

Very Short Answer Type Questions

[1 mark]

Que 1. Find the class mark of the class 100-120.

Sol. Class mark = $\frac{\text{Lower limit} + \text{Upper limit}}{2}$
 $= \frac{100+120}{2} = 110$

Que 2. In a frequency distribution, the mid-value of a class is 10 and the width of the class is 6. Find the lower limit of the class.

Sol. Lower limit of the class = $10 - \frac{1}{2} \times 6 = 10 - 3 = 7$

Que 3. The frequency distribution:

Marks	0 – 20	20 – 40	40 – 60	60 – 100
Number of students	10	15	20	25

has been represented graphically as follows:

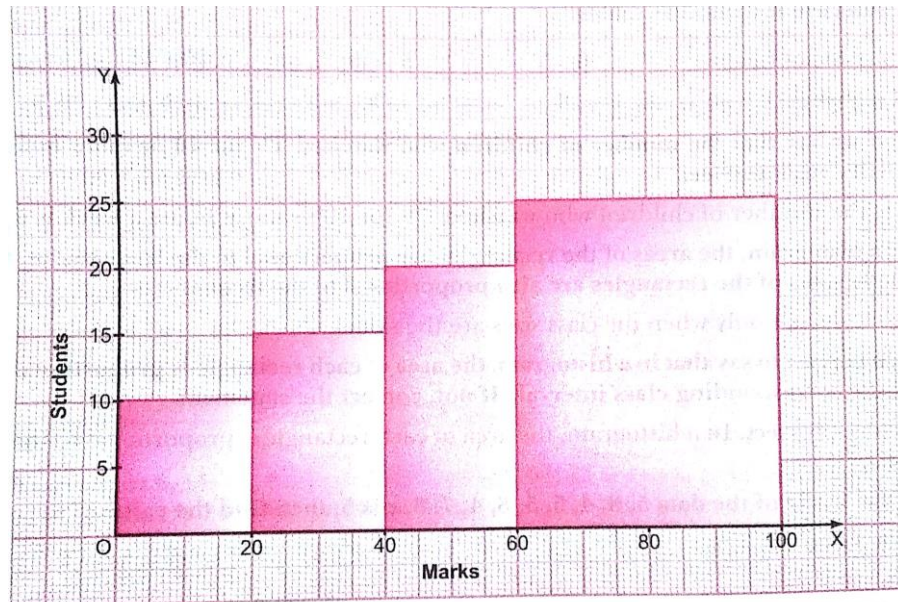


Fig. 14.1

Do you think this representation is correct? Why?

Sol. No, as the classes are of varying widths, not of uniform widths.

Que 4. In a diagnostic test in mathematics given to students, the following marks (out of 100) are recorded: 46, 52, 48, 11, 40, 62, 44, 53, 96, 98

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

Sol. Medium, because

- (i) each value occurs once
- (ii) the data is influenced by extreme values.

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

Sol. In order to find the median, data to be arranged in ascending or descending order before finding the median.

Que 6. The class marks of a continuous distribution are:

1.04, 1.14, 1.24, 1.34, 1.44, 1.54, and 1.64

Is it correct to say that the last interval will be 1.55-1.73? Justify your answer.

Sol. It is not correct because the difference between two consecutive marks should be equal to the class size.

Que 7. The mean of the data:

2, 8, 6, 5, 6, 3, 6, 4, 9, 15, 6, 5 IS Given to be 5. Based on this information, is it correct to say that the mean of the data:

10, 12, 30, 18, 8, 12, 6, 12, 10, 8, 10, 12, 16, 4 is 10? Give reason.

Sol. It is correct as the 2nd data is obtained by multiplying each observation of data by 2, therefore, the mean will be 2 times the mean of the data, i.e., 10.

Que 8. 30 children were asked about the number of hours they watched TV programme last week. The results are recorded as under:

Number of hours	0 – 5	5 – 10	10 – 15	15 – 20
Frequency	8	16	4	2

Can we say that the number of children who watched TV for 10 or more hours a week is 22? Justify your answer.

Sol. No, the number of children who watched TV for 10 or more hours a week is 4 + 2, i.e., 6.

Que 9. In a histogram, the areas of the rectangles are proportional to the frequencies. Can we say that the length of the rectangle are also proportional to the frequencies?

Sol. N., It is true only when the class sizes are the same.

Que 10. Is it correct 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.

Sol. It is not correct. In a histogram, the area of each rectangle is proportional to the frequency of its class.

Que 11. If the mode of the data 5, 8, 4, 5, 5, 8, 4, 7, 8, x is 5, then find the value of x.

Sol. The value of $x = 5$.

Short Answer Type Questions – I

[2 marks]

Que 1. Find the arithmetic mean of first-five natural numbers.

$$\text{Sol. Mean} = \frac{1+2+3+4+5}{5} = \frac{15}{5} = 3$$

Que 2. Find the median of the numbers: 4, 4, 5, 7, 6, 7, 7, 12, 3.

Sol. Arranging the data in ascending order, we get

3, 4, 4, 5, 6, 7, 7, 7, 12

Here, $n = 9$

$$\begin{aligned}\text{Median} &= \frac{(9+1)\text{th}}{2} \text{ observation} \\ &= 5^{\text{th}} \text{ observation} = 6.\end{aligned}$$

Que 3. If the class marks in frequency distribution are 19.5, 26.5, 33.5, 40.5, then find the class corresponding to the class mark 33.5.

Sol. The class size of the distribution is $= 40.5 - 33.5 = 7$

The required class of the mark 33.5 is $\left[33.5 - \frac{7}{2}\right] - \left[33.5 + \frac{7}{2}\right]$, i. e., 30 – 37.

Que 4. The mean of ten numbers is 55. If one number is excluded, their mean becomes 5. Find the excluded number.

Sol.

$$\text{Mean of 10 numbers} = \frac{\sum_{i=1}^{10} x_i}{10}$$

$$\Rightarrow \sum_{i=1}^{10} x_i = 10 \times 55 = 550$$

$$\text{New mean} = \frac{\sum_{i=1}^9 x_i}{9}$$

$$\Rightarrow \sum_{i=1}^9 x_i = 50 \times 9 = 450,$$

$$\text{Excluded number} = 550 - 450 = 100$$

Que 5. Mean of 50 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.

Sol. Here, $n = 50$, $\bar{x} = 80.4$

$$\text{So, } \bar{x} = \frac{\Sigma xi}{n} \Rightarrow 80.4 = \frac{\Sigma xi}{50}$$

$$\Rightarrow \Sigma xi = 80.4 \times 50 = 4020$$

$$\begin{aligned} \text{Correct value of } \Sigma xi &= 4020 - 69 + 96 \\ &= 4047 \end{aligned}$$

$$\text{Correct mean} = \frac{\text{Correct value of } \Sigma xi}{n} = \frac{4047}{50} = 80.94$$

Que 6. Ten observations 6, 14, 15, 17, x + 1, 2x -13, 30, 32, 34, 43 are written in an ascending order. The median of the data is 24. Find the value of x.

Sol. 6, 14, 15, 17, x + 1, 2x - 13, 30, 32, 34, 43,

Here, n = 10

Since the number of observations is 10 (an even number), therefore, the median

$$= \frac{\left(\frac{10}{2}\right)^{th} \text{ observation} + \left(\frac{10}{2} + 1\right)^{th} \text{ observation}}{2}$$

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

$$\Rightarrow 24 = \frac{x + 1 + 2x - 13}{2} \Rightarrow 48 = 3x - 12$$

$$\Rightarrow 3x = 48 + 12 = 60 \Rightarrow x = 20$$

Que 7. The points scored by a basketball team in a series of matches are as follows: 17, 2, 7, 27, 25, 5, 14, 18, 10, 24, 48, 10, 8, 7, 10, 28. Find the median and mode for the data.

Sol. Arranging the data in ascending order, we get

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

Since number of observation (n) = 16, which is even. Therefore, median is the mean of $\left(\frac{n}{2}\right)^{th}$

and $\left(\frac{n}{2} + 1\right)^{th}$ observation, i.e., 8th and 9th observation.

Here, 8th observation = 10

9th observation = 14

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

As 10 occurs most frequently, i.e., three times. So, the mode is 10.

Short Answer Type Questions – II

[3 marks]

Que 1. 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

0.05	0.08	0.08	0.09	0.04	0.17
0.16	0.15	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

days is as follows:

(i) Make a grouped frequency distribution table for this data with interval 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. Frequency distributions of above data in tabular form is given as:

Concentration of sulphur dioxide (in ppm)	Tally marks	Frequency
0.00 – 0.04		4
0.04 – 0.08		8
0.08 – 0.12		9
0.12 – 0.16		3
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 9 days.

Que 2. 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, 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. Frequency Distribution table

Blood group	Tally marks	Frequency
A		9
B		6
O		12
AB		3
Total		30

Blood group O is most common as it has highest frequency, i.e., 12.

Blood group AB is rarest as it has lowest frequency, i.e., 3.

Que 3. 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. Frequency distribution of above data in tabular form is given as:

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

Que 4. Convert the given frequency distribution into a continuous grouped frequency distribution:

Class interval	Frequency
150 – 158	7
154 – 157	7
158 – 161	15
162 – 165	10
166 – 169	5
170 – 173	6

In which interval would 153.5 and 157.5 be included?

Sol. Consider the classes 150 – 153 and 154 – 157.

The lower limit of 154 – 157 = 154

The upper limit of 150 – 153 = 153

The difference = 154 – 153 = 1

Half the difference = $\frac{1}{2} = 0.5$

So, the new class interval formed from 150 – 153 is (150 – 0.5) – (153 + 0.5), i.e., 149.5 – 153.5.

Continuous classes formed are:

Class interval	Frequency
149.5 – 153.5	7
153.5 – 157.5	7
157.5 – 161.5	15
161.5 – 165.5	10
165.5 – 169.5	5
169.5 – 173.5	6

153.5 is included in the class interval 153.5 – 157.5 and 157.5 in 157.5 – 161.5.

Que 5. 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) The frequency distribution of above data in tabular form is given as:

Number of hours	Tally marks	Frequency
0 – 5		10
5 – 10		13
10 – 15		5
15 – 20		2
Total		30

(ii) Two children watched television for 15 or more hours a week.

Que 6. Obtain the mean of the following distribution:

Sol.

Frequency	Variable
4	4
8	6
14	8
11	10
3	12

$$\Rightarrow \bar{x} = \frac{\Sigma fx}{\Sigma f} \Rightarrow \bar{x} = \frac{322}{40} \Rightarrow \bar{x} = 8.05$$

Que 7. If the mean of the following data is 20.2, find the value of p:

x	10	15	20	25	30
y	6	8	p	10	6

Sol.

x	f	fx
10	6	60
15	8	120
20	p	20 p
25	10	250
30	6	180
	$\Sigma f = 30 + p$	$\Sigma fx = 610 + 20 p$

Sol.

$$\bar{x} = \frac{\Sigma fx}{\Sigma f}$$

$$\therefore 20.2 = \frac{610+20p}{30+p}$$

$$\Rightarrow 20.2(30 + p) = 610 + 20p$$

$$\Rightarrow 606 + 20.2p = 610 + 20p$$

$$\Rightarrow 20.2p - 20p = 610 - 606$$

$$\Rightarrow 0.2p = 4$$

$$\Rightarrow p = \frac{4}{0.2} = \frac{40}{2} \Rightarrow p = 20$$

Long Answer Type Questions

[4 Marks]

Que 1. The value of π up to 50 decimal places is given below:

3.14159265358979323846264338327950288419716939937510

(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. Frequency distribution of the digits from 0 to 9 after the decimal point in tabular form is given as:

Digits	Tally	Frequency
0	=	2
1	≡	5
2	≡	5
3	≡ III	8
4	≡	4
5	≡	5
6	≡	4
7	≡	4
8	≡	5
9	≡ III	8
Total		50

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

Que 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. Frequency distribution of above data in tabular form is given as:

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.

Que 3. The height of 50 students, measured to the nearest centimeter, have been found to be as follows:

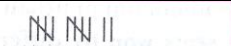




161	150	154	165	168	161	154	162	150	151
162	164	171	165	158	154	156	172	160	170
153	159	161	170	162	165	166	168	165	164
154	152	153	156	158	162	160	161	173	166
161	159	162	167	168	159	158	153	154	159

(i) Represent the data given above by a grouped frequency distribution table,

taking the class interval as 160 – 165, 165 – 170, etc.

(ii) What can you conclude about their height from the table?

Sol. (i) Frequency distribution of above data in tabular form is given as:

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

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

Que 4. The following data on the number of girls to the nearest ten per thousand boys in different sections of the society is given on next page:

Section of the society	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 above information by a bar graph.

(ii) Write two conclusions you can arrive at from the graph, with justification.

Sol. (i)

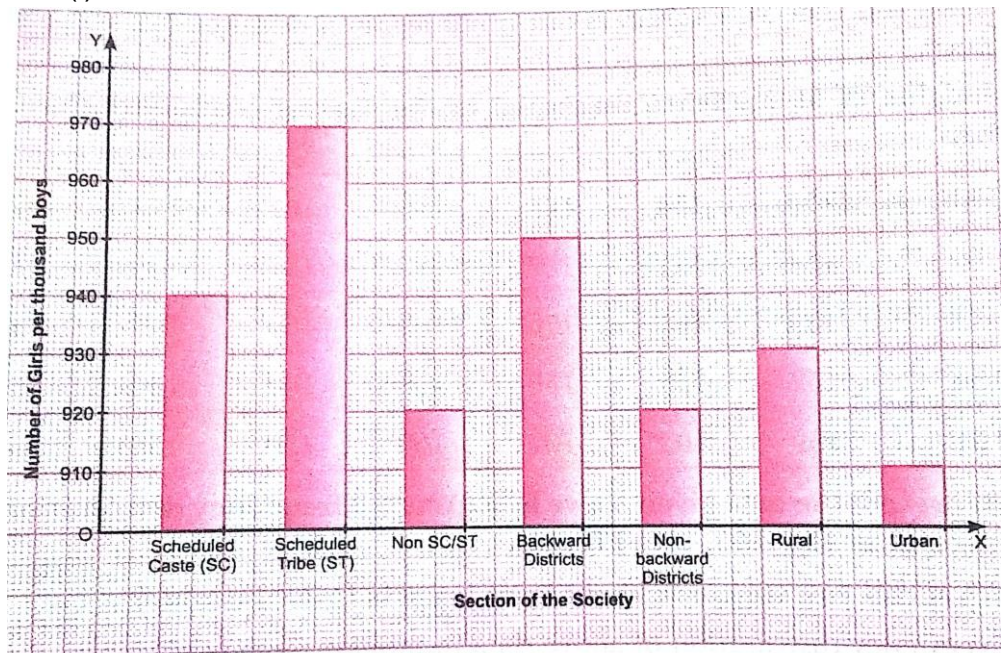


Fig. 14.2

(ii) Number of girls to the nearest ten per thousand boys are maximum in scheduled tribes whereas they are minimum in urban areas.

Que 5. Given below are the seats won by different political parties in the polling outcome of 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)

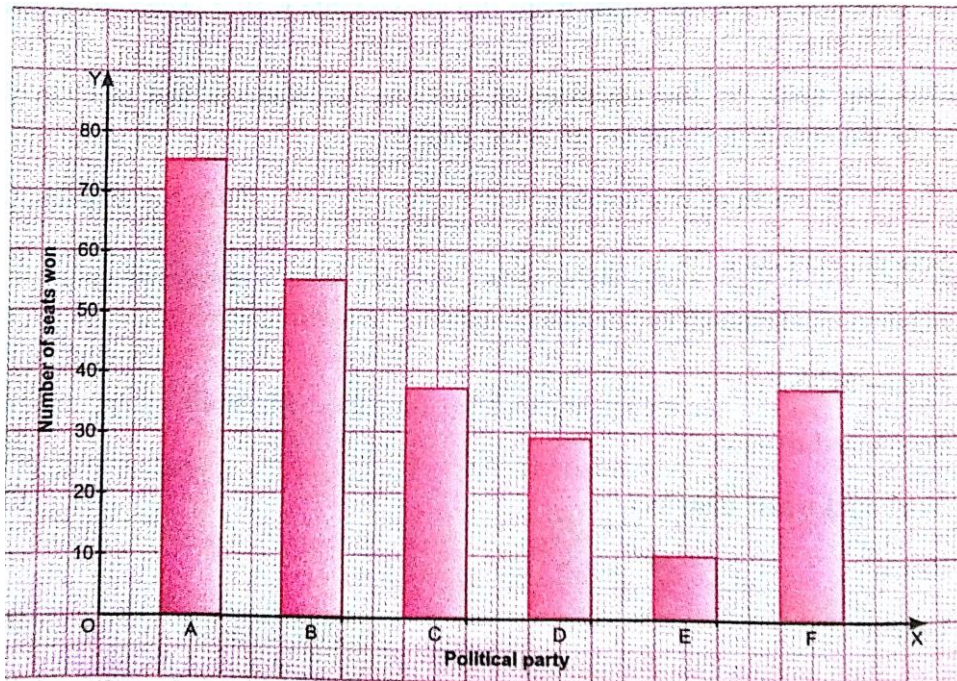


Fig. 14.3

(ii) Party A won the maximum number of seats, i.e., 75.

Que 6. A survey conducted by an organization for the cause of illness and death among the women between the ages 15 – 44 (in years) worldwide found the following figures (in per cent).

S.No.	Causes	Female fatality rate (%)
1.	Reproductive health conditions	31.8
2.	Neuropsychiatric condition	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 gives above graphically.

(ii) Which condition is the major cause of women's ill health and death worldwide?

Sol. (i)

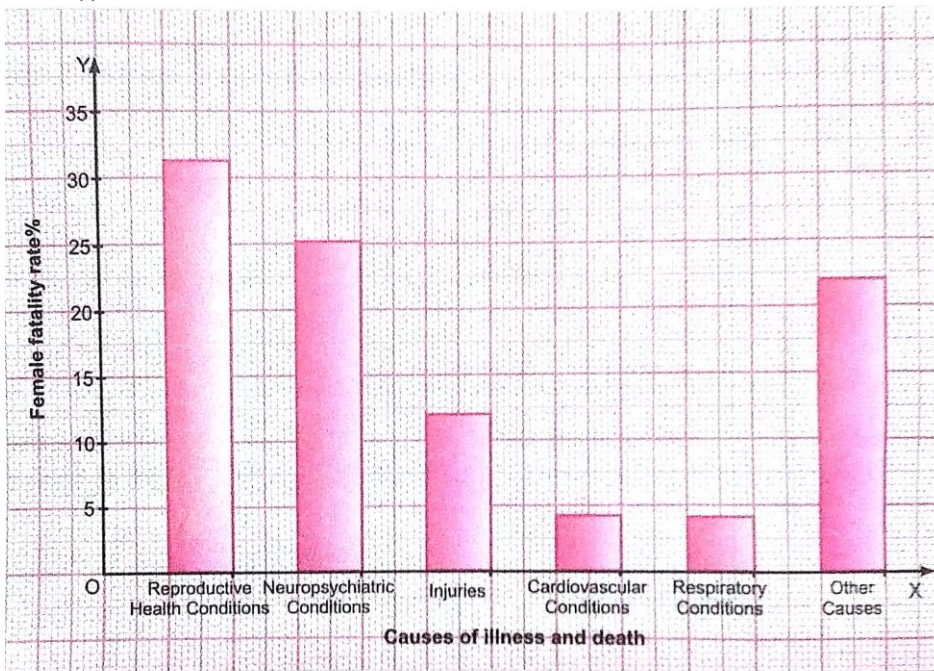


Fig. 14.4

(ii) The major cause of women's ill and death worldwide is reproductive health conditions.

Que 7. The length of 40 leaves of a plant are measured correct to one millimeter, and the obtained data is represented in the following table:

Length (in mm)	188 – 125	127 – 135	136 – 144	145 – 153	154 – 162	163 – 171	172 – 180
Number of leaves	3	5	9	12	5	4	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) Consider the class 188 – 126 and 127 – 135

The lower limit of 127 – 135 = 127

The upper limit of 118 – 126 = 126

$$\text{Half of the difference} = \frac{127-126}{2} = 0.5$$

So, the new class interval formed from 188 – 126 is

(118 – 0.5) – (126 + 0.5), i.e., 117.5 – 126.5

$(118 - 0.5) - (126 + 0.5)$, i.e., $117 - 126.5$

Continuing in the same manner, the continuous classes formed are:

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

(ii) Yes, frequency polygon.

(iii) No, this frequency includes all leaves whose length are from 144.5 mm to 153.5 mm.

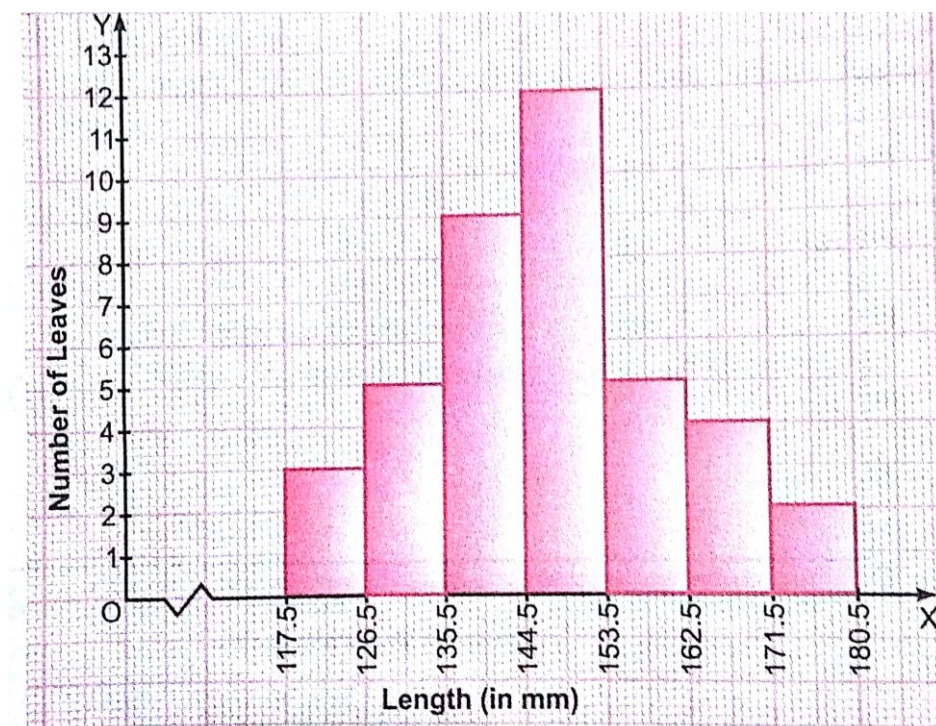


Fig. 14.5

Que 8. The following table gives the life times of 400 neon lamps:

Lifetime (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 and a frequency polygon.
(ii) How many lamps have a lifetime of 700 or more hours?

Sol. (i)

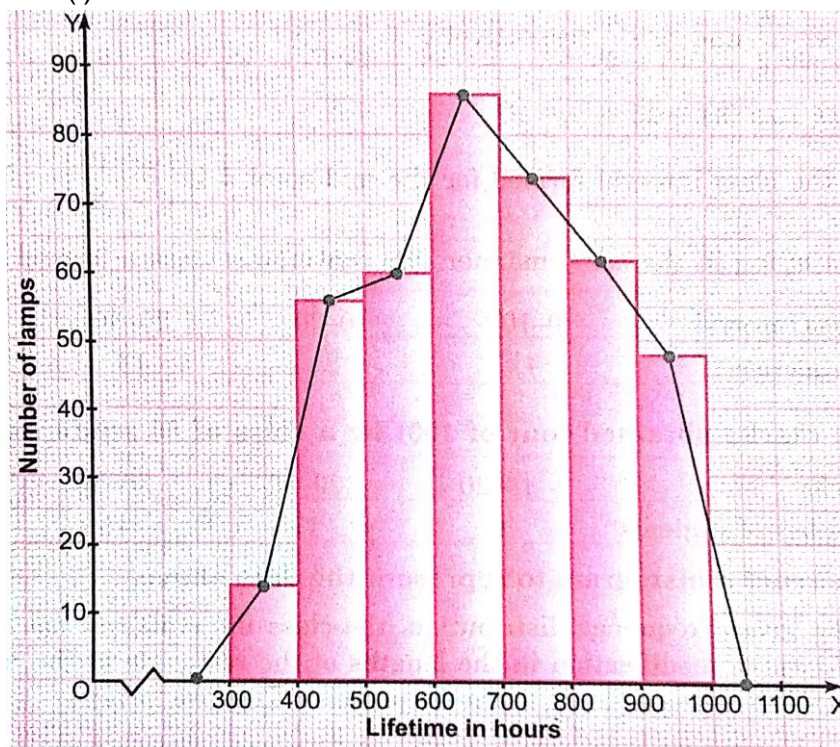


Fig. 14.6

(ii) Number of lamps having life 700 or more hours $74 + 62 + 48 = 184$

HOTS (Higher Order Thinking Skills)

Que 1. A class consists of 50 student out of which 30 are girls. The mean 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.

Sol. Mean marks scored by girls (\bar{x}_1) = 73

Number of girls (n_1) = 30

Mean marks scored by boys (\bar{x}_2) = 71

Number of boys (n_2) = 50 – 30 = 20

$$\begin{aligned}\text{Mean score of the whole class } (\bar{x}_{12}) &= \frac{n_1\bar{x}_1+n_2\bar{x}_2}{n_1+n_2} \\ &= \frac{30 \times 73+20 \times 71}{30+20} \\ &= \frac{2190+1420}{50} \\ &= \frac{3610}{50} \\ \bar{x}_{12} &= 72.2\end{aligned}$$

Que 2. Prepare a Continuous grouped frequency distribution from the following data:

Mid-point	5	15	25	35	45
Frequency	4	8	13	12	6

Also find the size of class intervals.

Sol. If m is mid-point of a class and h is the class size, lower and upper limits of the class intervals are $m - \frac{h}{2}$ and $m + \frac{h}{2}$ respectively.

Class size (h) = 15 – 5 = 10

So, the class interval formed for the mid-point 5 is $\left(5 - \frac{10}{2}\right) - \left(5 + \frac{10}{2}\right)$ i.e., 0 – 10

Continuing in the same manner, the continuous classes formed are:

Class interval	0-10	10-20	20-30	30-40	40-50
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Frequency	4	8	13	12	6
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Que 3. The marks obtained (out of 100) by a class of 80 student are given below:

Marks	10-20	20-30	30-50	50-70	70-100
Number of student	6	17	15	16	26

Construct a histogram to represent the data above.

Sol. In the given frequency distribution, the class interval are not of equal width. Therefore, we would make modification in the length of the rectangle in the histogram so that the areas of rectangle are proportional to the frequencies. Thus we have:

Marks	Frequency	Width of the class	Length of the rectangle
10-20	6	10	$\frac{10}{10} \times 6 = 6$
20-30	17	10	$\frac{10}{10} \times 17 = 17$
30-50	15	20	$\frac{10}{20} \times 15 = 7.5$
50-70	16	20	$\frac{10}{20} \times 16 = 8$
70-100	26	30	$\frac{10}{30} \times 26 = 8.67$

Now, we draw rectangles with lengths as given in the last column. The histogram of data is given below:

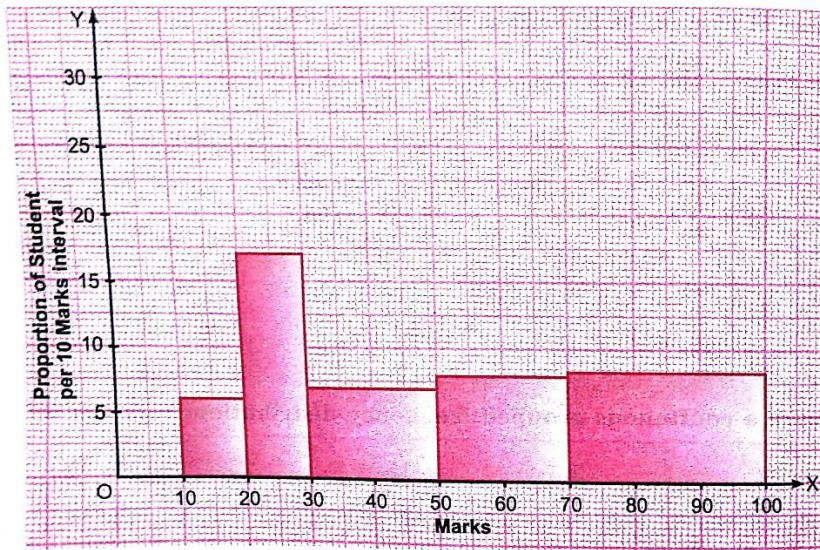


Fig. 14.7

Que 4. Draw a frequency polygon for the following distribution:

Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of student	7	10	6	8	12	3	2	2

Sol.

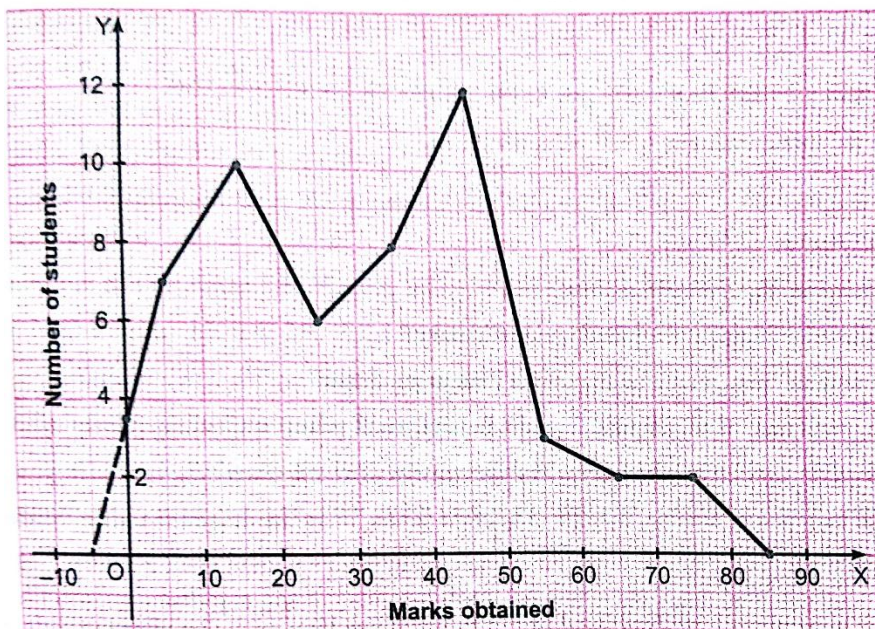


Fig. 14.8

x_i	f_i	(x_i, f_i)
5	7	(5, 7)
15	10	(15, 10)
25	6	(25, 6)
35	8	(35, 8)
45	12	(45, 12)
55	3	(55, 3)
65	2	(65, 2)
75	2	(75, 2)

Value Based Questions

Que 1. A survey was conducted on 50 persons of a society to find whether they title them as honest (H), courageous (C), creative (Cr), cooperative (Co) or patriotic (P). The following data was obtained:

P	H	H	Co	H	Cr	C	C	Cr	P
Co	P	H	Cr	P	P	C	Cr	P	H
H	Cr	Co	C	C	Co	P	P	H	Co
P	H	C	H	Co	C	C	P	Co	C
Co	P	Cr	P	P	P	H	Co	P	Cr

Construct a frequency distribution table for the above data. Which social value amongst the above values is the most important according to you for the development of a society? Justify your answer.

Sol.

Value Traits	Tally Marks	Number of Persons
Honest	IIII II	10
Courageous	IIII I	9
Creative	IIII	7
Cooperative	IIII I	9
Patriotic	IIII III	15
Total		50

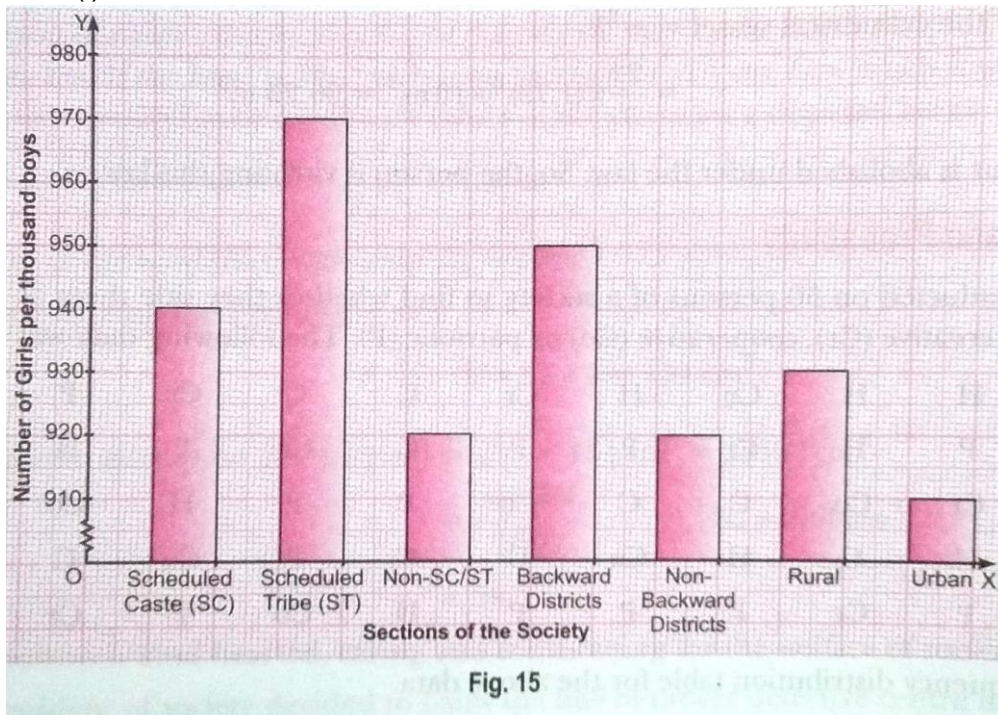
Each value with justification is correct. (Write yourself)

Que 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 Case (SC)	940
Scheduled Tribe (Tribe)	970
Non-SC/ST	920
Backward districts	950
Non-backward districts	920
Rural	930
Urban	910

- (i) Represent the above information by a bar graph.
- (ii) Write two conclusions you can arrive at from the graph, with justification. Is gender equity important? How will relate it with social development?

Sol. (i)



(ii) The gender equity exists most in scheduled tribe and least in urban areas. Yes, gender equity leads to economic growth which, in turn, helps in the development of a society.

Que 3. The percentage of salary donated by twelve different households to an orphanage every month are: 2, 5, 3, 5, 6, 1, 2, 4, 3, 5, 2, 2

Find the mean, median and mode of the data.

What qualities do the persons of these households possess?

Sol. Mean = $\frac{\text{Sum of the observations}}{\text{Number of observation}}$

$$= \frac{2+5+3+5+6+1+2+4+3+5+2+2}{12} = \frac{40}{12} = 3.3$$

Mean percentage of salary donated = 3.3%

Arranging the data in ascending order, we get

1, 2, 2, 2, 2, 3, 3, 4, 5, 5, 5, 6

The maximum occurring observation = 2

∴ Modal percentage of salary donated = 2%

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

$$= \frac{6^{\text{th}} \text{ observation} + 7^{\text{th}} \text{ observation}}{2} = \frac{3+3}{2} = 3$$

∴ Medan percentage of salary donated = 3%
Social service, kind, caring.

Que 4. Tanya a class IX student received cash award of ₹10,000 (Ten thousand) in the singing competition. Her father advised her to make a budget plan for spending this amount. She made the following plan:

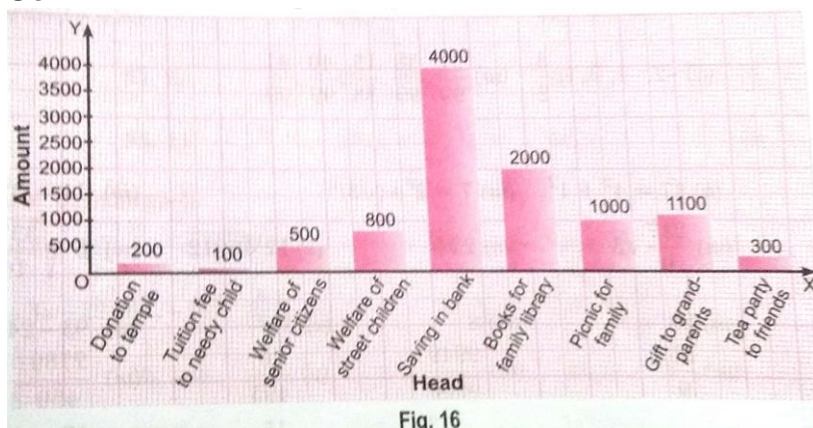
S.No.	Head	Amount
1	Donation to temple	200
2	Tuition fee to needy child	100
3	Welfare of senior citizen	500
4	Welfare of street children	800
5	Saving in bank	4000
6	Books for family library	2000
7	Picnic for family	1000
8	Gift to grandparents	1100
9	Tea party to friend	300
	Total	10,000

Make a bar graph for the above data.

From the above information answer the following questions:

1. Which mathematical concepts have been covered in this?
2. How will you rate her budget plan? In your opinion which head has been given (i) more than it deserved and (ii) less than it deserved?
3. Which values are depicted in her plant?

Sol.



1. Statistics
2. Do yourself
3. Respect for elders, kind, socially active.

Que 5. Out of 125 houses in a locality, 45 donate some part of their income every month to a charitable. Organisation. Find the probability that a household chosen at random does not donate every month.

How does donation to charitable organisations help in the development of society?

What social values do these 45 households possess?

Sol. $\frac{16}{25}$, Charitable organisations provide help to needy persons, so donating them means channelising the funds in the right way and hence, developing the society. Such households are socially active, generous and responsible citizens.

Que 6. At a petrol pump, it was found that out of 50 vehicles that came there, 22 asked for petrol and the remaining used other fuels.

(a) Find the probability that the next vehicle that will come, will ask for petrol.

(b) How can we save petrol?

Sol. (a) $\frac{11}{25}$

(b) By using more of public transport wherever possible and using substitutes of petrol such as diesel and CNG.