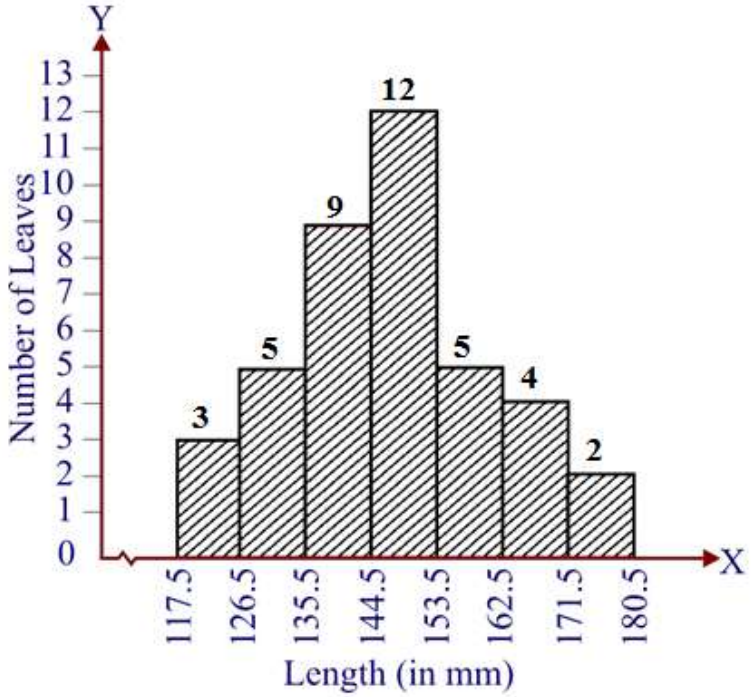
Q.4 The length of 40 leaves of a plant are measured correct to one millimeter, and the obtained data is represented in the table:

Length (in mm)	Number of leaves
118 - 126	3
127 - 135	5
136 - 144	9
145 - 153	12
154 - 162	5
163 - 171	4
172 - 180	2

(i) Draw a histogram to represent the given data.
(ii) Is there any other suitable graphical representation for the same data?
(iii) Is it correct to conclude that maximum number of leaves are 153 mm long? Why?
***Sol.* (i)** Since, given frequency distribution is not continuous distribution. So, we need to first convert it into a continuous frequency distribution.
The difference between the lower limit of a class (i.e.126) and the upper limit of the preceding class (i.e. 127) is 1. So, (h = 127-126 = 1).
Now, to convert the given frequency distribution into a continuous frequency distribution, we need to subtract h/2 = ½ = 0.5 from each of lower limit and add 0.5 to each upper limit.

Length (in mm)	Number of leaves
117.5 – 126.5	3
126.5 – 135.5	5
135.5 – 144.5	9
144.5 – 153.5	12
153.5 – 162.5	5
165.5 – 171.5	4
171.5 – 180.5	2

Thus, the histogram of the above frequency distribution:



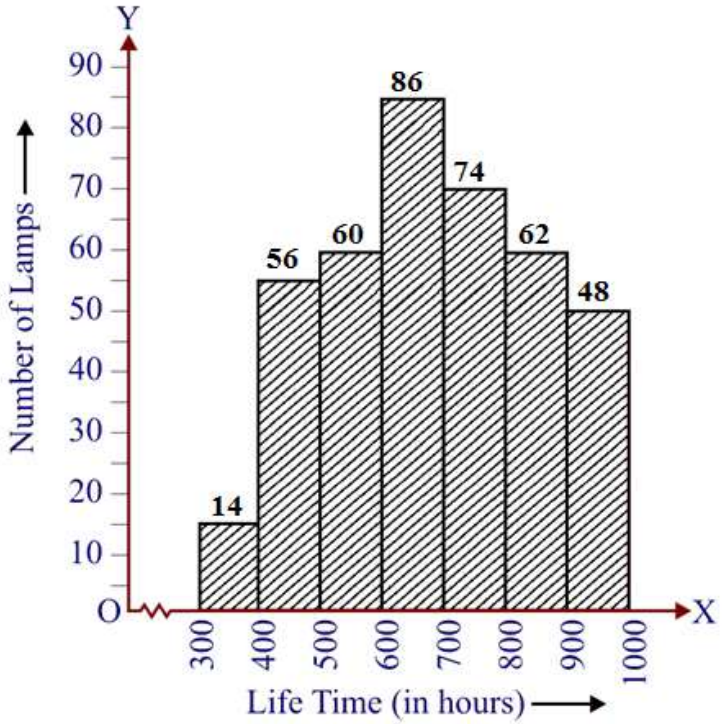
(ii) Another method is frequency polygon for representing frequency distribution graphically.
(iii) We cannot conclude that the maximum number of leaves are 153 mm long because the maximum number of leaves lie in-between the length of 144.5 – 153.5.

Q.5 The following table gives the life times of 400 neon lamps:

Life time (in hours)	Number of lamps
300 - 400	14
400 - 500	56
500 - 600	60
600 - 700	86
700 - 800	74
800 - 900	62
900 - 1000	48

(i) Represent the given information with the help of a histogram.
(ii) How many lamps have a life time of more than 700 hours?

Sol. **(i)** The histogram of the given frequency distribution:



(ii) Number of lamps have a life time of more than 700 hours = 74 + 62 + 48
= 184.

Q.6 The following two table gives the distribution of students of two sections according to the marks obtained by them:

Section A		Section B	
Marks	Frequency	Marks	Frequency
0 - 10	3	0 - 10	5
10 - 20	9	10 - 20	19
20 - 30	17	20 - 30	15
30 - 40	12	30 - 40	10
40 - 50	9	40 - 50	1

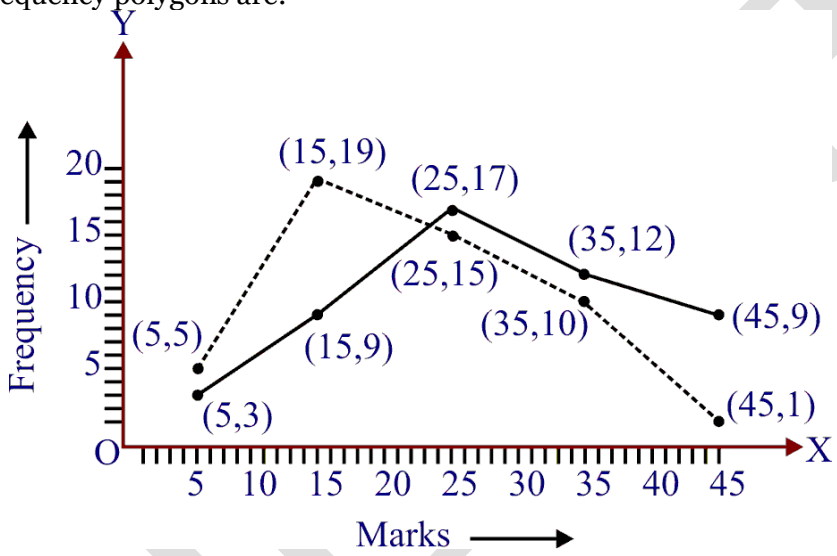
Represent the marks of the students of both the sections on the same graph by two frequency polygons.

Sol. Firstly we need to obtain the class marks in the following table:

Marks	Class marks	Section A	Section B
0 – 10	5	3	5
10 – 20	15	9	19
20 – 30	25	17	15
30 – 40	35	12	10
40 – 50	45	9	1

Now, represent the class marks on X-axis with scale 1 cm = 5 unit and the frequencies on Y-axis with scale 1 cm = 5 unit.

For frequency polygon of section A, plot the points (5, 3), (15, 9), (25, 17), (35, 12) and (45, 9), and join these points by line segments.
Now, for frequency polygon of section B, plot the points (5, 5), (15, 19), (25, 15), (35, 10) and (45, 1) on the same scale and join these points by dotted line segments.
These two frequency polygons are:



Q.7 The runs scored by two teams A and B on the first 60 balls in a cricket match are given on the next page:

Number of balls	Team A	Team B
1 - 6	2	5
7 - 12	1	6
13 - 18	8	2
19 - 24	9	10
25 - 30	4	5
31 - 36	5	6
37 - 42	6	3
43 - 48	10	4
49 - 54	6	8
55 - 60	2	10

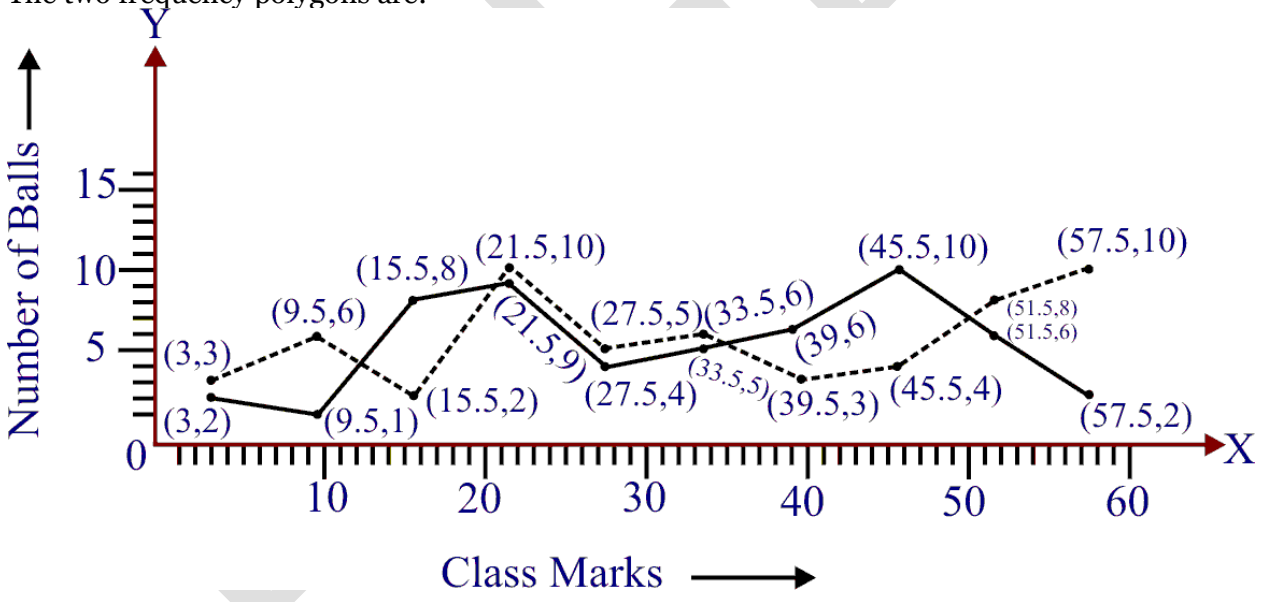
Represent the data of both the teams on the same graph by frequency polygons.

Sol. Firstly we need to obtain the class marks in the following table:

Number of balls	Class marks	Team A	Team B
0 – 6	3	2	3
7 – 12	9.5	1	6
13 – 18	15.5	8	2
19 – 24	21.5	9	10
25 – 30	27.5	4	5
31 – 36	33.5	5	6
37 – 42	39.5	6	3
43 – 48	45.5	10	4
49 – 54	51.5	6	8
55 – 60	57.5	2	10

Now, represent class marks on x-axis with scale 1 cm = 10 unit and frequencies on y-axis with scale 1 cm = 5 unit.

For frequency polygon of team A, plot the points (3, 2) (9.5, 1), (15.5, 8), (21.5, 9), (27.5, 4), (33.5, 5), (39.5, 6), (45.5, 10), (51.5, 6) and (57.5, 2) and join these points by the line segments.
Now for frequency polygon of team B, plot the points (3, 3) (9.5, 6), (15.5, 2) (21.5, 10), (27.5, 5), (33.5, 6) (39.5, 3), (45.5, 4) (51.5, 8) and (57.5, 10) and join these point with dotted line segment.
The two frequency polygons are:



Q.8 A random survey of the number of children of various age groups playing in a park was found as follows:

Age (in years)	Number of children
1 - 2	5
2 - 3	3
3 - 5	6
5 - 7	12
7 - 10	9
10 - 15	10
15 - 17	4

Draw a histogram to represent the data above,

Sol. Since, in the given frequency distribution, the class-sizes are different. So, we need to calculate the adjusted frequency for each class:

$$\text{Adjusted frequency for a class} = \frac{\text{Minimum class} - \text{size}}{\text{Class} - \text{size of this class}} \times \text{its frequency}$$

Minimum class- size = 2–1 = 1.

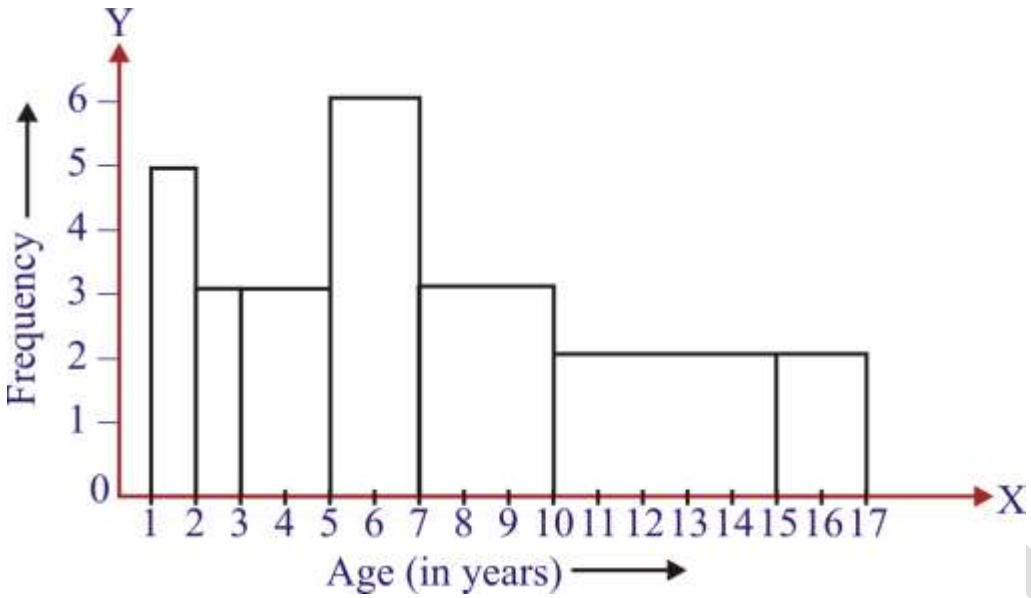
Thus, the following table of the adjusted frequency:

Age (in years)	Frequency	Width	Adjusted Frequency
1 – 2	5	1	1/1 × 5 = 5
2 – 3	3	1	1/1 × 3 = 3
3 – 5	6	2	1/2 × 6 = 3
5 – 7	12	2	1/2 × 12 = 6
7 – 10	9	3	1/3 × 9 = 3
10 – 15	10	5	1/5 × 10 = 2
15 – 17	4	2	1/2 × 4 = 2

Now represent the class intervals along the X-axis with scale 1 cm = 1 unit and the corresponding adjusted frequencies on the Y-axis with scale 1 cm = 1 unit.

Now, draw rectangles with the class intervals as bases and the corresponding adjusted frequencies as the heights.

The required histogram:



Q.9 100 surnames were randomly picked up from a local telephone directory and a frequency distribution of the number of letters in the English alphabets in the surnames was found as follows :

Number of letters	Number of surnames
1 - 4	6
4 - 6	30
6 - 8	44
8 - 12	16
12 - 20	4

(i) Draw a histogram to depict the given information.
(ii) Write the class interval in which the maximum number of surnames lie.

Sol. **(i)** Since in the given frequency distribution, the class-sizes are different.
So, we need to calculate the adjusted frequency for each class:

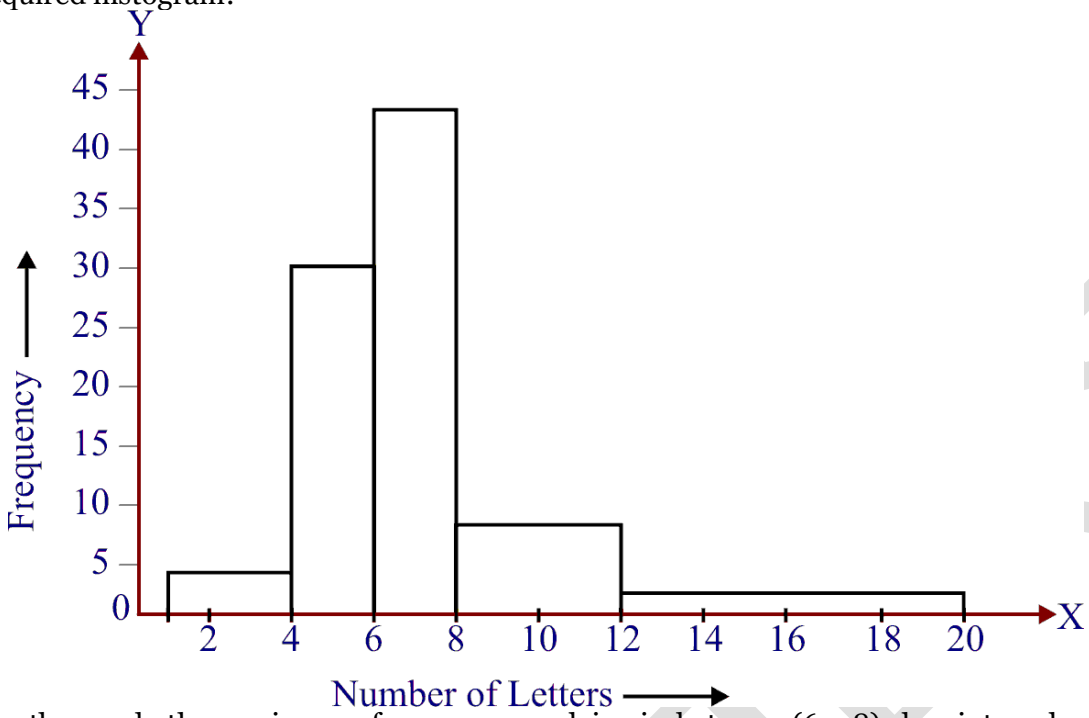
$$\text{Adjusted frequency for a class} = \frac{\text{Minimum class} - \text{size}}{\text{Class} - \text{size of this class}} \times \text{its frequency}$$

Minimum class-size = 6 – 4 = 2.
Thus, the following table of the adjusted frequency:

Number of letters	Frequency	Adjusted frequency
1 – 4	6	2/3 × 6 = 4
4 – 6	30	2/2 × 30 =30
6 – 8	44	2/2 × 44 = 44
8 – 12	16	2/4 × 16 = 8
12 – 20	4	2/8 × 4 =1

Now, represent the class intervals along the X-axis with scale 1 cm = 2 unit and the corresponding adjusted frequencies on the Y-axis with scale 1 cm = 5 unit.

Now, draw rectangles with the class intervals as bases and the corresponding adjusted frequencies as the heights.
Thus, required histogram:



(ii) From the graph, the maximum of surnames are lying in-between (6 – 8) class interval.