

In the Chapter

In this chapter, you will be studying the following points:

- Facts or figures, collected with a definite purpose, are called data.
- Statistics is the area of study dealing with the presentation, analysis and interpretation of data.
- How data can be presented graphically in the form of bar graphs, histograms and frequency polygons.
- **Primary and Secondary Data** : When the information was collected by the investigator herself or himself with a definite objective in her or his mind, the data obtained is called primary data.

When the information was gathered from a source which already had the information stored, the data obtained is called secondary data.

- **Raw Data** : Let us consider the marks obtained by 10 students in a mathematics test as given below

55 36 95 73 60 42 25 78 75 64

The data in this form is called raw data.

Range : The difference of the highest and the lowest values in the data is called the range of the data.

Range = Highest value – Lowest value.

- **Graphical Representation of Data** : There is another way of representing data which is called graphical representation of data. The main graphical representations are as follows :

(i) Bar graphs : A bar graph is a pictorial representation of data in which usually bars of uniform width are drawn with equal spacing between them on one axis (say the x -axis), depicting the variable. The values of the variable are shown on the other axis (say the y -axis) and heights of the bars depends on the values of the variable.

(ii) Histogram : A histogram is a graphical representation of a grouped frequency distribution with continuous classes. The steps of construction are as follows :

(a) We represent along x -axis the class limits and frequencies along y -axis on a suitable scale.

(b) We now draw rectangles (or rectangular bars) of width equal to the class size and lengths according to the frequencies of the corresponding class intervals.

(iii) Frequency polygon : For an ungrouped distribution, the frequency polygon is obtained by plotting points with abscissa as the variate values and the ordinate as the corresponding frequencies and joining the plotted points by means of straight lines. For a grouped frequency distribution, the abscissa of points are mid-values of the class intervals. For equal class intervals the frequency polygon can be obtained by joining the middle points of the upper sides of the adjacent rectangles of the histogram by means of straight lines.

- **Mode** : The mode is that value of the observation which occurs most frequently, *i.e.*, an observation with the maximum frequency is called the mode.

Extreme values in the data affect the mean. The median and mode are not affected by extreme values present in the data.

NCERT TEXT BOOK QUESTION (SOLVED)

EXERCISE 14.1

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

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

- (i) Number of students in our class.
- (ii) Number of fans in our schools.
- (iii) Electricity bills of our house for last two years.
- (iv) Election results obtained from television or newspapers.
- (v) Literacy rate figures obtained from Educational Survey.

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

Ans. We know that, when the information was collected by the investigator herself or himself with a definite objective in her or his mind, the data obtained is called primary data.

∴ In the given data (in Q.1) examples (i), (ii) and (iii) are called primary data and when the information was gathered from a source which already had the information stored, the data obtained is called secondary data.

∴ In the given data (in Q.1) examples (iv) and (v) are called secondary data.

EXERCISE 14.2

Q.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, 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?

Ans. The number of students who have a certain type of blood group is called the frequency of those blood groups. To make data more easily understandable, we write it in a table, as given below:

Blood group	Number of students
A	9
B	6
O	12
AB	3
Total	30

From table, we observe that the higher frequency blood group *i.e.*, most common blood group is A and the lowest frequency blood group *i.e.*, rarest blood group is AB.

Q.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?

Ans.

Distance (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		30

Q.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?

Ans. (i)

Relative Humidity (in %)	Tally Marks	Frequency
84–86		1
86–88		1
88–90		2
90–92		2
92–94		7
95–96		6
96–98		7
98–100		4
Total		30

(ii) The data appears to have been taken in the rainy season as the relative humidity is high.

(iii) Range = $99.2 - 84.9 = 14.3$.

Q.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?

Ans. (i)

Heights (in cm)	Tally Marks	Frequency
150–155		12
155–160		9
160–165		14
165–170		10
170–175		5
Total		50

(ii) From the table, our conclusion is that more than 50% of students (i.e., $12 + 9 + 14 = 35$) are shorter than 165 cm.

Q.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?

Ans. (i) We condense the given data into groups like 0.00-0.04, 0.04-0.08, ... 0.20-0.24. (since, our data is from 0.01 to 0.22). The class width in this case is 0.04.

Now, the given data can be condensed in tabular form as follow :

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 $2 + 4 + 2 = 8$ days (by table).

Q.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.

Ans. Firstly, we write the data in a table

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

In above table, we observe that the repetition of '0' in given data is 6 times, 1 as to 10 times, 2 as 9 and 3 as 5 times. Also, the above table is called an ungrouped frequency distribution table or simply a frequency distribution table.

Q.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 8
3 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?

Ans. (i) Frequency Distribution Table :

Digits	Tally Marks	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.

Q.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?

Ans. (i) The required grouped frequency distribution table is given below :

Number of hours	Frequency
0 - 5	10
5 - 10	13
10 - 15	5
15 - 20	2
Total	30

(ii) From table, we observe that the number of children is 2, who watched television for 15 or more hours a week.

Q.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.

Ans. We condense the given data into groups like 2.0-2.5, 2.5-3.0, ..., 4.5-5.0. (Since, our data is from 2.2 to 4.6). The class width in this case is 0.5.

Now, the given data can be condensed in tabular form as follows :

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

The above table is called a grouped frequency distribution table.

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

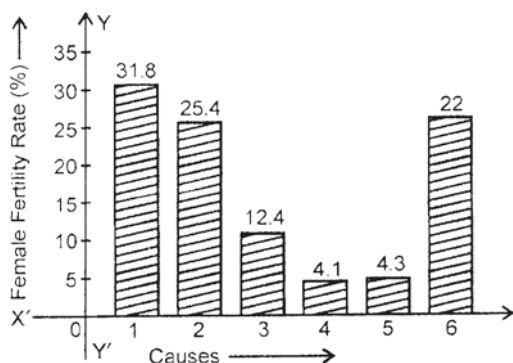
4.	Cardiovascular conditions	4.3
5.	Respiratory conditions	4.1
6.	Other causes	22.0

(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.

Ans. (i)



(ii) Sexual and reproductive health conditions.

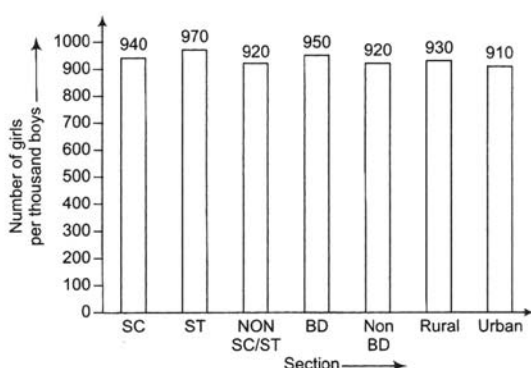
Q.2. The following data on the number of girls (to the nearest ten) per thousand boys in different sections of Indian society is given below.

Section	Number of girls per thousand boys
Scheduled Caste (SC)	940
Scheduled 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.

Ans. (i) Bar Graph



(i) From the graph we find that the number of girls to the nearest ten per thousand boys are maximum in scheduled tribes whereas they are minimum in urban areas.

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

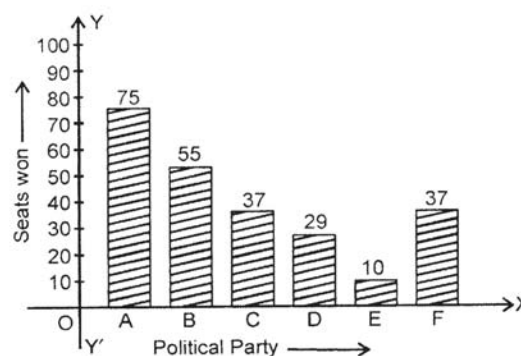
(i) Draw a bar graph to represent the polling results.

(ii) Which political party won the maximum number of seats?

Ans. We draw the bar graph of this data, note that the unit in the second column is seats won by political party.

(i) We present the political party on the horizontal axis choosing any scale, since width of the bar is not important but for clarity, we take equal widths for all bars and maintain equal gaps in between. Let on political party be represented by one unit.

(ii) We represent the seats won on the vertical axis. Here, we can choose the scale as 1 unit = 10.



Party 'A' won the maximum number of seats i.e., 75.

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:

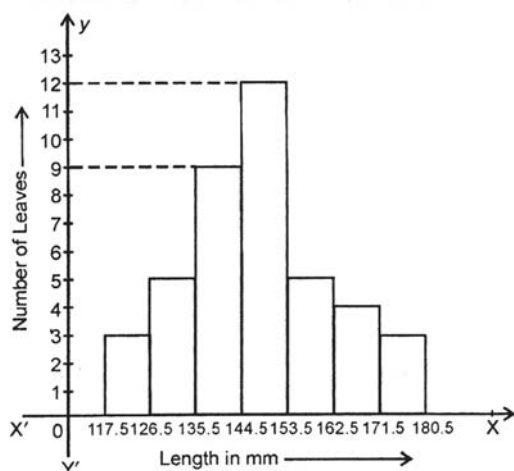
Length (in mm)	Number of leaves
118 - 126	3
127 - 135	5
136 - 144	9
145 - 153	12
154 - 162	5
163 - 171	4
172 - 180	2

(i) Draw a histogram to represent the given data. [Hint: First make the class intervals continuous]

(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?

Ans. (i)



Histogram : First we convert this data into exclusive or continuous form

Length (in mm)	Number of leaves
117.5 - 125.5	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

(ii) Frequency Polygon.

(iii) No, we cannot conclude that maximum of leaves are 153 mm long, as maximum frequency lies between 145 - 153.

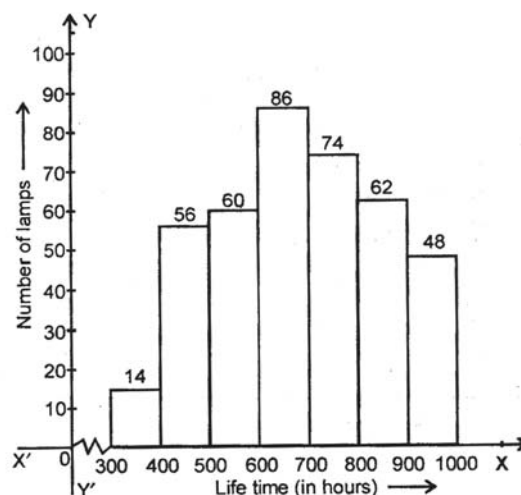
Q.5. The following table gives the life times of 400 neon lamps:

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?

Ans. (i)



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

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.

Ans. For Section A :

Marks	Mid-point (X_i)	f_i
0 - 10	5	3
10 - 20	15	9
20 - 30	25	17
30 - 40	35	12
40 - 50	45	9

For Section B :

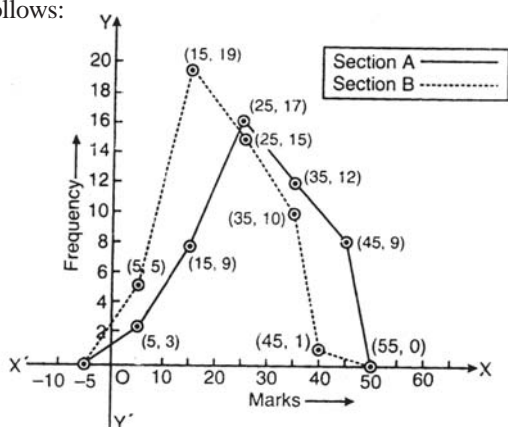
Marks	Mid-point (X_i)	f_i
0 - 10	5	3

10 - 20	15	19
20 - 30	25	15
30 - 40	35	10
40 - 50	45	1

For Section A, we plot the points $(-5, 0), (5, 3), (15, 9), (25, 17), (35, 12), (45, 9), (55, 0)$, and join these points by line segments.

For section B, we plot the points $(-5, 0), (5, 5), (15, 19), (25, 15), (35, 10), (45, 1), (55, 0)$ and join these points by dotted line segments.

Thus, we get two frequency polygons as follows:



Q.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.]

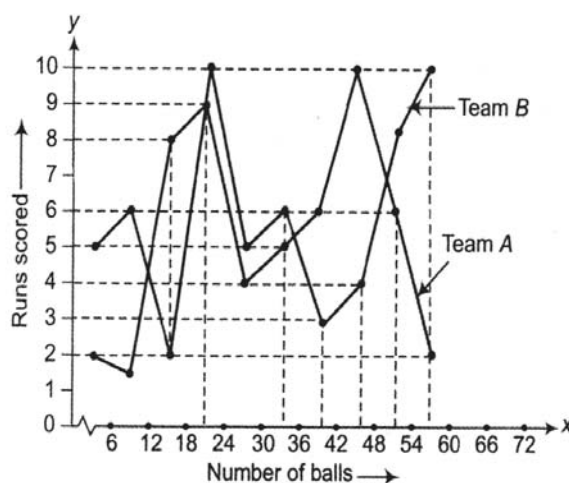
Ans. First make the class intervals continuous

Modified Table

Number of balls	Class marks	Team A	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

Now, draw a frequency polygon curve.



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.

Ans. We know that, the areas of the rectangles are proportional to the frequencies in a histogram. Here, the widths of the rectangles are varying. So, we need to make certain modifications in the lengths of the rectangles, so that the areas are again proportional to the frequencies.

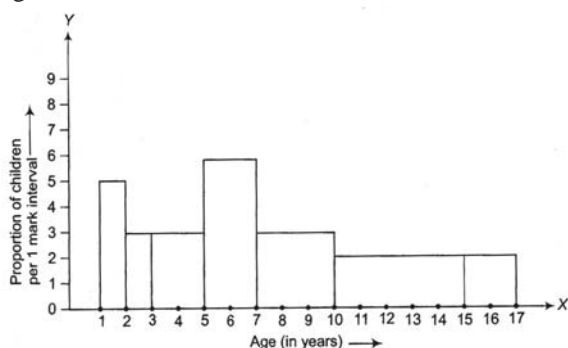
1. Select a class interval with the minimum class size. The minimum class size is 1.

2. The lengths of the rectangles are then modified to be proportionate to the class size 1.

Now, we get the following table

Age (in years)	Number of children (frequency)	Width of the class	Length of the rectangle
1 - 2	5	1	$\frac{5}{1} \times 1 = 5$
2 - 3	3	1	$\frac{3}{1} \times 1 = 3$
3 - 5	5	2	$\frac{6}{2} \times 1 = 3$
5 - 7	12	2	$\frac{12}{2} \times 1 = 6$
7 - 10	8	3	$\frac{9}{3} \times 1 = 3$
10 - 15	10	5	$\frac{10}{5} \times 1 = 2$
15 - 17	4	2	$\frac{4}{2} \times 1 = 2$

So, the correct histogram with varying width is given below :



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.

Ans. (i) We know that, the areas of the rectangles are proportional to the frequencies in a histogram. Here, the widths of the rectangles are varying. So, we need to make certain modifications in the lengths of the rectangles. So that the areas are again proportional to the frequencies.

1. Select a class interval with the minimum class size. The minimum class size is 2.

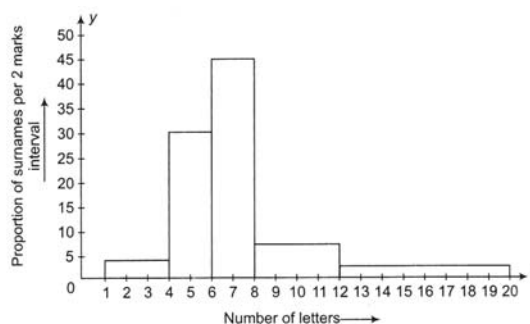
2. The lengths of the rectangles are then modified to be proportionate to the class size 2.

Since, we have calculated these lengths for interval of 2 letters in each case, we may call these lengths as proportion of surnames per 2 mark interval'.

So, the correct histogram with varying width is given below :

Here, we make a modified table by given data with minimum class size 2.

Number of Letters	Number of surnames	Width of the class	Length of the 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	$\frac{16}{2} \times 2 = 8$
12 - 20	4	8	$\frac{4}{8} \times 2 = 1$



EXERCISE 14.4

Q.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.

Ans.

$$\text{Mean} = \frac{\text{Sum of all the observations}}{\text{Total number of observations}}$$

$$= \frac{2+3+4+5+0+1+3+3+4+3}{10}$$

$$= \frac{28}{10} = 2.8$$

For Median : Data in ascending order is 0, 1, 2, 3, 3, 3, 3, 4, 4, 5

$n = 10$ which is even.

$\therefore \frac{n}{2}$ and $\left(\frac{n}{2} + 1\right)$ th observations are

$$\frac{10}{2} \text{ and } \frac{10}{2} + 1 \text{ or } 5\text{th and } 6\text{th}$$

$$\begin{aligned} 5\text{th observation} &= 3 \\ \text{and } 6\text{th observation} &= 3 \end{aligned}$$

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

For mode :

Score	Frequency
0	1
1	1
2	1
3	4
4	2
5	1
Total	10

Here, 3 occurs most frequently (4 times)

$\therefore \text{Mode} = 3$

Q.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.

Ans.

$$\text{Mean} = \frac{41+39+48+52+46+62+54+40+96+52+98+40+42+52+60}{15}$$

$$= \frac{822}{15} = 54.8$$

First of all arrange the data in ascending order as follows :

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

Here, $n = 15$ (odd)

$$\therefore \text{Median} = \text{value of } \left(\frac{n+1}{2}\right)^{\text{th}} \text{ observation}$$

$$= \left(\frac{15+1}{2}\right)^{\text{th}} \text{ observation}$$

$$= 8\text{th observation} = 52$$

We see that 52 occurs maximum number of times. Hence, mode = 52.

Q.3. The following observations have been arranged in 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

Ans. Observation in ascending order are : 29, 32, 48, 50, x , $x + 2$, 72, 78, 84, 95

$n = 10$ which is even.

$$\therefore \frac{n}{2} \text{ and } \left(\frac{n}{2} + 1\right) \text{th observations}$$

$$\frac{10}{2} \text{th and } \left(\frac{10}{2} + 1\right) \text{th observations}$$

\Rightarrow 5th and 6th observations.

$$\therefore \text{Median} = \frac{5\text{th observation} + 6\text{th observation}}{2}$$

$$\Rightarrow 63 = \frac{x + (x + 2)}{2} = x + 1$$

$$\text{Now } x + 1 = 63$$

$$\text{or } x = 63 - 1 = 62$$

$$\text{Hence } x = 62.$$

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

Ans. We first arrange the data in ascending order. 14, 14, 14, 14, 17, 18, 18, 22, 23, 25, 28

We see that 14 occurs maximum number of times. Hence, mode = 14.

Q.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

Ans.

Salary (in Rs.)	Frequency	
x	f	fx
3000	16	48,000
4000	12	48,000
5000	10	50,000
6000	8	48,000
7000	6	42,000
8000	4	32,000
9000	3	27,000
10000	1	10,000
Total	60	305,000

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{305000}{60} = \text{Rs. } 5083.33$$

Q.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.

Ans. (i) When the data is consistent and the extreme values are not much high or low than other observations, in such case mean is the appropriate measure of central tendency.

Example : Mean age of 30 students of class IX.

(ii) Median marks obtained by 20 students out of 50 marks in class IX.

Since the marks obtained by different students may be like 10, 20, 30 etc. We know that median do not affected by extreme values present in the data.

Hence, the median is an appropriate measure of central tendency.

Additional Questions

Q.1. In a diagnostic test in mathematics given to students, the following marks (out of 100) are recorded :

46, 52, 48, 11, 41, 62, 54, 53, 96, 40, 98, 44

Which 'average' will be a good representative of the above data and why ?

Ans. Median will be a good representative of the data, because

- (i) Each value occurs once.
- (ii) The data is influenced by extreme values.

Q.2. Find the mode of the following marks (out of 10) obtained by 20 students :

4, 6, 5, 9, 3, 2, 7, 7, 6, 5, 4, 9, 10, 10, 3, 4, 7, 6, 9, 9

Ans. We arrange this data in the following form:
2, 3, 3, 4, 4, 4, 5, 5, 6, 6, 6, 7, 7, 7, 9, 9, 9, 10, 10

Here 9 occurs most frequently, i.e., four times.
So, the mode is 9.

Q.3. A child says that the median of 3, 14, 18, 20, 5 is 18. What doesn't the child understand about finding the median ?

Ans. He understands that the median is the just middle value of the observations of data. But the data should be arranged in ascending / descending order before finding the median.

Q.4. Is it correct to say that in a histogram, the area of each rectangle is proportional to the class size of the corresponding class interval? If not, correct the statement.

Ans. It is not correct because area of each rectangle of a histogram is not proportional to the class size. It is proportional to the frequency of the class.

Q.5. A class consists of 50 students out of which 30 are girls. The mean of marks scored by girls in a test is 73 (out of 100) and that of boys is 71. Determine the mean score of the whole class.

Ans. No. of students in a class = 50

No. of Girls = 30

Mean marks of girls = 73

Sum of scores obtained by all girls
= $30 \times 73 = 2190$

Mean marks of boys = 71

Sum of scores (marks) obtained by all boys
 $= 71 \times 20 = 1420$

\therefore Means score of the whole class

$$= \frac{2190 + 1420}{50}$$

$$= \frac{3610}{50} = 72.2$$

Q.6. Mean of 60 observations was found to be 80.4. But later on, it was discovered that 96 was misread as 69 at one place. Find the correct mean.

Ans. Sum of 50 observations $= 50 \times 80.4$
 $= 4020$

Correct total $= 4020 + (96 - 69)$
 $= 4027$

$$\text{Correct mean} = \frac{4020 + 27}{50} = \frac{4027}{50}$$

$$= 80.94.$$

Q.7. The point scored by a basket ball team in a series of matches are as follows :

17, 2, 7, 27, 256, 5, 14, 18, 10, 24, 48, 10, 8, 7, 10, 28

Find the median and mode for the data.

Ans. Data arranging in ascending order

2, 5, 7, 7, 8, 10, 10, 14, 17, 18, 24, 25, 27, 28, 48

Mode = 10

$$\text{Median} = \frac{10 + 14}{2} = 12.$$

Q.8. The mean of 100 observations is 50. If the observation 50 is replaced by 150, what will be the resulting mean ?

Ans. Mean of 100 obs. = 50

\therefore Total sum of 100 obs. $= 50 \times 100 = 5000$

Since 50 is replaced by 150, therefore total sum will be increased $[(150 - 50) = 100]$ by 100.

i.e. Now Total sum $= 5000 + 100 = 5100$

$$\therefore \text{Correct mean} = \frac{5100}{100} = 51$$

Q.9. The class marks of a distribution are 26, 31, 36, 41, 46, 51, 56, 61, 66, 71. Find the true class limits.

Ans. Here class size $= 31 - 26 = 5$

$$\text{Half of the class size} = \frac{5}{2} = 2.5$$

\therefore Lower class limits are $(26 - 2.5), (31 - 2.5), (36 - 2.5), \dots$

i.e., 23.5, 28.5, 33.3,

Upper class limits are $(26 + 2.5), (31 + 2.5), (36 + 2.5), \dots$

i.e., 28.5, 33.5, 38.5,

Thus the class limits of the given class marks are 23.5 – 28.5, 28.5 – 33.5, 33.5 – 38.5, 38.5 – 43.5, 43.5 – 48.5, 48.5 – 53.4, 53.5 – 58.5, 58.5 – 63.5, 63.5 – 68.5 and 68.5 – 73.5.

Since the classes are exclusive, true class limits are the same as the class limits.

Q.10. In a test given by 15 students the following marks were awarded. Find mean, median and mode.

52, 49, 41, 38, 39, 61, 58, 52, 47, 72, 85, 52, 68, 62, 79

Ans. For mean

$$\text{Mean} = \frac{\text{Sum of all the observations}}{\text{No. of observations}}$$

$$= \frac{52 + 49 + 41 + 38 + 39 + 61 + 58 + 52 + 47 + 72 + 85 + 52 + 68 + 62 + 79}{15}$$

$$= \frac{844}{15} = 57$$

So, mean of the given data = 57.

For median : Data in ascending order are :

38, 39, 41, 47, 49, 52, 52, 52, 58, 61, 62, 68, 72, 79, 85

Here, $n = 15$, which is odd, therefore

$$\text{Median} = \text{Value of } \left(\frac{n+1}{2} \right) \text{ the observation}$$

$$= \text{Value of } \left(\frac{5+1}{2} \right) \text{ the observation}$$

$$= \text{Value of 8th observation}$$

$$= 52$$

So, median of the given data = 52.

For mode : The observation with highest frequency is the mode of the data.

Here, the frequency of 52 is 3, which is highest, so mode of the given data = 52.

Multiple Choice Questions

Q.1. Which one of the following is not a measure of central tendency?

- (a) Range (b) Mean
(c) Median (d) Mode

Ans. (a) Range

Q.2. Mean of first 10 natural numbers is:

- (a) 6.5 (b) 2.8
(c) 5.5 (d) 8.7

Ans. (c) 5.5

Q.3. Class mark of an interval 25-50 is:

- (a) 32.5 (b) 34.5
(c) 37.5 (d) 34.7

Ans. (c) 37.5

Q.4. The mean of $x, x+2, x+4, x+6, x+8$ is:

- (a) $x+4$ (b) $x-4$
(c) $x-4$ (d) $x+5$

Ans. (a) $x+4$

Q.5. The median of the values 37, 31, 42, 43, 46, 25, 39, 45, 32 is:

- (a) 39 (b) 37
(c) 42 (d) 43

Ans. (a) 39

Q.6. The mean of 8 observations is 40. If 5 is added to each observation, then new mean will be:

- (a) 39 (b) 37
(c) 25 (d) 45

Ans. (d) 45

Q.7. If the median of the values 37, 31, 42, 43, 46, 25, 39, 45, 32, is:

- (a) 39 (b) 35
(c) 25 (d) 45

Ans. (b) 35

Q.8. Mode of the following scores is:

- 14, 25, 14, 28, 18, 17, 18, 14, 23, 22, 14, 18,
(a) 18 (b) 14
(c) 25 (d) 28

Ans. (b) 14

Q.9. Mode of the given data 110, 120, 130, 120, 110, 140, 130, 120, 140, 120 is:

- (a) 110 (b) 140
(c) 120 (d) 130

Ans. (c) 120

Q.10. Which one of the following is the graphical representation of statistical data?

- (a) bar graph (b) histogram
(c) frequency polygon
(d) cumulative frequency distribution

Ans. (d) cumulative frequency distribution