

NCERT QUESTIONS WITH SOLUTIONS

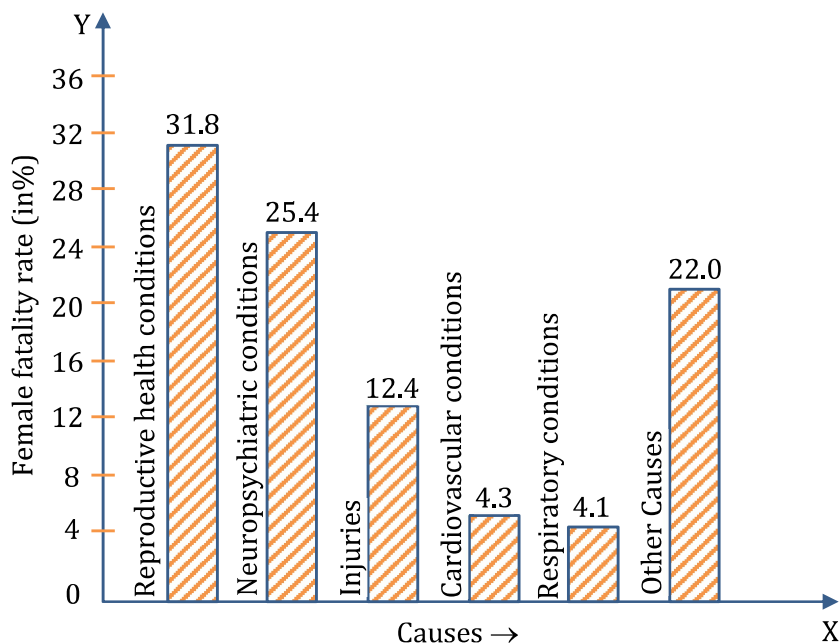
EXERCISE : 12.1

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

- (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) Scale: y-axis 1cm = 4 units



- (ii) Reproductive health conditions is the major cause of women's ill health and death worldwide.
- (iii) Two factors may be lack of education and poor background.

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 Tribe (ST)	970
Non SC/ST	920
Backward districts	950
Non-backward districts	920
Rural	930
Urban	910

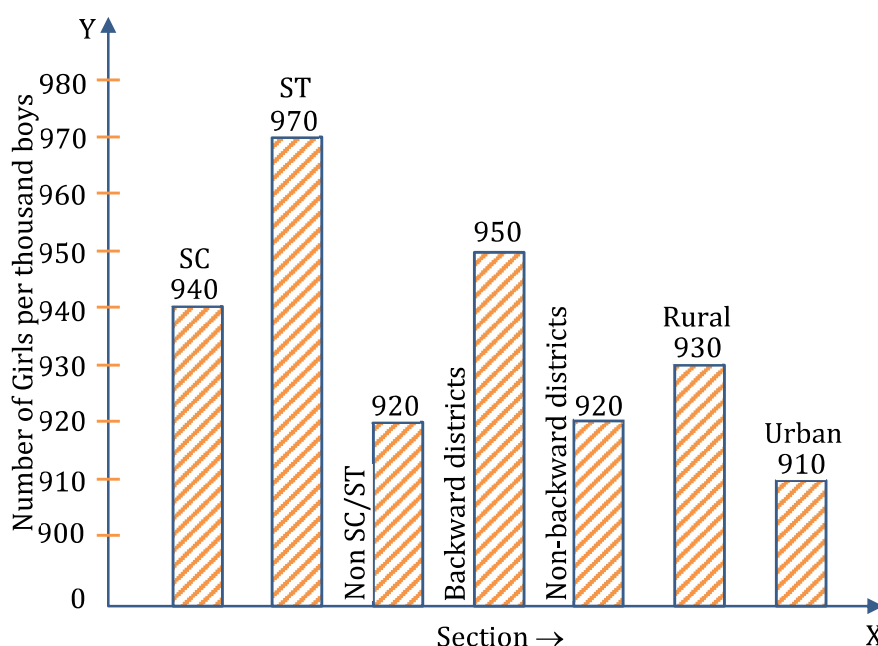
- (i) Represent the information above by a bar graph.
(ii) In the classroom, discuss what conclusions can be arrived at from the graph.

Sol. (i) We have 7 entries in the data and their values are 940, 970, 920, 950, 920, 930, 910.

We will plot these values on the Y-axis and the marking will be as below :

900, 910, 920, 930, 940, 950, 960, 970, 980.

- (ii) We take one unit of length along the Y-axis = 10.



- (ii) It can be observed that maximum number of girls per thousand boys (i.e., 970) is for ST and minimum number of girls per thousand boys (i.e., 910) is for urban. Also, the number of girls per thousand boys is greater in rural areas than that in urban areas, backward districts than that in non-backward districts, SC and ST than that in non SC/ST.

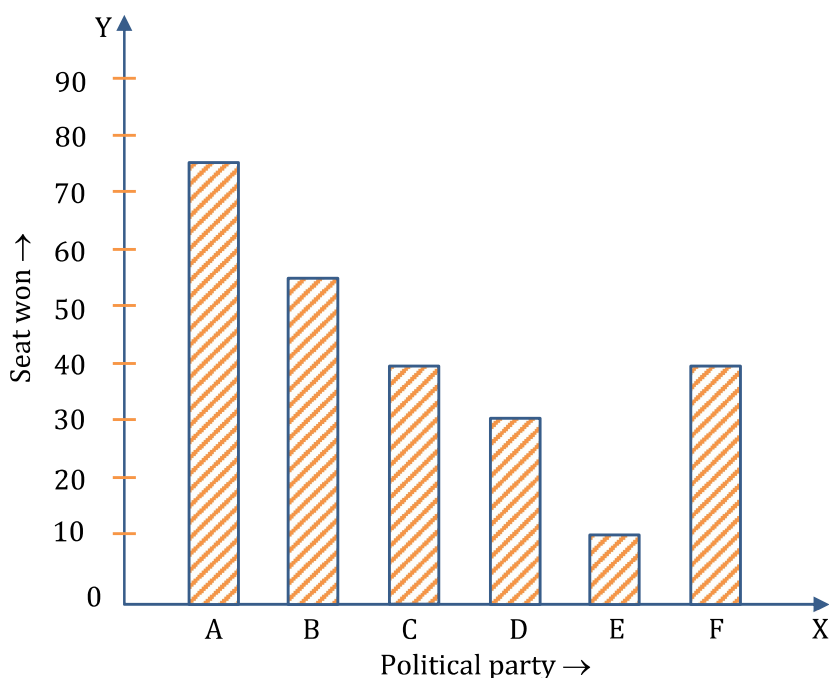
3. Given below are the seats won by different political parties in the polling outcome of a state assembly elections:

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) The required bar graph is given below :

Scale : on y-axis 1 unit = 10 seats.



- (ii) The political party A won the maximum number of seats.

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

- (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 the maximum number of leaves are 153 mm long? Why?

Sol. (i) The given frequency distribution is not continuous. Therefore, first we have to modify it to be continuous distribution.

$$\frac{127 - 126}{2} = \frac{1}{2} = 0.5$$

∴ The modified class intervals are :

$$(118 - 0.5) - (126 + 0.5) = 117.5 - 126.5$$

$$(127 - 0.5) - (135 + 0.5) = 126.5 - 135.5$$

$$(135 - 0.5) - (144 + 0.5) = 135.5 - 144.5$$

$$(145 - 0.5) - (153 + 0.5) = 144.5 - 153.5$$

$$(154 - 0.5) - (162 + 0.5) = 153.5 - 162.5$$

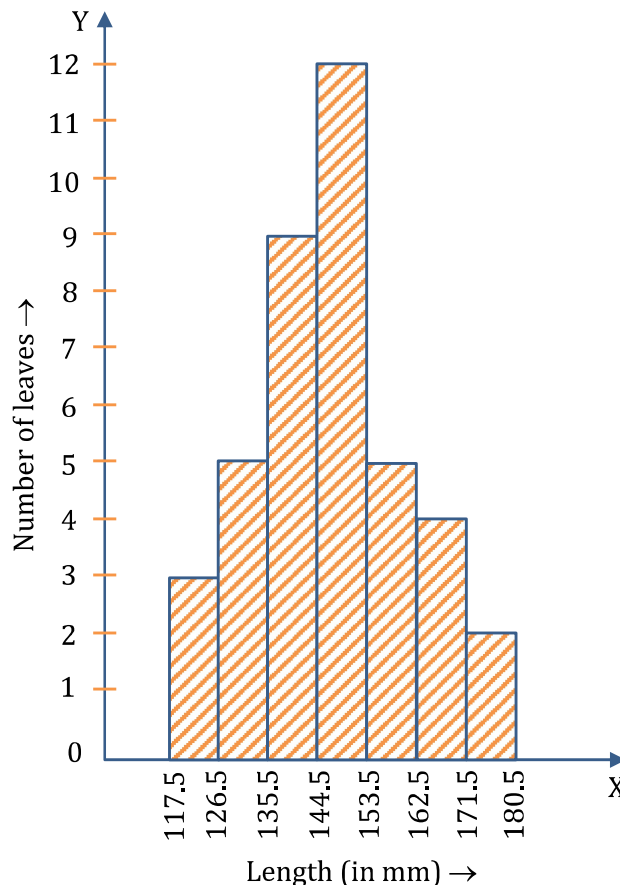
$$(163 - 0.5) - (171 + 0.5) = 162.5 - 171.5$$

$$(172 - 0.5) - (180 + 0.5) = 171.5 - 180.5$$

Thus, the modified frequency distribution is

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

Now, the required histogram of the above frequency distribution is as shown here :



- (ii) Yes, other suitable graphical representation is a “frequency polygon”
- (iii) No, it is not a correct statement. The maximum number of leaves are not 153 mm long rather they are from 145 mm to 153 mm long.

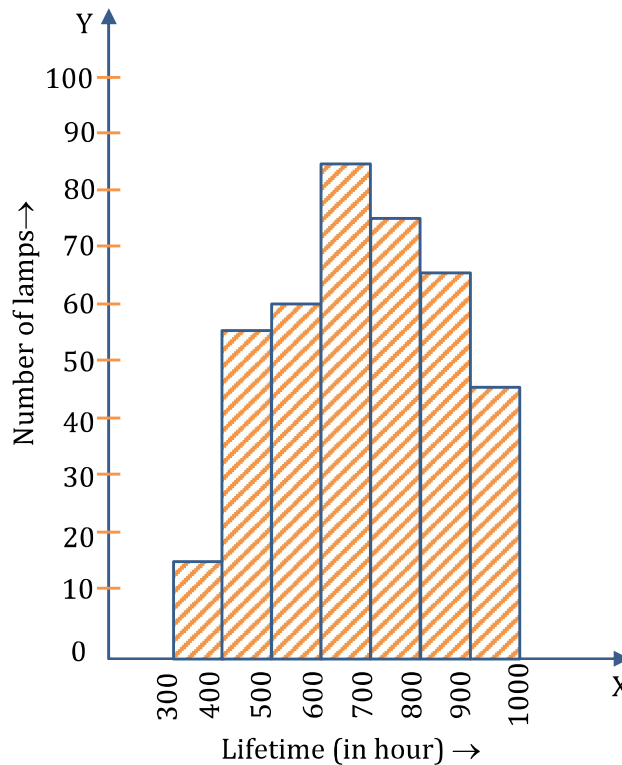
5. The following table gives the life times of 400 neon lamps:

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 required histogram is shown as :

Scale : on y-axis, 1 unit = 10 lamps.



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

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

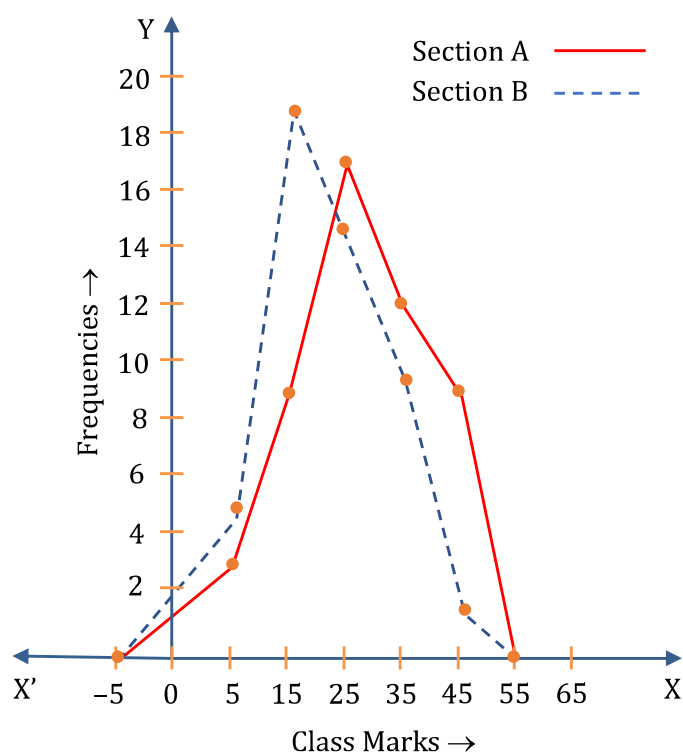
Section A		Section B	
Marks	Frequency	Marks	Frequency
0-10	3	0-10	5
10-20	9	10-20	19
20-30	17	20-30	15
30-40	12	30-40	10
40-50	9	40-50	1

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.** Class marks for section A are : 5, 15, 25, 35, 45 and corresponding frequencies as 3, 9, 17, 12, 9 respectively.

Its frequency polygon is the join of the points (by line segments) $(-5, 0)$, $(5, 3)$, $(15, 9)$, $(25, 17)$, $(35, 12)$, $(45, 9)$ and $(55, 0)$.

Similarly, for the section B, the frequency polygon is the join of the points $(-5, 0)$, $(5, 5)$, $(15, 19)$, $(25, 15)$, $(35, 10)$, $(45, 1)$ and $(55, 0)$.



It can be observed that the performance of students of section 'A' is better than the students of section 'B' in terms of good marks.

7. The runs scored by two teams A and B on 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

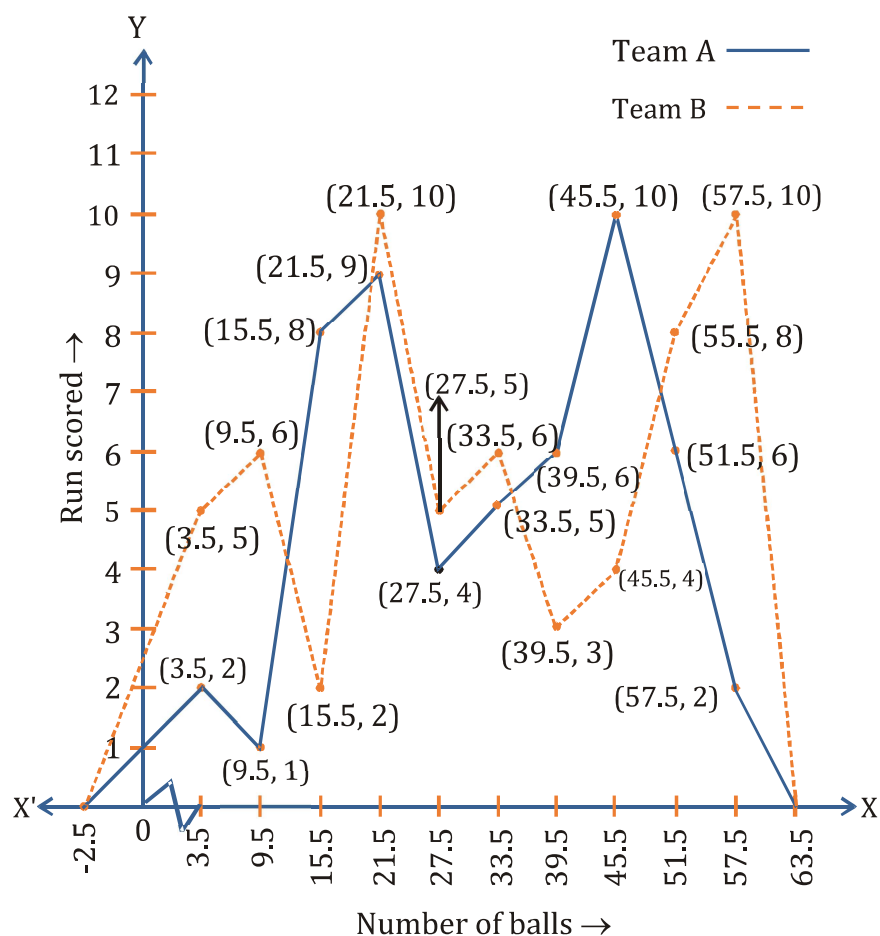
Represent the data of both the teams on the same graph by frequency polygons.

[Hint: First make the class intervals continuous.]

- Sol.** The given class intervals are not continuous. Therefore, we first modify the distribution as continuous.

Number of Balls	Class Marks	Frequency Team A	Frequency 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

Plotting the above observed pair on the same graph paper, we get



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

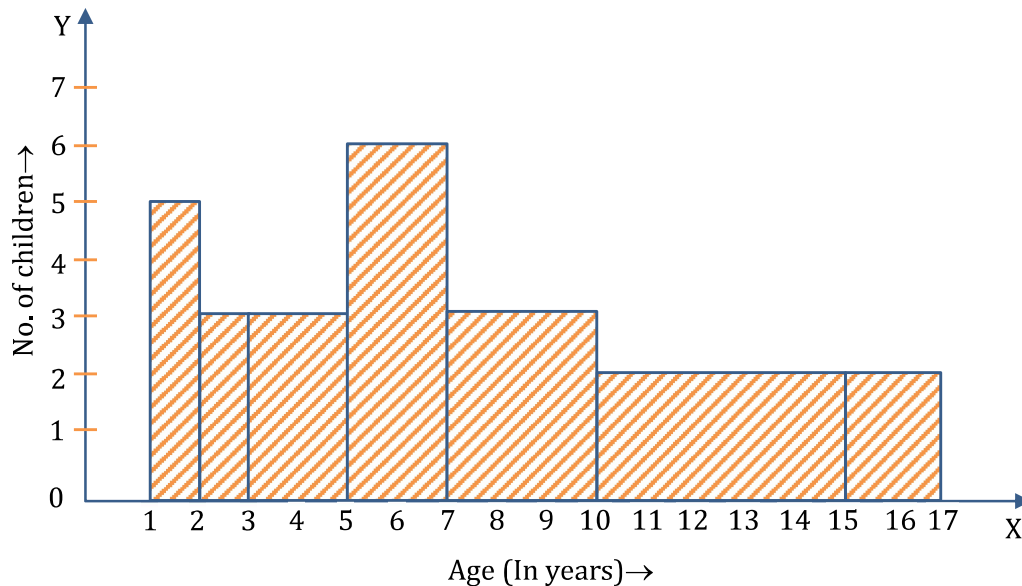
Age (in years)	Number of children
1-2	5
2-3	3
3-5	6
5-7	12
7-10	9
10-15	10
15-17	4

Draw a histogram to represent the data above.

Sol. The width of the class interval is not uniform. We make calculations for proportionate heights of the rectangles of the histogram to be made as in the following table.

Age (in years)	Frequency	Width	Height of the rectangle
1-2	5	1	$5/1 \times 1 = 5$
2-3	3	1	$3/1 \times 1 = 3$
3-5	6	2	$6/2 \times 1 = 3$
5-7	12	2	$12/2 \times 1 = 6$
7-10	9	3	$9/3 \times 1 = 3$
10-15	10	5	$10/5 \times 1 = 2$
15-17	4	2	$4/2 \times 1 = 2$

Now, we make the histogram from the above table.



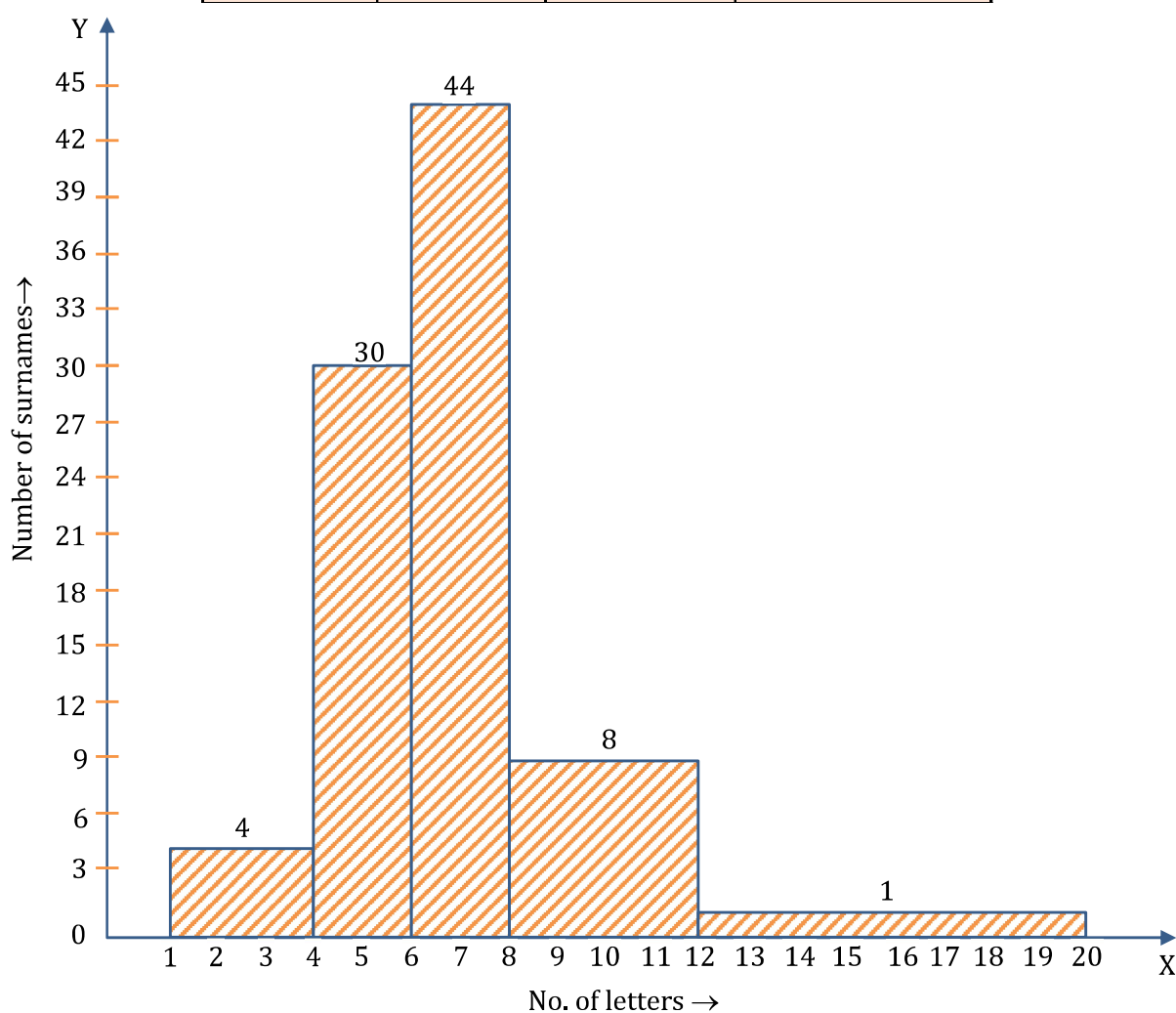
9. 100 surnames were randomly picked up from a local telephone directory and a frequency distribution of the number of letters in the English alphabet in the surnames was found as follows :

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

- Draw a histogram to depict the given information.
- Write the class interval in which the maximum number of surnames lie.

Sol. (i) As in solution 8, we make adjustments about the heights of the rectangle of the required histogram and make a table as below :

Number of letters	Frequency	Width of interval	Height of rectangle
1-4	6	3	$6/3 \times 2 = 4$
4-6	30	2	$30/2 \times 2 = 30$
6-8	44	2	$44/2 \times 2 = 44$
8-12	16	4	$16/4 \times 2 = 8$
12-20	4	8	$4/8 \times 2 = 1$



(ii) (6-8)

Deleted Exercise

1. Give five examples of data that you can collect from your day-to-day life.

Sol. Five examples of data that we can gather from our day to day life are :

- Number of students in our class
- Number of fans in our school.
- Electricity bills of our house for last two years
- Election results obtained from television or newspapers.
- Literacy rate figures obtained from Educational Survey.

Of course, remember that there can be many more different answers.

2. Classify the data in Q.1 above as primary or secondary data.

Sol. Primary data ; (i), (ii) and (iii)

Secondary data ; (iv) and (v)

Deleted Exercise

1. The blood groups of 30 students of Class VIII are recorded as follows:

A, B, O, O, AB, O, A, O, B, A, O, B, A, O, O,

A, AB, O, A, A, O, O, AB, B, A, O, B, A, B, O.

Represent this data in the form of a frequency distribution table. Which is the most common, and which is the rarest blood group among these students?

Sol.

Blood group	A	B	O	AB	Total
No. of students	9	6	12	3	30

Most common – O, Rarest – AB

2. The distance (in km) of 40 engineers from their residence to their place of work were found as follows:

5 3 10 20 25 11 13 7 12 31

19 10 12 17 18 11 32 17 16 2

7 9 7 8 3 5 12 15 18 3

12 14 2 9 6 15 15 7 6 12

Construct a grouped frequency distribution table with class size 5 for the data given above taking the first interval as 0-5 (5 not included). What main features do you observe from this tabular representation?

Sol.

Distances (in km)	Tally Marks	Frequency
0-5		5
5-10		11
10-15		11
15-20		9
20-25		1
25-30		1
30-35		2
Total		40

It is observed that 36 engineers out of 40 live at a distance not more than 20 km from their residence. Only 4 engineers live more than 20 km far.

3. The relative humidity (in %) of a certain city for a month of 30 days was as follows :

98.1 98.6 99.2 90.3 86.5 95.3 92.9 96.3

94.2 95.1 89.2 92.3 97.1 93.5 92.7 95.1

97.2 93.3 95.2 97.3 96.2 92.1 84.9 90.2

95.7 98.3 97.3 96.1 92.1 89

- (i) Construct a grouped frequency distribution table with classes 84 - 86, 86 - 88, etc.
 (ii) Which month or season do you think this data is about?
 (iii) What is the range of this data?

Sol. (i)

Relative humidity (in%)	Frequency
84-86	1
86-88	1
88-90	2
90-92	2
92-94	7
94-96	6
96-98	7
98-100	4
Total	30

- (ii) The data appears to be taken in the rainy season as the relative humidity is high.
 (iii) Range = $99.2 - 84.9 = 14.3$

4. The heights of 50 students, measured to the nearest centimetres, have been found to be as follows:

161 150 154 165 168 161 154 162 150 151

162 164 171 165 158 154 156 172 160 170

153 159 161 170 162 165 166 168 165 164

154 152 153 156 158 162 160 161 173 166

161 159 162 167 168 159 158 153 154 159

- (i) Represent the data given above by a grouped frequency distribution table, taking the class intervals as 160 – 165, 165 – 170, etc.
 (ii) What can you conclude about their heights from the table?

Sol. (i)	Heights (in cm)	Frequency
	150-155	12
	155-160	9
	160-165	14
	165-170	10
	170-175	5
	Total	50

(ii) One conclusion that we can draw from the above table is that more than 50% of students are shorter than 165 cm.

5. A study was conducted to find out the concentration of sulphur dioxide in the air in parts per million (ppm) of a certain city. The data obtained for 30 days is as follows:

0.03 0.08 0.08 0.09 0.04 0.17 0.16 0.05
 0.02 0.06 0.18 0.20 0.11 0.08 0.12 0.13
 0.22 0.07 0.08 0.01 0.10 0.06 0.09 0.18
 0.11 0.07 0.05 0.07 0.01 0.04

(i) Make a grouped frequency distribution table for this data with class intervals as 0.00 – 0.04, 0.04 – 0.08, and so on.

(ii) For how many days, was the concentration of sulphur dioxide more than 0.11 parts per million?

Sol. (i)	Concentration of sulphur dioxide (in ppm)	Frequency
	0.00-0.04	4
	0.04-0.08	9
	0.08-0.12	9
	0.12-0.16	2
	0.16-0.20	4
	0.20-0.24	2
	Total	30

(ii) The concentration of sulphur dioxide was more than 0.11 ppm for 8 days.

6. Three coins were tossed 30 times simultaneously. Each time the number of heads occurring was noted down as follows :

0 1 2 2 1 2 3 1 3 0 1 3 1 1 2 2 0 1 2 1 3 0
 0 1 1 2 3 2 2 0

Prepare a frequency distribution table for the data given above.

Sol.	Number of heads	0	1	2	3	Total
	Frequency	6	10	9	5	30

7. The value of π upto 50 decimal places is given below :

3 . 1 4 1 5 9 2 6 5 3 5 8 9 7 9 3 2 3 8 4 6 2 6 4 3 3 3
8 2 7 9 5 0 2 8 8 4 1 9 7 1 6 9 3 9 9 3 7 5 1 0

- (i) Make a frequency distribution of the digits from 0 to 9 after the decimal point.
(ii) What are the most and the least frequently occurring digits?

Sol. (i)

Digits	Frequency
0	2
1	5
2	5
3	8
4	4
5	5
6	4
7	4
8	5
9	8
Total	50

- (ii) The most frequently occurring digits are 3 and 9. The least occurring is 0.

8. Thirty children were asked about the number of hours they watched TV programmes in the previous week. The results were found as follows:

1 6 2 3 5 12 5 8 4 8 10 3
4 12 2 8 15 1 17 6 3 2 8 5
9 6 8 7 14 12

- (i) Make a grouped frequency distribution table for this data, taking class width 5 and one of the class intervals as 5 – 10.
(ii) How many children watched television for 15 or more hours a week?

Sol. (i)

Number of hours	0-5	5-10	10-15	15-20	Total
No. of children	10	13	5	2	30

- (ii) 2 children.

9. A company manufactures car batteries of a particular type. The lives (in years) of 40 such batteries were recorded as follows:

2.6, 3.0, 3.7, 3.2, 2.2, 4.1, 3.5, 4.5, 3.5, 2.3, 3.2, 3.4, 3.8, 3.2, 4.6, 3.7, 2.5, 4.4, 3.4, 3.3, 2.9, 3.0,
4.3, 2.8, 3.5, 3.2, 3.9, 3.2, 3.2, 3.1, 3.7, 3.4, 4.6, 3.8, 3.2, 2.6, 3.5, 4.2, 2.9, 3.6

Construct a grouped frequency distribution table for this data, using class intervals of size 0.5 starting from the interval 2 – 2.5.

Sol.	Life of batteries (in years)	Frequency
	2.0-2.5	2
	2.5-3.0	6
	3.0-3.5	14
	3.5-4.0	11
	4.0-4.5	4
	4.5-5.0	3
	Total	40

Deleted Exercise

1. The following number of goals were scored by a team in a series of 10 matches :

2, 3, 4, 5, 0, 1, 3, 3, 4, 3

Find the mean, median and mode of these scores.

- Sol.** The data has 10 values. We arrange these values in the ascending order as below :

0, 1, 2, 3, 3, 3, 3, 4, 4, 5.

$$(i) \text{ Mean} = \frac{0+1+2+3+3+3+3+4+4+5}{10} = \frac{28}{10} = 2.8$$

- (ii) We have 5th and 6th values each equal to 3 as the two middle most values.

$$\text{Therefore, median} = \frac{3+3}{2} = 3$$

- (iii) The value “3” has maximum frequency. Hence, we have mode = 3.

2. In a mathematics, test given to 15 students, the following marks (out of 100) are recorded:

41, 39, 48, 52, 46, 62, 54, 40, 96, 52, 98, 40, 42, 52, 60

Find the mean, median and mode of this data.

- Sol.** To find the mean :

here n = 15.

$$41+39+48+52+46+62+$$

$$54+40+96+52+98+40+$$

$$\text{As, } \bar{x} = \sum_{i=1}^{n=15} x_i = \frac{42+52+60}{15}$$

$$\therefore \bar{x} = \frac{822}{15} = 54.8$$

Thus, mean = 54.8

To find median:

Arranging the given data in an ascending order, we have

39, 40, 40, 41, 42, 46, 48, 52, 52, 52, 54, 60, 62, 96, 98.

n = 15, an odd number.

$$\therefore \text{Median} = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term} = \left(\frac{15+1}{2} \right)^{\text{th}} \text{ term} = 8^{\text{th}} \text{ term}$$

Thus, Median = 52.

To find mode,

In the given data, the observation 52 occurs 3 times i.e; the maximum number of times.

Mode = 52.

3. The following observations have been arranged in an ascending order. If the median of the data is 63, find the value of x : 29, 32, 48, 50, x , $x + 2$, 72, 78, 84, 95

Sol. 63 is the median of the given data. The two middle most values of the arranged data (in the ascending order) are x and $x + 2$.

$$\Rightarrow \frac{x + (x + 2)}{2} = 63 \Rightarrow x = 62$$

4. Find the mode of 14, 25, 14, 28, 18, 17, 18, 14, 23, 22, 14, 18.

Sol. We arrange the data in the ascending (or descending) order as below : 14, 14, 14, 14, 17, 18, 18, 18, 22, 23, 25, 28.

The value of 14 has maximum frequency. Therefore, the mode of the data is 14.

5. Find the mean salary of 60 workers of a factory from the following table:

Salary (in Rs.)	Number of workers
3000	16
4000	12
5000	10
6000	8
7000	6
8000	4
9000	3
10000	1
Total	60

Sol.

Salary (in Rs.) (x_i)	Number of Workers (f_i)	$x_i f_i$
3000	16	48000
4000	12	48000
5000	10	50000
6000	8	48000
7000	6	42000
8000	4	32000
9000	3	27000
10000	1	10000
Total	$\Sigma f_i = 60$	$\Sigma x_i f_i = 305000$

$$\therefore \bar{x} = \frac{\sum_{i=1}^8 (x_i f_i)}{\sum_{i=1}^8 f_i} = \frac{305000}{60} = 5083.33$$

Thus, the required mean salary = Rs.5083.33

6. Give one example of a situation in which

- (i) the mean is an appropriate measure of central tendency.
- (ii) the mean is not an appropriate measure of central tendency but the median is an appropriate measure of central tendency.

Sol. (i) Marks award to a student in 5 weekly tests are

7, 8, 8, 9, 10 (out of 10)

Here, Median = 8, Mode = 8

but we find mean = $\frac{7+8+8+9+10}{5} = 8.4$

So, here we find that the mean value is more appropriate measure of central tendency.

- (ii) Median weight of a pen, a book, a match box, a rubber band and a chair.
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