

## 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%):

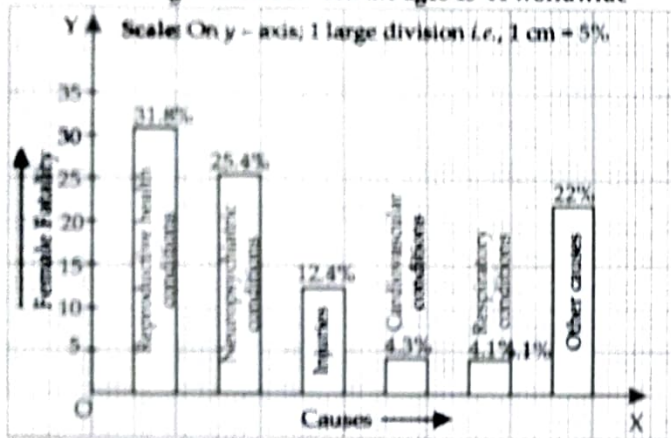
S. No.	Causes	Female fatality rate (%)
1.	Reproductive health conditions	31.8
2.	Neuropsychiatric conditions	25.4
3.	Injuries	12.4
4.	Cardiovascular conditions	4.3
5.	Respiratory conditions	4.1
6.	Other causes	22.0

- (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) We represent the given information in the form of a bar graph. We construct the bar graph through the following steps:

- Step (i)** Draw two perpendicular axes OX and OY on a plain paper.
- Step (ii)** Along OX mark "Causes" and along OY "Female Fatality rate (%)".
- Step (iii)** Along OX, choose suitable width for each bar.
- Step (iv)** Along OY, choose an appropriate scale and mark the Female Fatality rate (%).

**Bar graph showing the cause of illness and death among women between the ages 15-44 worldwide**



- (ii) From the bar graph it is observed that reproductive health conditions is the major cause of women's ill health and fatality worldwide.
- (iii) Two major factors for poor reproductive health conditions are as follows:
- (1) Lack of awareness among women.
  - (2) Lack of medical facilities.

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

Section	Number of girls per thousand boys
Scheduled Caste (SC)	940
Scheduled Tribes (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) In the classroom discuss what conclusions can be arrived at from the graph.

**Sol.** (i) We represent the given information in the form of a bar graph. We construct the bar graph through the following steps:

- Step (i)** Draw two perpendicular axes OX and OY on a plain paper.
- Step (ii)** Along OX mark "Section" and along OY mark "Number of girls per thousand boys."
- Step (iii)** Along OX choose suitable width for each bar.
- Step (iv)** Along OY choose an appropriate scale. Here choose 1 large division = 100 girls.
- Step (v)** Calculate the heights of the various bars as follows:

(I) Height of bar for scheduled caste (SC)

$$= \frac{1}{100} \times 940 = 9.4 \text{ large divisions}$$

(II) Height of bar for scheduled tribe (ST)

$$= \frac{1}{100} \times 970 = 9.7 \text{ large divisions}$$

(III) Height of bar for Non SC/ST

$$= \frac{1}{100} \times 920 = 9.2 \text{ large divisions}$$

(IV) Height of bar for Backward districts

$$= \frac{1}{100} \times 950 = 9.5 \text{ large divisions}$$

(V) Height of bar for non-backward districts

$$= \frac{1}{100} \times 920 = 9.2 \text{ large divisions}$$

(VI) Height of bar for Rural

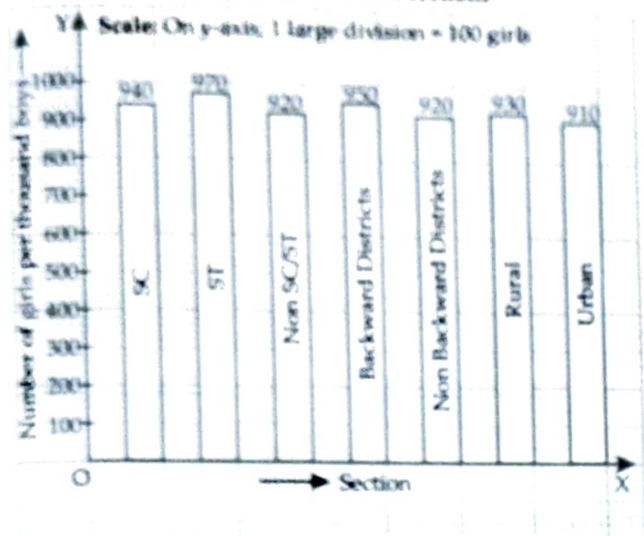
$$= \frac{1}{100} \times 930 = 9.3 \text{ large divisions}$$



(VII) Height of bar for Urban

$$= \frac{1}{100} \times 910 = 9.1 \text{ large divisions}$$

Record of the number of girls per thousand boys from different sections



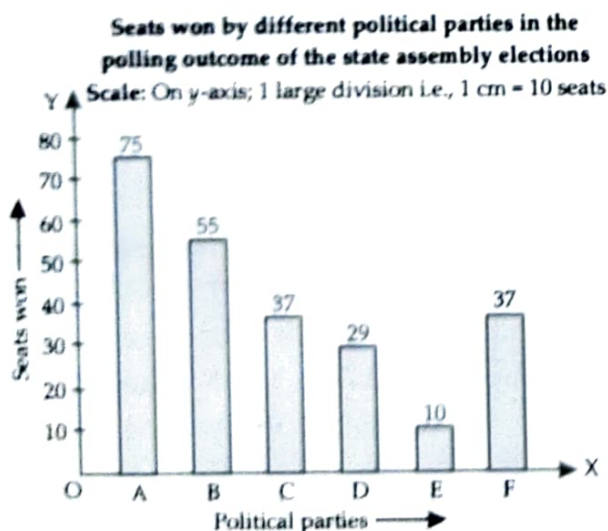
(ii) From the graph it is observed that in each section the number of girls are nearly same. We also observe that the number of girls in each section are less than the boys.

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

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

- Draw a bar graph to represent the polling results.
- Which political party won the maximum number of seats.

**Sol.** (i) We represent the given information in the form of a bar graph which is drawn as below:



(ii) Out of all won seats, 75 is the maximum

So, party A has won maximum number of seats.

**Q. 4.** The length of 40 leaves of a plant are measured correct to one millimetre, and the obtained data is represented in the following 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

- Draw a histogram to represent the given data.
- Is there any other suitable graphical representation for the same data?
- Is it correct to conclude that the maximum number of leaves is 153 mm long? Why?

**Sol.** (i) We first make the distribution continuous (i.e. inclusive to exclusive form) as given below:

Let us find half the difference between the lower limit of a class and upper limit of its proceeding class i.e.  $\frac{1}{2} (127 - 126)$

$$= \frac{1}{2} = 0.5$$

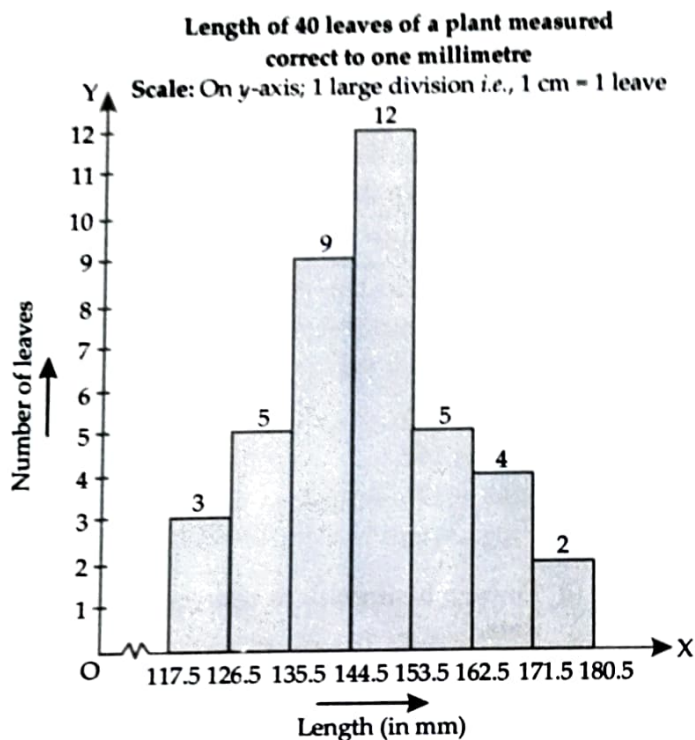
Now to make distribution continuous; in each of the class.

We subtract 0.5 from the lower limit and add 0.5 to the upper limit.

Thus, we get the distribution as below:

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
162.5 – 171.5	4
171.5 – 180.5	2

We represent the given data in the form of a histogram which is as ahead:



- (ii) Yes, we can represent the given data by other graphical representation named as **Frequency Polygon**, which is as follows:

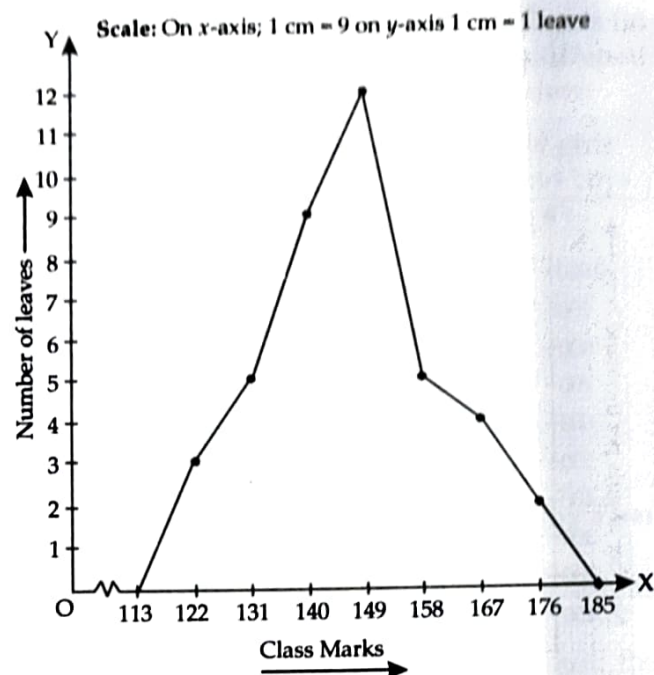
First of all, we prepare a table with class-marks and corresponding number of leaves.

Length (in mm)	Class Mark	Number of leaves
117.5 - 126.5	122	3
126.5 - 135.5	131	5
135.5 - 144.5	140	9
144.5 - 153.5	149	12
153.5 - 162.5	158	5
162.5 - 171.5	167	4
171.5 - 180.5	176	2

We plot the class-marks on x-axis and number of leaves on y-axis.

We plot the ordered pairs (122, 3), (131, 5), ..... , (176, 2).

Join them by line segments to get the frequency polygon.



- (iii) No, because the maximum number 12 is corresponding to the class interval 145 - 153 which implies that the leaves whose length are 145 mm or less than 153 mm are maximum in number.

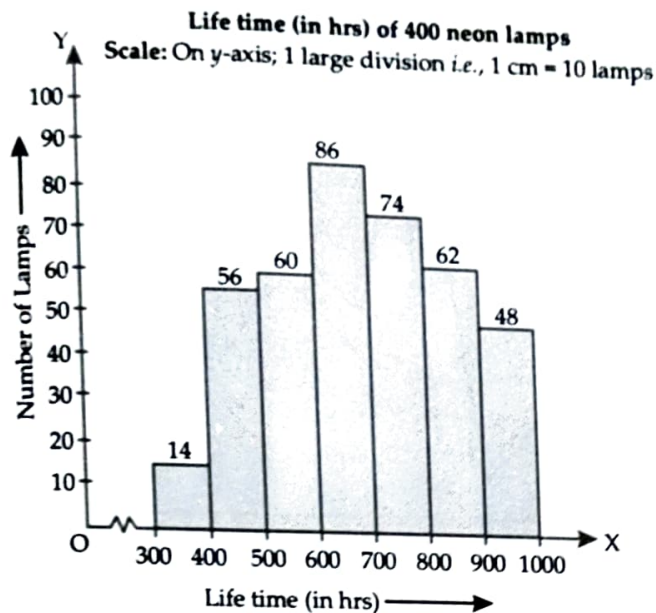
**Q. 5.** The following table gives the life times of 400 neon lamps:

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) We represent the given information in the form of histograms which is as follows:





- (ii) Number of lamps having life time of more than 700 hours =  $74 + 62 + 48 = 184$ .

**Q. 6.** The following 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. From the two polygons compare the performance of the two sections.

**Sol.** We represent the given information in the form of frequency polygon.

So, we prepare a table with class-marks and corresponding number of students of sections A and B.

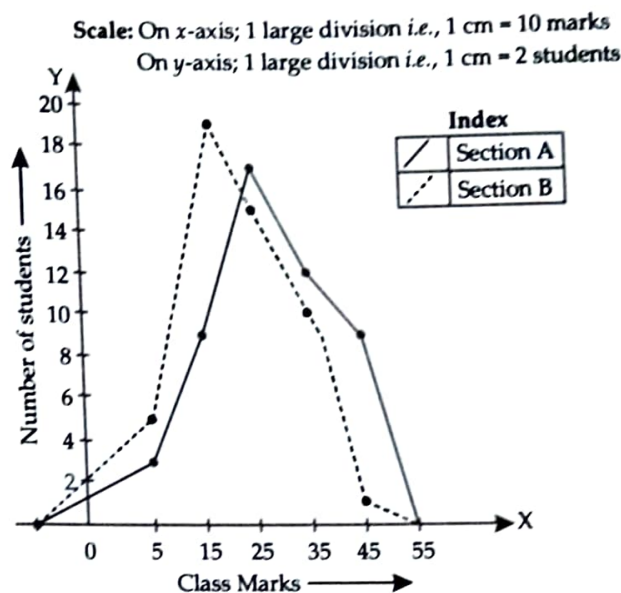
Marks obtained	Class-Marks	Number of students in Section A	Number of students in Section B
0 - 10	5	3	5
10 - 20	15	9	19
20 - 30	25	17	15
30 - 40	35	12	10
40 - 50	45	9	1

We plot the class-marks on x-axis and number of students on y-axis.

We plot the ordered pairs (5, 3), (15, 9), (25, 17), (35, 12) and (45, 9). Join them by line segments to get the frequency polygon for section A.

We plot the ordered pairs (5, 5), (15, 19), (25, 15), (35, 10) and (45, 1).

Join these by dotted line segments to get the frequency polygon for section B.



From the graph we observe that:

Students of section B performed better; because as we move right on x-axis the number of students are spread widely over greater marks as compared to the students of section A.

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

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.** We represent the given information in the form of frequency polygon.

We first make the class intervals continuous, then find the class marks.



Correction factor,

$$d = \frac{\text{Value of lower limit of a class} - \text{Value of upper limit of preceding class}}{2}$$

$$\Rightarrow d = \frac{7-6}{2} = \frac{1}{2} = 0.5.$$

New exclusive series is as follows:

Lower limit - $d$	Upper limit + $d$	Class boundaries
$1 - 0.5 = 0.5$	$6 + 0.5 = 6.5$	$0.5 - 6.5$
$7 - 0.5 = 6.5$	$12 + 0.5 = 12.5$	$6.5 - 12.5$
$13 - 0.5 = 12.5$	$18 + 0.5 = 18.5$	$12.5 - 18.5$
$19 - 0.5 = 18.5$	$24 + 0.5 = 24.5$	$18.5 - 24.5$
$25 - 0.5 = 24.5$	$30 + 0.5 = 30.5$	$24.5 - 30.5$
$31 - 0.5 = 30.5$	$36 + 0.5 = 36.5$	$30.5 - 36.5$
$37 - 0.5 = 36.5$	$42 + 0.5 = 42.5$	$36.5 - 42.5$
$43 - 0.5 = 42.5$	$48 + 0.5 = 48.5$	$42.5 - 48.5$
$49 - 0.5 = 48.5$	$54 + 0.5 = 54.5$	$48.5 - 54.5$
$55 - 0.5 = 54.5$	$60 + 0.5 = 60.5$	$54.5 - 60.5$

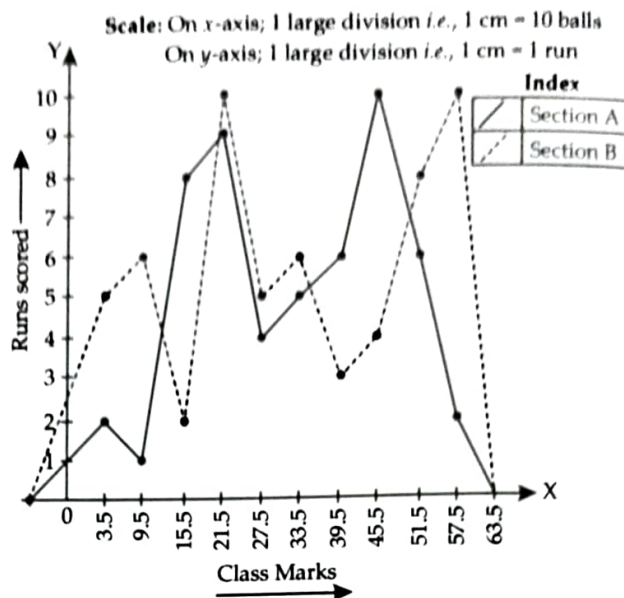
Number of balls	Class-Marks	Runs scored by team A	Runs scored by team B
$0.5 - 6.5$	3.5	2	5
$6.5 - 12.5$	9.5	1	6
$12.5 - 18.5$	15.5	8	2
$18.5 - 24.5$	21.5	9	10
$24.5 - 30.5$	27.5	4	5
$30.5 - 36.5$	33.5	5	6
$36.5 - 42.5$	39.5	6	3
$42.5 - 48.5$	45.5	10	4
$48.5 - 54.5$	51.5	6	8
$54.5 - 60.5$	57.5	2	10

We plot the class-marks on  $x$ -axis and number of students on  $y$ -axis.

We plot ordered pairs  $(3.5, 2), (9.5, 1), \dots, (57.5, 2)$ .

Join them by line segments to get the frequency polygon for team A.

We plot the ordered pairs  $(3.5, 5), (9.5, 6), \dots, (57.5, 10)$ . Join them by dotted line-segments to get the frequency polygon for team B.



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

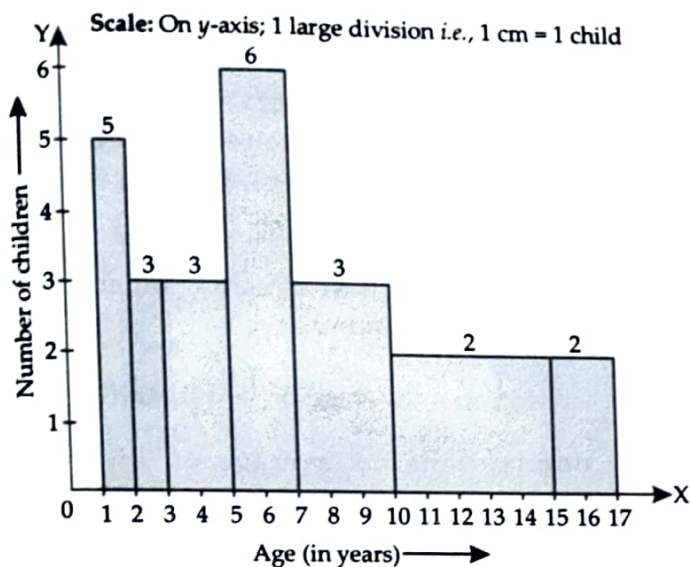
Draw a histogram to represent the data above.

Sol. Here classes are not of equal size. We select the class with minimum class size. Here minimum class size is 1.

Adjustment of frequencies (height of rectangles) according to the class size are as follows:

Age (in years)	Frequency	Width	Length of rectangle
1 - 2	5	1	$\frac{5}{1} \times 1 = 5$
2 - 3	3	1	$\frac{3}{1} \times 1 = 3$
3 - 5	6	2	$\frac{6}{2} \times 1 = 3$
5 - 7	12	2	$\frac{12}{2} \times 1 = 6$
7 - 10	9	3	$\frac{9}{3} \times 1 = 3$
10 - 15	10	5	$\frac{10}{5} \times 1 = 2$
15 - 17	4	2	$\frac{4}{2} \times 1 = 2$

Now we draw the histogram, using these lengths.



- 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 alphabet 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.** Here classes are not of equal size. We select the class with minimum class size. Here minimum class size is 2.

Adjustment of frequency (height of rectangles) according to the class size are as follows:

Number of letters	Frequency	Width of interval	Length of rectangle
1 – 4	6	3	$\frac{6}{3} \times 2 = 4$
4 – 6	30	2	$\frac{30}{2} \times 2 = 30$
6 – 8	44	2	$\frac{44}{2} \times 2 = 44$
8 – 12	16	4	$\frac{16}{4} \times 2 = 8$
12 – 20	4	8	$\frac{4}{8} \times 2 = 1$

Now we draw the histogram using these lengths

