

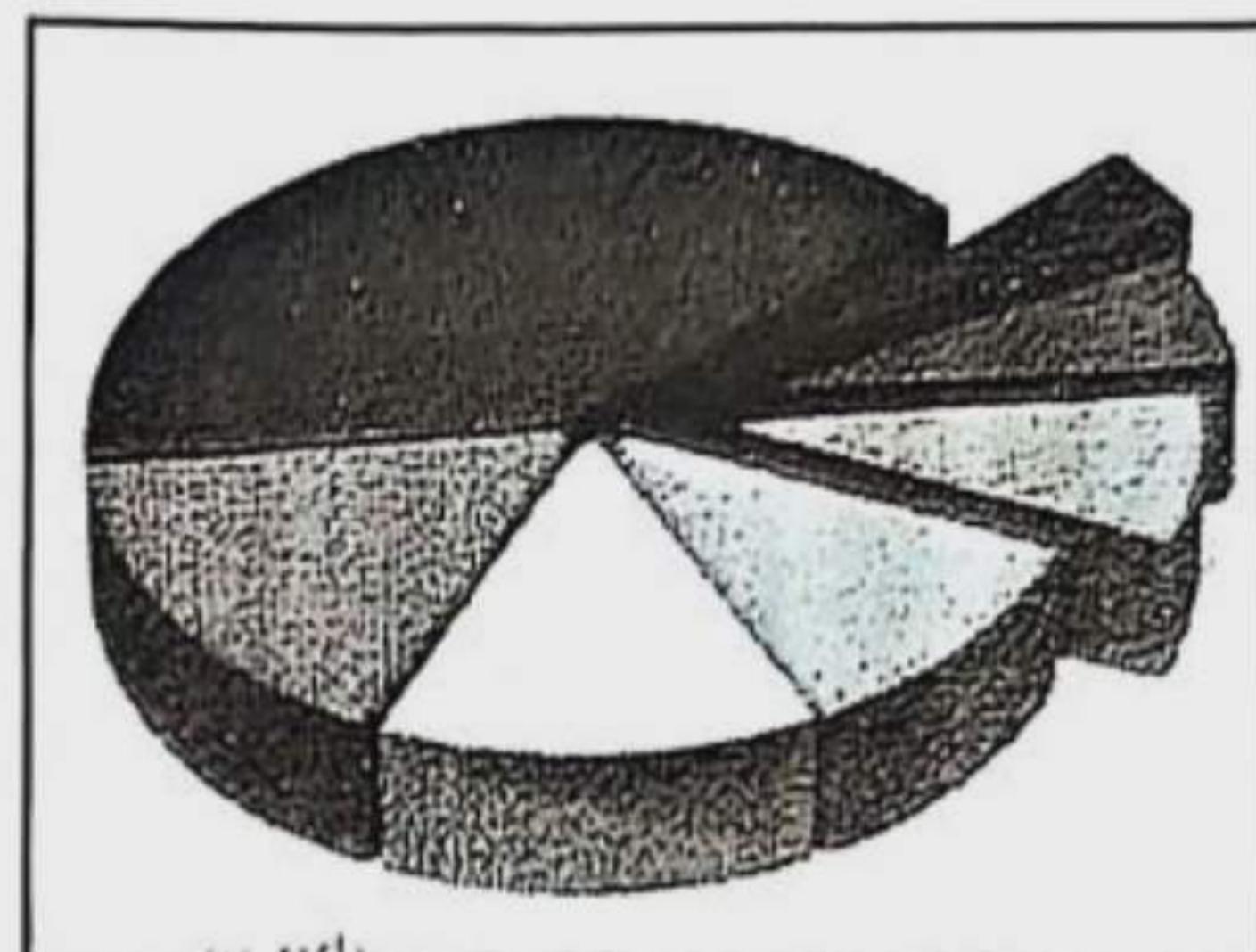
Information and Data

Contents for Discussion

- Information and data • Frequency Distribution Table • Diagram
- Central Tendency • Arithmetic Mean • Median • Mode.

 **Learning Outcomes :** After studying this chapter I will be able to—

- explain the central tendency.
- determine average, median and mode with the help of mathematical formulae and solve related problems.
- draw histogram and pie-chart.



Practice



**Solutions to Mathematical Problems following
100% accurate format for best prep.**

Dear learners, mathematical problems of this chapter have been divided into exercise, multiple choice, short, creative and exercise-based activities in light of the learning outcomes. Practice the solutions well to ensure the best preparation in the exam.

At a Glance Important Contents of Chapter

- **Statistics :** Any information or data based on numbers or events is statistics.
- **Data :** The numbers used for information or events are the data of statistics.
- **Primary data :** The data collected directly from the source are primary data.
- **Secondary data :** The secondary data are collected from indirect sources.
- **Central Tendency :** The data cluster round the value at centre of middle. The tendency of clustering of the data to the value at middle or centre is called central tendency.
- Range of data = (Highest number – Lowest number + 1)
- Number of classes = $\frac{\text{Range}}{\text{Class interval}}$ (Converted into integer)
- Arithmetic mean, $\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n} = \frac{1}{n} \sum_{i=1}^n x_i$
- **Median :** If the data are arranged either in ascending or descending order, the value which divides the data into two equal parts is the median.
- For unorganized data, if the number of data is n –

$$(i) \text{ If number is odd, median} = \frac{n+1}{2} \text{ th terms; } (ii) \text{ If number is even median} = \frac{\frac{n}{2} \text{ th terms} + \left(\frac{n}{2} + 1\right) \text{ th terms}}{2}$$

- **Mode :** The number which appears maximum time is the mode of the data.



Solutions to Exercise Problems



Let's solve the textbook problems



MCQs with Answers



1. Which one of the following defines a class interval?
 - The difference between first and last data
 - The sum of last and first data
 - The sum of largest and smallest data
 - The difference between highest and lowest numbers of each class.

2. Which one of the following indicates the data included in a class ?
 - Frequency of the class
 - Mid-point of the class
 - Limit of the class
 - Cumulative frequency

3. What is the arithmetic mean of the numbers 8, 12, 16, 17, 20 ?

Ⓐ 10.5 Ⓑ 12.5
Ⓒ 13.6 Ⓒ 14.6

► Explanation : $\frac{8 + 12 + 16 + 17 + 20}{5}$

$$= \frac{73}{5} = 14.6$$

4. What is the median of the numbers 10, 12, 14, 18, 19, 25 ?

Ⓐ 11.5 Ⓑ 14.6
Ⓒ 16 Ⓒ 18.6

► Explanation : Here, data : [10, 12, 14, 18, 19, 25]

$$\therefore \text{Median} = \frac{14 + 18}{2} = \frac{32}{2} = 16.$$

5. What are the modes of the numbers 6, 12, 7, 12, 11, 12, 11, 7, 11 ?

Ⓐ 11 and 7 Ⓑ 11 and 12
Ⓑ 7 and 12 Ⓒ 6 and 7

- The frequency distribution table of the marks obtained in mathematics by 40 students of your class is as follows :

Class interval	41 – 55	56 – 70	71 – 85	86 – 100
Frequency	6	10	20	4

In the context of the table answer the question (6 – 8) :

6. Which one is the class interval ?

Ⓐ 5 Ⓑ 10
Ⓒ 12 Ⓒ 15

► Explanation : Class interval = Higher (Limit – Lower limit) + 1
 $= (55 - 41) + 1 = 14 + 1 = 15$

7. Which one is mid-value of the 2nd class ?

Ⓐ 45 Ⓑ 63
Ⓑ 78 Ⓒ 93

8. Which is the lower value of the class of mode in the table above ?

Ⓐ 41 Ⓑ 56
Ⓒ 71 Ⓒ 86

Creative Questions with Solutions

Ques. 01 The marks obtained by 25 students in the annual examination are given below :

72, 85, 78, 84, 78, 75, 69, 67, 88, 80, 74, 77, 79, 69, 74, 73, 83, 65, 75, 69, 63, 75, 86, 66, 71.

- a. Find the arithmetic mean of the marks obtained directly. 2
 b. Make the frequency distribution table with 5 as class interval and find the arithmetic mean from the table. 4
 c. Show the difference between the arithmetic means found in two different ways. 4

Solution to Question No. 01 :

a The sum of marks obtained by 25 students = 1875
 Total number of students = 25

$$\therefore \text{Direct mean} = \frac{1875}{25} = 75$$

Ans. 75.

b Here lowest mark = 63 and highest mark = 88

∴ The range of the data = $(88 - 63) + 1$ or, 26
 So, the number of class with class interval of

$$5 = \frac{26}{5} = 5.2 \text{ or } 6.$$

∴ A frequency distribution table is constructed as under :

Classes	Mid-value of class (x_i)	Frequency (f_i)	mid-value of data × Frequency ($x_i \times f_i$)
61 – 65	63	2	126
66 – 70	68	5	340
71 – 75	73	8	584
76 – 80	78	5	390
81 – 85	83	3	249
86 – 90	88	2	176
		25	1865

$$\therefore \text{Arithmetic mean} = \bar{x} = \frac{\sum_{i=1}^n f_i x_i}{n} = \frac{1865}{25} = 74.6.$$

c Mean obtained directly = 75

Arithmetic mean using table = 74.6

∴ The calculated difference between mean obtained directly and arithmetic mean
 $= (75 - 74.6) = 0.40$

Ans. 0.40.

Solutions to Mathematical Problems

10. A table is given below. Find the arithmetic mean. Draw the histogram of the data.

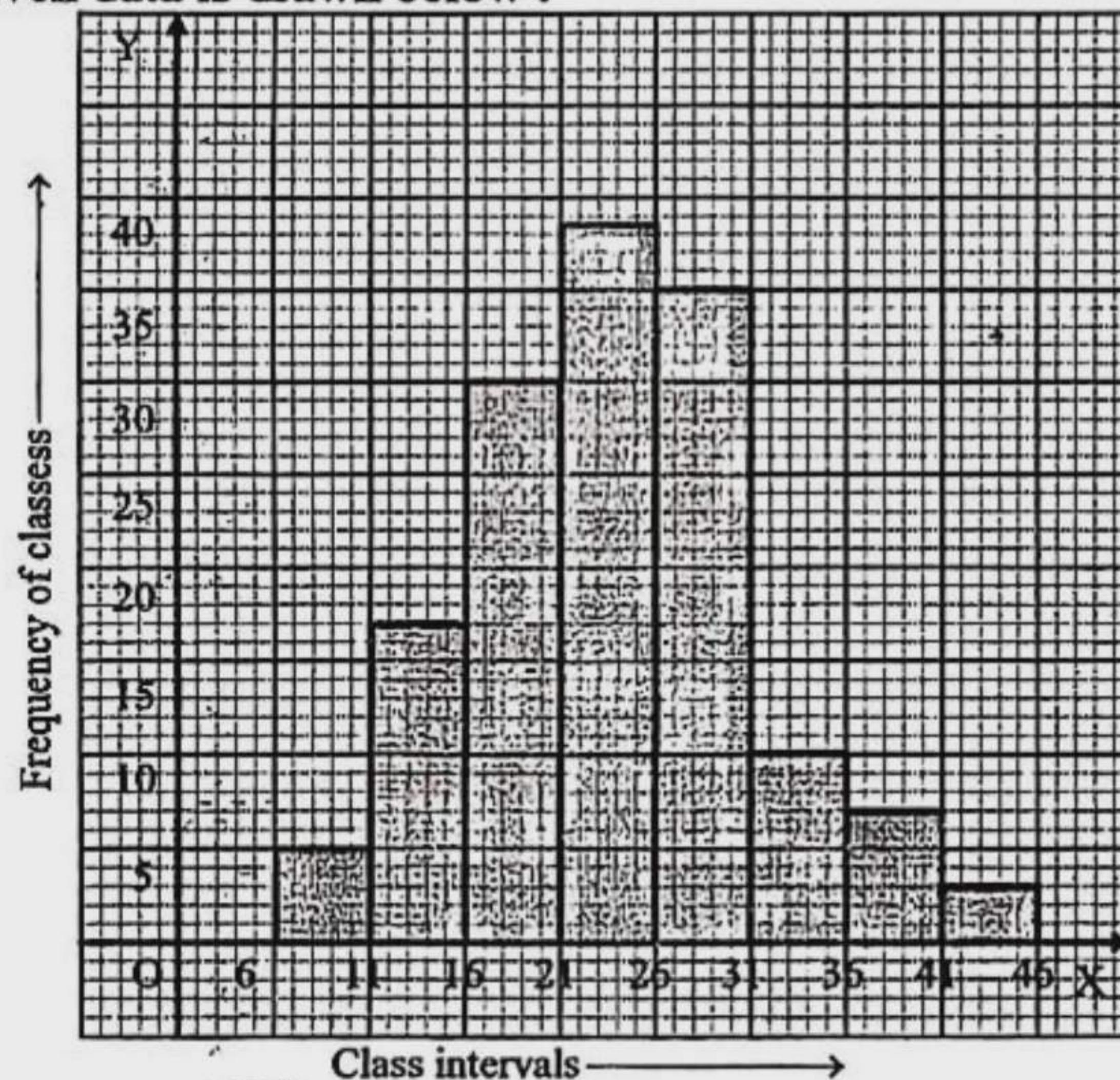
Marks obtained	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45
Frequency	5	17	30	38	35	10	7	3

Solution : A frequency distribution table with given data is given below :

Class	Mid-value of class (x_i)	Frequency (f_i)	Mid-Value of class \times frequency ($x_i \times f_i$)
6 – 10	8	5	40
11 – 15	13	17	221
16 – 20	18	30	540
21 – 25	23	38	874
26 – 30	28	35	980
31 – 35	33	10	330
36 – 40	38	7	266
41 – 45	43	3	129
	Total :	145	3380

$$\therefore \text{The required mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{3380}{145} = 23.31$$

A histogram of the given data is drawn below :



11. Find the arithmetic mean from the following table :

Daily income (in Tk.)	2210	2215	2220	2225	2230	2235	2240	2245	2250
Frequency	2	3	5	7	6	5	5	4	3

Solution : A frequency table is constructed below with the given data :

Daily income (in Tk) (x_i)	Frequency (f_i)	Daily income \times frequency ($x_i f_i$)
2210	2	4420
2215	3	6645
2220	5	11100
2225	7	15575
2230	6	13380
2235	5	11175
2240	5	11200
2245	4	8980
2250	3	6750
	$\Sigma f_i = 40$	$\Sigma x_i \times f_i = 89225$

$$\therefore \text{The required mean} = \frac{\sum x_i f_i}{\sum f_i} = \frac{89225}{40} = 2230.63$$

12. Weekly savings (in taka.) of 40 house wives are as follows :

155, 173, 166, 143, 168, 160, 156, 146, 162, 158, 159, 148, 150, 147, 132, 156, 140, 155, 145, 135, 151, 141, 149, 169, 140, 125, 122, 140, 137, 175, 145, 150, 164, 142, 156, 152, 146, 148, 157, 167.

Find the arithmetic mean, median and mode of weekly savings.

Solution : A frequency distribution table is constructed below with the given data :

Class of weekly savings (in Tk.)	121–130	131–140	141–150	151–160	161–170	171–180
Mid Value of class (x_i)	125.5	135.5	145.5	155.5	165.5	175.5
Frequency (f_i)	2	6	14	10	6	2
Mid-Value × frequency ($f_i x_i$)	251.0	813	2037.0	1555.0	993.0	351.0

Here the sum of Mid-value × frequency ($\sum f_i x_i$) = 251 + 813 + 2037 + 1555 + 993 + 351 = 6000

Total frequency = 40

$$\therefore \text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{6000}{40} = 150$$

∴ Mean is 150 taka.

Again arranging the data in ascending order we have,

122, 125, 132, 135, 137, 140, 140, 140, 141, 142, 143, 145, 145, 146, 146, 147, 148, 148, 149, 150, 150, 151, 152, 155, 155, 156, 156, 156, 157, 158, 159, 160, 162, 164, 166, 167, 168, 169, 173, 175.

Here, we have 40 numbers. So, the average of 20th and 21st numbers are the median of the data.

$$\therefore \text{Median} = \frac{150 + 150}{2} = 150.$$

Further, 140 and 156 occurs the highest times three times each in the data.

So, Mode is 140 taka and 156 taka.

13. Find the arithmetic mean and draw the histogram of the data :

Age (in years)	5–6	7–8	9–10	11–12	13–14	15–16	17–18
Frequency	25	27	28	31	29	28	22

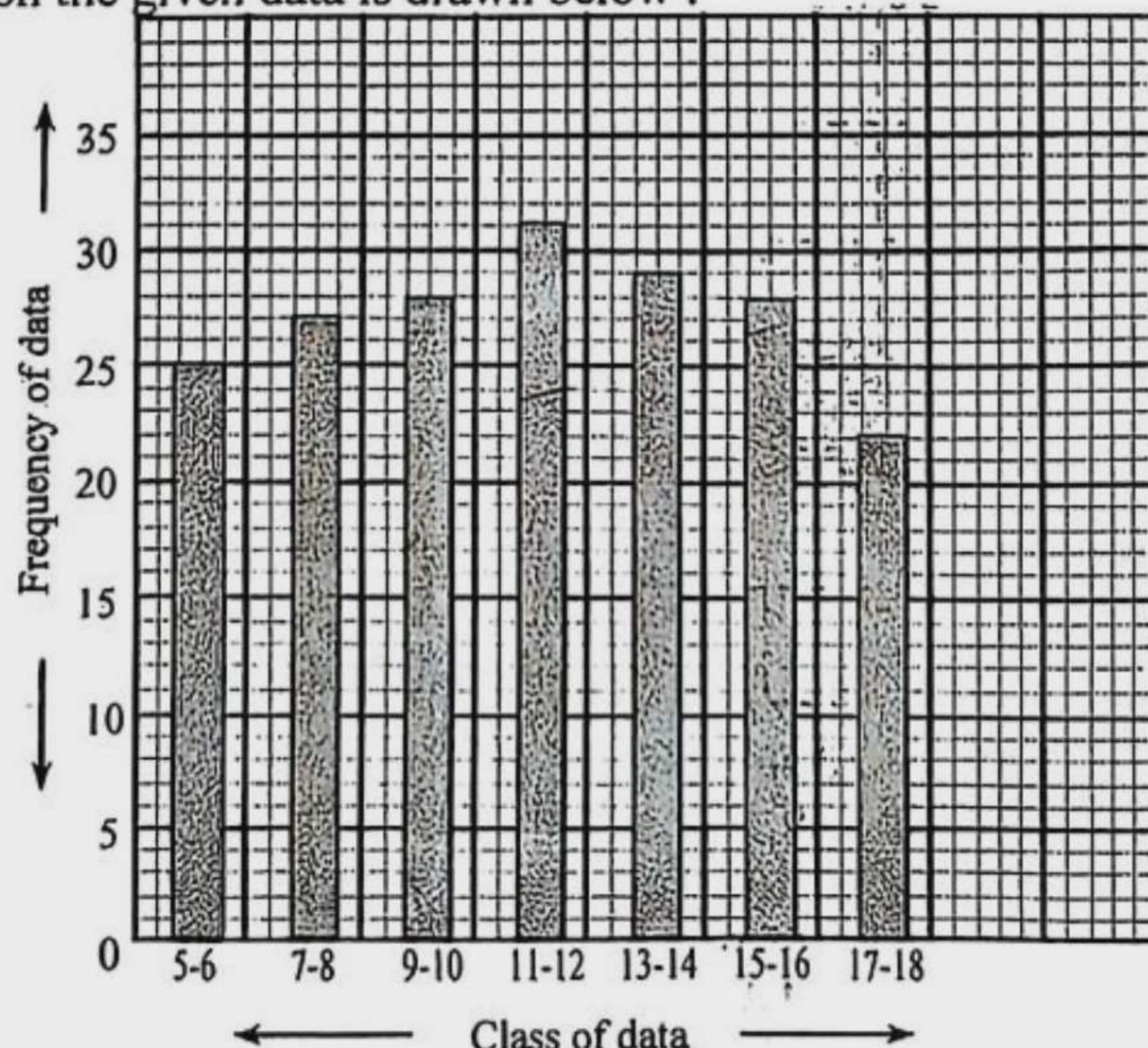
Solution :

Class of Age (in years)	5–6	7–8	9–10	11–12	13–14	15–16	17–18	Total
Mid-Value of age class (x_i)	5.5	7.5	9.5	11.5	13.5	15.5	17.5	-
Frequency (f_i)	25	27	28	31	29	28	22	190
Mid Value × frequency ($x_i \times f_i$)	137.5	202.5	266.0	356.5	391.5	434.0	385.0	2173

$$\therefore \text{Mean} = \frac{\sum x_i f_i}{\sum f_i} = \frac{2173}{190} = 11.44 \text{ (approx.)}$$

∴ Mean is 11.44 years. (approx.)

A histogram based on the given data is drawn below :



14. The frequency distribution table of monthly wages of 100 labourers of an industry is given below. What is the arithmetic mean of monthly wages of the labours ? Draw the histogram of the following data.

Monthly wages (in 100 taka)	51–55	56–60	61–65	66–70	71–75	76–80	81–85	86–90
Frequency	6	20	30	15	11	8	6	4

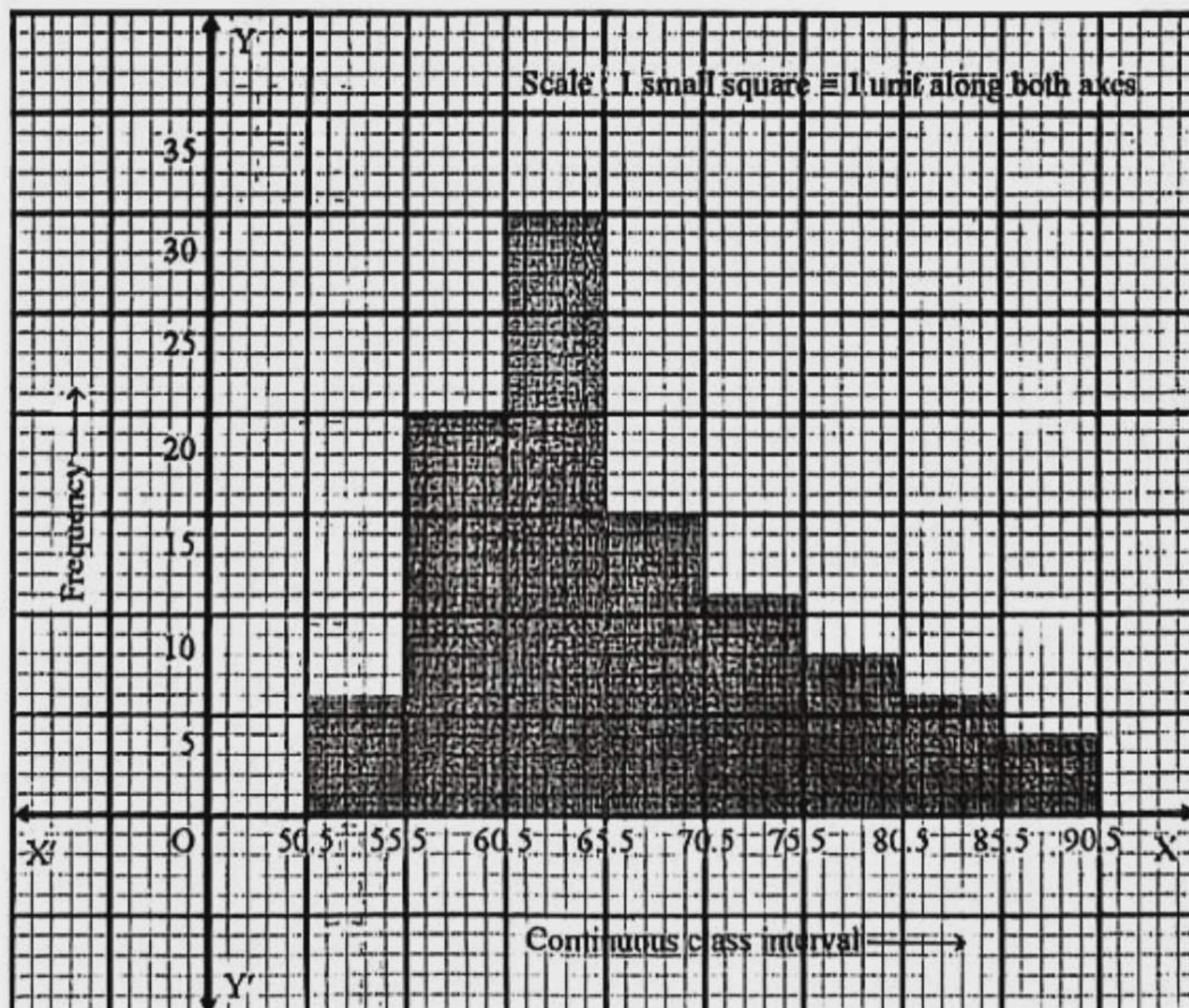
Solution :

Monthly wages (in hundred Tk.) Class	Mid-Value of wages class (in hundred Tk.) (x_i)	Continuous class interval	Frequency (f_i)	$x_i \times f_i$
51–55	53	50.5 – 55.5	6	318
56–60	58	55.5 – 60.5	20	1160
61–65	63	60.5 – 65.5	30	1890
66–70	68	65.5 – 70.5	15	1020
71–75	73	70.5 – 75.5	11	803
76–80	78	75.5 – 80.5	8	624
81–85	83	80.5 – 85.5	6	498
86–90	88	85.5 – 90.5	4	352
Total			$\sum f_i = 100$	$\sum f_i x_i = 6665$

$$\therefore \text{The mean value} = \frac{\sum x_i f_i}{\sum f_i} = \frac{6665}{100} = 66.65$$

\therefore The mean of monthly wages = 66.65 taka

A histogram is constructed below with the given data :



15. Marks obtained in English by 30 students of class VIII are :

45, 42, 60, 61, 58, 53, 48, 52, 51, 49, 73, 52, 57, 71, 64, 49, 56, 48, 67, 63, 70, 59, 54, 46, 43, 56, 59, 43, 68, 52.

- What are the numbers of classes with 5 as class interval ?
- Make a frequency distribution table with 5 as class interval.
- Find the arithmetic mean from the table.

Solution :

- a. Here the highest number of the data = 73
 The lowest number of the data = 42
 \therefore The range of the data = $(73 - 42) + 1 = 32$

$$\therefore \text{The required number of classes with class interval } 5 = \frac{32}{5} \\ = 6.4 \text{ or, } 7.$$

- b. Frequency distribution table with 5 as class interval :

Class of Marks	41–45	46–50	51–55	56–60	61–65	66–70	71–75	Total
Frequency	4	5	6	7	3	3	2	30
Mid-Value of Class of marks	43	48	53	58	63	68	73	-
Mid-value × frequency	172	240	318	406	189	204	146	1675

- c. Here from (b), $\Sigma \text{Mid-Value} \times \text{Frequency} = 1675$

Total frequency = 30

$$\therefore \text{Mean Value} = \frac{1675}{30}$$

= 55.83 (approx.)

\therefore Mean of mark is 55.83. (approx.)

16. Daily savings of 50 students are given below :

Saving (in taka)	41–50	51–60	61–70	71–80	81–90	91–100
Frequency	6	8	13	10	8	5

- a. Make a cumulative frequency table.
 b. Find the arithmetic mean from the table.

Solution :

- a. Cumulative frequency table is constructed below with the given data :

Class of saving (in taka)	Mid-Value of class	Frequency	Cumulative frequency	Mid-Value × frequency
41–50	45.50	6	6	273.0
51–60	55.50	8	14	444.0
61–70	65.50	13	27	851.5
71–80	75.50	10	37	755.0
81–90	85.50	8	45	684.0
91–100	95.50	5	50	477.5
Total		50		3485.0

- b. Calculation of arithmetic mean :

From (a) above, we have,

$$\Sigma \text{mid-value} \times \text{frequency} = 3485.$$

$$\text{Total frequency} = 50.$$

$$\therefore \text{Arithmetic Mean} = \frac{3485}{50} = 69.7$$

\therefore Mean savings is 69.7 taka.

17. The favourite fruits of 200 students are given in the table. Draw a pie-chart :

Fruit	Mango	Jackfruit	Lichi	Jambolic
Number of students	70	30	80	20

Solution :

Here we shall have to draw a pie-diagram of favourite fruits for 200 students.

Pie-diagram means a circular diagram of students' number based on their fondness of fruits.

We know, there is an angle measuring 360° at the centre of a circle.

So, for drawing a pie-diagram, 360° have to be divided into 200 students according to fondness of individual fruits :

200 students will cover 360° .

$$1 \text{ student will cover } \frac{360}{200}$$

$$70 \text{ students will cover } \frac{360^\circ \times 70}{200} = 126^\circ$$

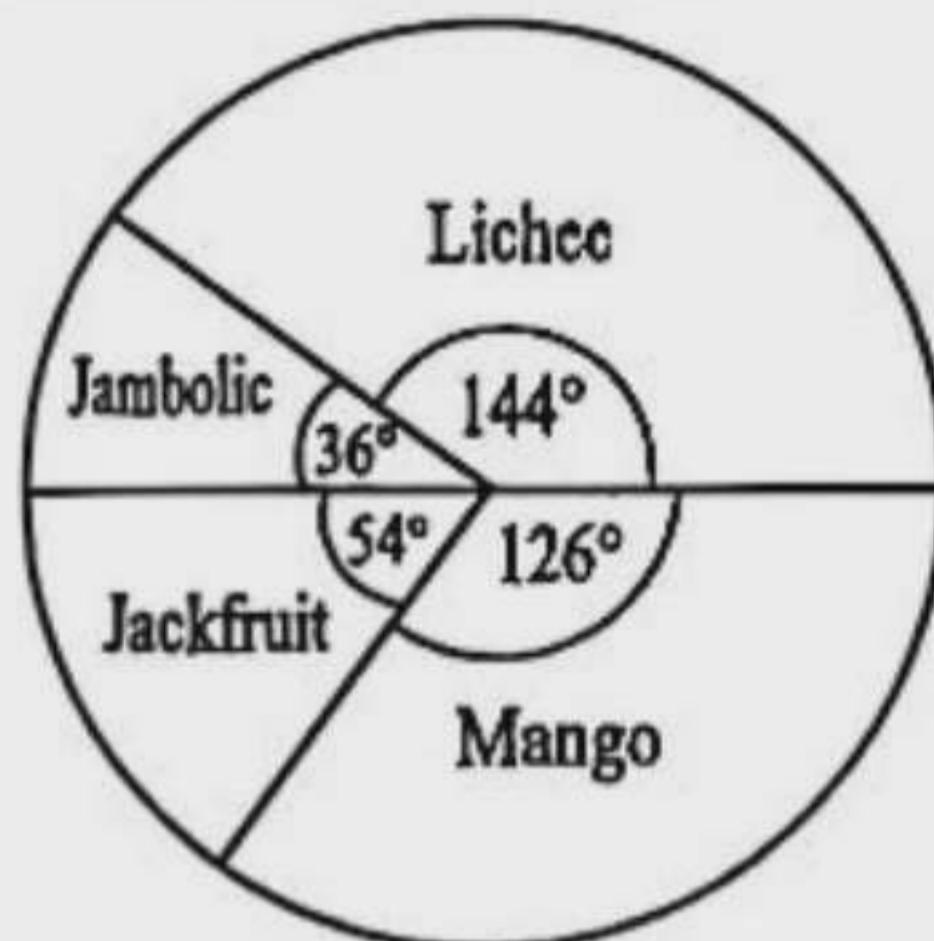
That is, the students who are fond of mango will cover 126° of the pie-diagram.

$$\text{Similarly, the students who are fond of jackfruit (30 students) will cover pie-diagram} = \frac{360^\circ \times 30}{200} = 54^\circ.$$

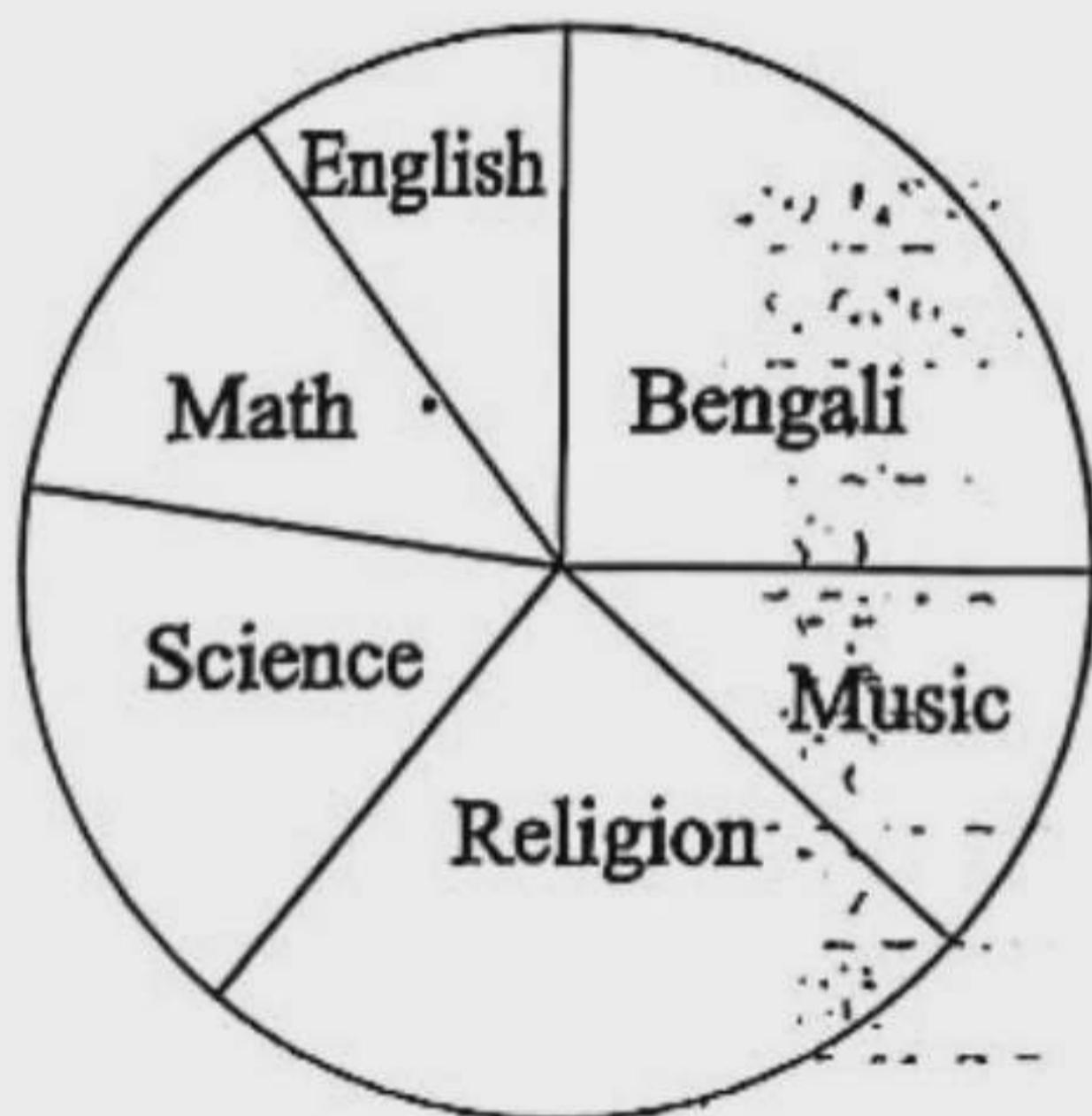
$$\text{The students who are fond of lichee (80 students) will cover pie-diagram} = \frac{360^\circ \times 80}{200} = 144^\circ.$$

$$\text{And the students who are fond of jambolic (20 students) will cover pie-diagram} = \frac{360^\circ \times 20}{200} = 36^\circ.$$

So, the required pie-diagram is constructed as under :



18. The subjects chosen by 720 students are presented in the pie-chart. Express in numbers.



Bengali – 90°
English – 30°
Math – 50°
Science – 60°
Religion – 80°
Music – 50°

$\rule[1ex]{1cm}{0.4pt}$ 360°

Solution : According to pie-diagram, 360° is for 720 students.

$$\therefore 1^\circ \text{ is for } \frac{720}{360} \text{ students.}$$

$$90^\circ \text{ is for } \frac{\frac{2}{360} \times 720}{360} \text{ students} = 180 \text{ students}$$

$$30^\circ \text{ is for } \frac{\frac{2}{360} \times 720}{360} \text{ students} = 60 \text{ students}$$

$$50^\circ \text{ is for } \frac{\frac{2}{360} \times 720}{360} \text{ students} = 100 \text{ students}$$

$$60^\circ \text{ is for } \frac{\frac{2}{360} \times 720}{360} \text{ students} = 120 \text{ students}$$

$$80^\circ \text{ is for } \frac{\frac{2}{360} \times 720}{360} \text{ students} = 160 \text{ students}$$

$$50^\circ \text{ is for } \frac{\frac{2}{360} \times 720}{360} \text{ students} = 100 \text{ students}$$

\therefore Chooser of Bangla is 180 students, English is 60 students, Mathematics is 100 students, Science is 120 students, Religion is 160 students and Music is 100 students.





Creative Questions with Solutions

Ques. 19 A frequency distribution table of the marks obtained in mathematics by 50 students is as follows :

Marks obtained	60	65	70	75	80	85
Frequency	5	8	11	15	8	3

- a. Find out the Median. 2
- b. Find out the Arithmetic mean. 4
- c. Draw the pie-chart of the given data. 4

Solution to Question No. 19 :

a Cumulative frequency table of the given data is made below :

Obtained Marks	Frequency	Cumulative frequency
60	5	5
65	8	13
70	11	24
75	15	39
80	8	47
85	3	50
Total	50	

Here the total frequency of the data is 50. So, the median of the data is the average of 25th and 26th values and it is $\frac{75 + 75}{2}$ or 75.

b In order to calculate the mean of the data, the given data is tabulated as under :

Obtained marks (x_i)	Frequency (f_i)	$f_i \times x_i$
60	5	300
65	8	520
70	11	770
75	15	1125
80	8	640
85	3	255
Total	$n = 50$	$\sum f_i x_i = 3610$

$$\text{We know, mean} = \frac{\sum f_i x_i}{n}$$

$$\text{Here } n = 50, \sum f_i x_i = 3610$$

$$\therefore \text{The required mean} = \frac{3610}{50} \text{ or } 72.2$$

c Here total marks obtained by 50 students = 3610
Total measure of angle at the centre of a circle = 360° .

\therefore total 300 marks obtained by 5 persons cover $\approx \frac{360^\circ}{3610} \times 300$

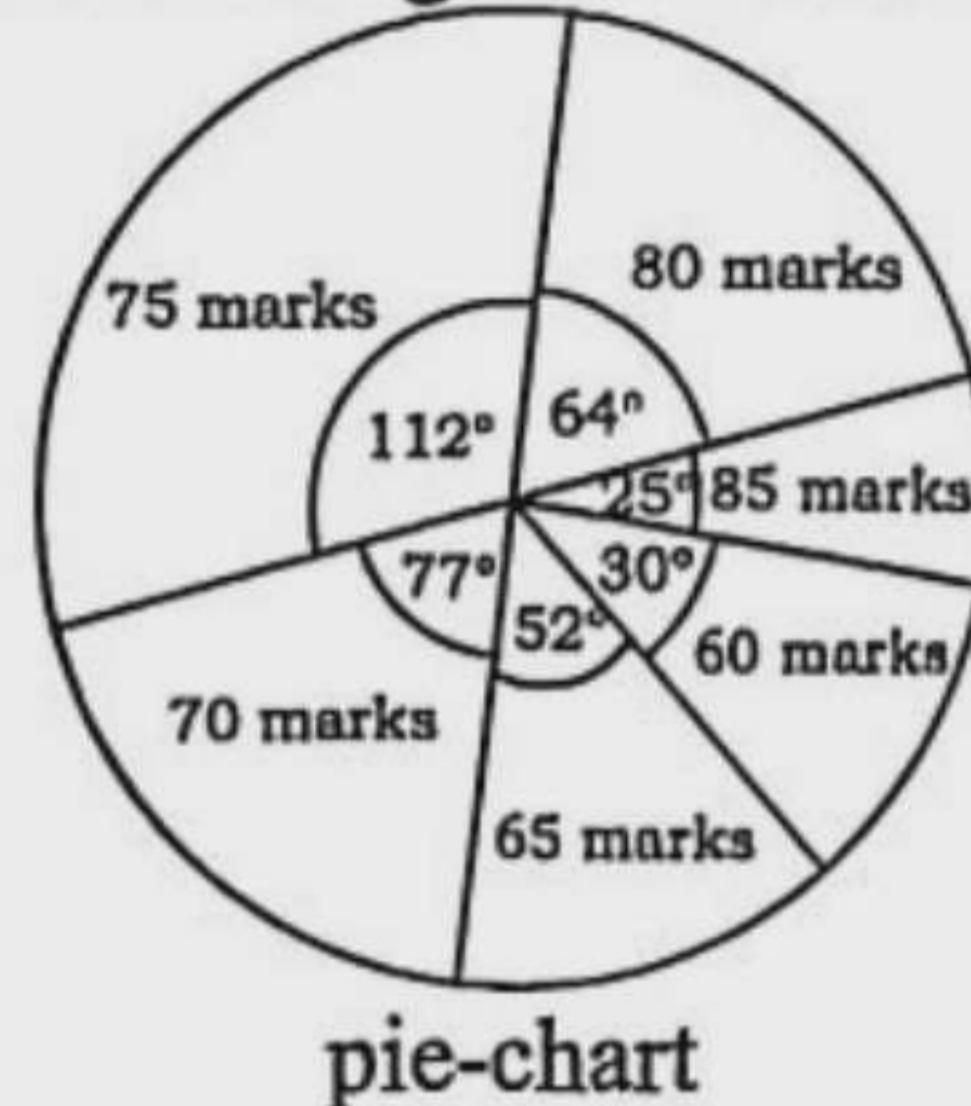
$$\approx 30^\circ$$

$$\text{ " } 520 \text{ " " " } 8 \text{ " " } \approx \frac{360^\circ}{3610} \times 520 \\ \approx 52^\circ$$

$$\text{ " } 770 \text{ " " " } 11 \text{ " " } \approx \frac{360^\circ}{3610} \times 770 \\ \approx 77^\circ$$

$$\begin{aligned} \text{ " } 1125 \text{ " " " } 15 \text{ " " } &\approx \frac{360^\circ}{3610} \times 1125 \\ &\approx 112^\circ \\ \text{ " } 640 \text{ " " " } 8 \text{ " " } &\approx \frac{360^\circ}{3610} \times 640 \\ &\approx 64^\circ \\ \text{ " } 255 \text{ " " " } 3 \text{ " " } &\approx \frac{360^\circ \times 255}{3610} \\ &\approx 25^\circ \end{aligned}$$

Now a pie-chart of the given data is drawn below :



Ques. 20 A table is given below :

Class interval	20-29	30-39	40-49	50-59	60-69
Frequency	10	6	18	12	8

- a. Find the median of the data : 7, 5, 4, 9, 3, 8. 2
- b. Find out the Arithmetic mean from the data (table). 4
- c. Draw the Histogram on the data. 4

Solution to Question No. 20 :

a The given data is arranged in ascending order as under :

$$3, 4, 5, 7, 8, 9$$

$$\text{Here, median of the above data} = \frac{5 + 7}{2} = \frac{12}{2} = 6$$

b In order to find the mean of the data, the given data is tabulated as under :

Class interval	Mid-value of class interval (x_i)	Frequency (f_i)	$x_i \times f_i$
20-29	24.5	10	245
30-39	34.5	6	207
40-49	44.5	18	801
50-59	54.5	12	654
60-69	64.5	8	516

$$n = 54 \quad \sum x_i f_i = 2423$$

We know, the mean of a data = $\frac{\sum f_i x_i}{n}$.

$$\therefore \text{The required mean} = \frac{2423}{54} \text{ or } 44.87 \text{ (approx.)}$$

c A graph paper of xy-plane is taken. class intervals are plotted along x-axis. In this case, 1 small square is taken as unit of class interval.

Frequency of the respective class interval is plotted along y-axis. 1 small square of graph paper is taken as unit of frequency in this case too. Thus a histogram of the given data is drawn below :



Ques. 21 Weekly savings (in taka) of 40 housewives are given below :

155, 173, 166, 143, 168, 160, 156, 146, 162, 158, 159, 148, 150, 147, 132, 136, 154, 140, 155, 145, 135, 151, 141, 169, 140, 125, 122, 140, 137, 175, 145, 150, 164, 142, 156, 152, 146, 148, 157, 167.

- a. Arrange the data in ascending order. 2
- b. Find out the Median and Mode. 4
- c. Make a frequency distribution table with 5 as class interval and find out the Arithmetic mean. 4

Solution to Question No. 21 :

a. The given data are arranged in ascending order of values as under :

122, 125, 132, 135, 136, 137, 140, 140, 140, 141, 142, 143, 145, 145, 146, 146, 147, 148, 148, 150, 150, 151, 152, 154, 155, 155, 156, 156, 156, 157, 158, 159, 160, 162, 164, 166, 167, 168, 168, 173, 175

b. Here total frequency of the data = 40

∴ Median of the data = the average of 20th and 21st values.

$$= \frac{150 + 150}{2} \\ = 150$$

Again 140 occurs the maximum i.e. 3 times in the data. So, 140 is the mode of the data.

c. A frequency distribution table with the given data is made below considering 5 as class interval :

Class interval	Mid-value of class interval (x_i)	Tally marks	Frequency f_i	$x_i \times f_i$
121 – 125	123		2	246
126 – 130	128	0	0	0
131 – 135	133		2	266
136 – 140	138		5	690
141 – 145	143		5	715
146 – 150	148		7	1036
151 – 155	153		5	765
156 – 160	158		6	948
161 – 165	163		2	326
166 – 170	168		4	672
171 – 175	173		2	346
Total			$n = 40$	$\sum f_i x_i = 6010$

We know, mean = $\frac{\sum f_i x_i}{n}$

Here, $n = 40$, $\sum f_i x_i = 6010$

∴ The required mean = $\frac{6010}{40}$ or, 150.25



Multiple Choice Q/A



Designed as per topic



11.1 Information and data ▶ Textbook Page 171

1. What is information? (Easy)
 - (a) Facts or details of something or somebody
 - (b) A collection of some words
 - (c) A collection of some letters
 - (d) All the above
2. What is data? (Easy)
 - (a) An information about theft
 - (b) An information about family maintenance
 - (c) A numerical information about something
 - (d) All the above
3. What is meant by present age? (Medium)
 - (a) Age of information technology
 - (b) Ancient age
 - (c) Middle age
 - (d) None of the above
4. How many ways are there for collection of data? (Medium)
 - (a) 5
 - (b) 2
 - (c) 3
 - (d) 4

5. What is called a numerical information? (Medium)
 - (a) Mean
 - (b) Statistics
 - (c) Statistical data
 - (d) Mode
6. What is called a data arranged in a particular characteristic? (Medium)
 - (a) Unorganized data
 - (b) Non-arranged data
 - (c) Organized data
 - (d) None of the above
7. How many information must be included in a data? (Easy)
 - (a) 10
 - (b) 5
 - (c) 3
 - (d) More than one or some
8. Why is graph used for presenting a data? (Hard)
 - (a) To make the data attractive and easy to understand
 - (b) To enhance the out look of the data
 - (c) To calculate central tendency of the data
 - (d) All the above.

9. i. Numerical information is mathematical data.
ii. When information of a data are arranged in a particular norm, it is called an organized data.
iii. Mathematical data contains more than one information.
Which one of the following is correct? (Medium)
a ① i & ii ② ii & iii ③ i & iii ④ i, ii & iii
10. i. Information generally published in newspapers through radio and television are not mathematical data.
ii. A numerical information cannot be considered as mathematical data.
iii. A graph is used to mean data in short.
Which one of the following is correct? (Medium)
c ① i, ii ② ii, iii ③ i, iii ④ i, ii & iii
11. What is the mode of the following data?
2, 5, 2, 12, 5, 11, 2, 7, 1, 11. (Hard) [DjB '19]
b ① 1 ② 2 ③ 5 ④ 11
-  11.2 Frequency Distribution Table ▶ Textbook Page 172
12. Which of the following is used to denote tally? (Medium)
b ① @Σ ② ||| ③ □ ④ $\sum_{i=1}^K$
13. If the highest value is 80 and the lowest value is 40 of any data and the class interval is 5, what will be the number of classes? (Easy) [DB '19]
b ① 8 ② 9 ③ 40 ④ 41
14. The highest and lowest values of a data are 95 and 70 respectively and class interval is 5. What is the number of classes? (Easy) [RB '19]
c ① 10 ② 7 ③ 6 ④ 5
15. What is the class interval of the class '6 – 10'? (Easy) [CtgB '19]
b ① 4 ② 5 ③ 6 ④ 10
16. If range is 57 and class interval is 10, what is number of classes? (Medium) [SB '19]
b ① 5 ② 6 ③ 7 ④ 8
17. What is the range of the data 121, 213, 107, 219, 199, 120? (Easy) [RB '18]
d ① 99 ② 100 ③ 112 ④ 113
18. The range of a data is 26 and the highest value is 42 then, which one is the lowest value? (Medium) [CB '18]
c ① 15 ② 16 ③ 17 ④ 34
19. What is the range of the number 21, 24, 18, 10, 6, 23, 30? (Medium) [CtgB '18]
d ① 9 ② 10 ③ 24 ④ 25
20. To make a frequency distribution table from data which one is of the following is first step? (Hard) [SB '18]
a Number of class ② Range
b Frequency ③ Class interval ④

21. In a statistical data highest number is 96 and lowest number is 51 then what is the range? (Hard) [JB '17]
b ① 45 ② 46 ③ 73.5 ④ 96.5
22. Cumulative frequency table—(Hard) [CB '17]
i. needs not to evaluate arithmetic mean
ii. is necessary to determine median
iii. is unnecessary to draw a histogram
Which one is correct?
d ① i & ii ② i & iii ③ ii & iii ④ i, ii & iii
23. Which one of the following is expressed by the data included in a class? (Medium) [CB '17]
① Cumulative frequency ② Mid-point of the class
c ③ Limit of the class ④ Frequency of the class
24. What is the median of the numbers below? (Easy) [CtgB '17]
8, 10, 7, 13, 12, 15
c ① 13 ② 12 ③ 11 ④ 10
25. If the maximum value of any data is 60, the minimum value is 20 and the class interval is 5, then what is the number of classes? (Medium) [BB '17]
b ① 8 ② 9 ③ 40 ④ 41
- The frequency distribution table of the marks obtained in English by 50 students of your class is as follows :
- | Class Interval | 51-60 | 61-70 | 71-80 | 71-90 | 91-100 |
|----------------|-------|-------|-------|-------|--------|
| Frequency | 6 | 15 | 20 | 5 | 4 |
- In the context of the table answer the questions No. 26 and 27 :
26. Which one is mid-value of 1st class? (Easy) [DjB '17]
c ① 51 ② 55 ③ 55.5 ④ 60
27. Which is the lower value of the class of mode in the table above? (Medium) [DjB '17]
c ① 51 ② 61 ③ 71 ④ 81
- Answer to the questions No. 28 to 30 from the given table :
- | Class | 42-47 | 48-53 | 54-59 | 60-65 | 66-71 |
|-----------|-------|-------|-------|-------|-------|
| Frequency | 6 | 10 | 7 | 4 | 1 |
- [DB '16]
28. What is the class interval? (Easy)
c ① 4 ② 5 ③ 6 ④ 7
29. What is the lower limit of the class of mode? (Easy)
b ① 42 ② 48 ③ 54 ④ 60
30. Which one is the median class? (Easy)
① 42 – 47 ② 48 – 53
b ③ 54 – 59 ④ 60 – 65
31. Find the range of the following data : 28, 25, 23, 19, 29, 21, 25, 18. (Medium) [RB '16]
a ① 8 ② 10 ③ 11 ④ 12

32.	Class interval	10 – 19	20 – 29	30 – 29
	Frequency	1	3	6

In the above data — (Hard) [RB '16]

- i. class interval is 10
- ii. mid-value of second class is 24
- iii. the lower value of the class of mode is 30

Which one is correct?

- a) i & ii b) i & iii
- b) ii & iii c) i, ii & iii

33. The number of tally marks in a class is called —. (Hard) [JB '16]

- a) Frequency b) Class mid-value
- a) Range of class b) Class interval

34. If the highest value of the data is 60, lowest value is 20 and class interval is 5 then which one is the number of class? (Medium) [CB '16]

- b) 8 b) 9 c) 40 d) 41

35. How many steps are taken for making frequency table? (Medium) [CtgB '16]

- b) 3 b) 4 c) 5 d) 6

36. If range is 25, class interval is 4, what is number of class? (Hard) [CtgB '16]

- a) 6 b) 6.25 c) 7 d) 7.25

■ The frequency distribution table of the marks obtained in mathematics by the students of class eight of a school is given :

Class interval	41 – 50	51 – 60	61 – 70	71 – 80
Frequency	5	7	17	11

In the context of the table, answer the questions No. 37 and 38 : [SB '16]

37. Which one is the class interval? (Easy)

- c) 8 b) 9 c) 10 d) 11

38. Which one is mid-value of 3rd class? (Medium)

- b) 65 b) 65.5 c) 70 d) 75.5

■ The frequency distribution table of the marks obtained in Mathematics by 40 students of class eight is as follows :

Class interval	41-50	51-60	61-70	71-80
Frequency	5	13	16	6

In the context of the table, answer the questions 39 to 41 : [JB '15]

39. Which one is the class interval? (Easy)

- d) 4 b) 5 c) 9 d) 10

40. Which one is mid-value of third class? (Medium)

- b) 75.5 b) 65.5 c) 55.5 d) 45.5

41. What can we find out from the table? (Easy)

- i. Able to measure central tendency by using it
- ii. Cumulative frequency is 16 of its third class
- iii. The lower limit of mode-class is 61

Which one of the following is true?

- c) i & ii b) ii & iii
- c) i & iii d) i, ii & iii

■ Answer the questions No. 42 and 43 in the light of the frequency distribution table given below :

Class interval	41-50	51-60	61-70	71-80
Frequency	8	13	10	6

42. Which is the class-interval? (Easy) [CB '15]

- c) 5 b) 9 c) 10 d) 40

43. What is the Mid-value of the 2nd class? (Medium)

- c) 45.5 b) 55 c) 55.5 d) 65.5

44. Which one is the mid-value of class interval (56 – 60)? (Hard) [CtgB '15]

- d) 56 b) 60 c) 59 d) 58

45. What kind of data are 30, 45, 40, 36, 42, 36, 33, 42 of the ages of 8 people? (Medium) [SB '15]

- a) Organized b) Disorganized
- b) Tally data d) Class data

46. If the highest value and lowest value of a data are 50 and 15 respectively, what is its range? (Easy) [SB '15]

- c) 30 b) 35 c) 36 d) 37

■ Answer question No. 47 and 48 on the basis of the information given below :

Class interval	41 – 55	56 – 70	71 – 85	86 – 100
Frequency	6	10	20	4

47. Which is the class interval of the data? (Easy) [DjB '15]

- d) 5 b) 10 c) 14 d) 15

48. What is the mid-value of the 2nd class? (Medium) [DjB '15]

- b) 62 b) 63 c) 64 d) 65

49. The range of data is 26 and the highest value is 42 then, which one is the lowest value? (Hard) [Rajuk Uttara Model College, Dhaka]

- a) 15 b) 16 c) 17 d) 34

50. Which one of the following indicates the data included in a class? (Easy) [Ideal School & College, Dhaka]

- a) Frequency of the class
- b) Mid point of the class
- c) Limit of the class
- d) Cumulative frequency

■ Answer to the question No. (51 to 53) in the light of the table below :

Class-interval	51-60	61-70	71-80	81-90	91-100
Frequency	7	12	15	10	6

[Viqarunnisa Noon School and College, Dhaka]

51. Which is the class-interval of the given data? (Medium)

- d) 5 b) 6 c) 10 d) 11

52. Which is the mid-value of the last class? (Easy)

- c) 95 b) 96 c) 95.5 d) 96.5

53. Which is the upper limit of the mode class? (Medium)

- b) 70 b) 80 c) 100 d) 90

 11.3 Diagram

→ Textbook Page 173

54. How many degree is found in the centre of pie-chart? (Hard) [JB '19]
 ⓐ 90° ⓑ 180° ⓒ 270° ⓓ 360°
55. How many degree is found in the centre of pie-chart? (Medium) [CtgB '18]
 ⓐ 90° ⓑ 180° ⓒ 270° ⓓ 360°
56. What is the another name of pie-chart? (Hard) [JB '17]
 ⓐ Circular diagram ⓑ Section area of circle
 ⓑ Histogram ⓒ Circle distribution
57. Pie-chart is —. (Hard) [CtgB '17]
 i. a graph
 ii. called circular diagram
 iii. a statistics which is presented as a part of 360°
Which one is correct?
 ⓐ i & ii ⓑ i & iii ⓒ ii & iii ⓓ i, ii & iii
58. Which is the height of a histogram? (Hard) [SB '17]
 ⓐ Frequency ⓑ Cumulative frequency
 ⓑ Class interval ⓒ Range
59. Pie-chart is —. (Hard) [JB '16]
 i. one kind of diagram
 ii. a circular diagram
 iii. if a statistics is presented as a part of 360°
Which one is correct?
 ⓐ i & ii ⓑ i & iii ⓒ ii & iii ⓓ i, ii & iii
60. How many degree is found in the pie-chart? (Easy) [DjB '16]
 ⓐ 90° ⓑ 180° ⓒ 270° ⓓ 360°
61. What is pie-chart? (Medium) [JB '15]
 ⓐ Graph ⓑ Table ⓒ Data ⓓ Tally
62. Height of histogram is for — (Medium)
[Rajuk Uttara Model College, Dhaka]
 ⓐ Frequency ⓑ Cumulative frequency
 ⓑ Class interval ⓒ Range
-  11.4 Central Tendency → Textbook Page 176
63. How many type of measuring the central tendency are there in Statistics? (Easy) [CtgB '19]
 ⓐ 1 ⓑ 2 ⓒ 3 ⓓ 4
64. The measures of central tendency are —. (Hard) [RB '18]
 ⓐ median and tally
 ⓑ mode and cumulative frequency
 ⓒ median and mid-value of a class
 ⓑ median and mode
65. What is called the result of the sum of lower limit and higher limit of class interval and divided by 2? (Medium) [JB '16]
 ⓐ class limit ⓑ mode
 ⓑ class interval ⓒ class mid-value
66. How many kinds are there to measure the central tendency? (Easy) [DB '15]
 ⓐ 1 ⓑ 2 ⓒ 3 ⓓ 4

67. What is called the tendency of clustering of the data to the value at centre? (Medium) [SB '15]
 ⓐ Mode ⓑ Range
 ⓑ Median ⓓ Central tendency

 11.5 Arithmetic mean → Textbook Page 177

68. Which one of the following is arithmetic mean of 5, 6, 7, 8, 9? (Hard)
 ⓐ 6.5 ⓑ 7.5 ⓒ 5.8 ⓓ 7
69. The body weight of first 5 students of class six are 22 kg, 29 kg, 25 kg, 26 kg and 24 kg. What is the mean weight of the students? (Hard)
 ⓐ 25 kg ⓑ 25.2 kg ⓒ 26 kg ⓓ 26.2 kg
70. What is the mean of the numbers 2, 1, 9, 0, 3, 4, 1, 6, 9, 0? (Medium) [DB '19]
 ⓐ 3.89 ⓑ 3.77 ⓒ 3.50 ⓓ 2.40
71. What is the arithmetic mean of the data 0, 0, 2, 4, 6, 8, 7, 3? (Easy) [CtgB '19]
 ⓐ 3.75 ⓑ 5 ⓒ 5.75 ⓓ 6
72. What is the mean of the numbers 8, 12, 16, 17, 20? (Hard) [DjB '19]
 ⓐ 10.5 ⓑ 12.5 ⓒ 13.6 ⓓ 14.6
73. If the arithmetic mean of 17, 25, 27, 13, 23 and x is 19. What is the value of x? (Medium) [DB '16]
 ⓐ 14 ⓑ 12 ⓒ 9 ⓓ 8
Marks obtained in mathematics by 10 students of class VIII are :
 48, 41, 50, 47, 40, 38, 46, 43, 45, 50.
Answer the questions No. 74 and 75 in respect of the above information : [JB '16]
74. What is range of the above data? (Medium)
 ⓐ 10 ⓑ 11 ⓒ 12 ⓓ 13
75. What is the arithmetic mean of the above data? (Easy)
 ⓐ 44.5 ⓑ 44.8 ⓒ 45.5 ⓓ 45.8
76. What is the mean of the numbers 17, 19, 23, 26, 35? (Medium) [DjB '16]
 ⓐ 23 ⓑ 24 ⓒ 26 ⓓ 27
77. What is the mean of the numbers 8, 12, 16, 17, 20? (Medium) [DjB '15]
 ⓐ 10.5 ⓑ 12.5 ⓒ 13.6 ⓓ 14.6
-  11.6 Median → Textbook Page 180
78. Let us consider the first 12 natural numbers. What is their median? (Easy)
 ⓐ 5 ⓑ 6 ⓒ 6.5 ⓓ 7
79. i. Formula for computing arithmetic mean =

$$\frac{\text{Sum of data}}{\text{Number of data}}$$
.
 ii. When there are 9 numbers in an arranged data, 5th number is its median.
 iii. One numerical information can form a data.
Which one of the following is correct? (Medium)
 ⓐ i & ii ⓑ ii & iii ⓒ i & iii ⓓ i, ii & iii



80. What is median of the following numbers :
28, 13, 23, 29, 16, 21? (Medium) [RB '19]
 a) @ 22 b) 23 c) 26 d) 29
- Answer the questions no. 81 and 82 based on following information;
25, 15, 19, 23, 30, 12, 27, 35, 17, 21 [CB '19]
81. What is the median of the numbers? (Easy)
 a) @ 22 b) 23 c) 26 d) 30
82. What is range of the data? (Medium)
 a) @ 12 b) 13 c) 23 d) 24
83. Which one is the median of the data 8, 0, 6, 1, 4, 7? (Hard) [CtgB '19]
 a) @ 1 b) 4 c) 5 d) 6
84. What is the median of the numbers 11, 23, 25, 15, 21, 12, 18, 17, 27, 22, 29, 19, 30, 16? (Medium) [SB '19]
 a) @ 18 b) 18.5 c) 20 d) 20.5
85. What is the median of the number 18, 25, 10, 14, 12 and 19? (Hard) [DjB '19]
 a) @ 11.5 b) 14.5 c) 16 d) 18
- 35, 42, 42, 43, 42, 48, 55, 56, 55, 58, 52 are numbers, then. [MB '19]
- Answer the questions no. 86 and 87 :
86. What is the median of the numbers? (Easy)
 a) @ 48 b) 43 c) 55 d) 42
87. What is the arithmetic mean of the numbers? (Medium)
 a) @ 42 b) 47 c) 48 d) 49
88. What is the median of the numbers 9, 10, 32, 30, 12, 17, 19, 25? (Hard) [DB '18]
 a) @ 16 b) 17 c) 18 d) 19
- Answer the questions No. 89 and 90 based on the following information :
1, 3, 2, 5, 5, 12, 13, 10, 12 [JB '18]
89. Which one is the median? (Medium)
 a) @ 4 b) 5 c) 10 d) 12
90. Which one is the mean? (Medium)
 a) @ 5 b) 6 c) 7 d) 9
91. What is the median of the numbers 6, 5, 12, 8, 10 and 15? (Hard) [CB '18]
 a) @ 8 b) 9 c) 10 d) 12
92. What is the median of the prime number from 1 to 20? (Medium) [CtgB '18]
 a) @ 12 b) 11 c) 9 d) 7
- From the above table answer the questions No. 93 and 94 : [SB '18]
93. In given frequency table which one is the median? (Easy)
 a) @ 62.5 b) 65 c) 67.5 d) 70
94. In given frequency table which one is the mean? (Easy)
 a) @ 63.09 b) 63.90 c) 66.25 d) 66.52

95. Number of total data is n and if n is odd number then which one is the median? (Easy) [DjB '18]
 a) Average of $\frac{n}{2}$ th and $(\frac{n}{2} + 1)$ th terms
 b) $\frac{n-1}{2}$ th term
 c) $\frac{(n+1)}{2}$ th term
 d) Average of $\frac{n}{2}$ and $(\frac{n}{2} - 1)$ th terms
- Answer the question No. 96 and 97 based on the following data :
0, 0, 1, 1, 5, 6, 3, 2.
96. What is the median of the data? (Easy) [DB '17]
 a) @ 0 b) 1.2 c) 1.5 d) 3.2
97. What is the Arithmetic mean of the data? (Hard) [DB '17]
 a) @ 2.3 b) 2.25 c) 3.2 d) 3.5
- | Class | 42-47 | 48-53 | 54-59 | 60-65 | 66-71 |
|-----------|-------|-------|-------|-------|-------|
| Frequency | 6 | 10 | 7 | 4 | 1 |
- Answer the questions No. 98 and 99 based on the above table :
98. Which one is the median class? (Easy) [RB '17]
 a) @ 66 – 71 b) 60 – 65 c) 54 – 69 d) 48 – 53
99. What is the class interval? (Easy) [RB '17]
 a) @ 4 b) 5 c) 6 d) 7
100. Which one of the following is the median of the numbers 28, 13, 23, 29, 16, 21? (Easy) [CB '17]
 a) @ 20 b) 21 c) 22 d) 23
101. What is the median of the numbers 7, 5, 14, 13, 10, 9, 8, 6, 11, 12? (Medium) [SB '17]
 a) @ 8 b) 8.5 c) 9 d) 9.5
102. If the total numbers of data are n and n is an odd number, then median is —. (Medium) [BB '17]
 a) $\frac{n}{2}$ th term b) $\frac{n-1}{2}$ th term
 c) $\frac{n+1}{2}$ th term d) $(\frac{n}{2} + 1)$ th term
103. What is the median of the numbers 9, 6, 5, 3, 8, 4, 10, 12? (Easy)
 a) @ 14 b) 8 c) 7 d) 6
104. What is the median of the numbers 21, 16, 12, 27, 18, 14? (Medium) [SB '16]
 a) @ 16 b) 17 c) 18 d) 34
105. What is the median of the numbers 28, 6, 20, 8, 12, 22? (Hard) [DjB '16]
 a) @ 16 b) 17 c) 21 d) 24
106. What is the median of the odds natural numbers from 1 to 10? (Hard) [RB '15]
 a) @ 4 b) 5 c) 6 d) 7

107. What is the median of the numbers 8, 10, 12, 14, 18, 20? (Hard) [JB '15]
 ⓐ @ 12 ⓑ 13 ⓒ 14 ⓓ 412

108. Number of total data is n and if n is odd number then median is —. (Hard) [CB '15]

- Ⓐ Ⓛ $\frac{n}{2}$ th term Ⓜ $\frac{n-1}{2}$ th term
 Ⓝ Ⓞ $\frac{n+1}{2}$ th term Ⓟ $\left(\frac{n}{2} + 1\right)$ th term

109. Which one of the following is the median of 9, 12, 13, 16, 18, 22, 22? (Easy) [CtgB '15]

- Ⓐ Ⓛ 16 Ⓜ 22 ⓒ 13 ⓓ 18

110. What is the median of the numbers 10, 12, 14, 18, 19 and 25? (Medium)
 [Ideal School & College, Dhaka]

- Ⓒ Ⓛ 11.5 Ⓜ 14.6 ⓒ 16 ⓓ 18.6

111. 17, 15, 14, 19, 13 and 18 which is the median of the above data? (Hard)

[Tiqarunnisa Noon School and College, Dhaka]

- Ⓐ Ⓛ 15 Ⓜ 17 ⓒ 16.5 ⓓ 16

11.7 Mode

► Textbook Page 182

112. What is the mode of the first 9 natural numbers? (Easy)

- Ⓐ Ⓛ 5 Ⓜ 4 Ⓝ None of the above
 Ⓞ Ⓟ 6

113. What is the mode of the numbers — 25, 12, 17, 8, 25, 12, 7, 5, 12, 5? (Easy)

- Ⓐ Ⓛ 25 Ⓜ 12 Ⓝ None of the above
 Ⓞ Ⓟ 5

114. What is mode of a data? (Hard)

- Ⓐ Highest number of a data
 Ⓛ Most frequently occurring value in a data
 Ⓜ Lowest number of a data

- Ⓐ Ⓛ Lowest number of numbers in a data

115. 40, 50, 60, 50, 30, 50, 60, 25 are some natural numbers. What is their mode? (Hard)

- Ⓐ Ⓛ 40 Ⓜ 50 ⓒ 60 ⓓ 25

116. i. Arithmetic mean of the first five natural numbers is 3.
 ii. Median of the first nine natural numbers is 5.

- iii. 1, 2, 3, 1, 2, 3, 1, 2, 3, 1 are some natural numbers with mode, 1.

Which one of the following is correct? (Medium)

- Ⓐ Ⓛ i & ii Ⓜ ii & iii ⓒ i & iii Ⓝ i, ii & iii

- Answer questions from 117 to 121 following the information given hereafter :
 10 students of class six of Motijheel Ideal School secured marks in mathematics in the last annual exam were 99, 92, 97, 94, 99, 100, 96, 95, 99, 92.

117. What was the arithmetic mean of the above data? (Easy)

- Ⓐ Ⓛ 95.3 Ⓜ 96.3 ⓒ 98.3 ⓓ 97.3

118. What was the median of the data? (Easy)

- Ⓒ Ⓛ 96 Ⓜ 97 ⓒ 96.5 ⓓ 97.5

119. What was the mode of the data? (Easy)

- Ⓐ Ⓛ 92 Ⓜ 95 ⓒ 97 ⓓ 99

120. If two 92 of the data are replaced by two 100, what will be median of the data? (Medium)

- Ⓒ Ⓛ 97 Ⓜ 96 ⓒ 99 ⓓ 100

121. What is the mode of the following numbers?
 6, 10, 7, 10, 5, 13, 6, 11, 11, 13, 7, 7, 15, 14 (Hard)

[JB '19]

- Ⓐ Ⓛ 6 Ⓜ 7 ⓒ 10 ⓓ 11

122. What is the mode of the numbers : 8, 7, 9, 8, 7, 9, 6, 7, 8, 6, 7, 8, 9, 8? (Hard)

[BB '19]

- Ⓒ Ⓛ 6 Ⓜ 7 ⓒ 8 ⓓ 9

123. What are the modes of the numbers 9, 11, 15, 17, 11, 15, 17, 11, 17? (Hard)

[DB '18]

- Ⓐ Ⓛ 9 and 11 Ⓜ 11 and 15

- Ⓓ Ⓛ 15 and 17 Ⓜ 11 and 17

A frequency distribution table of marks in Mathematics obtained by 40 students is given below :

Class interval	41-55	56-70	71-85	86-100
Frequency	6	10	20	4

■ Answer the questions No. 124 to 127 based on the above table : [BB '18]

124. What is the class interval? (Medium)

- Ⓐ Ⓛ 5 Ⓜ 10 ⓒ 14 ⓓ 15

125. Which is the Mid-value of the 4th class interval? (Medium)

- Ⓑ Ⓛ 94 Ⓜ 93 ⓒ 50 ⓓ 43

126. Which is the upper limit of the mode class? (Easy)

[BB '18]

- Ⓒ Ⓛ 100 Ⓜ 86 ⓒ 85 ⓓ 71

127. Which one is the mode of 3, 6, 4, 6, 5, 6, 5, 4, 5? (Hard)

[DjB '18]

- Ⓒ Ⓛ 3 and 4 Ⓜ 4 and 6 ⓒ 5 and 6 ⓓ 4 and 5

■ Answer the questions No. 128 and 129 according to the following information : 5, 8, 9, 8, 7, 6, 8, 1. [CB '16]

128. Which one of the following is the range of the above data? (Easy)

- Ⓑ Ⓛ 10 Ⓜ 9 ⓒ 8 ⓓ 7

129. What is the mode of the data? (Medium)

- Ⓒ Ⓛ 5 Ⓜ 7 ⓒ 8 ⓓ 9

■ Answer the question No. 130 and 131 based on the following table :

Class interval	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Frequency	8	5	10	8	19	6	4

[CtgB '16]

130. Which one is the class of mode? (Easy)

- Ⓓ Ⓛ 20 – 29 Ⓜ 30 – 39 ⓒ 40 – 49 ⓓ 50 – 59

131. Which one of the following is the mid-value of 3rd class? (Medium)

- Ⓑ Ⓛ 54.5 Ⓜ 34.5 ⓒ 24.5 ⓓ 14.5

- Answer to the questions No. 132 and 133 in the light of the following information :

Class interval	51 – 60	61 – 70	71 – 80	81 – 90
Frequency	5	16	13	6

[DJB '16]

132. Which one is the mid-value of 2nd class? (Easy)

(b) @ 55.5 (d) 65.5 (c) 75.5 (d) 85.5

133. Which one is the mode-class? (Medium)

(b) @ 51 – 60 (d) 61 – 70 (c) 71 – 80 (d) 81 – 90

- Answer the questions No. 134 and 135 from the following table :

Class interval	16 - 25	26 - 35	36 - 45	46 - 55	56 - 65
Frequency	4	2	10	5	4

134. Which one is the class of mode? (Medium) [DB '15]

(b) @ 46 – 55 (d) 36 – 45 (c) 16 – 25 (d) 56 – 65

135. Which one is the class of median? (Medium)

[DB '15]

(b) @ 26 – 35 (d) 36 – 45 (c) 46 – 55 (d) 56 – 65

- According to the stem below answer the questions No. 136 – 138 :

Following the data :

21, 18, 26, 18, 16, 22, 19. [RB '15]

136. What is the mode of the given data? (Easy)

(b) @ 16 (d) 18 (c) 19 (d) 26

137. What types are the given data? (Medium)

(a) Organized (b) Unorganized

(b) (c) Tally (d) Class

138. What is the mean of the given data? (Medium)

(b) @ 10 (d) 20 (c) 21 (d) 26

139. What are the modes of the numbers 5, 11, 6, 11, 10, 11, 10, 6, 10? (Easy)

[JB '15]

(a) 6 and 11 (b) 5 and 6

(c) (c) 10 and 11 (d) 6 and 10

140. What are the modes of the numbers 6, 12,

7, 12, 11, 12, 11, 7, 11? (Easy)

[Ideal School & College, Dhaka]

(a) 11 and 7 (b) 11 and 12

(b) (c) 7 and 12 (d) 6 and 7



Short Q/A



Designed as per topic



► 11.1 Information and Data ► Textbook Page 171

- Question 1.** What is data? How many types of data are there and what are they?

Solution : Numerical information obtained through counting or measurement is called data. There are two types of data. They are :

1. Primary data or direct data.
2. Secondary data or indirect data.

- Question 2.** What is meant by statistics and statistical data?

Solution : Statistics: Statistics is numerical information about a fact or event.

Statistical data: Statistical data is the numbers used to express and present the information described in statistics.

- Question 3.** What are primary and secondary data?

Solution : Primary: Primary data is data collected directly from the source. For example, data obtained from experiments and observations.

Secondary data: Secondary data is data collected from indirect sources. For example, data obtained from daily newspapers and television.

- Question 4.** What is organized and disorganized data? Give an example.

Solution : Organized data: Organized data is when the data is arranged in order of value. For example, the numbers 20, 25, 27, 32, 35, 38 are organized data.

Disorganized data: Disorganized data is when the data is not arranged in order of value. For example, the numbers 17, 10, 15, 25, 20, 18 are disorganized data.

- Question 5.** The numbers obtained in mathematics by 25 students are given below :

70, 75, 80, 90, 95, 72, 79, 80, 96, 87, 89, 90, 92, 98, 77, 78, 86, 72, 70, 71, 86, 87, 90, 92, 95.

Arrange the data in ascending order of value.

Solution : The data is arranged in ascending order of value:

70, 70, 71, 72, 72, 75, 77, 78, 79, 80, 80, 86, 86, 87, 87, 89, 90, 90, 90, 92, 92, 95, 95, 96, 98.

► 11.2 Frequency Distribution Table

► Textbook Page 172

- Question 6.** What are the steps to create a frequency distribution table?

Solution : There are four steps to creating a frequency distribution table. Like :

1. Range determination
2. Class number determination
3. Class interval determination
4. Frequency determination using tally marks.

- Question 7.** Define class interval with example.

Solution : The difference between the upper and lower limits of any class is called the class interval of that class. Suppose, 10 – 20 is a class, its minimum value is 10 and maximum value is 20 and $(20 - 10) = 10$, the class interval will be $10 + 1 = 11$.



Question 8. What is range? Write the formula for determining the range.

Solution : The difference between the highest value and the lowest value of a data distribution is called the range.

$$\text{Range} = (\text{highest number} - \text{lowest number}) + 1.$$

Question 9. Find the range of the numbers 7, 5, 14, 13, 10, 8, 9, 11, 12, 6.

Solution : Here, the lowest number is 5 and the highest number = 14.

$$\text{So, Range} = (\text{highest number} - \text{lowest number}) + 1 = (14 - 5) + 1 = 9 + 1 = 10. \text{ The required range is } 10.$$

Question 10. The numbers obtained in mathematics are given below: 56, 60, 42, 82, 75, 62, 38, 44, 55, 72, 63, 86, 63, 50, 84, 46, 40, 72, 36, 72, 80, 72, 64, 78, 59, 54, 72, 70, 85, 88. Find the range of the data.

Solution : Here, the lowest number of the given data = 36 and the highest number = 88.

$$\therefore \text{Range} = (88 - 36) + 1 = 52 + 1 = 53. \text{ The required range is } 53.$$

Question 11. What is class number? Write the formula for determining the class number.

Solution : The class number is the number of classes into which the range is divided.

$$\text{Class number} = \frac{\text{Range}}{\text{Class interval}} \text{ (converted to integer).}$$

Question 12. If the highest value of a data is 85, the lowest value is 45 and the class interval is 5, what is the class number?

$$\begin{aligned} \text{Solution : Range} &= (\text{highest value} - \text{lowest value}) + 1 \\ &= (85 - 45) + 1 = 40 + 1 = 41. \end{aligned}$$

$$\therefore \text{Class number} = \frac{\text{Range}}{\text{Class interval}} + 1 = \frac{41}{5} = 8.2 = 9 \text{ (in integer)}$$

The required class number is 9.

Question 13. If the range of a data is 34 and the highest value is 75, find the lowest value of the data.

Solution : Given, the range of the data is 34 and the highest value = 75.

$$\begin{aligned} \text{We know, Range} &= (\text{highest value} - \text{lowest value}) + 1. \\ \text{or, } 34 &= (75 - \text{lowest value}) + 1. \end{aligned}$$

$$\text{or, } 75 - \text{lowest value} + 1.$$

$$\text{or, lowest value} = 76 - 34.$$

So, the lowest value is 42.

Question 14. The numbers obtained in mathematics by 30 students of class VIII are:

60, 45, 40, 55, 58, 68, 54, 68, 49, 56, 59, 49, 42, 72, 70, 59, 52, 70, 53, 64, 70, 48, 57, 67, 70, 63, 41, 61, 62, 50. Find the class number with class interval 5.

Solution : Here, the lowest number is 40 and the highest number obtained is 72.

$$\therefore \text{Range} = (72 - 40) + 1 = 32 + 1 = 33.$$

$$\text{Class number with class interval } 5 = \frac{33}{5} = 6.6 \text{ or } 7 \text{ (in integer).}$$

So, the class number is 7.

Question 15. The numbers obtained by 30 students in the annual examination are given below : 55, 64, 79, 61, 42, 70, 85, 75, 68, 53, 88, 71, 47, 62, 64, 74, 95, 48, 50, 64, 93, 68, 77, 64, 79, 60, 52, 89, 58, 66.

Find the class number with class interval 10.

Solution : The lowest number of the given data is 42 and the highest number is 95.

$$\begin{aligned} \therefore \text{Range} &= (\text{highest number} - \text{lowest number}) + 1 \\ &= (95 - 42) + 1 = 53 + 1 = 54. \end{aligned}$$

$$\text{Class number with class interval } 10 = \frac{54}{10} = 5.4$$

or 6 (in integer).

So, the class number is 6.

Question 16. The numbers obtained in mathematics by 30 students of class VIII are : 67, 48, 56, 49, 64, 71, 57, 52, 73, 49, 51, 52, 48, 53, 58, 61, 60, 42, 45, 63, 70, 59, 54, 46, 43, 56, 59, 43, 68, 52.

Find the class number with class interval 5.

Solution : Here, the lowest number obtained is 42 and the highest number is 73.

$$\therefore \text{Range} = (73 - 42) + 1 = 31 + 1 = 32.$$

$$\text{Class number with class interval } 5 = \frac{32}{5} = 6.4$$

or 7 (in integer).

So, the class number is 7.

Question 17. The numbers obtained in mathematics by 40 students of class VIII are given below: 53, 45, 60, 85, 92, 42, 61, 58, 86, 94, 97, 32, 99, 75, 75, 44, 47, 52, 75, 88, 36, 42, 48, 98, 86, 39, 78, 80, 82, 55, 53, 60, 71, 81, 35, 69, 70, 75, 90, 35. What is the class number with class interval 10?

Solution : The lowest value of the given data is 32 and the highest value is 99.

$$\therefore \text{Range} = (99 - 32) + 1 = 67 + 1 = 68.$$

$$\text{Class number with class interval } 10 = \frac{68}{10} = 6.8 = 7.$$

The required class number is 7.

► 11.3 Diagram

► Textbook Page 173

Question 18. What is a histogram?

Solution : A histogram is a graphical representation of a frequency distribution in which rectangles are drawn with bases equal to the class intervals and heights equal to the corresponding frequencies. The histogram is drawn by taking the class interval along the x-axis and the frequency along the y-axis.



Question 19. What is a pie-chart? How many degrees does the angle at the center of a pie-chart form?

Solution : A pie-chart is a graph. Sometimes the collected statistics consist of the sum of the elements or it is divided into some classes. If these classes are expressed by different slices of a circle, the diagram thus obtained is a pie-chart.

The angle at the center of a pie-chart is 360° .

Question 20. What is the angle in a pie-chart for 200 out of 600 students?

Solution : The angle formed at the center of the circle is 360° .

Now, the angle for 600 students is 360° .

\therefore The angle for 1 student is $\frac{360^\circ}{600}$.

\therefore The angle for 200 students is $\frac{360^\circ \times 200}{600} = 120^\circ$.

The required angle is 120° .

Question 21. If the angle for women in a pie-chart of 450 women, men, and children is 120° , then how many women are there?

Solution : We know that the angle at the center of a circle is 360° .

For 360° , there are 450 people.

\therefore For 1° , there are $\frac{450}{360}$ people.

\therefore For 120° , there are $\frac{450 \times 120}{360} = 150$ women.

The required number of women is 150.

Question 22. If the angle for girls in a pie-chart of 270 students is 80° , then how many girls are there?

Solution : We know that the angle at the center of a circle is 360° .

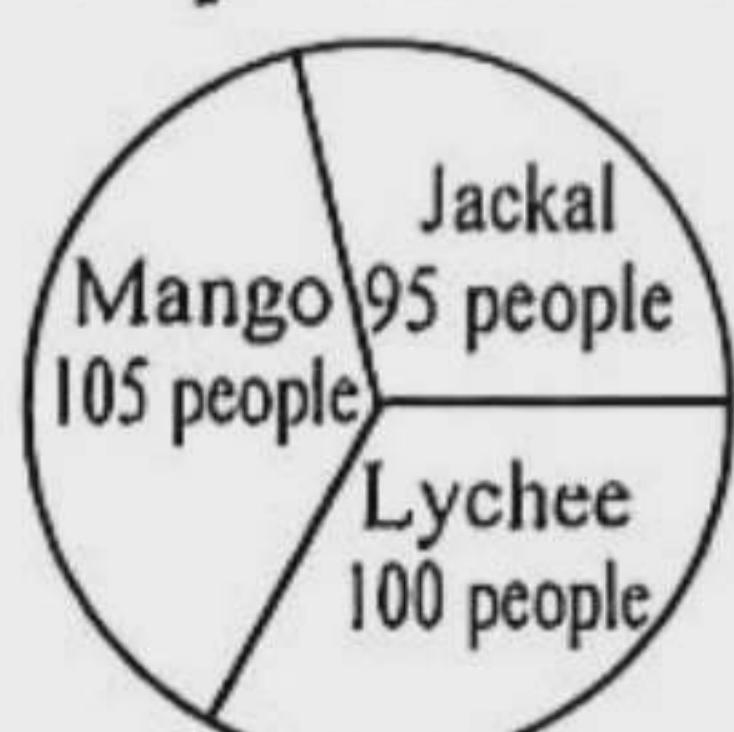
For 360° , there are 270 students.

So, for 1° , there are $270/360$ students.

Therefore, for 80° , there are $\frac{270 \times 80}{360} = 60$ girls.

The required number of girls is 60.

Question 23. The favorite fruits of 300 students of eighth grade are presented in the pie-chart.



What is the angle for the students who like mangoes?

Solution : Here, the total number of students = $(105 + 95 + 100) = 300$.

The angle at the center of a circle is 360° .

For 300 students, the angle is 360° .

\therefore For 1 student, the angle is $\frac{360^\circ}{300}$.

\therefore For 105 students, the angle is $\frac{360^\circ \times 105}{300} = 126^\circ$.

The angle for the students who like mangoes is 126° .

Question 24. In a school, there are 150 girl students out of 400 students. Show the angle for girl students in a pie-chart.

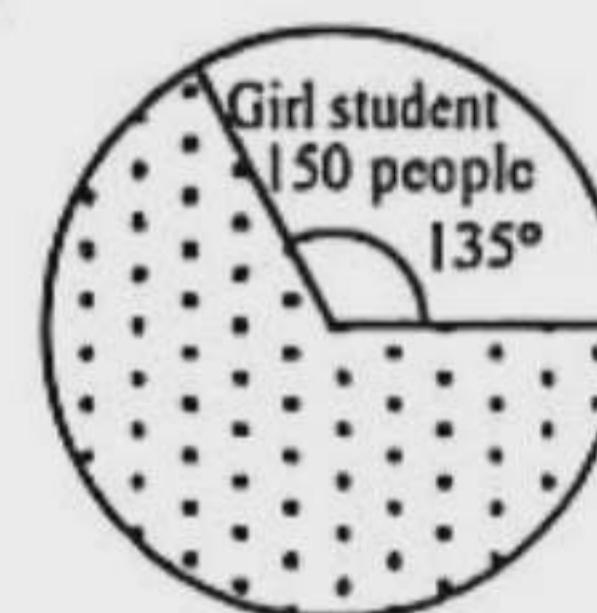
Solution : The angle at the center of a circle is 360° .

For 400 students, the angle is 360° .

So, for 1 student, the angle is $\frac{360^\circ}{400}$.

\therefore For 150 students, the angle is $\frac{360^\circ \times 150}{400} = 135^\circ$.

\therefore The required pie-chart is shown below.



Question 25. In an exam, 25 students out of 60 got a GPA of 5. Show the data in a pie-chart.

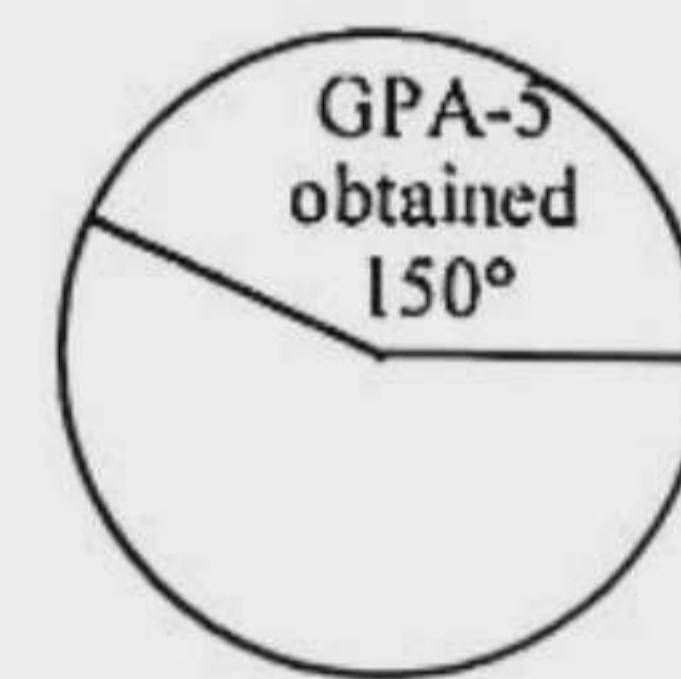
Solution : The angle at the center of a circle is 360° .

For 60 students, the angle is 360° .

\therefore For 1 student, the angle is $\frac{360^\circ}{60}$.

\therefore For 25 students, the angle is $\frac{360^\circ \times 25}{60} = 150^\circ$.

The required pie-chart is shown below.



Question 26. Out of 240 students, 106 got a GPA of 5. Show the data in a pie-chart.

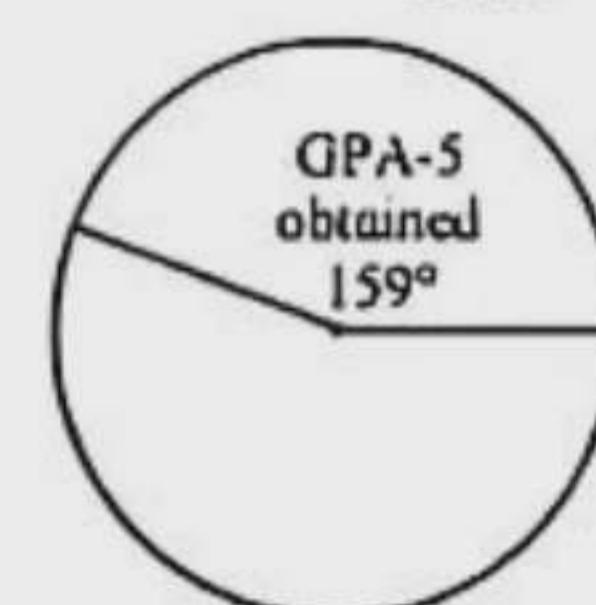
Solution : The angle at the center of a circle is 360° .

For 240 students, the angle is 360° .

\therefore For 1 student, the angle is $\frac{360^\circ}{240}$.

\therefore For 106 students, the angle is $\frac{360^\circ \times 106}{240} = 159^\circ$.

The required pie-chart is shown below.



Question 27. How many marks out of 60 would a student need to get an angle of 150° in a pie-chart?

Solution : We know that the angle at the center of a pie-chart is 360° .

So, for 360° , the marks are 60.

$$\therefore \text{For } 1^\circ, \text{ the marks are } \frac{60}{360}.$$

$$\therefore \text{For } 150^\circ, \text{ the marks are } \frac{60 \times 150}{360} = 25.$$

The required marks are 25.

Question 28. In a school, there are 200 girl students out of 600 students. Show the angle for girl students in a pie-chart.

Solution : Here, the total number of students is 600, and the number of girl students is 200.

For 600 students, the angle is 360° .

$$\therefore \text{For 1 student, the angle is } \frac{360^\circ}{600}.$$

$$\therefore \text{For 200 students, the angle is } \frac{360^\circ \times 200}{600} = 120^\circ.$$

The required pie-chart is shown below.



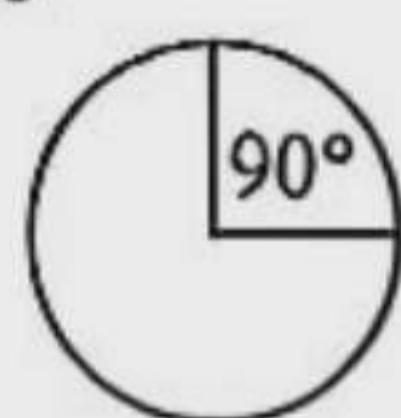
Question 29. In an exam, 15 students out of 60 got a GPA of 5. Show the data in a pie-chart.

Solution : The angle at the center of a circle is 360° . For 60 students, the angle is 360° .

$$\therefore \text{For 1 student, the angle is } \frac{360^\circ}{60}.$$

$$\therefore \text{For 15 students, the angle is } \frac{360^\circ}{60} = 90^\circ.$$

The required pie-chart is shown below.



► 11.4 Central Tendency ► Textbook Page 176

Question 30. Define central tendency with an example.

Solution : In statistics, the tendency of the data to cluster around the value at the center or middle is called central tendency. The average age of the students in a class is an example of central tendency.

Question 31. How many measures of central tendency are there and what are they?

Solution : There are three measures of central tendency :

1. Arithmetic mean
2. Median
3. Mode

► 11.5 Arithmetic Mean

► Textbook Page 177

Question 32. What is the arithmetic mean of the numbers 2, 1, 9, 0, 3, 5, 7, 9, 11, and 6?

Solution : The sum of the numbers = $2 + 1 + 9 + 0 + 3 + 5 + 7 + 9 + 11 + 6 = 53$.

The total number of data = 10.

$$\therefore \text{The arithmetic mean} = \frac{\text{Sum of the numbers}}{\text{Total number of data}} \\ = \frac{53}{10} = 5.3.$$

The required arithmetic mean is 5.3.

Question 33. Find the arithmetic mean of the first ten prime numbers.

Solution : The first ten prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23, and 29.

The sum of the numbers = $2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 + 29 = 129$.

$$\therefore \text{The arithmetic mean} = \frac{\text{Sum of the numbers}}{\text{Total number of data}} \\ = \frac{129}{10} = 12.9.$$

The required arithmetic mean is 12.9.

Question 34. Find the arithmetic mean of the numbers 13, 7, 8, 5, 9, 4, and 16.

Solution : Here, the total number of data = 7. The sum of the data = $13 + 7 + 8 + 5 + 9 + 4 + 16 = 62$.

$$\therefore \text{The arithmetic mean} = \frac{\text{Sum of the data}}{\text{Number of data}} \\ = \frac{62}{7} = 8.86 \text{ (approximately)}$$

The required arithmetic mean is 8.86 (approximately).

Question 35. Find the arithmetic mean of the numbers 6, 11, 12, 7, 19, 15, and 14.

Solution : The sum of the numbers = $6 + 11 + 12 + 7 + 19 + 15 + 14 = 84$.

$$\text{The arithmetic mean} = \frac{\text{Sum of the numbers}}{\text{Total number of data}} \\ = \frac{84}{7} = 12$$

The required arithmetic mean is 12.

Question 36. If the arithmetic mean of 17, 25, 27, 13, 23, and x is 19, then find the value of x.

Solution : The sum of the numbers = $17 + 25 + 27 + 13 + 23 + x = 105 + x$.

The total number of data = 6.

$$\therefore \text{The arithmetic mean} = \frac{\text{Sum of the numbers}}{\text{Total number of data}}$$

$$\text{or, } 19 = \frac{105 + x}{6}$$

$$\text{or, } 114 = 105 + x.$$

$$\text{or, } x = 114 - 105 = 9.$$

The required value of x is 9.

Question 37. Find the arithmetic mean of the marks obtained in mathematics by 10 students of 8th grade, which are given below : 47, 41, 50, 40, 38, 70, 75, 60, 80, 65.

Solution : The sum of the numbers = $47 + 41 + 50 + 40 + 38 + 70 + 75 + 60 + 80 + 65 = 566$.

The total number of students = 10.

$$\text{The arithmetic mean} = \frac{\text{Sum of the numbers}}{\text{Total number of students}} \\ = \frac{566}{10} = 56.6$$

The required arithmetic mean is 56.6.

11.6 Median

► Textbook Page 180

Question 38. What is the median? Write the formula for finding the median of n data.

Solution : When the data are arranged in order of value, the value that divides the data into two equal parts is called the median of the data. The formula for finding the median of n data is as follows :

$$1. \text{Median} = \text{Value of the } \frac{n+1}{2} \text{ th term} \\ [\text{If } n \text{ is an odd number}].$$

$$2. \text{Median} = \frac{\text{Value of the } \frac{n}{2} \text{ th term} + \text{Value of the } \left(\frac{n}{2} + 1\right) \text{ th term}}{2} \\ [\text{if } n \text{ is an even number}].$$

Question 39. Find the median of the data: 23, 13, 29, 28, 16, 19, 20, and 30.

Solution : Arranging the data in ascending order, we get: 13, 16, 19, 20, 23, 28, 29, and 30. Here, n = 8, which is an even number.

$$\text{So, the median} = \frac{\text{Value of the } \frac{8}{2} \text{ th term} + \text{Value of the } \left(\frac{8}{2} + 1\right) \text{ th term}}{2} \\ = \frac{\text{Value of the 4th term} + \text{Value of the 5th term}}{2} \\ = \frac{20 + 23}{2} = \frac{43}{2} = 21.5$$

The required median is 21.5.

Question 40. What is the median of the numbers 11, 7, 5, 12, 6, 14, 13, 9, 8, 10, and 15?

Solution : Arranging the numbers in ascending order, we get: 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15. Here, n = 11, which is an odd number.

$$\text{So, the median} = \text{Value of the } \frac{11+1}{2} \text{ th term} =$$

Value of the 6th term = 10.

The required median is 10.

Question 41. Find the median of the data: 22, 12, 23, 17, 24, 13, 17, 19, 24, 29, and 30.

Solution : The given data arranged in ascending order is: 12, 13, 17, 17, 19, 22, 23, 24, 24, 29, and 30. Here, the total number of data, n = 11, which is an odd number.

$$\text{So, the median} = \text{Value of the } \frac{11+1}{2} \text{ th term} \\ = \text{Value of the 6th term} = 22.$$

The required median is 22.

Question 42. Find the median of the data : 7, 5, 4, 9, 3, and 8.

Solution : Arranging the numbers 7, 5, 4, 9, 3, and 8 in ascending order, we get: 3, 4, 5, 7, 8, and 9. Here, n = 6, which is an even number.

$$\text{So, the median} = \frac{\text{Value of the } \frac{6}{2} \text{ th term} + \text{Value of the } \left(\frac{6}{2} + 1\right) \text{ th term}}{2} \\ = \frac{\text{Value of the 3rd term} + \text{Value of the 4th term}}{2} \\ = \frac{5 + 7}{2} = \frac{12}{2} = 6.$$

The required median is 6.

Question 43. What is the median of the prime numbers from 1 to 20?

Solution : The prime numbers from 1 to 20 are: 2, 3, 5, 7, 11, 13, 17, and 19. Here, n = 8, which is an even number.

So, the median

$$= \frac{\text{Value of the } \frac{8}{2} \text{ th term} + \text{Value of the } \left(\frac{8}{2} + 1\right) \text{ th term}}{2} \\ = \frac{\text{Value of the 4th term} + \text{Value of the 5th term}}{2} \\ = \frac{7 + 11}{2} = \frac{18}{2} = 9.$$

The required median is 9.

Question 44. The frequency distribution table of the marks obtained by some students in an exam is given below. Determine the class in which the median is located.

Obtained Number	40-49	50-59	60-69	70-79	80-89
Frequency	8	12	18	24	10

Solution : The cumulative frequency table:

Obtained Number	Frequency	Cumulative Frequency
40-49	8	8
50-59	12	20
60-69	18	38
70-79	24	62
80-89	10	72



Here, $n = 72$

So, the median term = $\frac{n}{2} = \frac{72}{2} = 36$ th term.

∴ The 36th term is located in the class interval 60 – 69. Therefore, the median is located in the class interval 60 – 69.

Question 45. The frequency distribution table of the marks obtained in mathematics by 60 students of 8th grade is given below. Find the median from the table.

Obtained Number	60	65	70	75	80
Frequency	5	10	18	15	12

Solution : The cumulative frequency table for determining median :

Obtained Number	Frequency	Cumulative Frequency
60	5	5
65	10	15
70	18	33
75	15	48
80	12	60
	$n = 60$	

Here, $n = 60$, which is an even number.

So, the median

$$\begin{aligned} & \text{Value of the } \frac{60}{2} \text{ th term} + \text{Value of the } \left(\frac{60}{2} + 1\right) \text{ th term} \\ &= \frac{\text{Value of the } 30 \text{th term} + \text{Value of the } 31 \text{st term}}{2} \\ &= \frac{70 + 70}{2} = \frac{140}{2} = 70 \end{aligned}$$

The required median is 70.

Question 46. The frequency distribution table of the marks obtained in mathematics is given below. Determine the median class.

Marks Obtained	51-55	56-60	61-65	66-70	71-75	76-80
Frequency	6	8	13	10	8	5

Solution : The fourth class is 66-70.

$$\begin{aligned} \therefore \text{So, the median of the fourth class} &= \frac{66 + 70}{2} \\ &= \frac{136}{2} = 68 \end{aligned}$$

The required median is 68.

► 11.7 Mode

► Textbook Page 182

Question 47. Define mode with an example.

Solution : The number which appears most often in a data set is called the mode. For example, the numbers obtained in mathematics by 5 students are 70, 75, 70, 75, 70. Here, 70 appears the most, 3 times. So, the mode is 70.

Question 48. Which is the mode of the data 11, 9, 12, 11, 9, 10?

Solution : Arranging the data in ascending order of value, we get 9, 9, 10, 11, 11, 12.

Observing the arranged data, it can be seen that the number 9 and 11 appears most often, 2 times. The rest of the numbers appear once.

So, the modes are 9 and 11.

Question 49. Find the mode of the numbers 10, 14, 15, 13, 12, 15, 13, 11, 13, 18.

Solution : The given numbers are arranged in ascending order of value :

10, 11, 12, 13, 13, 13, 14, 15, 15, 18.

Here, in the presentation of the numbers, 13 appears 3 times, 15 appears 2 times and the rest of the numbers appear once. Here 13 appears the most, 3 times.

So, the mode of the numbers is 13.

Question 50. Find the mode of the data 40, 43, 40, 40, 43, 44, 44, 46, 48, 40, 44, 54, 64, 60, 55, 57, 44.

Solution : The data is arranged in ascending order of value :

40, 40, 40, 40, 43, 43, 44, 44, 44, 44, 46, 48, 54, 55, 57, 60, 64.

Among the data, 40 and 44 appear the most, 4 times. 43 appears 2 times and the rest of the numbers appear once.

So, the modes of the data are 40 and 44.

Question 51. Do the numbers 1, 0, 7, 5, 2, 1, 4, 3 have a mode? Explain.

Solution : The number which appears most often in a data set is called the mode. Here, 1 appears the most, 2 times, and each of the rest of the numbers appears once. So, the mode is 1.

So, the numbers have a mode.

Question 52. What is the mode of the data 6, 5, 6, 12, 5, 11, 6, 7, 2, 1, 2, 11?

Solution : Arranging the data in ascending order of value, we get 1, 2, 2, 5, 5, 6, 6, 6, 7, 11, 11, 12.

In the data set, 2 appears 2 times, 5 appears 2 times, 6 appears 3 times, 11 appears 2 times, and the rest of the numbers appear once. Here, 6 appears the most, 3 times. So, the mode of the data is 6.

Question 53. The frequency distribution table of the marks obtained in science by 40 students of your class is given below. Prepare a cumulative frequency distribution table of the data.

Marks Obtained	61-65	66-70	71-75	76-80	81-85
Frequency	7	8	6	9	10

Solution :

Marks Obtained	Frequency	Cumulative Frequency
61-65	7	7
66-70	8	15
71-75	6	21
76-80	9	30
81-85	10	40

Question 54. Consider the frequency distribution table below. Determine the median class.

Marks Obtained	41-45	46-50	51-55	56-60	61-65	66-70
Frequency	6	9	15	12	10	8

Find the mid-value of the median class.

Solution : Solution: Here, the frequency appears most often, 15 times, in the class (51-55). So, the modal class is (51-55).

So, the median of the class $\frac{51 + 55}{2} = \frac{106}{2} = 53$

So, the median of the modal class is 53.

Question 55. The frequency distribution table below shows the number of students who got different marks in their annual exam. Prepare a cumulative frequency distribution table.

Class Interval	30-39	40-49	50-59	60-69	70-79
Frequency	8	6	14	10	12

Solution :

Class Interval	Frequency	Cumulative Frequency
30 – 39	8	8
40 – 49	6	14
50 – 59	14	28
60 – 69	10	38
70 – 79	12	50

Question 56. The frequency distribution table below shows the marks obtained by 50 students of 8th grade in English. Find the mid-value of the modal class.

Solution : The class with the highest frequency is called the modal class. In the given table, the class 71-80 has the highest frequency of 20.

Therefore, the modal class is 71-80.

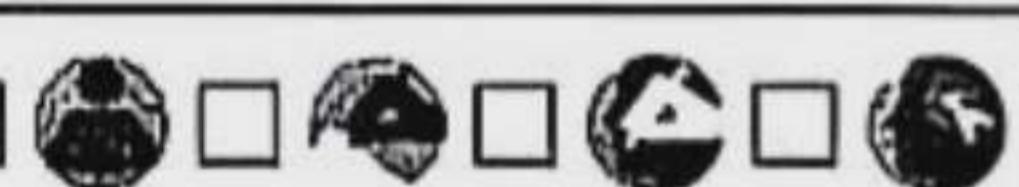
$$\text{The mid-value of the modal class} = \frac{71 + 80}{2}$$

$$= \frac{151}{2} = 75.5$$

So, the median of the modal class is 75.5.

**Creative Q/A**

Designed as per learning outcomes



Ques. 01 The secured marks in Mathematics of 15 students of class six in S. H. Khan School are : 95, 62, 87, 32, 59, 92, 82, 66, 75, 99, 44, 37, 58, 51, 62.

a. Is the data an organized data? Bring the data in an organized form. 2

b. Determine arithmetic mean of the data. 4

c. Find median and mode of the data. 4

Solution to Question No. 01 :

a The numbers in the given data are not properly arranged in order or tabular form. So, it is an unorganized data. Organized form (in ascending order) of the data is :

32, 37, 44, 51, 58, 59, 62, 62, 66, 75, 82, 87, 92, 95, 99.

b The sum of the data,

$$= 32 + 37 + 44 + 51 + 58 + 59 + 62 + 62 + 66 + 75 + 82 + 87 + 92 + 95 + 99 = 1001$$

Number of data = 15

We know,

$$\text{Arithmetic mean} = \frac{\text{Sum of data}}{\text{Number of data}}$$

\therefore The required mean $= \frac{1001}{15} = 66.73$ (approx).

Ans. Arithmetic mean is 66.73 (approx).

c From (a), we have the organized data as under : 32, 37, 44, 51, 58, 59, 62, 62, 66, 75, 82, 87, 92, 95, 99
Here number of data = 15

$\therefore \left(\frac{15+1}{2}\right)$ or 8th number of the organized data is the required median of the data. 62 is the 8th number. So, median is 62.

Again, 62 occurs maximum times i. e. 2 times in the data. So, 62 is the mode of the data.

Ques. 02 The data of runs for first 10 overs of Bangladeshi National Cricket Team are as under :

Over	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th
Run	2	15	0	7	10	15	9	6	4	10

a. What is line diagram? 2

b. Find the arithmetic mean or average of run for 10 overs. 4

c. Draw a line diagram with the given data. 4

Solution to Question No. 02 :

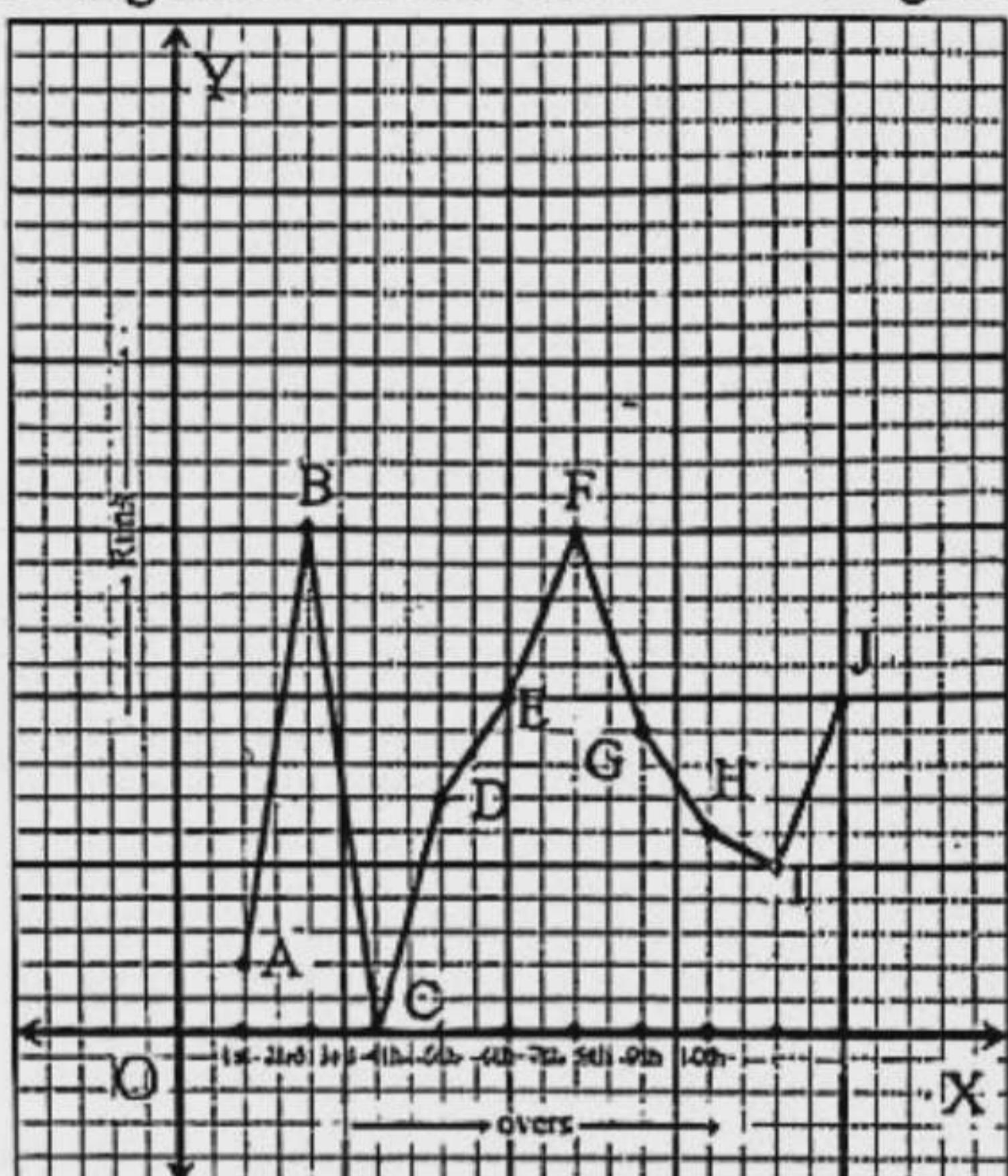
a A line diagram is a graph representing a data. When a data is presented in the form of a line, it is termed as a line diagram. A line diagram helps to understand a data in a very lucid and easy way.

b Here total number of runs in 10 overs = 78
Number of overs = 10

$$\therefore \text{The required mean} = \frac{78}{10} = 7.8$$

Ans. 7.8.

c A line diagram is drawn below with the given data :



For drawing a line diagram, let us take a graph paper. Let us further take two lines OX and OY in such a way so that OX and OY are mutually perpendicular. Then overs are placed along OX at an equal distance of two small divisions. Runs are placed along OY taking one small division for one run. Let us consider, we have points A, B, C, D, E, F, G, H and I plotting respective runs against 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th and 10th overs respectively. Joining A, B; B, C; C, D; D, E; E, F; F, G; G, H; H, I, we have a line diagram of the data.

Ques. 03 The marks obtained in Bangla by 30 students of class viii are :

50, 36, 62, 80, 72, 59, 54, 60, 86, 63, 84, 70, 85, 88, 64, 78, 44, 55, 72, 63, 56, 60, 42, 82, 75, 62, 38, 46, 40, 72.

- a. Determine the range. 2
- b. Determine the median. 4
- c. Make a frequency distribution table taking 5 as class interval. 4

• Dhaka Board 2019

Solution to Question No. 03 :

a Here, highest mark of the data = 88 and lowest mark of the data = 36

$$\therefore \text{The range of the data} = (88 - 36) + 1 = 52 + 1 = 53$$

b In order to find the median of the given data, the data are arranged in ascending order of values as follows :

36, 38, 40, 42, 44, 46, 50, 54, 55, 56, 59, 60, 60, 62, 62, 63, 63, 64, 70, 72, 72, 72, 75, 78, 80, 82, 84, 85, 86, 88.

From the arranged data made above it is evident that total frequency (total number of students) is $n = 30$, an even number.

$$\begin{aligned}\therefore \text{Median of the data} &= \frac{\frac{n}{2} \text{ th value} + \left(\frac{n}{2} + 1\right) \text{ th value}}{2} \\ &= \frac{15^{\text{th}} \text{ value} + 16^{\text{th}} \text{ value}}{2} \\ &= \frac{62 + 63}{2} = 62.5\end{aligned}$$

Thus, determined median of the data is 62.5.

c From 'a' above we have range of the given data is 53.

$$\begin{aligned}\therefore \text{Number of classes with class interval } 5 &= \frac{53}{5} \\ &= 10.6 \\ &\approx 11\end{aligned}$$

Now, a frequency distribution table is made below taking 5 as class interval :

Class Interval	Tally Mark	Frequency
36 – 40		3
41 – 45		2
46 – 50		2
51 – 55		2
56 – 60		4
61 – 65		5
66 – 70		1
71 – 75		4
76 – 80		2
81 – 85		3
86 – 90		2
Total		$n = 30$

Ques. 04 The frequency distribution table of the marks obtained in Mathematics by 60 students of class VIII is given :

Marks obtained	41–45	46–50	51–55	56–60	61–65	66–70
Frequency	6	9	15	12	10	8

- a. Determine the mid value of mode class. 2
- b. Determine the mean. 4
- c. Draw the histogram of given data. 4

• Dhaka Board 2019

Solution to Question No. 04 :

a Here, maximum numbers of frequency are 15 which lie in the class interval (51 – 55). So, it is evident that this class is the class of mode.

$$\therefore \text{Mid value of the mode class} = \frac{51 + 55}{2} = 53.$$

- b** In order to find the arithmetic mean of the given data, the data are tabulated as under :

Marks obtained	Mid value (x_i)	Frequency (f_i)	$f_i \times x_i$
41 – 45	43	6	258
46 – 50	48	9	432
51 – 55	53	15	795
56 – 60	58	12	696
61 – 65	63	10	630
66 – 70	68	8	544
Total		$\sum f_i = 60$	$\sum f_i x_i = 3355$

We know, arithmetic mean, $\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{3355}{60} = 55.92$

∴ The determined mean is 55.92

- c** To draw the histogram of the given data continuous class interval frequency distribution table is made below :

Class interval	Continuous class interval	Frequency
41 – 45	40.5 – 45.5	6
46 – 50	45.5 – 50.5	9
51 – 55	50.5 – 55.5	15
56 – 60	55.5 – 60.5	12
61 – 65	60.5 – 65.5	10
66 – 70	65.5 – 70.5	8

Now, to draw the histogram of the given data, a graph paper of xy – plane is taken. Then continuous class intervals and their respective frequencies of the given data are plotted along x -axis and y -axis respectively considering 1 small square of the graph paper as 1 unit along both x and y axes. The broken part $\Delta\Delta$ implies the presence of the continuous class interval 0 to 40.5. The following histogram is drawn below :

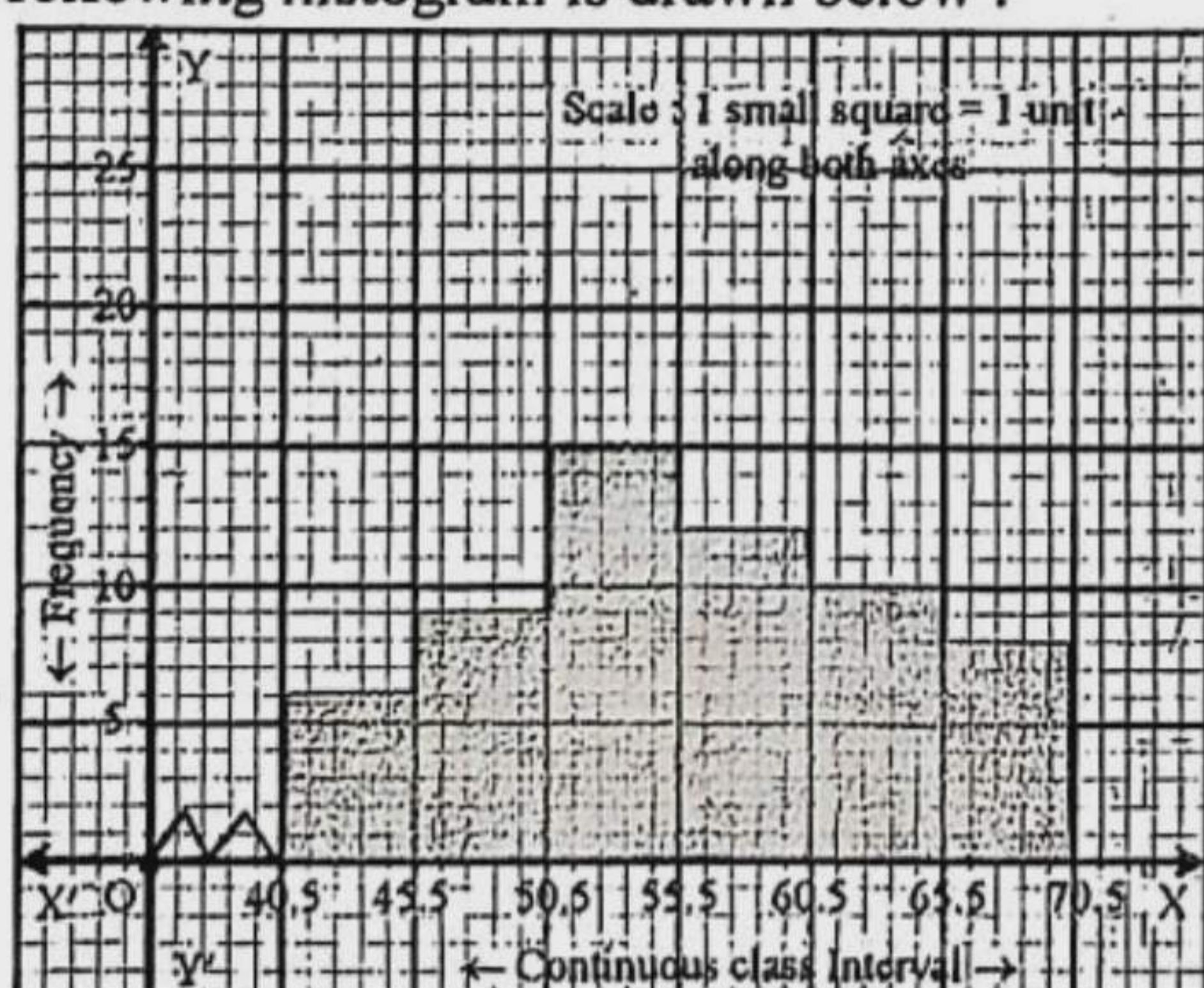


Figure : A Histogram.

- Ques. 05** Marks obtained in Mathematics by 30 students of class VIII are :

85, 56, 62, 75, 88, 92, 57, 64, 72, 87, 95, 52, 68, 77, 85, 98, 58, 65, 79, 84, 93, 55, 69, 73, 95, 82, 71, 95, 85, 97.

- | | |
|---|---|
| a. 106 students obtained GPA-5 out of 240 students.
Show the information in pie-chart. | 2 |
| b. Make a frequency distribution table with 5 as class interval. | 4 |
| c. Find out the median of given information. | 4 |

● Rajshahi Board 2019

Solution to Question No. 05 :

- a** Here, total number of students = 240. We know that, in a circle, the angle subtended at the centre is 360° . Now, in the case of 106 students who obtained GPA-5, the angle = $\frac{106}{240} \times 360^\circ = 159^\circ$.

The information is shown below in pie chart :

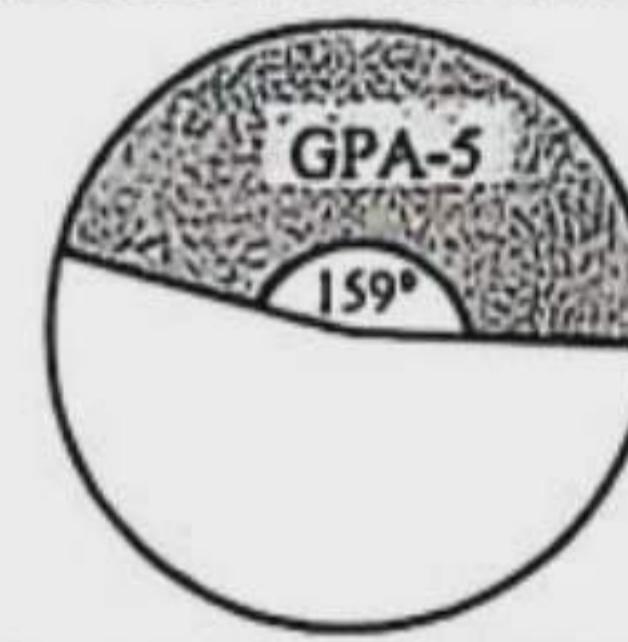


Figure : Pie-chart.

- b** Here, the highest value of the data = 98 and the lowest value of the data = 52

∴ Range of the data = $(98 - 52) + 1 = 46 + 1 = 47$

$$\therefore \text{Number of classes with 5 as class interval} = \frac{47}{5} = 9.4 \approx 10$$

A frequency distribution table is made below :

Class interval	Tally mark	Frequency
51 – 55		2
56 – 60		3
61 – 65		3
66 – 70		2
71 – 75		4
76 – 80		2
81 – 85		5
86 – 90		2
91 – 95		5
96 – 100		2
Total		$n = 30$

- c** In order to find the median of the given data, the data are arranged in ascending order below :
52, 55, 56, 57, 58, 62, 64, 65, 68, 69, 71, 72, 73, 75, 77, 79, 82, 84, 85, 85, 85, 87, 88, 92, 93, 95, 95, 95, 97, 98. Here, $n = 30$; which is an even number.

$$\therefore \text{Median} = \frac{\text{Sum of numerical values of } \frac{30}{2} \text{ th and } \left(\frac{30}{2} + 1\right) \text{ th terms}}{2}$$

$$= \frac{\text{Sum of numerical values of } 15^{\text{th}} \text{ and } 16^{\text{th}} \text{ terms}}{2}$$

$$= \frac{77 + 79}{2} = 78$$

∴ Median of the marks obtained is 78.

Ques. 06 The frequency distribution table of the marks obtained in Mathematics by 100 students of a school is given below :

Marks obtained	66–70	71–75	76–80	81–85	86–90	91–95	96–100
Frequency	10	14	19	24	16	12	5

- a. Find the mode of the following : 10, 14, 15, 13, 12, 15, 13, 11, 13, 18. 2
- b. Find the arithmetic mean from table. 4
- c. Draw the histogram of the data with description. 4

© Rajshahi Board 2019

Solution to Question No. 06 :

a. Arranging the given data in ascending order, we get, 10, 11, 12, 13, 13, 13, 14, 15, 15, 18

In presentation of the data, 13 repeats 3 times, 15 repeats 2 times and rest appears once. Hence the mode is 13.

∴ Required Mode is 13.

b. A frequency distribution table is made below to find the arithmetic mean of the given data :

Class interval	Midvalue (x_i)	Frequency (f_i)	$f_i \times x_i$
66 – 70	68	10	680
71 – 75	73	14	1022
76 – 80	78	19	1482
81 – 85	83	24	1992
86 – 90	88	16	1408
91 – 95	93	12	1116
96 – 100	98	5	490
Total		$\sum f_i = 100$	$\sum f_i x_i = 8190$

We know, arithmetic mean, $\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{8190}{100} = 81.9$

∴ Determined Arithmetic mean is 81.9.

c. To draw the histogram of the data, continuous class interval frequency distribution table is made below :

Class interval	Continuous class interval	Frequency
66 – 70	65.5 – 70.5	10
71 – 75	70.5 – 75.5	14
76 – 80	75.5 – 80.5	19
81 – 85	80.5 – 85.5	24
86 – 90	85.5 – 90.5	16
91 – 95	90.5 – 95.5	12
96 – 100	95.5 – 100.5	5

In order to draw a histogram of the given data, a graph paper of xy -plane is taken. Then continuous class intervals and their respective frequencies of the given data are plotted along x -axis and y -axis respectively considering 1 small square as a unit along both axes of the graph paper. The broken part $\Delta\Delta$ implies the presence of the continuous class interval 0 to 65.5.

The following histogram is drawn below :

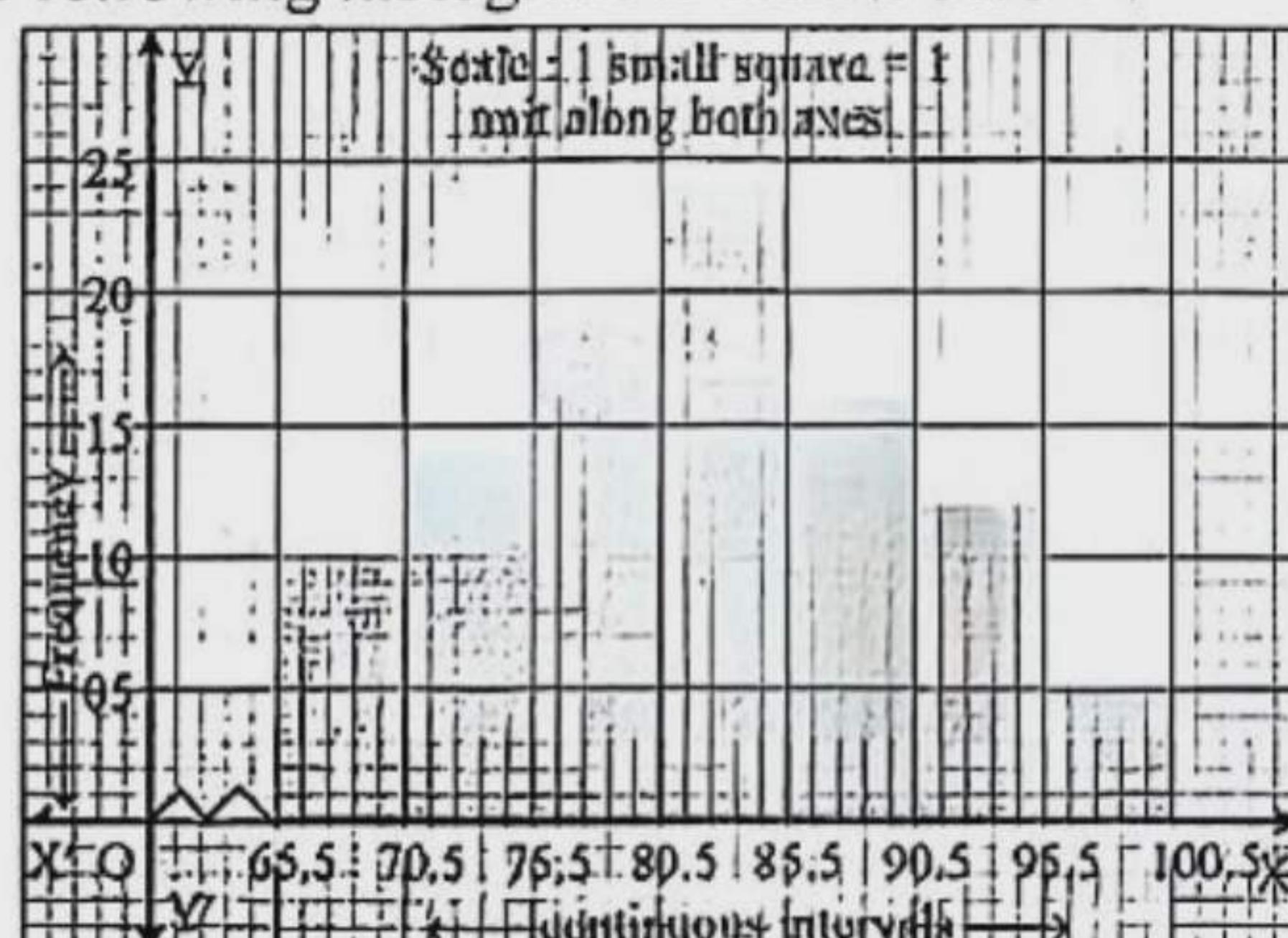


Figure : A Histogram

Ques. 07 The frequency distribution table of marks in Mathematics obtained by 50 students of a school is given below :

Obtained Marks	41–50	51–60	61–70	71–80	81–90	91–100
No of students	6	8	13	10	8	5

- a. What obtained marks out of 60 for a student indicate 150° angle in pie-chart? 2
- b. Find the arithmetic mean from table. 4
- c. Draw the histogram of the data with description. 4

© Jashore Board 2019

Solution to Question No. 07 :

a. In a pie-chart,

360° covers = 60 marks

$$\therefore 1^\circ \quad " \quad = \frac{60}{360^\circ} \quad "$$

$$\therefore 150^\circ \quad " \quad = \frac{60 \times 150^\circ}{360^\circ} = 25 \text{ marks (Ans.)}$$

b. To find arithmetic mean of the data, the given data are tabulated as under :

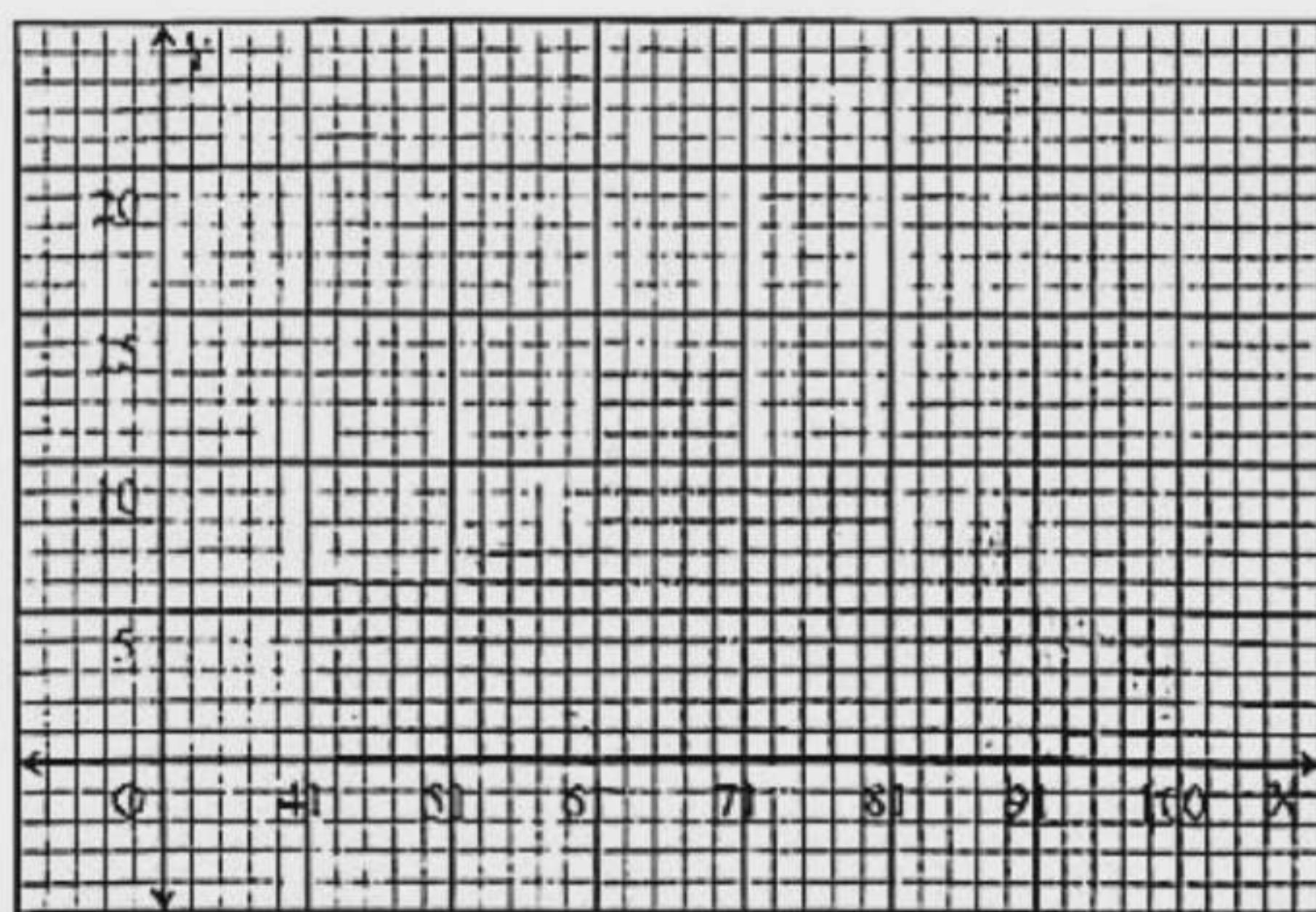
Class interval	Class mid-value (x_i)	Frequency (f_i)	$x_i \times f_i$
41 – 50	45.5	6	273.0
51 – 60	55.5	8	444.0
61 – 70	65.5	13	851.5
71 – 80	75.5	10	755.0
81 – 90	85.5	8	684.0
91 – 100	95.5	5	477.5
Total		50	3485.0

∴ Arithmetic mean = $\frac{\text{total } x_i \times f_i}{\text{total frequency}}$.

$$= \frac{3485}{50} \\ = 69.7$$

c. To draw a histogram of the given data, a graph paper of xy -plane is taken. The desired histogram is then drawn on the graph paper taking one small

square of the graph paper as 2 unit of class interval along x – axis and one small square of the graph paper as 1 unit of frequency along y-axis as under :



Ques. 08 Marks obtained in Mathematics by 35 students of class eight are given below :

71, 66, 86, 78, 75, 69, 93, 76, 65, 63, 78, 72, 86, 78, 84, 91, 77, 88, 67, 73, 83, 66, 91, 81, 72, 86, 82, 80, 74, 81, 77, 79, 74, 61, 83.

- What does central tendency mean? 2
- Make a frequency distribution table with 5 as class interval. 4
- Find out the median of the given data. 4

© Jashore Board 2019

Solution to Question No. 08 :

a **Central tendency :** The tendency of clustering the values towards the central value of a data is called central tendency. The central value of any data represents the data measuring the central tendency. In general, measurement of central tendency are, arithmetic mean, median and mode.

b Here, highest marks = 93

lowest marks = 61

$$\therefore \text{Range} = (93 - 61) + 1 = 33$$

If 5 is taken as class interval then number of class
 $= \frac{33}{5} = 6.6 \approx 7$.

A frequency distribution table with class interval 5 of the given data is made below :

Class interval	Tally mark	Frequency
61 – 65		3
66 – 70		4
71 – 75		7
76 – 80		8
81 – 85		6
86 – 90		4
91 – 95		3

c In order to find the median of the given data, the data are arranged in ascending order of values as follows :

61, 63, 65, 66, 66, 67, 69, 71, 72, 72, 73, 74, 74, 75, 76, 77, 77, 78, 78, 78, 79, 80, 81, 81, 82, 83, 83, 84, 86, 86, 86, 88, 91, 91, 93.

Here $n = 35$, odd number

$$\begin{aligned}\therefore \text{Median of the data} &= \left(\frac{n+1}{2}\right) \text{th value} \\ &= 18 \text{th value} \\ &= 78 \text{ (Ans.)}\end{aligned}$$

Ques. 09 The frequency distribution table of marks obtained in Mathematics by 50 students is as follows :

Marks obtained	50	55	60	65	70	75	80
Frequency	5	7	10	15	8	3	2

- Determine the mean of first ten prime numbers. 2
- Determine the median. 4
- Draw the pie-chart of the data. 4

● Cumilla Board 2019

Solution to Question No. 09 :

a Here, 1st 10 prime numbers are :

2, 3, 5, 7, 11, 13, 17, 19, 23, 29.

$$\therefore \text{Summation of } 1^{\text{st}} 10 \text{ prime numbers} = 2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 + 29 = 129$$

$$\therefore \text{Mean, } \bar{x} = \frac{129}{10} = 12.9 \text{ (Ans.)}$$

b Frequency table for finding median is made below :

Marks obtained	Frequency	Cumulative frequency
50	5	5
55	7	12
60	10	22
65	15	37
70	8	45
75	3	48
80	2	50

Here, $n = 50$ which is an even number

$$\begin{aligned}\therefore \text{Median} &= \frac{\frac{n}{2} \text{th value} + \left(\frac{n}{2} + 1\right) \text{th value}}{2} \\ &= \frac{25^{\text{th}} \text{ value} + 26^{\text{th}} \text{ value}}{2} \\ &= \frac{65 + 65}{2} = 65 \text{ (Ans.)}\end{aligned}$$

c Total measure of angle of the centre of a circle = 360°

Here total frequencies = 50

Angle for 50 students is 360°

$$\therefore \text{,, , } 1 \text{,, , } \frac{360^\circ}{50}$$

$$\therefore \text{,, , } 5 \text{,, , } \frac{360^\circ \times 5}{50} \text{ or, } 36^\circ$$

Now,

$$\text{For 50 marks } = \frac{5}{50} \times 360^\circ = 36^\circ$$

For 55 marks $= \frac{7}{50} \times 360^\circ = 50.4^\circ$

For 60 marks $= \frac{10}{50} \times 360^\circ = 72^\circ$

For 65 marks $= \frac{15}{50} \times 360^\circ = 108^\circ$

For 70 marks $= \frac{8}{50} \times 360^\circ = 57.6^\circ$

For 75 marks $= \frac{3}{50} \times 360^\circ = 21.6^\circ$

For 80 marks $= \frac{2}{50} \times 360^\circ = 14.4^\circ$

Here, the obtained angles are drawn as parts of 360° , which is the pie-chart of the data.

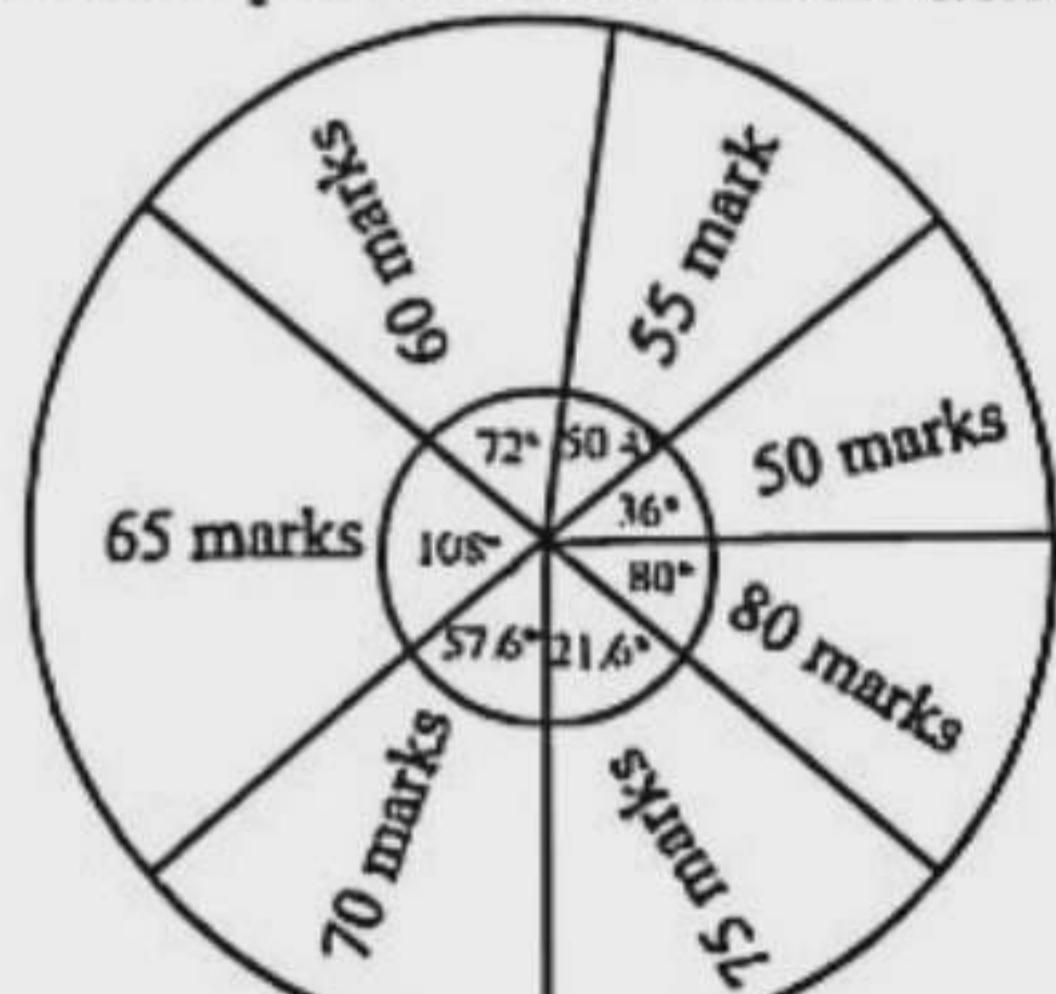


Figure : Pie-chart

Ques. 10 Weekly savings (in taka) of 30 labourers are given below :

153, 160, 145, 135, 148, 168, 170, 176, 150, 160, 183, 156, 140, 135, 146, 158, 160, 154, 166, 177, 138, 145, 157, 144, 155, 137, 148, 171, 168, 180.

- Determine the mode from the stem. 2
- To make a frequency distribution table with 5 as class interval, determine the arithmetic mean. 4
- Draw the histogram of the data. 4

● Cumilla Board 2019

Solution to Question No. 10 :

a. The data are arranged in ascending order : 135, 135, 137, 138, 140, 144, 145, 145, 146, 148, 148, 150, 153, 154, 155, 156, 157, 158, 160, 160, 160, 166, 168, 168, 170, 171, 176, 177, 180, 183.

In presentation of the data, 135 repeats 2 times, 145 repeats 2 time, 148 reports 2 times, 160 repeats 3 times, 168 repeats 2 times and the rest appears once, Hence the mode is 160.

b. Here, highest value = 183
lowest value = 135

$$\therefore \text{Range} = (183 - 135) + 1 = 49$$

If 5 is taken as class interval, then the number of classes $= \frac{49}{5} = 9.8 \approx 10$

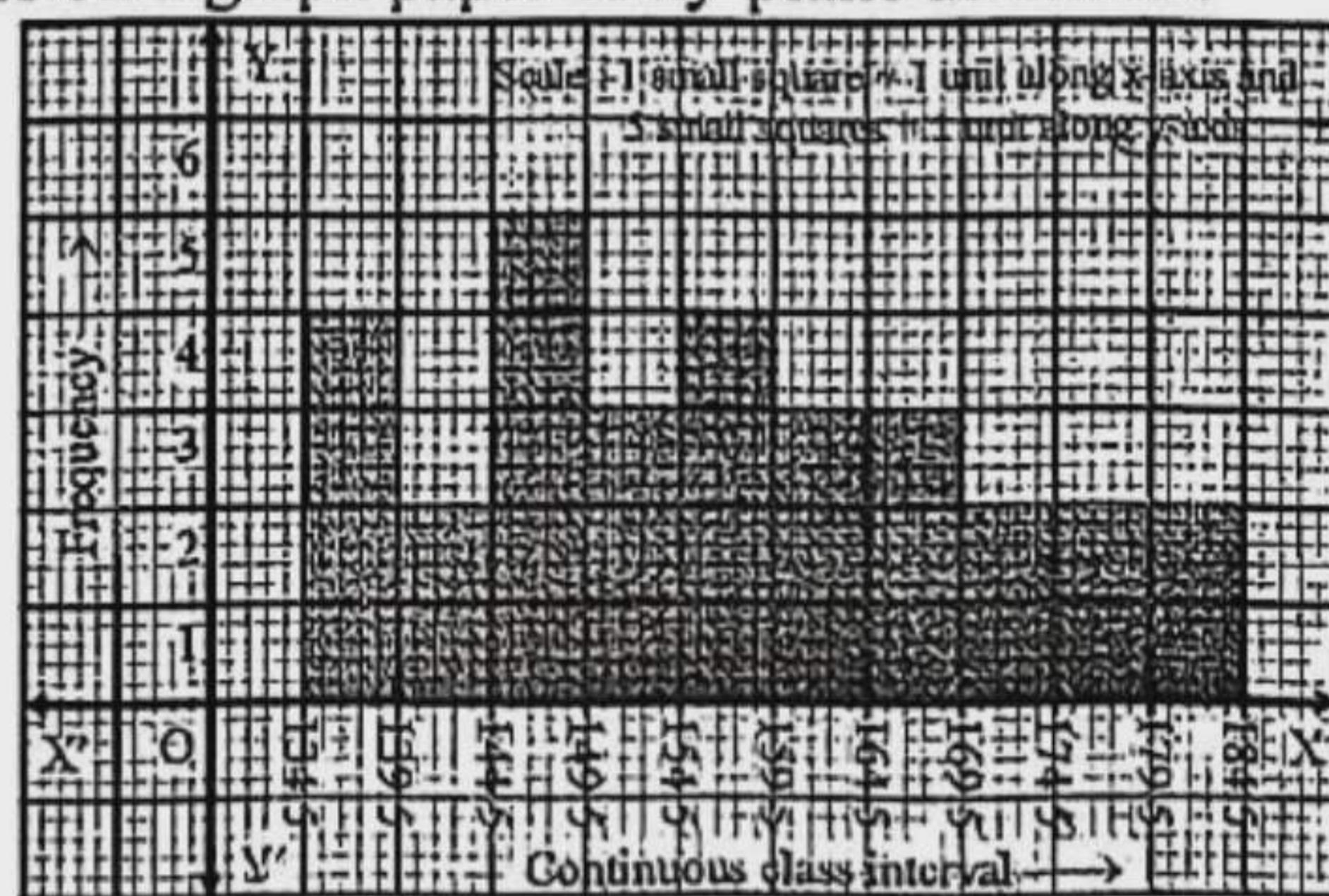
A frequency distribution table of the given data with class interval of 5 is made below :

Class interval	Tally mark	Frequency
135 – 139		4
140 – 144		2
145 – 149		5
150 – 154		3
155 – 159		4
160 – 164		3
165 – 169		3
170 – 174		2
175 – 179		2
180 – 184		2

c. The table for drawing histogram is given below :

class interval	Continuous class interval	frequency
135 – 139	134.5 – 139.5	4
140 – 144	139.5 – 144.5	2
145 – 149	144.5 – 149.5	5
150 – 154	149.5 – 154.5	3
155 – 159	154.5 – 159.5	4
160 – 164	159.5 – 164.5	3
165 – 169	164.5 – 169.5	3
170 – 174	169.5 – 174.5	2
175 – 179	174.5 – 179.5	2
180 – 184	179.5 – 184.5	2

In order to draw a histogram of the given table continuous class interval are plotted along x-axis and corresponding frequencies are plotted along y-axis on a graph paper of xy-plane as under :



Ques. 11 The frequency distribution table of per-hour payment of 50 labourers of a factory is given below :

Payment per hour (Tk)	56–60	61–65	66–70	71–75	76–80
Frequency	7	10	20	8	5

- Find the mid-value of the class of mode. 2
- Find the arithmetic mean from the table. 4
- Draw the histogram of the data. 4

● Chattogram Board 2019

Solution to Question No. 11 :

a. Here, maximum numbers of frequency are 20 which lie in the class interval (66 – 70). So it is evident that this class interval is the class of mode.

$$\therefore \text{Mid value of the mode class} = \frac{66 + 70}{2} = 68.$$

- b** In order to find the arithmetic mean of the given data, the data are tabulated as under :

Payment per hour (Tk.)	Mid value (x_i)	Frequency (f_i)	$f_i \times x_i$
56 – 60	58	7	406
61 – 65	63	10	630
66 – 70	68	20	1360
71 – 75	73	8	584
76 – 80	78	5	390
Total		$\sum f_i = 50$	$\sum f_i x_i = 3370$

We know, arithmetic mean, $\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{3370}{50} = 67.4$

∴ The determined arithmetic mean is 67.4.

- c** To draw the histogram of the given data, continuous class interval frequency distribution table is made below :

Class interval	Continuous class interval	Frequency
56 – 60	55.5 – 60.5	7
61 – 65	60.5 – 65.5	10
66 – 70	65.5 – 70.5	20
71 – 75	70.5 – 75.5	8
76 – 80	75.5 – 80.5	5

In order to draw a histogram of the given data, a graph paper of xy – plane is taken. Then continuous class intervals and their respective frequencies of the given data are plotted along x -axis and y -axis respectively considering 1 small square of the graph paper as an unit along both x and y axes. The broken part of the graph is meant for upper limit of continuous class interval from 0 – 55.5.

The following histogram is drawn below :

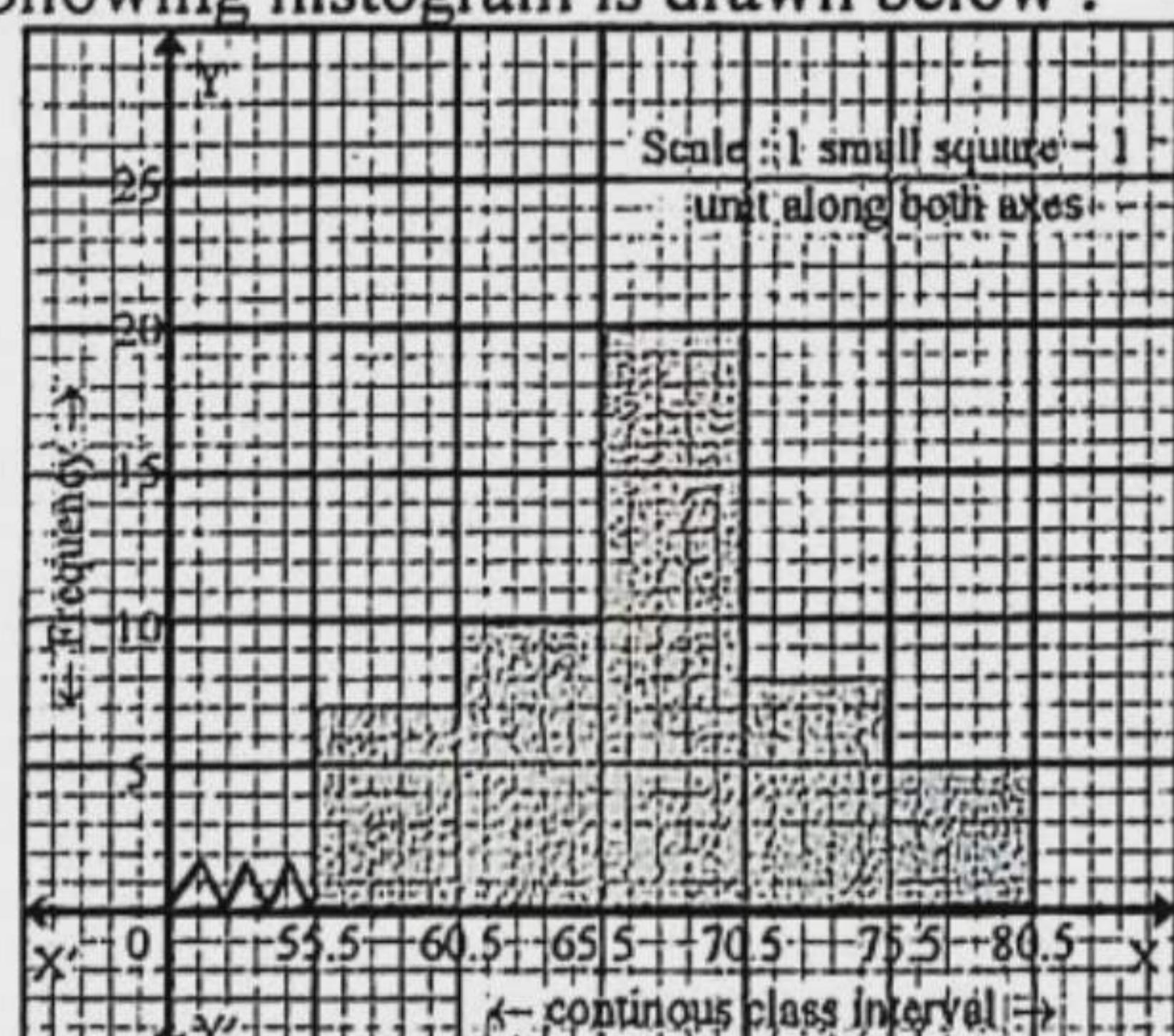


Figure : A Histogram

- Ques. 12** The marks obtained by 30 students in annual exam is given below :

55, 64, 79, 61, 42, 70, 85, 75, 68, 53, 88, 71, 47, 62, 64, 74, 95, 48, 50, 64, 93, 68, 77, 64, 79, 60, 52, 89, 58, 66.

- a. Determine the number of classes with 10 as class interval. 2
b. Make a cumulative frequency distribution table. 4
c. Find the median and mode of the given data. 4

Solution to Question No. 12 :

- a** Here, highest mark of the data = 95 and lowest mark of the data = 42
 \therefore Range of the data = $(95 - 42) + 1 = 53 + 1 = 54$
 \therefore Number of classes with 10 as class interval
 $= \frac{54}{10} = 5.4 \approx 6$.

- b** A cumulative frequency distribution table is made below :

Class Interval	Tally Mark	Frequency	Cumulative frequency
41 – 50		4	4
51 – 60		5	9
61 – 70		10	19
71 – 80		6	25
81 – 90		3	28
91 – 100		2	30
Total		$n = 30$	

- c** In order to find the median and mode of the given data, the data are arranged in ascending order as follows : 42, 47, 48, 50, 52, 53, 55, 58, 60, 61, 62, 64, 64, 64, 66, 68, 68, 70, 71, 74, 75, 77, 79, 79, 85, 88, 89, 93, 95. From the arranged data made above, it is evident that total frequency (total number of students) is $n = 30$, an even number.

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

$$= \frac{15^{\text{th}} \text{ value} + 16^{\text{th}} \text{ value}}{2}$$

$$= \frac{64 + 66}{2}$$

$$= 65.$$

In presentation of the data, 64 repeats 4 times, 68 repeats 2 times, 79 repeats 2 times and the rest appears once. Hence, the mode is 64.

∴ Required Median and Mode are 65 and 64 respectively.

Ques. 13 A table is given below :

Class interval	30–39	40–49	50–59	60–69	70–79
Frequency	8	6	14	10	12

- a. Make a cumulative frequency table. 2
 b. Find the arithmetic mean from the table. 4
 c. Draw the histogram on the data with description. 4

● Sylhet Board 2019

Solution to Question No. 13 :

- a** A cumulative frequency table is made below :

Class interval	Frequency	Cumulative frequency
30 – 39	8	8
40 – 49	6	14
50 – 59	14	28
60 – 69	10	38
70 – 79	12	50

b To find the arithmetic mean of the given data, a frequency distribution table is made below :

Class interval	Midvalue (x_i)	Frequency (f_i)	$f_i \times x_i$
30 – 39	34.5	8	276
40 – 49	44.5	6	267
50 – 59	54.5	14	763
60 – 69	64.5	10	645
70 – 79	74.5	12	894
Total		$\sum f_i = 50$	$\sum f_i x_i = 2845$

We know, arithmetic mean, $\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{2845}{50} = 56.9$

∴ Determined arithmetic mean is 56.9.

c To draw the histogram of the given data, continuous class interval frequency distribution table is made below :

Class interval	Continuous class interval	Frequency
30 – 39	29.5 – 39.5	8
40 – 49	39.5 – 49.5	6
50 – 59	49.5 – 59.5	14
60 – 69	59.5 – 69.5	10
70 – 79	69.5 – 79.5	12

In order to draw a histogram of the given data, a graph paper of xy-plane is taken. Then continuous class intervals and their respective frequencies of the given data are plotted along x-axis and y-axis respectively considering 1 small square = 2 unit along x-axis and 1 small square = 1 unit along y-axis of the graph paper. The broken part ΔΔ implies the presence of the continuous class interval 0 to 29.5.

The following histogram is drawn below :

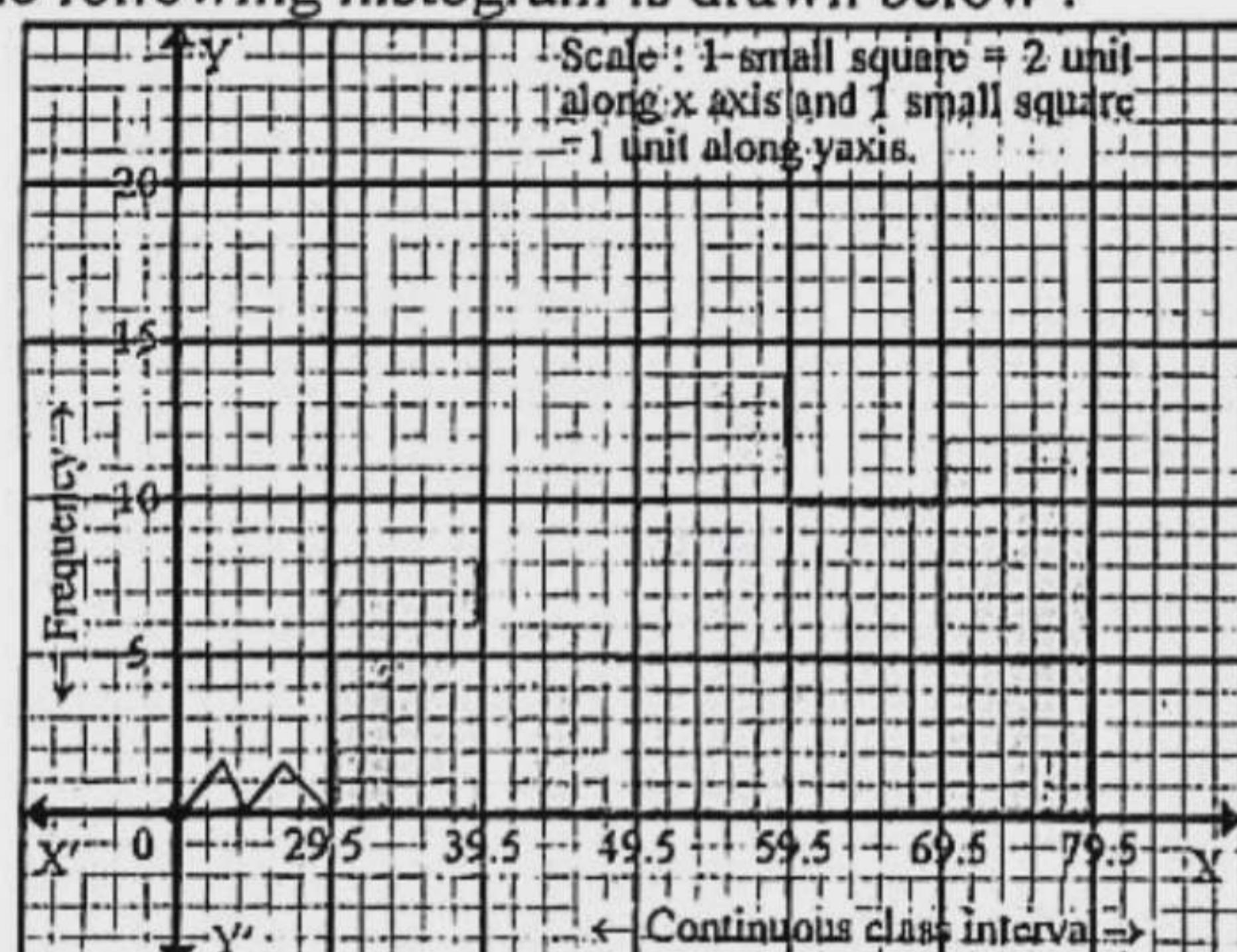


Figure : A Histogram

Ques. 14 The marks obtained in Mathematics by 40 learners are given below :

70, 35, 80, 40, 60, 55, 58, 45, 60, 65, 48, 70, 46, 50, 60, 65, 70, 58, 60, 48, 85, 72, 36, 85, 60, 50, 46, 65, 55, 61, 60, 52, 58, 90, 65, 78, 84, 83, 55, 45.

- Find the mean of the numbers 13, 7, 8, 5, 9, 4, 16. 2
- Make a frequency distribution table with 6 as class interval. 4
- Find the median of the given data. 4

Solution to Question No. 14 :

a Here, sum of the numbers = $13 + 7 + 8 + 5 + 9 + 4 + 16 = 62$

and number of numbers = 7

∴ Mean, $\bar{x} = \frac{\text{sum of the numbers}}{\text{number of numbers}} = \frac{62}{7} = 8.86$

b Here, the highest value of the data = 90

and the lowest value of the data = 35

∴ Range of the data = $(90 - 35) + 1 = 55 + 1 = 56$

∴ Number of classes with 6 as class interval

$$= \frac{56}{6} = 9.33 \approx 10$$

A frequency distribution table is made below :

Class Interval	Tally Mark	Frequency
35 – 40		3
41 – 46		4
47 – 52		5
53 – 58		6
59 – 64		7
65 – 70		7
71 – 76		1
77 – 82		2
83 – 88		4
89 – 94		1
Total		n = 40

c In order to find the median of the given data, the data are arranged in ascending order below :

35, 36, 40, 45, 45, 46, 46, 48, 48, 50, 50, 52, 55, 55, 55, 58, 58, 58, 60, 60, 60, 60, 60, 61, 65, 65, 65, 65, 70, 70, 70, 72, 78, 80, 83, 84, 85, 85, 90.

Here, n = 40; which is an even number.

$$\therefore \text{Median} = \frac{\text{sum of numerical values of } \frac{40}{2} \text{ th and } \left(\frac{40}{2} + 1\right) \text{ th terms}}{2}$$

$$= \frac{\text{sum of numerical values of } 20^{\text{th}} \text{ and } 21^{\text{st}} \text{ terms}}{2}$$

$$= \frac{60 + 60}{2} = 60$$

∴ Median of marks obtained is 60.

Ques. 15 Marks obtained in Mathematics by 20 students of class eight are—

70, 55, 85, 96, 82, 87, 90, 63, 78, 88, 89, 69, 70, 72, 67, 65, 88, 75, 76, 62.

- Find the arithmetic mean of the marks obtained directly. 2
- Make a frequency distribution table with 5 as class interval. 4
- Find out the difference between median and mode. 4

Solution to Question No. 15:

a. Here, summation of the given data = $70 + 55 + 85 + 96 + 82 + 87 + 90 + 63 + 78 + 88 + 89 + 69 + 70 + 72 + 67 + 65 + 88 + 75 + 76 + 62 = 1527$

Number of data = 20

$$\therefore \text{Arithmetic mean} = \frac{1527}{20} = 76.35 \text{ (Ans.)}$$

b. Here, lowest number = 55

and highest number = 96

$$\therefore \text{Range} = (96 - 55) + 1 \\ = 42$$

If 5 is taken as class interval then number of

$$\text{classes} = \frac{42}{5} = 8.4 \approx 9$$

A frequency distribution table of the given data with class interval 5 is made below :

Class interval	Tally	Frequency
55-59		1
60-64		2
65-69		3
70-74		3
75-79		3
80-84		1
85-89		5
90-94		1
95-99		1

c. In order to find the median and mode of the given data, the data are arranged in ascending order of values as follows : 55, 62, 63, 65, 67, 69, 70, 70, 72, 75, 76, 78, 82, 85, 87, 88, 88, 89, 90, 96.

Here, $n = 20$ even number

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

$$= \frac{10^{\text{th}} \text{ value} + 11^{\text{th}} \text{ value}}{2} = \frac{75 + 76}{2} = \frac{151}{2} = 75.5$$

Again, each of 70 and 88 occurs maximum 2 times in the data.

So, the mode of the data are 70 and 88.

Difference between median and mode are

$$= (75.5 - 70) = 5.5 \text{ and } (88 - 75.5) = 12.$$

Ques. 16 The frequency distribution table of the marks obtained in English by 50 students of class eight is given below :

Obtained marks	41-45	46-50	51-55	56-60	61-65	66-70
Frequency	5	8	11	14	9	3

- a. Find the mid-point of the mode class. 2
- b. Find the arithmetic mean from the table. 4
- c. Draw the histogram from the data. 4

• Barishal Board 2019

Solution to Question No. 16 :

a. Here, maximum frequency (14) lies in the class (56-60). So, (56-60) is the mode class.

$$\therefore \text{Mid-value of mode class} = \frac{56 + 60}{2} = 58 \text{ (Ans.)}$$

b. In order to determine the arithmetic mean of the given data, the data are tabulated as follows :

Class interval	Mid value (x_i)	Frequency (f_i)	$f_i x_i$
41-45	43	5	215
46-50	48	8	384
51-55	53	11	583
56-60	58	14	812
61-65	63	9	567
66-70	68	3	204
Total		$n = 50$	$\sum f_i x_i = 2765$

$$\therefore \text{Arithmetic mean}, \bar{x} = \frac{\sum f_i x_i}{n} = \frac{2765}{50} = 55.3$$

∴ Determined arithmetic mean is 55.3. (Ans.)

c. For drawing histogram, the given data is tabulated as below :

Class interval	Continuous class interval	frequency
41-45	40.5-45.5	5
46-50	45.5-50.5	8
51-55	50.5-55.5	11
56-60	55.5-60.5	14
61-65	60.5-65.5	9
66-70	65.5-70.5	3

A graph paper of xy plane is taken, continuous class intervals are plotted along x -axis. In this case 1 small square is taken as unit of class interval. Frequency of the respective class intervals is plotted along y -axis. 1 small square of graph paper is taken as unit along y -axis of frequency in this case too. Thus a histogram of given data is drawn below :



Ques. 17 In the World Cup Cricket, run of 25 batsman are given below :

87, 85, 20, 15, 17, 22, 28, 30, 35, 37, 42, 46, 50, 51, 55, 59, 61, 63, 78, 84, 55, 51, 55, 43, 31

a. Determine the mode of the data. 2

b. Making a frequency distribution table with 15 as class interval, determine the arithmetic mean. 4

c. Draw the histogram of the data. 4

• Dinajpur Board 2019

Solution to Question No. 1.7 :

a The data are arranged in ascending order : 15, 17, 20, 22, 28, 30, 31, 35, 37, 42, 43, 46, 50, 51, 51, 55, 55, 55, 59, 61, 63, 78, 84, 85, 87.

In the presentation of the data, 51 repeats 2 times, 55 repeats 3 times and the rest appears once. Hence the mode is 55.

∴ Required mode is 55.

b Here, highest value of the data = 87

and lowest value of the data = 15

$$\therefore \text{Range} = (87 - 15) + 1 \\ = 72 + 1 = 73$$

$$\therefore \text{Number of classes with } 15 \text{ as class interval} = \frac{73}{15} \\ = 4.87 \\ \approx 5$$

A frequency distribution table is made below to determine the arithmetic mean from the given data :

Class interval	Mid value (x_i)	Frequency (f_i)	$f_i \times x_i$
15–29	22	5	110
30–44	37	6	222
45–59	52	8	416
60–74	67	2	134
75–89	82	4	328
Total		$\sum f_i = 25$	$\sum f_i x_i = 1210$

$$\text{We know that, arithmetic mean, } \bar{x} = \frac{\sum f_i x_i}{\sum f_i} \\ = \frac{1210}{25} \\ = 48.4$$

∴ Determined mean is 48.4.

c To draw the Histogram of the given data, continuous class interval frequency distribution table is made below :

Class interval	Continuous class interval	Frequency
15–29	14.5–29.5	5
30–44	29.5–44.5	6
45–59	44.5–59.5	8
60–74	59.5–74.5	2
75–89	74.5–89.5	4

In order to draw a Histogram of the given data, a graph paper of xy-plane is taken. Then continuous class intervals and their respective frequencies of the given data are plotted along x-axis and y a-axis respectively considering 1 small square = 3 unit along x-axis and 2 small square = 1 unit along y-axis of the graph paper. The broken part $\Delta\Delta$ implies the presence of the continuous class interval 0 to 14.5.

The following histogram is drawn below :

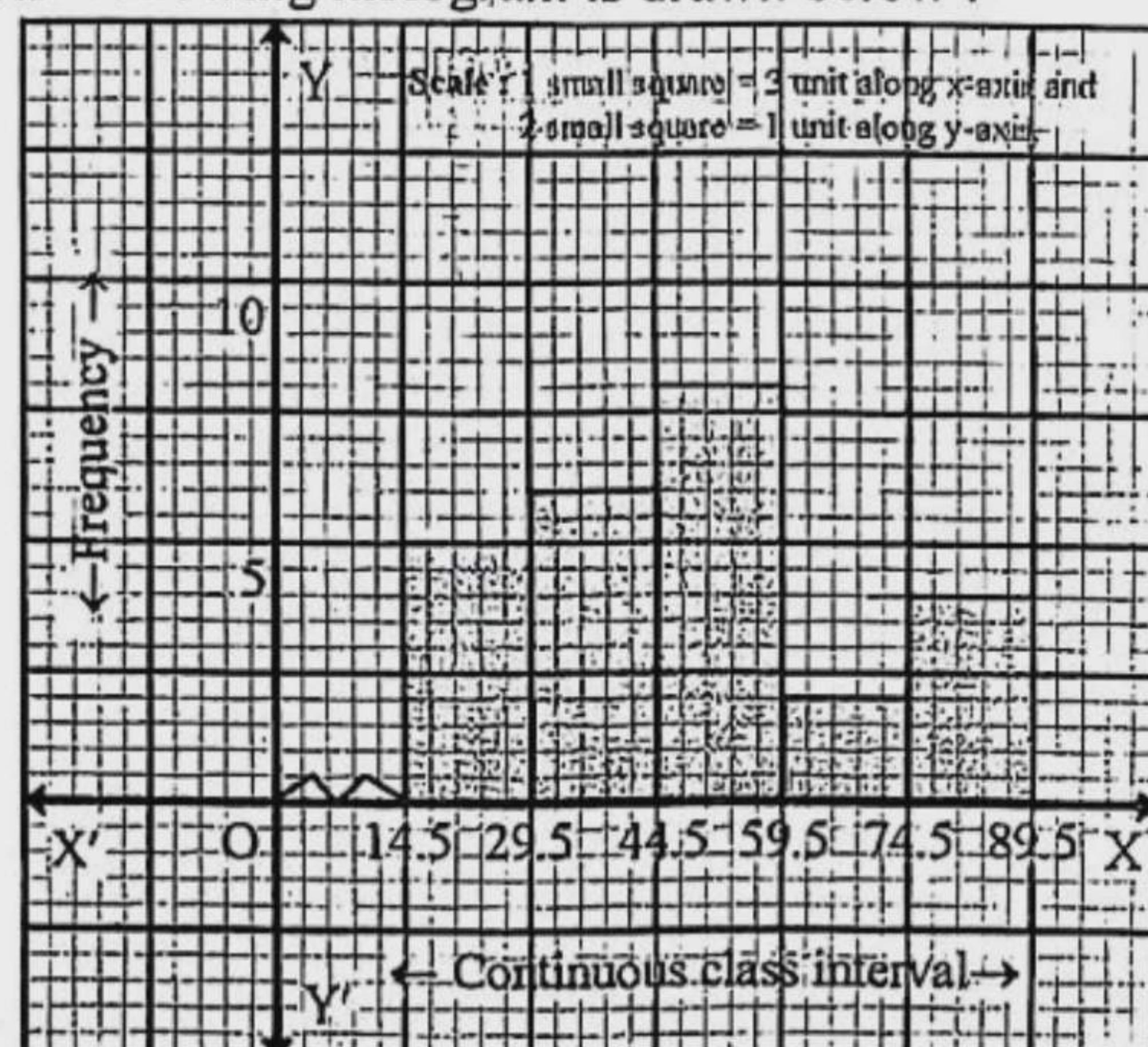


Figure : A Histogram

- Ques. 18** The numbers are : 42, 27, 45, 22, 41, 23, 46, 48, 50, 48, 48, 29, 52, 55, 65, 70, 32, 38.
- 40, 43, 40, 40, 43, 44, 44, 46, 48, 40, 44, 54, 64, 60, 55, 57, 44; Find the mode of the above data. 2
 - Find the median of the given numbers of the stem. 4
 - Find the arithmetic mean by class interval 10.4

• Mymensingh Board 2019

Solution to Question No. 18 :

a The data are arranged in ascending order :

40, 40, 40, 40, 43, 43, 44, 44, 44, 44, 46, 48, 54, 55, 57, 60, 64.
In presentation of the data, 40 repeats 4 times, 43 repeats 2 times, 44 repeats 4 times and the rest appears once.

∴ Required mode are 40 and 44.

b To find the median of the given data, the data are arranged below in ascending order :

22, 23, 27, 29, 32, 38, 41, 42, 45, 46, 48, 48, 48, 50, 52, 55, 65, 70.

Here, total number of data is 18 which is an even number.

$$\text{So, median} = \frac{\frac{18}{2}^{\text{th}} \text{ term} + \left(\frac{18}{2} + 1\right)^{\text{th}} \text{ term}}{2} \\ = \frac{9^{\text{th}} \text{ term} + 10^{\text{th}} \text{ term}}{2} \\ = \frac{45 + 46}{2} \\ = 45.5 \text{ (Ans.)}$$

c Here, highest value of the data = 70 and lowest value of the data = 22

$$\therefore \text{Range of the data} = (70 - 22) + 1 = 48 + 1 = 49$$

$$\therefore \text{Number of classes with class interval } 10 = \frac{49}{10} \\ = 4.9 \\ \approx 5$$

A frequency distribution table with class interval 10 is made below :

Class interval	Mid value (x_i)	Frequency (f_i)	$f_i \times x_i$
21-30	25.5	4	102
31-40	35.5	2	71
41-50	45.5	8	364
51-60	55.5	2	111
61-70	65.5	2	131
Total		$N = 18$	$\sum f_i x_i = 779$

$$\therefore \text{Arithmetic mean, } \bar{x} = \frac{\sum f_i x_i}{N} = \frac{779}{18} = 43.28 \text{ (Ans.)}$$

Ques. 19 Marks obtained by 30 students in Mathematics of class eight are :

60, 45, 40, 55, 58, 68, 54, 68, 49, 56, 59, 49, 42, 72, 70, 59, 52, 70, 53, 64, 70, 48, 57, 67, 70, 63, 41, 61, 62, 50.

- a. Determine the number of classes taking 5 as class interval. 2
- b. Determine the median of given data. 4
- c. Make a frequency distribution table with 6 as class interval and determine arithmetic mean. 4

• Dhaka Board 2018

Solution to Question No. 19 :

a The highest value of the data = 72

The lowest value of the data = 40

∴ Difference between the highest and the lowest value of the data = 32.
∴ Range of the data = $32 + 1 = 33$

∴ No. of classes with class interval 5 = $\frac{33}{5}$ or, 6.6 or, 7.

b To determine the median of the data, the data are arranged below in ascending order of values :

40, 41, 42, 45, 48, 49, 49, 50, 52, 53, 54, 55, 56, 57, 58, 59, 59, 60, 61, 62, 63, 64, 67, 68, 68, 70, 70, 70, 70, 72.

Here total number of data, $n = 30$, an even number

∴ Average of $\left(\frac{n}{2} + 1\right)$ th or, 16th value and $\frac{n}{2}$ th or, 15th value is the median.

Here, 15th value = 58 and 16th value = 59.

∴ The required median of the data = $\frac{58 + 59}{2}$ or, 58.5

c A frequency distribution table with class interval 6 of the given data is made below :

Class intervals	Tally marks	Mid value (x_i)	Frequency (f_i)	$x_i \times f_i$
40 – 45		42.5	4	170.0
46 – 51		48.5	4	194.0
52 – 57		54.5	6	327.0
58 – 63		60.5	7	423.5
64 – 69		66.5	4	266.0
70 – 75		72.5	5	362.5
Total :			30	1743

$$\therefore \text{Arithmetic mean} = \frac{1743}{30} \text{ or, } 58.1.$$

Ques. 20 The frequency distribution table of 50 students in science of class eight as follows :

Marks obtained	31-40	41-50	51-60	61-70	71-80	81-90
Frequency	6	8	13	10	8	5

- a. Make a cumulative frequency table. 2
- b. Determine the mean of the given table. 4
- c. Draw the histogram from the frequency distribution table. 4

• Dhaka Board 2018

Solution to Question No. 20 :

a A cumulative frequency table of the given data is made below :

Class interval of marks obtained	31-40	41-50	51-60	61-70	71-80	81-90
Frequency of class interval	6	8	13	10	8	5
Cumulative frequency	6	14	27	37	45	50

b To determine the mean of the given data, the data is tabulated as under :

Class of marks	Mid value of class (x_i)	Continuous class interval	Frequency (f_i)	$x_i \times f_i$
31 – 40	35.5	30.5 – 40.5	6	213.0
41 – 50	45.5	40.5 – 50.5	8	364.0
51 – 60	55.5	50.5 – 60.5	13	721.5
61 – 70	65.5	60.5 – 70.5	10	655.0
71 – 80	75.5	70.5 – 80.5	8	604.0
81 – 90	85.5	80.5 – 90.5	5	427.5
Total :	–		50	2985.0

$$\therefore \text{Arithmetic mean of the data} = \frac{2985}{50} \text{ or, } 59.7$$

c A histogram of the given data is drawn below plotting continuous class intervals along x-axis and the corresponding frequencies along y-axis on a graph paper of xy-plane



A Histogram

Ques. 21 The marks obtained in Bangla by 25 students are as follows —

42, 44, 46, 51, 47, 43, 42, 62, 65, 76, 50, 72, 83, 57, 62, 42, 53, 82, 68, 55, 42, 74, 88, 43, 59.

- a. Determine the range. 2
- b. Determine the median. 4
- c. Make a frequency distribution table with 10 as class interval and find out the arithmetic mean. 4

• Rajshahi Board 2018

Solution to Question No. 21 :

- a** Here, the highest value of the data = 88 and the lowest value of the data = 42
 \therefore Range of the data = $(88 - 42) + 1 = 47$
- b** Now, arranging the data in ascending order, we get, 42, 42, 42, 42, 43, 43, 44, 46, 47, 50, 51, 53, 55, 57, 59, 62, 62, 65, 68, 72, 74, 76, 82, 83, 88
 Total number of data = 25, an odd number,
 \therefore Median of the data = $\frac{25+1}{2}$ th or 13th value of the data.

Here, 13th value = 55

So, the median of the data = 55.

- c** A frequency distribution table of the given data is drawn below :

class interval of marks	41 – 50	51 – 60	61 – 70	71 – 80	81 – 90
Tally mark					
Frequency	9	6	4	3	3

Ques. 22 Total marks obtained in Mathematics and Science of 20 students are given below :
 165, 170, 184, 162, 176, 172, 166, 168, 177, 187, 195, 157, 160, 142, 145, 160, 189, 161, 171, 155.

- Determine the mode of the given data. 2
- Make a frequency distribution table with 10 as class interval and determine the arithmetic mean. 4
- Draw the Histogram of the data. 4

● Jashore Board 2018

Solution to Question No. 22 :

- a** The given data are arranged in ascending order of values as under :
 142, 145, 155, 157, 160, 160, 161, 162, 165, 166, 168, 170, 171, 172, 176, 177, 184, 187, 189, 195.

From the above organized data, it is seen that 160 occurs twice in the data.

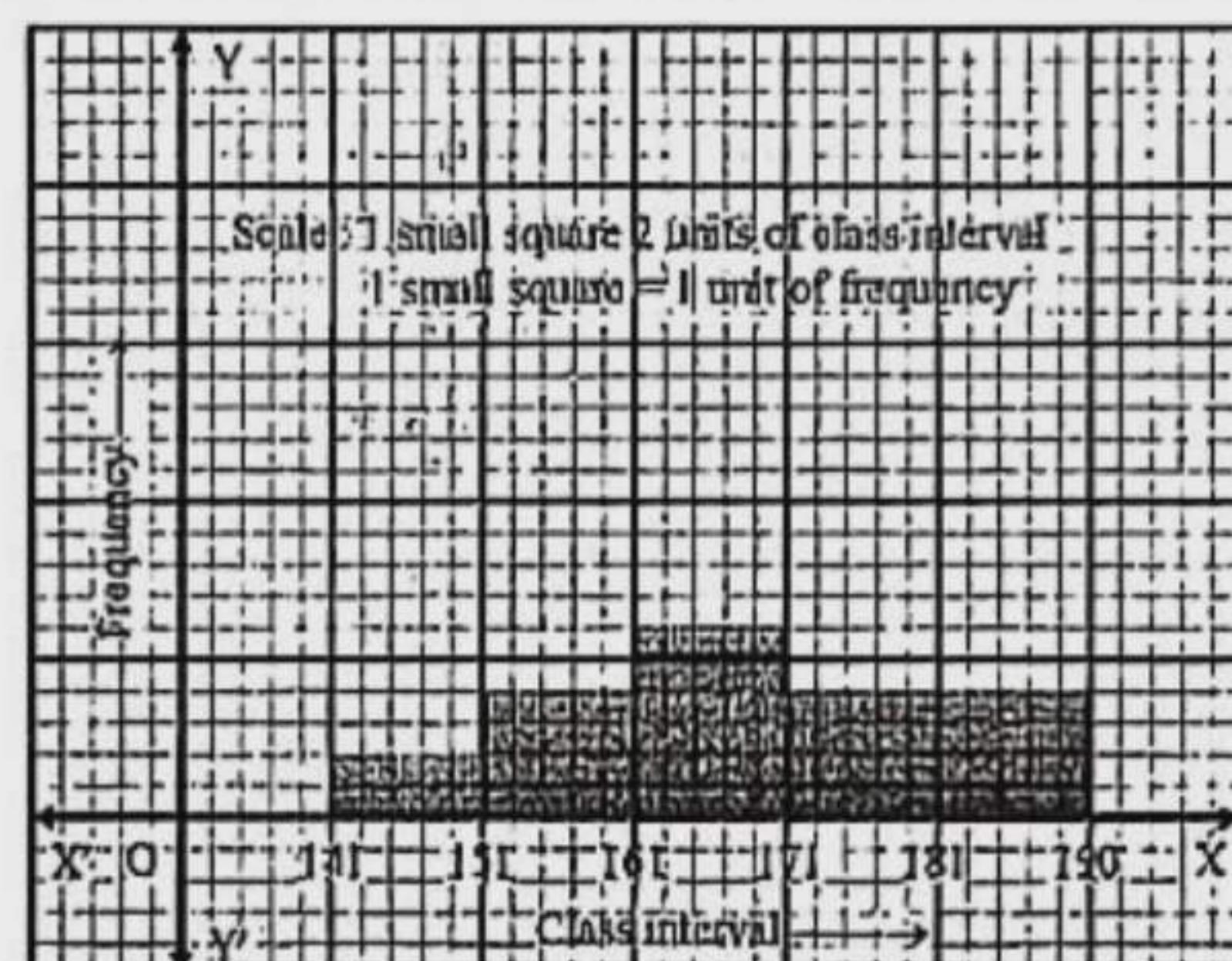
\therefore The mode of the data is 160.

- b** A frequency distribution table with class interval 10 of the given data is made below :

Class intervals of marks	Tally marks	Mid-value of class intervals (x_i)	Frequency of classes (f_i)	$x_i \times f_i$
141 – 150		145.5	2	291
151 – 160		155.5	4	622
161 – 170		165.5	6	993
171 – 180		175.5	4	702
181 – 190		185.5	4	742
Total			20	3350

\therefore Arithmetic mean, $\bar{x} = \frac{3350}{20}$ or, 167.5

- c** A histogram of the given data is drawn below based on the table in (b) by using the data :



A Histogram

Ques. 23 The frequency distribution table of marks in Mathematics obtained by 100 students of A.G. High School is given below :

Obtained marks	31-35	36-40	41-45	46-50	51-55	56-60	61-65
No. of students	10	14	19	24	16	12	5

- By mentioning the class interval of mode, find out the mid-point. 2
- Find the arithmetic mean from table. 4
- Draw the histogram of the data with description. 4

● Cumilla Board 2018

Solution to Question No. 23 :

- a** In the given data, the highest number of students ie the highest frequency is found to exist in the class 46-50.

\therefore 46–50 is the mode class and mid-point of mode class is $\frac{46+50}{2}$ or, 48.

- b** In order to find the arithmetic mean of the given data, the data are tabulated suitably as under :

Class interval of marks	Mid-Value of class interval (x_i)	Frequency of class interval (f_i)	$x_i \times f_i$
31–35	33	10	330
36–40	38	14	532
41–45	43	19	817
46–50	48	24	1152
51–55	53	16	848
56–60	58	12	696
61–65	63	5	315
Total		100	4690

We know,
 arithmetic mean of an arranged data,

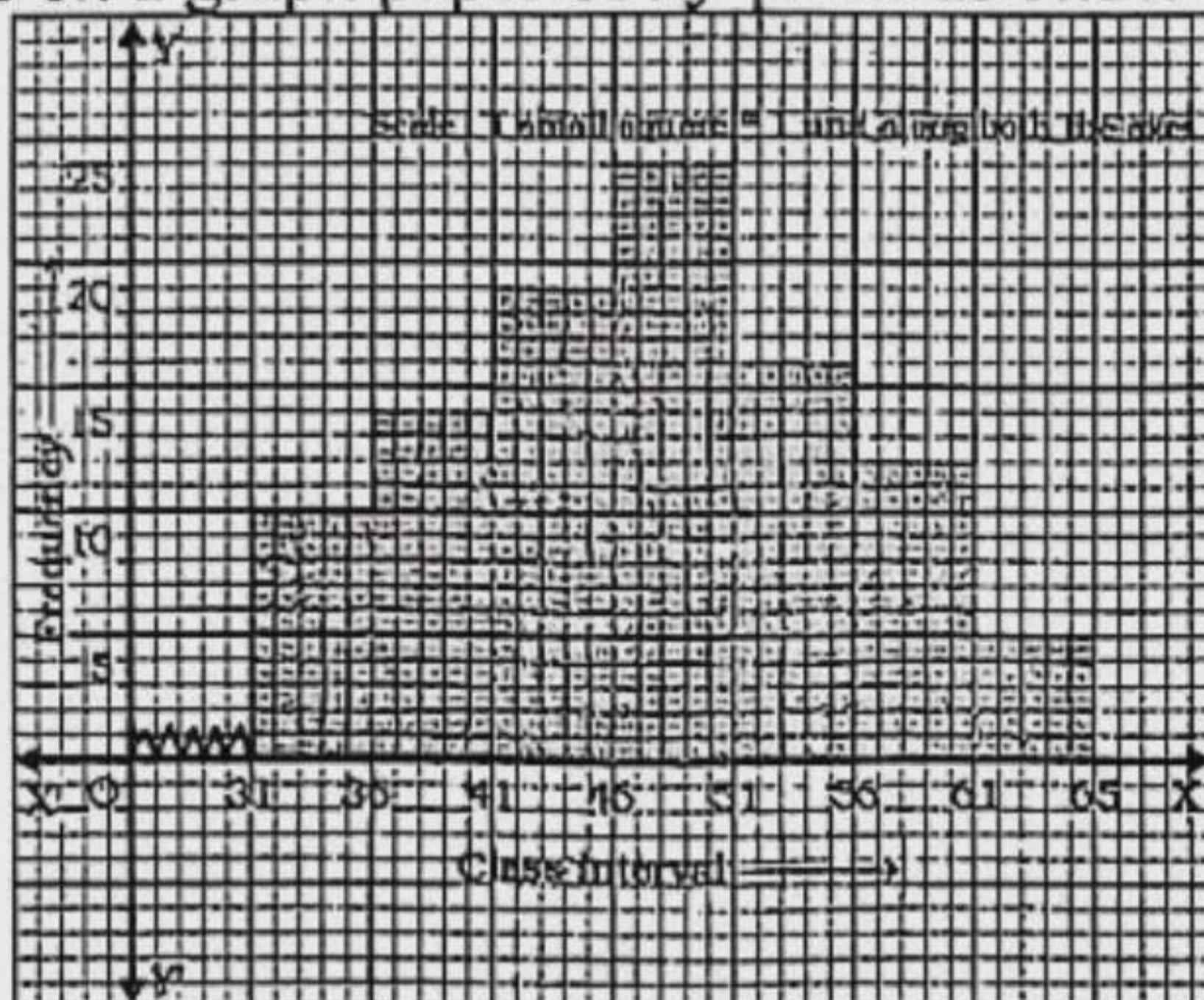
$$\bar{x} = \frac{\sum x_i \times f_i}{\sum f_i} \dots (1)$$

Here, we have, $\sum x_i \times f_i = 4690$ and $\sum f_i = 100$

$$\therefore \text{Mean, } \bar{x} = \frac{4690}{100}, \text{ from (1)} = 46.9$$

So, the determined arithmetic mean is 46.9

- c** In order to draw a histogram of the given data, class intervals of marks are plotted along x-axis and the corresponding frequencies are plotted along y-axis on a graph paper of xy-plane as under :



A Histogram

Ques. 24 Marks obtained in Mathematics by 30 students of Class VIII are given below—

51, 67, 53, 50, 81, 80, 79, 82, 87, 82, 75, 70, 67, 60, 53, 62, 65, 55, 50, 52, 71, 61, 72, 52, 41, 47, 43, 57, 42, 44.

- Among 600 students of a school, female students are 200. Express the angle by a Pie-chart for the female students. 2
- Make a frequency distribution table with 5 as class interval. 4
- Find out the median and mode from the table. 4

• Cumilla Board 2018

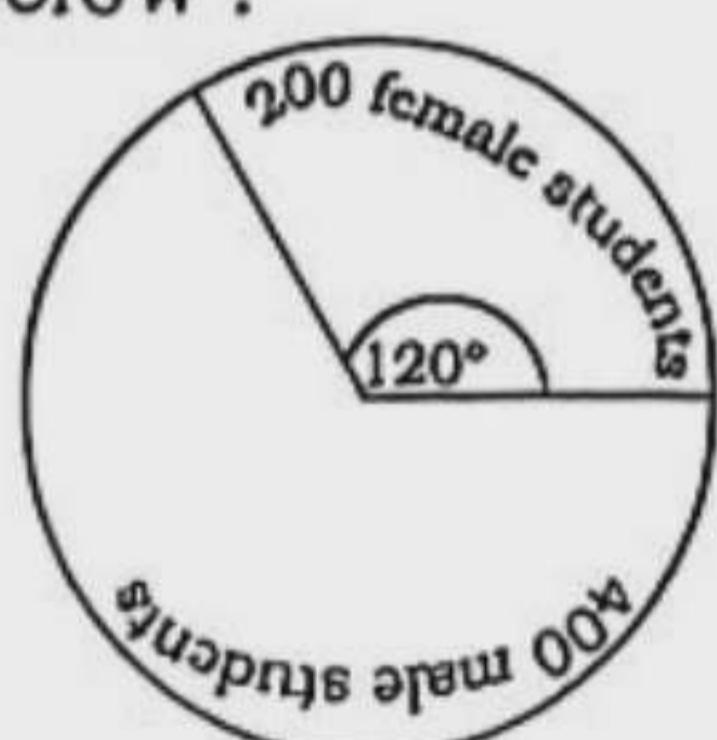
Solution to Question No. 24 :

- a In a pie-chart, 600 students covers = 360°

$$\text{So, } 200 \text{ " } " = \frac{360^\circ \times 200}{600}$$

or, 120°

Thus, 200 female students will cover 120° in a pie-chart as shown below :



- b A frequency distribution table of the given data with class interval of 5 is made below :

Class interval of marks	Tally marks	Frequency	Remarks
41–45		4	Highest value = 87
46–50		3	Lowest value = 41
51 – 55		6	Range = 47
56–60		2	No. of classes = 10
61–65		3	

Class interval of marks	Tally marks	Frequency	Remarks
66–70		3	
71–75		3	
76–80		2	
81–85		3	
86–90		1	
		30	

- c** In order to find the median and mode of the given data, the data are arranged in ascending order of values as follows :

41, 42, 43, 44, 47, 50, 50, 51, 52, 52, 53, 53, 55, 57, 60, 61, 62, 65, 67, 67, 70, 71, 72, 75, 79, 80, 81, 82, 82, 87.

From the arranged data made above, it is evident that total frequency (total number of students) is $n = 30$, an even number.

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

$$= \frac{15^{\text{th}} \text{ value} + 16^{\text{th}} \text{ value}}{2}$$

$$= \frac{60 + 61}{2}$$

$$= 60.5$$

Again, each of 50, 52, 53, 67 and 82 occurs maximum (2) times in the data.

So, mode of the data are 50, 52, 53, 67 and 82.

Thus, median = 60.5 and mode = 50, 52, 53, 67 and 82.

Ques. 25 Data-1 :

29, 37, 46, 51, 47, 49, 47, 34, 31, 49, 56, 25, 42, 56, 33, 54, 32, 33, 48, 59

Data-2 :

18, 25, 30, 10, 12, 16, 28, 20, 13, 21, 11, 27

- Is there any mode of the numbers 1, 0, 7, 5, 2, 1, 4, 3? Explain it. 2
- By using formula find the median of data-2. 4
- Make a cumulative frequency distributions table with 10 as class interval. 4

• Chattogram Board 2018

Solution to Question No. 25 :

- a In the given data, here we see that only 1 occurs twice and each of the other values occurs only once.

According to definition of mode of a data, 1 is the mode of the data.

So, there exists mode of the given data.

- b To find the median of data-2, the data are arranged in ascending order of values as under : 10, 11, 12, 13, 16, 18, 20, 21, 25, 27, 28, 30 :



From the above arrangement, it is seen that number of values in the data, $n = 12$, an even number.

∴ According to definition of median of an arranged data, median (When n is even) = Average of $\frac{n}{2}$ th value and $(\frac{n}{2} + 1)$ th value.

Here, $n = 12$ and as such $\frac{n}{2}$ th value or $\frac{12}{2}$ th value or 6th value of the data = 18 and that of $(\frac{n}{2} + 1)$ th value or 7th value = 20.

$$\therefore \text{The required median} = \frac{6^{\text{th}} \text{ value} + 7^{\text{th}} \text{ value}}{2}$$

$$= \frac{18 + 20}{2}$$

$$= \frac{38}{2} \text{ or, } 19$$

Thus, the median of the data is 19.

C For data-1, highest value = 56 and lowest " = 25

∴ Range of the data = $(56 - 25) + 1 = 32$

∴ No. of class with class interval 10 = $\frac{32}{10} = 3.2 \approx 4$.

Now, a cumulative frequency distribution table with class interval 10 is made below :

Class interval	Tally mark	Frequency	Cumulative frequency
25-34		7	7
35-44		2	9
45-54		8	17
55-64		3	20

Ques. 26 Marks obtained in Science subject by 30 students of class VIII are as follows :—

68, 52, 70, 92, 54, 75, 82, 98, 56, 88, 73, 90, 96, 58, 64, 77, 83, 80, 85, 72, 65, 87, 66, 78, 69, 90, 93, 79, 67, 95.

- In an examination 15 students got GPA-5 out of 60 students. Show the information in a pie-chart. 2
- Make a cumulative frequency distribution considering 5 as class interval. 4
- Determine the median of given data. 4

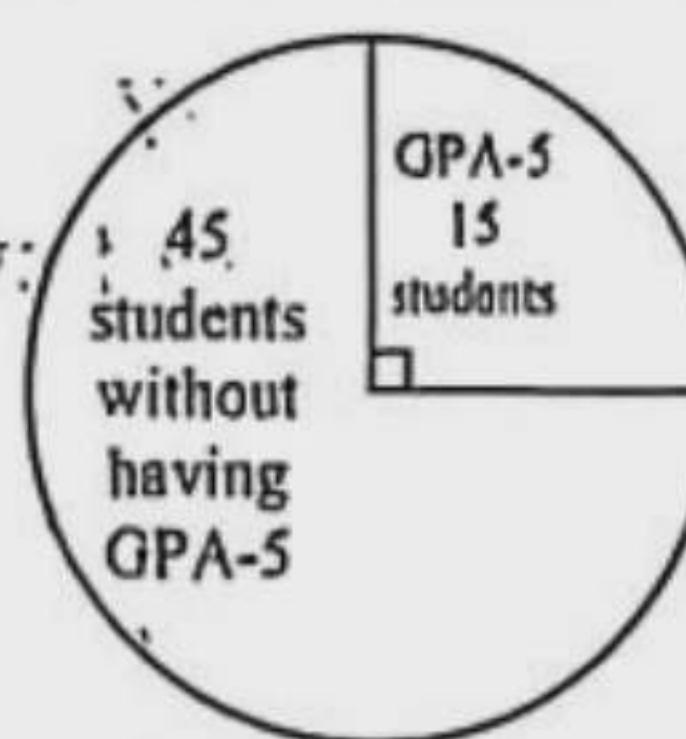
• Sylhet Board 2018

Solution to Question No. 26 :

a In a pie-chart, total angle at the centre = 360° . Here, 60 students cover = 360°

$$\therefore 15 \text{ " } " = \frac{360^\circ \times 15}{60} \text{ or, } 90^\circ.$$

∴ The desired pie-chart of 15 students obtaining GPA-5 out of 60 students is shown below :



A Pie-chart.

b Here, the highest value of the data = 98 and the lowest value of the data = 52

$$\therefore \text{Range of the data} = (98 - 52) + 1 = 47$$

$$\therefore \text{No. of classes with class interval 5} = \frac{47}{5}$$

$$= 9.4 \approx 10.$$

Now, a cumulative frequency distribution table of the given data with class interval 5 is made as under :

Class interval	Tally mark	Frequency	Cumulative frequency
51 - 55		2	2
56 - 60		2	4
61 - 65		2	6
66 - 70		5	11
71 - 75		3	14
76 - 80		4	18
81 - 85		3	21
86 - 90		4	25
91 - 95		3	28
96 - 100		2	30

c To determine the median of the given data, the data are arranged in ascending order of values as under :

52, 54, 56, 58, 64, 65, 66, 67, 68, 69, 70, 72, 73, 75, 77, 78, 79, 80, 82, 83, 85, 87, 88, 90, 90, 92, 93, 95, 96, 98.

There are 30 values in the given data where 30 is an even number.

∴ Average of $\frac{30}{2}$ th or 15th and $(\frac{30}{2} + 1)$ th or 16th value is the median.

Here, 15th value = 75 and 16th value = 78

$$\therefore \text{Median} = \frac{77 + 78}{2} \text{ or, } 77.5.$$

Ques. 27 A frequency distribution table of marks in Mathematics obtained by 60 students is given below :

Obtained marks	41-50	51-60	61-70	71-80	81-90
No. Of students	5	8	30	10	7

- Determine the mid-value of mode class. 2
- Determine the arithmetic mean from the frequency distribution table. 4
- Draw a histogram of the data. 4

• Barishal Board 2018

Solution to Question No. 27 :

a Here, the highest number of students lies in the class 61-70.

∴ Mode class of the data is 61-70.

$$\therefore \text{Mid-value of mode class} = \frac{61 + 70}{2} \text{ or, } 65.5$$

b To determine the arithmetic mean of the data, a frequency distribution table is made below :

Class interval	Mid-Value of class interval (x_i)	Frequency of class interval (f_i)	$x_i \times f_i$
41-50	45.5	5	227.5
51-60	55.5	8	444.0
61-70	65.5	30	1965.0
71-80	75.5	10	755.0
81-90	85.5	7	598.5
Total		$n = 60$	$\sum x_i f_i = 3990.0$

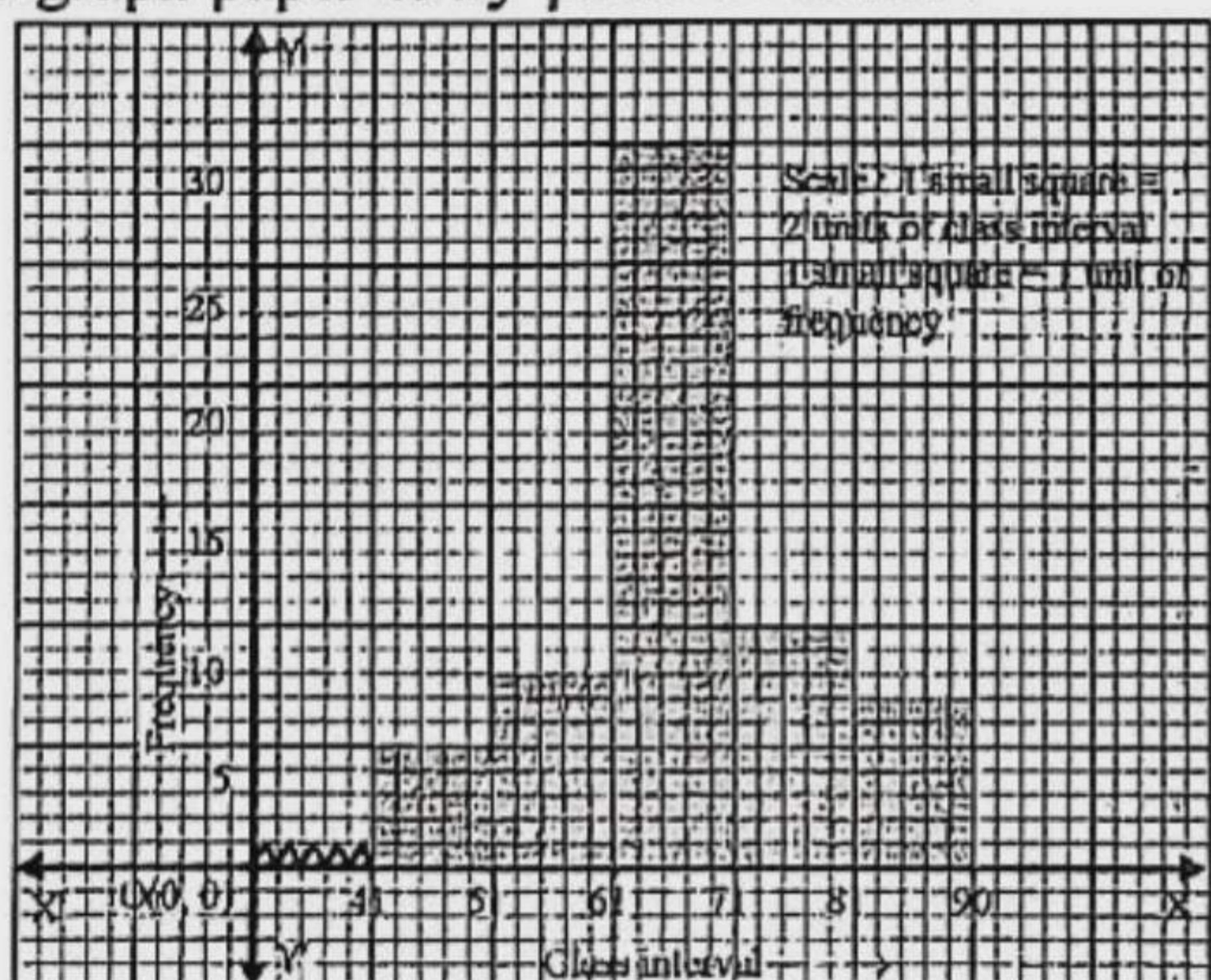
We know, the arithmetic mean of an arranged data,

$$\bar{x} = \frac{\sum x_i f_i}{n}$$

Here, $\sum x_i f_i = 3990$ and $n = 60$.

$$\therefore \text{The required arithmetic mean, } \bar{x} = \frac{3990}{60} = 66.5$$

c To draw a histogram of the data, the class interval of the data are plotted along x-axis and the corresponding frequencies are plotted along y-axis on a graph paper of xy-plane as under :



A Histogram

Ques. 28 The frequency distribution table of 60 students in English is given below :

Class interval	46-50	51-55	56-60	61-65	66-70	71-75
Frequency	4	8	10	20	12	6

- a. Make a cumulative frequency distribution table. 2
- b. Find the arithmetic mean from the table. 4
- c. Draw a histogram from the table. 4

Solution to Question No. 28 :

a A cumulative frequency distribution table of the given data is made below :

Class interval	46-50	51-55	56-60	61-65	66-70	71-75
Frequency	4	8	10	20	12	6
Cumulative frequency	4	12	22	42	54	60

b In order to find the arithmetic mean, the given data are further tabulated as under :

Class interval	Mid-value (x_i)	Frequency (f_i)	$x_i \times f_i$
46 – 50	48	4	192
51 – 55	53	8	424
56 – 60	58	10	580
61 – 65	63	20	1260
66 – 70	68	12	816
71 – 75	73	6	438
Total :		60	3710

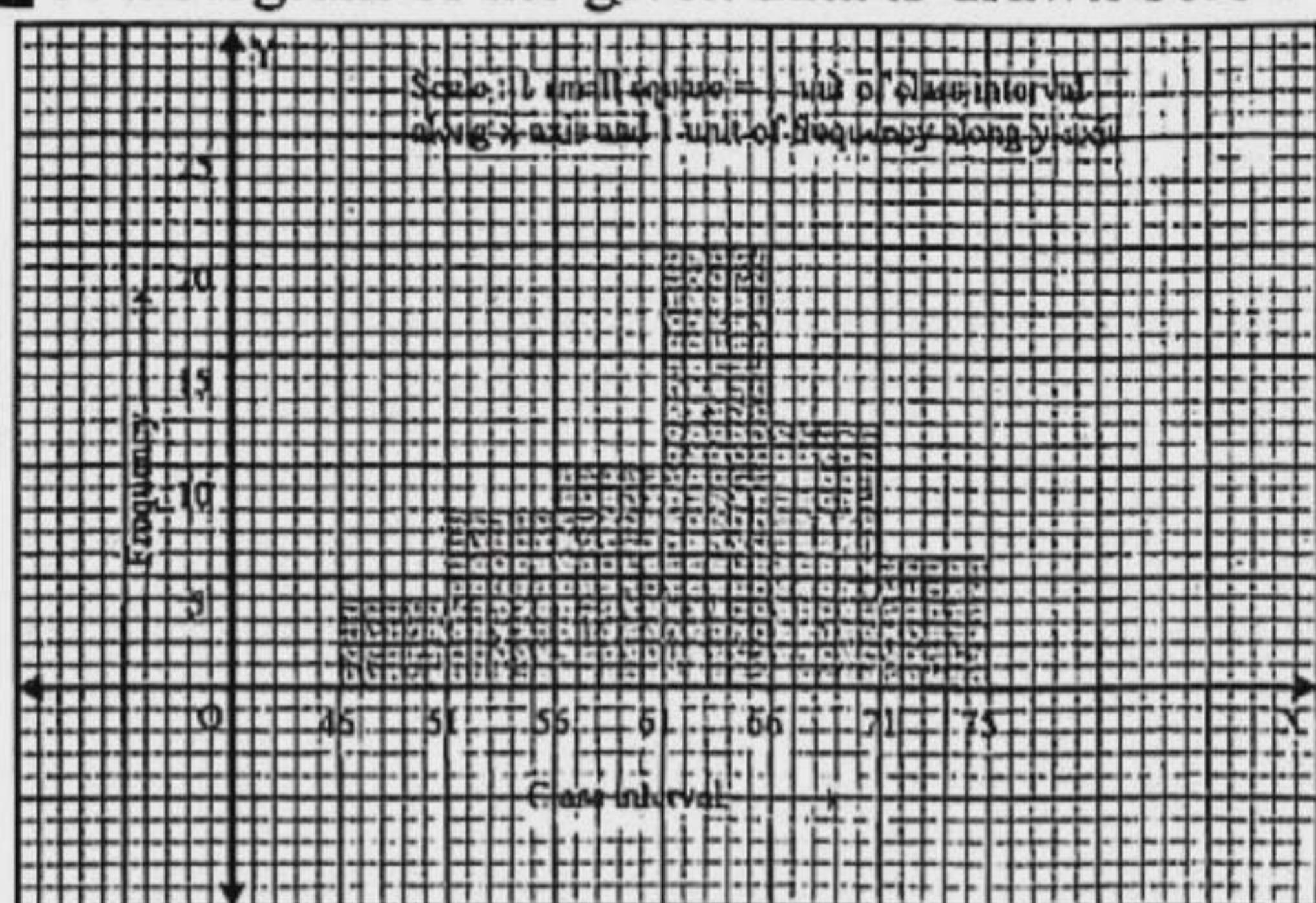
We know, the arithmetic mean, $\bar{x} = \frac{\sum x_i f_i}{\sum f_i}$.

$$\therefore \bar{x} = \frac{3710}{60}$$

= 61.83 (approx)

Thus, the desired arithmetic mean is 61.83.

c A histogram of the given data is drawn below :



A Histogram

Ques. 29 The marks obtained in Mathematics of 30 students of class eight are given below :

40, 35, 60, 55, 58, 45, 60, 65, 46, 50, 60, 65, 58, 60, 48, 36, 60, 50, 46, 65, 55, 61, 68, 65, 50, 40, 56, 60, 65, 46.

- a. What do you mean by central tendency? 2
- b. Find the median of the given data. 4
- c. Make the frequency distribution table with 5 as class-interval and determine arithmetic mean. 4

Solution to Question No. 29 :

a **Central tendency :** The tendency of clustering the values towards the central value of a data is called central tendency. The central value of any data represents the data measuring the central tendency. In general, measurement of central tendency are, arithmetic mean, median and mode.

b To find the median of the given data, the data are arranged in ascending order of values as under :
 35, 36, 40, 40, 45, 46, 46, 46, 48, 50, 50, 50, 55, 55, 56, 58, 58, 60, 60, 60, 60, 60, 61, 65, 65, 65, 65, 68.

Here, total data = 30 in number, an even number.
 ∴ median of the data is the value of the average of $\frac{30}{2}$ th and $\left(\frac{30}{2} + 1\right)$ th term, that is, the average of 15th and 16th term.

Here, 15th term = 56 and 16th term = 58.

∴ Average of the 15th and the 16th terms = $\frac{56 + 58}{2}$ or, 57.

Thus, the desired median of the given data is 57.

c For the purpose of determining arithmetic mean of the given data, the data are tabulated with class interval of 5 as under :

Class interval	Tally mark	Frequency (f _i)	Mid-value of class interval (x _i)	x _i × f _i
35 – 39		2	37	74
40 – 44		2	42	84
45 – 49		5	47	235
50 – 54		3	52	156
55 – 59		5	57	285
60 – 64		7	62	434
65 – 69		6	67	402
Total		30		1670

We know, the arithmetic mean of an organized data, $\bar{x} = \frac{\sum x_i \times f_i}{\sum f_i}$

$$\therefore \bar{x} = \frac{1670}{30} \text{ or, } 55.67. \text{ (approx)}$$

So, the determined arithmetic mean is 55.67

Ques. 30 Marks obtained in mathematics by 30 students of class VIII are :
 67, 48, 56, 49, 64, 71, 57, 52, 73, 49, 51, 52, 48, 53, 58, 61, 60, 42, 45, 63, 70, 59, 54, 46, 43, 56, 59, 43, 68, 52.

- Determine the number of classes with 5 as class interval. 2
- Make a cumulative frequency distribution table with 5 as class interval. 4
- Find out the median of the given marks. 4

Solution to Question No. 30 :

a Here, the greatest value of the data = 73

The lowest value of the data = 42

∴ Range of the data = $(73 - 42) + 1 = 31 + 1 = 32$

∴ Number of classes with interval 5 = $\frac{32}{5} = 6.4$ or, 7.

b A cumulative frequency distribution table with 5 as class interval is made below :

Class interval	Frequency	Cumulative frequency
41 – 45	4	4
46 – 50	5	9
51 – 55	6	15
56 – 60	7	22
61 – 65	3	25
66 – 70	3	28
71 – 75	2	30

c In order to find median of the given data, the data are arranged in ascending order as under :

42, 43, 43, 45, 46, 48, 48, 49, 49, 51, 52, 52, 52, 53, 54, 56, 56, 57, 58, 59, 59, 60, 61, 63, 64, 67, 68, 70, 71, 73.

We know that,

Median of a data arranged in order

= average of $\left\{ \frac{n}{2} \text{ th value and } \left(\frac{n}{2} + 1\right) \text{ th value} \right\}$.

Here $n = 30$ and $\frac{n}{2} = 15$.

∴ $\frac{n}{2}$ th value = 54 and $\left(\frac{n}{2} + 1\right)$ th value = 56.

$$\therefore \text{Median} = \frac{54 + 56}{2} = 55.$$

Ques. 31 Daily saving of 50 students are given below :

Saving (in taka)	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	6	8	13	10	8	5

a. Find the midpoint of the mode class. 2

b. Find the arithmetic mean from the table. 4

c. Draw the histogram of the table. 4

Solution to Question No. 31 :

a Here, the highest frequency lies in class 61–70.

∴ Mode class in this case is 61 – 70.

$$\therefore \text{Mid-point of mode class} = \frac{61 - 70}{2} = 65.5.$$

b To find arithmetic mean of the data, the given data are tabulated as under :

Class interval	Class mid-value (x _i)	Frequency (f _i)	x _i × f _i
41 – 50	45.5	6	273.0
51 – 60	55.5	8	444.0
61 – 70	65.5	13	851.5

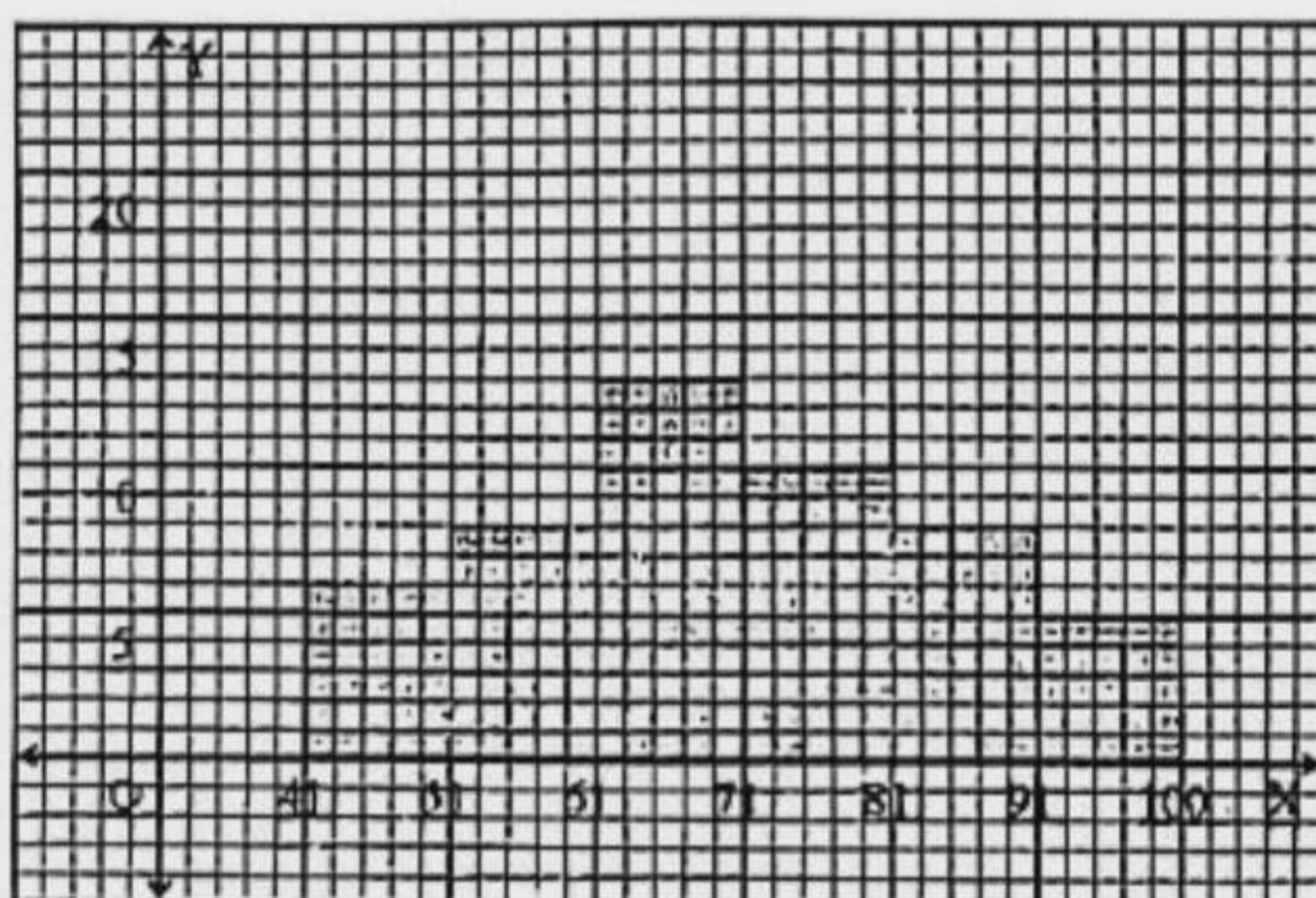
Class interval	Class mid-value (x_i)	Frequency (f_i)	$x_i \times f_i$
71 – 80	75.5	10	755.0
81 – 90	85.5	8	684.0
91 – 100	95.5	5	477.5
Total		50	3485.0

$$\therefore \text{Arithmetic mean} = \frac{\text{total } x_i \times f_i}{\text{total frequency}}$$

$$= \frac{3485}{50}$$

$$= 69.7$$

c To draw a histogram of the given data, a graph paper of xy -plane is taken. The desired histogram is then drawn on the graph paper taking one small square of the graph paper as 2 unit of class interval along x -axis and one small square of the graph paper as 1 unit of frequency along y -axis as under :



Ques. 32 The marks obtained in Bengali by 40 students of class VIII are as follows :

42, 45, 60, 61, 58, 53, 48, 52, 51, 49, 73, 52, 57, 71, 64, 49, 56, 48, 67, 63, 70, 59, 54, 46, 43, 56, 43, 59, 68, 52, 72, 67, 50, 52, 51, 42, 49, 41, 49, 53.

- What are the numbers of classes with 5 as class interval. 2
- Make a cumulative frequency distribution table with 5 as class interval. 4
- Find the median of the given data. 4

• Rajshahi Board 2017

Solution to Question No. 32 :

- a Here, the largest number of the given data = 73.
The smallest number of the given data = 41
 \therefore Range of the data = $(73 - 41) + 1 = 32 + 1 = 33$.
 \therefore Number of classes with class interval of 5 = $\frac{33}{5} = 6.6 \approx 7$

So, desired number of class of class interval = 7

- b A cumulative frequency distribution table of the given data with 5 as class interval is made below :

Class interval	Class frequency	Cumulative frequency
41 – 45	6	6
46 – 50	8	14
51 – 55	9	23
56 – 60	7	30
61 – 65	3	33
66 – 70	4	37
71 – 75	3	40

c In order to determine the median of the given data, the data are arranged in ascending order of values as under : 41, 42, 42, 43, 43, 45, 46, 48, 48, 49, 49, 49, 50, 51, 51, 52, 52, 52, 53, 53, 54, 56, 56, 57, 58, 59, 59, 60, 61, 63, 64, 67, 67, 68, 70, 71, 72, 73.

Here, total number of number of the given data, $n = 40$, So, $\frac{n}{2} = 20$.

\therefore Median of the data = average of the 20th and 21st values of the data. $= \frac{52 + 53}{2} = 52.5$

Ques. 33 The frequency distribution table of the marks obtained in science by 100 students of class eight is as follows —

Class interval	26-35	36-45	46-55	56-65	66-75	76-85	86-95
Frequency	6	11	16	25	22	15	5

- How many measurement are there for central tendency? What are they? 2
- Find the arithmetic mean from the table. 4
- Draw histogram from the given data with description. 4

• Jashore Board 2017

Solution to Question No. 33 :

- a There are three measurements of central tendency. They are :
- Arithmetic mean,
 - Median and
 - Mode.

b To find the arithmetic mean of the given data, the data is tabulated as under :

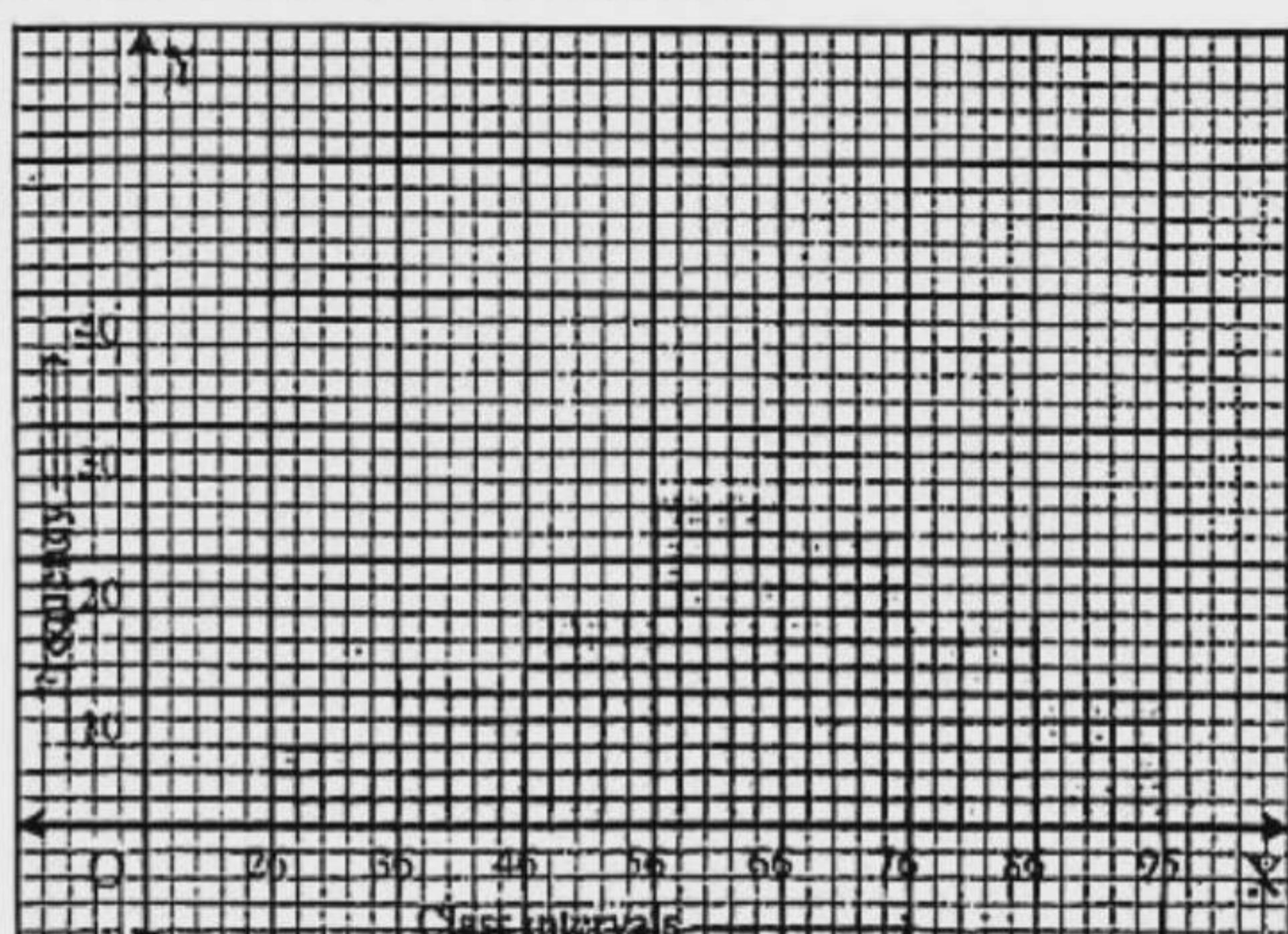
Class interval	Mid-value (x_i)	Frequency (f_i)	$x_i \times f_i$
26 – 35	30.5	6	183.0
36 – 45	40.5	11	445.5
46 – 55	50.5	16	808.0
56 – 65	60.5	25	1512.5
66 – 75	70.5	22	1551.0
76 – 85	80.5	15	1207.5
86 – 95	90.5	5	452.5
Total		100	6160.0

We know, arithmetic mean = $\frac{\text{Total } x_i \times f_i}{\text{Total frequency}}$

Here, total $x_i \times f_i = 6160.0$ and total frequency = 100

$$\therefore \text{Arithmetic mean} = \frac{6160}{100} \text{ or } 61.60$$

c To draw a histogram of the given data, a graph paper of xy-plane is taken. Class intervals are plotted on the graph paper along x-axis and the corresponding frequency of the class interval is plotted along y-axis considering 1 small square of the graph paper as 2 units of both class interval and frequency. Thus, the following histogram of the given data is drawn as under :



A Histogram

Ques. 34 The marks obtained in science by 30 students in the annual examination are given below—

75, 35, 40, 80, 65, 80, 80, 90, 95, 80, 65, 60, 75, 80, 40, 67, 70, 72, 69, 78, 80, 80, 65, 75, 75, 88, 93, 80, 75, 65.

- a. Define mode with example. 2
- b. In light of the stem, find out median. 4
- c. Make a frequency distribution table with 5 as class-interval and find out the arithmetic mean. 4

• Cumilla Board 2017

Solution to Question No. 34 :

a **Mode :** Mode of a data is a number of a data which occurs the highest number of times. Let 1, 2, 3, 3, 4, 4, 5, 5, 5, 5, 6, 7, 8 is an arranged data. Here the number 5 occurs 4 times in the data and it is the highest number of occurring of a number in the data. So, 5 is the mode of the data.

b To find out the median of the given data, the data are arranged below in ascending order :

35, 40, 40, 60, 65, 65, 65, 65, 67, 69, 70, 72, 75, 75, 75, 75, 78, 80, 80, 80, 80, 80, 80, 80, 80, 80, 88, 90, 93, 95.

Here, total number of data, $n = 30$, an even number.

\therefore Median = average of the $\frac{n}{2}$ th or 15th term and

$$\begin{aligned} & \left(\frac{n}{2} + 1 \right) \text{th or 16th term of the data} \\ & = \frac{75 + 75}{2} \\ & = 75. \end{aligned}$$

c A frequency distribution table with class interval 5 is made below :

Class interval	Mid-value of class interval (x_i)	Frequency (f_i)	$x_i \times f_i$
35 – 39	37.0	1	37
40 – 44	42.0	2	84
45 – 49	47.0	0	0
50 – 54	52.0	0	0
55 – 59	57.0	0	0
60 – 64	62.0	1	62
65 – 69	67.0	6	402
70 – 74	72.0	2	144
75 – 79	77.0	6	462
80 – 84	82.0	8	656
85 – 89	87.0	1	87
90 – 94	92.0	2	184
95 – 99	97.0	1	97
Total		30	2215

We know, arithmetic mean = $\frac{\text{Total of } x_i \times f_i}{\text{Total frequency}}$

Here total of $x_i \times f_i = 2215$ and
total frequency = 30

$$\therefore \text{The required arithmetic mean} = \frac{2215}{30}$$

or, 73.83 (approx.)

Ques. 35 The favourite subjects of 100 students are given in the table—

Subject	Religion	Science	Mathematics	Geography	Information and Technology
Number of student	10	20	30	25	15

- a. Define class-interval with example. 2
- b. Draw the pie-chart of the given table. 4
- c. Draw the histogram on the given table. 4

• Cumilla Board 2017

Solution to Question No. 35 :

a Class interval : Class interval of any class is a number which is 1 more than the difference between the highest value and the lowest value of that class.

Let, 30 – 34 is a certain class of a data. Here, the difference between the highest value and the lowest value of the class = $(34 - 30) = 4$. So, the class interval of the class, 30 – 34 is $(4 + 1)$ or, 5.

b A pie-chart of the given data is drawn as under :

Here, total number of subjects = 5 and

total number of students = 100.

So, 5 subjects as well as 100 students will cover 360° of the pie-chart.

That is, 100 students will cover 360°

$$\therefore 10 \text{ students will cover } \frac{360^\circ \times 10}{100} = 36^\circ$$

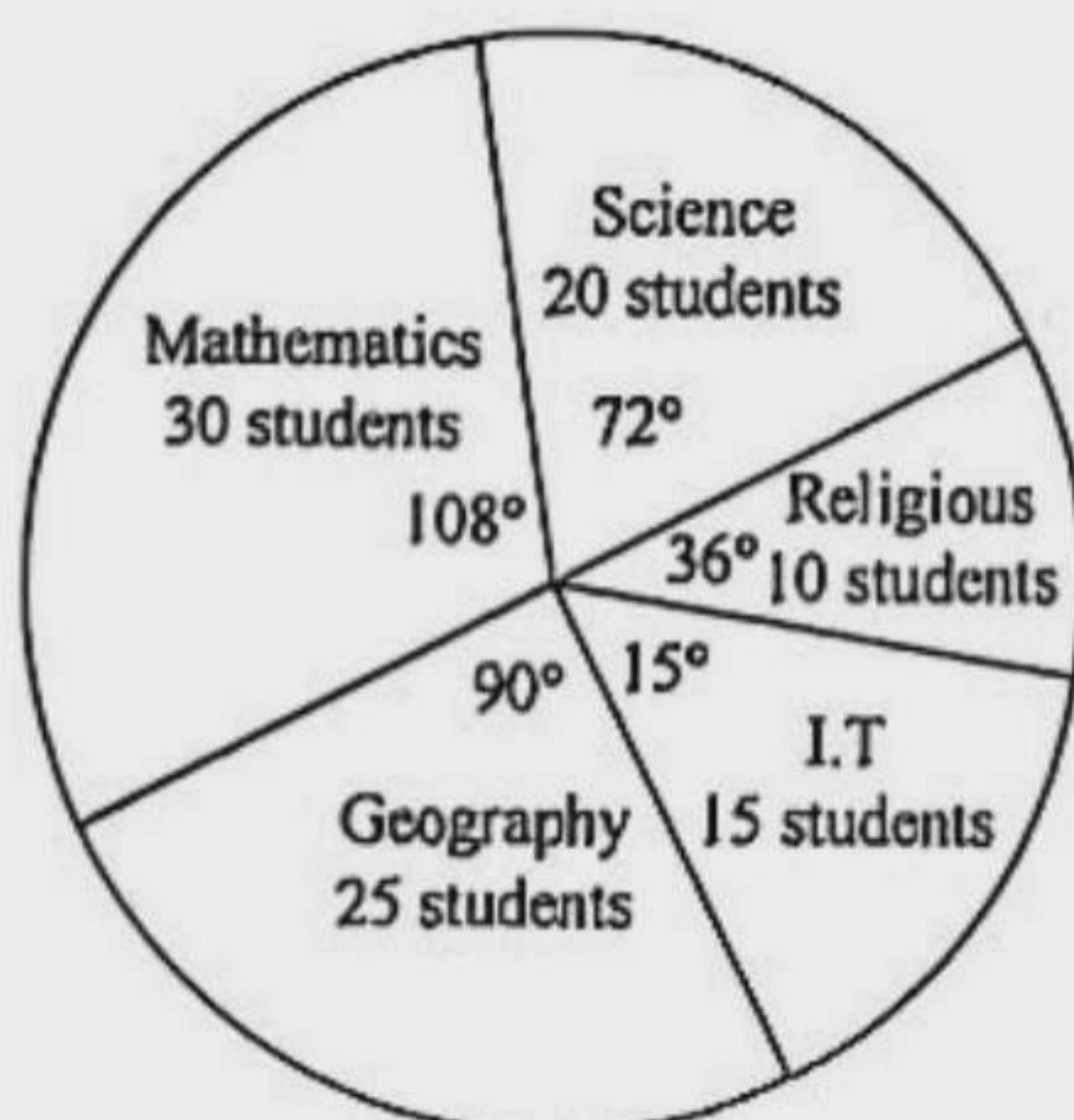
$$\therefore 20 \text{ students will cover } \frac{360^\circ \times 20}{100} = 72^\circ$$

$$\therefore 30 \text{ students will cover } \frac{360^\circ \times 30}{100} = 108^\circ$$

$$\therefore 25 \text{ students will cover } \frac{360^\circ \times 25}{100} = 90^\circ$$

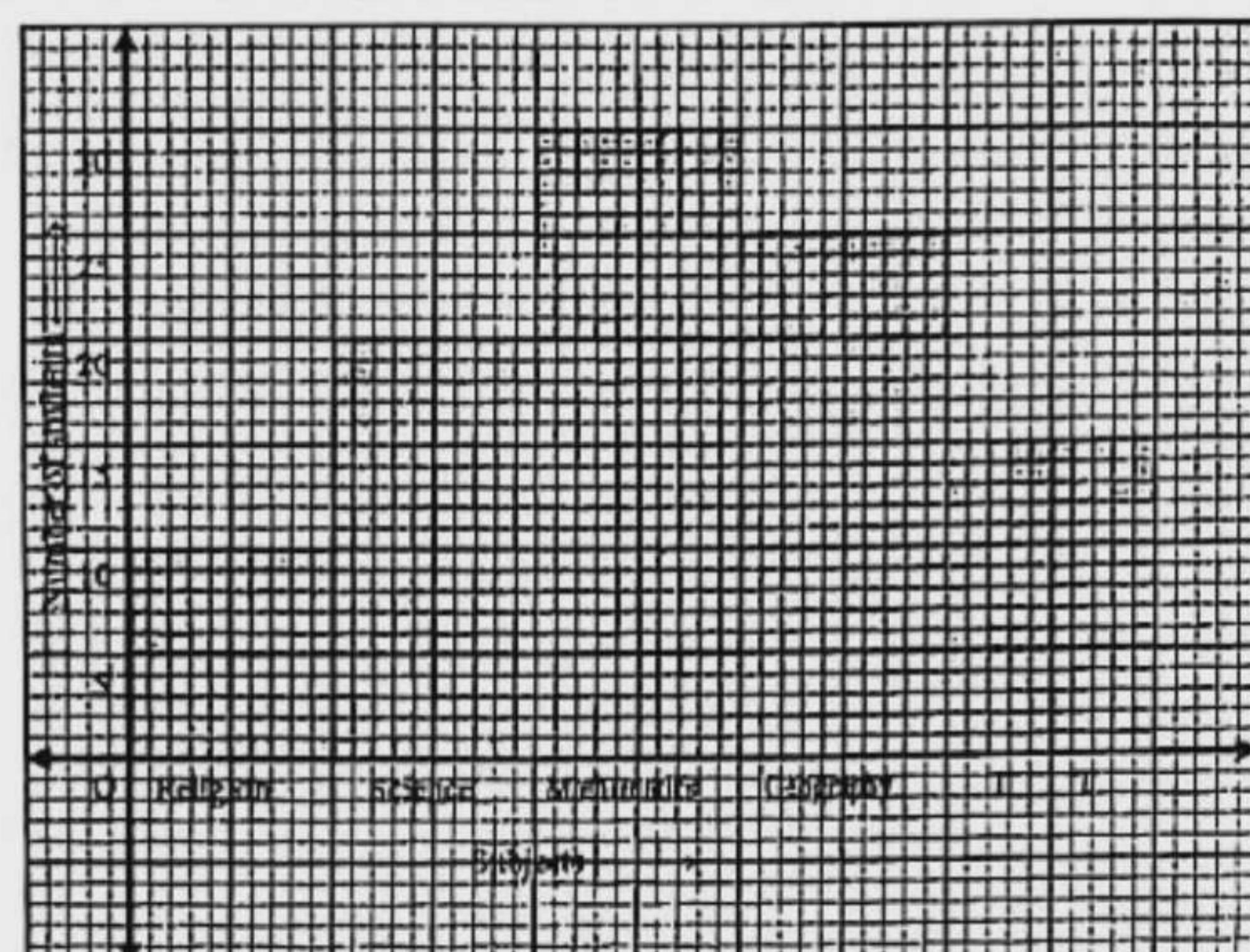
$$\therefore 15 \text{ students will cover } \frac{360^\circ \times 15}{100} = 54^\circ$$

So, pie-chart is :



A pie-chart

c To draw a histogram of the given data, a graph paper of xy -plane is taken. Subjects are plotted along x -axis keeping equal intervals of 10 small squares of the graph paper. Again, number of students are plotted along y -axis considering 1 small square of graph paper for 1 student. Thus the following histogram of the given data is drawn :



A Histogram

Ques. 36 Frequency distribution table of obtained marks in mathematics by 45 students in class eight is given below :

Marks	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	5	8	16	10	4	2

- Make a cumulative frequency table. 2
- Determine the median from the table. 4
- Draw the histogram from the frequency table. 4

© Chatogram Board 2017

Solution to Question No. 36 :

a A cumulative frequency distribution table of the given table is made below :

Class interval	Frequency	Cumulative frequency
41 – 50	5	5
51 – 60	8	13
61 – 70	16	29
71 – 80	10	39
81 – 90	4	43
91 – 100	2	45

Total = 45

b Here total frequency, $n = 45$, and odd number.

We know,

Median of a tabulated data

$$= \left(\frac{n+1}{2} \right) \text{ th value of the data}$$

$$= 23^{\text{th}} \text{ value of the data putting } n = 45$$

Again, 23rd value of the given data lies in class of 61 – 70.

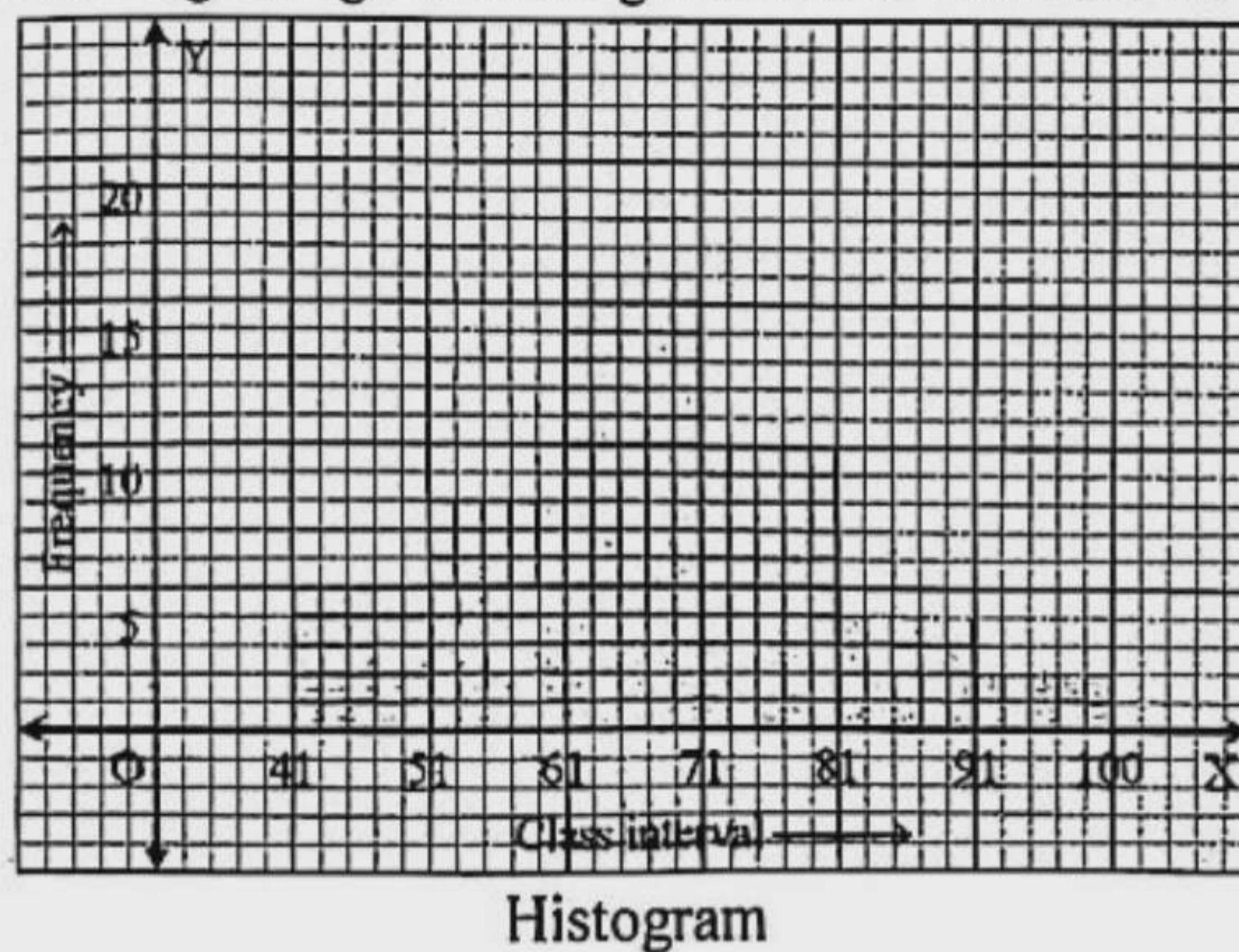
\therefore Median = mid-value of 61 – 70

$$= \frac{61 + 70}{2}$$

$$= 65.5$$



c To draw a histogram of the given data, a graph paper of xy -plane is taken. Then, class intervals are plotted along x -axis considering one small square of the graph paper as 2 units of class interval. Again, frequency of respective class interval are plotted along y -axis considering 1 small square of the graph paper as unit of frequency. Thus, the following histogram of the given data is constructed :



Histogram

Ques. 37 The weekly savings (in taka) of the 40 house wives are given below :

155, 173, 166, 143, 168, 160, 156, 146, 162, 158, 159, 148, 150, 147, 132, 136, 156, 140, 155, 145, 135, 151, 141, 169, 140, 125, 122, 140, 137, 175, 145, 150, 164, 142, 156, 152, 146, 148, 157, 167.

- Arrange the data in ascending order of the value. 2
- Find the median and the mode of the data. 4
- By making frequency distribution table with 6 as class interval, find the mean. 4

• Barishal Board 2017

Solution to Question No. 37 :

a The given data is arranged in ascending order of value as under :
122, 125, 132, 135, 136, 137, 140, 140, 140, 141, 142, 143, 145, 145, 146, 146, 147, 148, 148, 150, 150, 151, 152, 155, 155, 156, 156, 156, 157, 158, 159, 160, 162, 164, 166, 167, 168, 169, 173, 175.

b Here, total number of values = 40, an even number.

$$\therefore \text{Median} = \text{the average of } \frac{40}{2}\text{th and } \left(\frac{40}{2} + 1\right)\text{th value}$$

$$= \text{the average of 20th and 21st value}$$

$$= \frac{150 + 150}{2} = 150$$

Again, both 140 and 156 occurs the highest number of times in the data.

So, 140 and 156 are the mode of the data.

c A frequency distribution table with class interval 6 of the given data is made below :

Class interval	Mid-value of class interval (x_i)	Frequency (f_i)	$x_i \times f_i$
122 – 127	124.5	2	249.0
128 – 133	130.5	1	130.5
134 – 139	136.5	3	409.5
140 – 145	142.5	8	1140.0
146 – 151	148.5	8	1188.0
152 – 157	154.5	7	1081.5
158 – 163	160.5	4	642.0
164 – 169	166.5	5	832.5
170 – 175	172.5	2	345.0
Total		40	6018.0

We know, mean = $\frac{\text{Total of } x_i \times f_i}{\text{Total frequency}}$

$$\therefore \text{The required mean} = \frac{6018}{40} = 150.45$$

Ques. 38 Marks obtained in English by 30 students of class VIII are :

52, 67, 53, 50, 81, 80, 79, 82, 87, 82, 75, 70, 68, 60, 54, 63, 66, 55, 50, 52, 71, 61, 72, 52, 41, 48, 42, 57, 43, 43.

- Define the central tendency. 2
- Make the frequency distribution table and find the arithmetic mean from the table. 4
- Find the median and mode from the data. 4

• Dinajpur Board 2017

Solution to Question No. 38 :

a **Central tendency** : The tendency of clustering of the data to the middle value or centre is called central tendency. In general, arithmetic mean, median and mode of a data is known as central tendency of the data.

b To find the arithmetic mean of the data, a frequency distribution with class intervals table of the data are made as under :

Class interval	Mid-value (x_i)	Frequency (f_i)	$x_i \times f_i$
41 – 45	43	4	172
46 – 50	48	3	144
51 – 55	53	6	318
56 – 60	58	2	116
61 – 65	63	2	126
66 – 70	68	4	272
71 – 75	73	3	219
76 – 80	78	2	156
81 – 85	83	3	249
86 – 90	88	1	88
Total		30	1860

We know, arithmetic mean = $\frac{\text{Total of } x_i \times f_i}{\text{Total frequency}}$

Here total of $x_i \times f_i = 1860$ and total frequency = 30.

$$\therefore \text{The required arithmetic mean} = \frac{1860}{30} = 62.$$

c To find the median and mode of the given data, the data are arranged below in ascending order of value :
 41, 42, 43, 43, 48, 50, 50, 52, 52, 52, 53, 54, 55, 57, 60, 61, 63, 66, 67, 68, 70, 71, 72, 75, 79, 80, 81, 82, 82, 87.

We know,

median of an arranged data = average of $\frac{n}{2}$ th and $(\frac{n}{2} + 1)$ th value of the data.

Here, $n = 30$

$$\text{So, } \frac{n}{2} = 15 \text{ and } \frac{n}{2} + 1 = 16$$

$$\therefore 15 \text{ th value} = 60 \\ 16 \text{ th value} = 61$$

$$\therefore \text{Median of the data} = \frac{60 + 61}{2} = 60.5$$

Again, the number 52 occurs 3 times, the highest number of times in the data.

So, the mode of the data = 52.

Ques. 39 In the annual examination of class VIII, 40 students obtained marks in Bangla as under :

Class interval	31–40	41–50	51–60	61–70	71–80	81–90
Frequency	4	10	6	8	9	3

- Determine the mean of first 25 prime numbers. 2
- Find the arithmetic mean from the table. 4
- Considering the upper limit of class interval as obtained marks in science with same frequency of 40 students, draw the pie-chart. 4

► Rajuk Uttara Model College, Dhaka

Solution to Question No. 39 :

a First 25 prime numbers in ascending order are : 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97.

Here, $n = 25$; which is odd number.

Sum of the numbers = $(2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 + 29 + 31 + 37 + 41 + 43 + 47 + 53 + 59 + 61 + 67 + 71 + 73 + 79 + 83 + 89 + 97) = 1060$

$$\therefore \text{Mean} = \frac{\text{Sum of the numbers}}{\text{number of numbers}} \\ = \frac{1060}{25} = 42.4 \quad (\text{Ans.})$$

b To determine the mean of the given data, the data is tabulated as under :

Class of marks	Mid value of class (x_i)	Frequency (f_i)	$x_i \times f_i$
31 – 40	35.5	4	142
41 – 50	45.5	10	455

Class of marks	Mid value of class (x_i)	Frequency (f_i)	$x_i \times f_i$
51 – 60	55.5	6	333
61 – 70	65.5	8	524
71 – 80	75.5	9	679.5
81 – 90	85.5	3	256.5
Total :	—	40	2390

$$\therefore \text{Arithmetic mean of the data} = \frac{2390}{40} \text{ or, } 59.75$$

c According to question, total number of students is 40. 4 students obtained 40 marks, 10 students obtained 50 marks, 6 students obtained 60 marks, 8 students obtained 70 marks, 9 students obtained 80 marks and 3 students obtained 90 marks in science.

Now,

For 40 students, there is 360° in a pie-chart

$$\therefore " 4 " " " \left(\frac{360 \times 4}{40} \right)^\circ = 36^\circ \text{ in a pie-chart}$$

$$\therefore " 10 " " " \left(\frac{360 \times 10}{40} \right)^\circ = 90^\circ \text{ in a pie-chart}$$

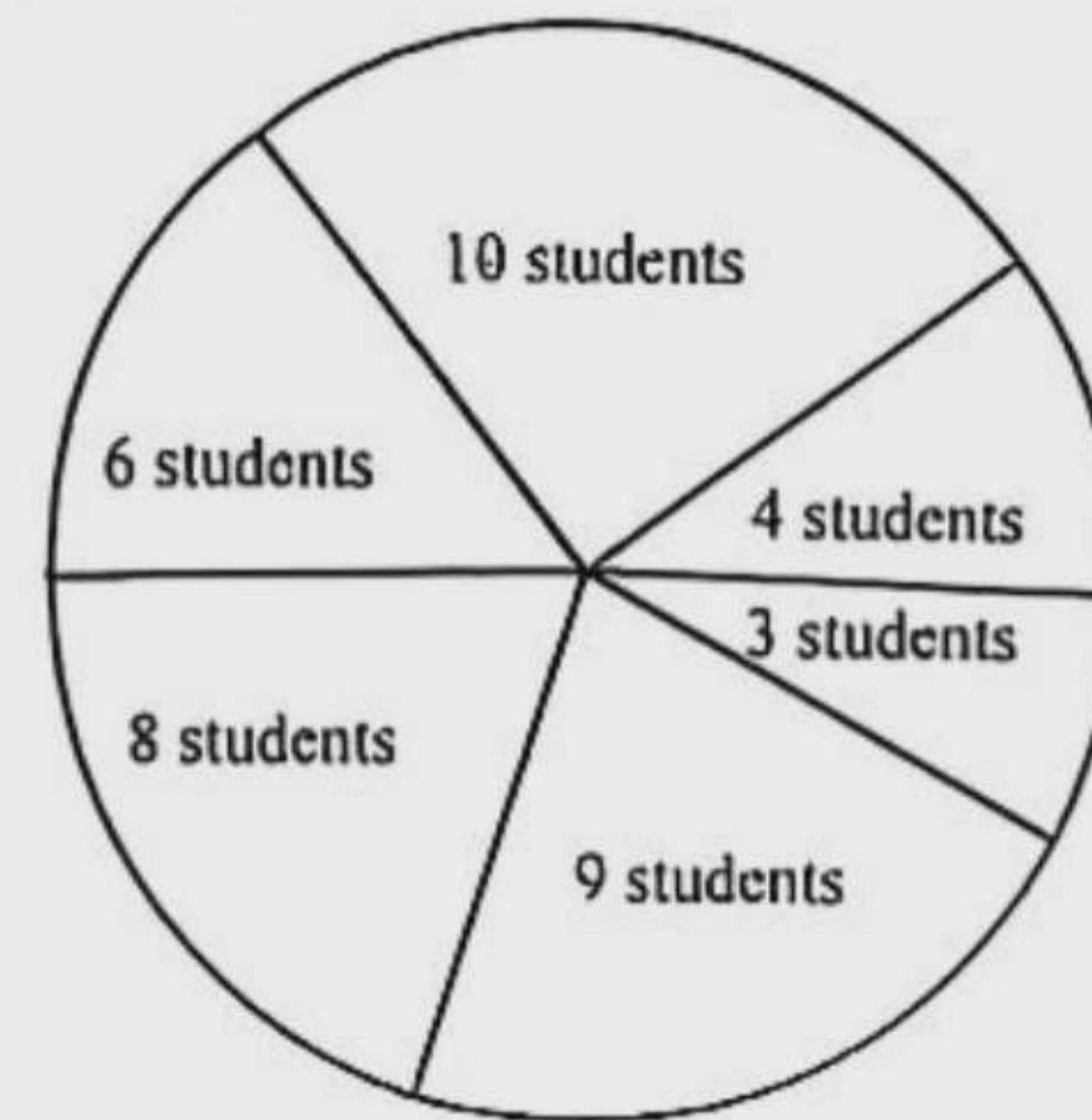
$$\therefore " 6 " " " \left(\frac{360 \times 6}{40} \right)^\circ = 54^\circ \text{ in a pie-chart}$$

$$\therefore " 8 " " " \left(\frac{360 \times 8}{40} \right)^\circ = 72^\circ \text{ in a pie-chart}$$

$$\therefore " 9 " " " \left(\frac{360 \times 9}{40} \right)^\circ = 81^\circ \text{ in a pie-chart}$$

$$\therefore " 3 " " " \left(\frac{360 \times 3}{40} \right)^\circ = 27^\circ \text{ in a pie-chart}$$

So, the required pie-chart is—



Ques. 40 Total marks obtained in Mathematics and Science of 20 students are given below :

165, 170, 184, 162, 176, 172, 166, 168, 177, 187, 195, 157, 160, 142, 145, 160, 189, 161, 171, 155.

- What is central tendency? Write down three measures of central tendency. 2
- Make a frequency distribution table with 10 as class interval and determine arithmetic mean. 4
- Draw histogram of the data. 4

► Rajuk Uttara Model College, Dhaka

Solution to Question No. 40 :

a The tendency of clustering of the data to the value at middle or centre is called central tendency. The central value of the data is a representative number which measures the central tendency. Generally, measurement of central tendency are (1) Arithmetic Average, (2) Median, (3) Mode.

b A frequency distribution table with class interval 10 of the given data is given below :

Class interval	Mid value of class interval (x_i)	Frequency (f_i)	$x_i \times f_i$
140 – 149	144.5	2	289
150 – 159	154.4	2	309
160 – 169	164.5	7	1151.5
170 – 179	174.5	5	872.5
180 – 189	184.5	3	553.5
190 – 199	194.5	1	194.5
Total		20	3370

We know,

$$\text{Arithmetic mean} = \frac{\text{Sum of } f_i x_i}{\text{Total frequency}}$$

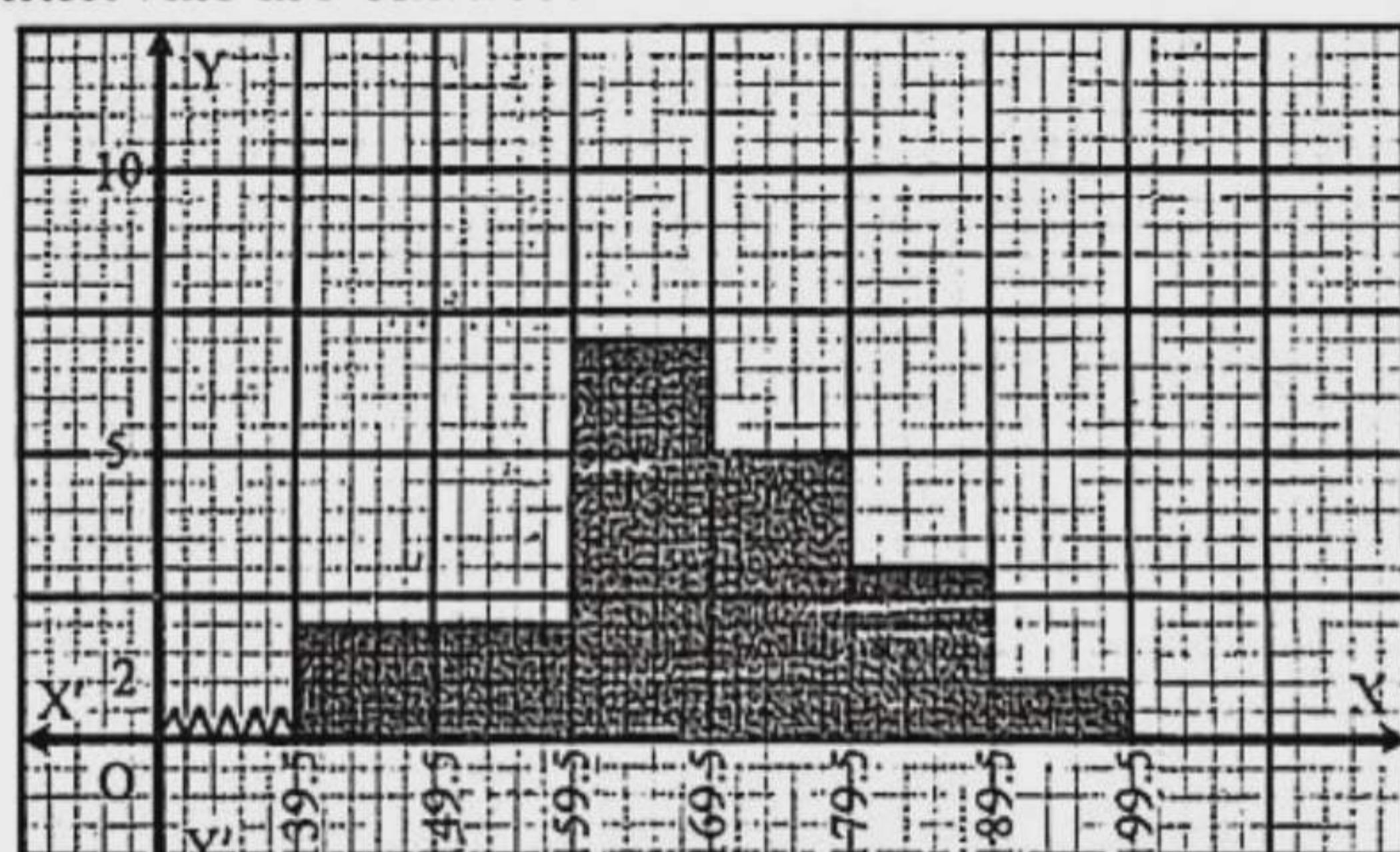
$$= \frac{3370}{20}$$

$$= 168.5 \text{ (Ans.)}$$

c For drawing histogram, the given data is tabulated as below :

Class interval	Continuous class interval	Frequency
140 – 149	139.5 – 149.5	2
150 – 159	149.5 – 159.5	2
160 – 169	159.5 – 169.5	7
170 – 179	169.5 – 179.5	5
180 – 189	179.5 – 189.5	3
190 – 199	189.5 – 199.5	1

Considering one unit of graph paper to represent 2 of the class interval along the x-axis and two units of graph paper to denote 1 of the frequency along the y-axis, the histogram of frequency distribution has been drawn. The broken segments from the origin of x-axis to 139.5 indicate that the previous intervals are omitted.



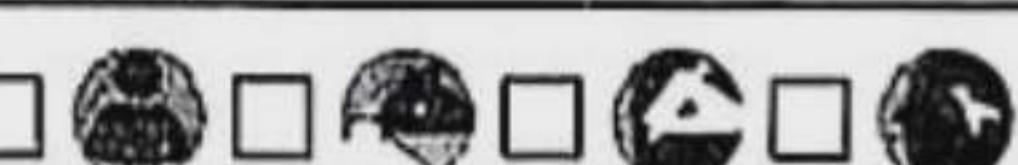
A Histogram



Solutions to Textual Activities



Along with textual reference



Activity 01 From groups of 20 from your class and put the heights of the members in a frequency table. ▶ Textbook Page 173

Solution : The heights inch of 20 members is as follows : 48, 54, 61, 60, 65, 66, 52, 62, 58, 60, 59, 62, 55, 56, 63, 49, 64, 61, 55, 67

Class interval	Tally marks	Frequency
46 – 50		2
51 – 55		4
56 – 60		3
61 – 65		4
66 – 70		2
Total		20



Super Suggestions



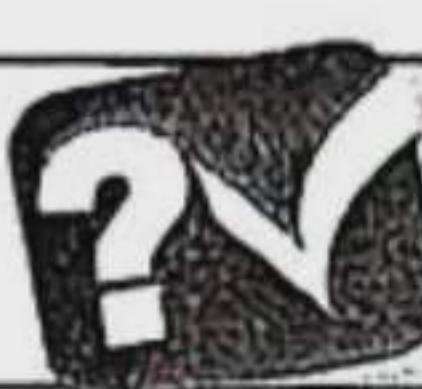
Super Suggestions with 100% preparatory questions selected by the Master Trainer Panel

Dear learners, important multiple choice, short and creative questions of this chapter selected by Master Trainer Panel for Half-Yearly and Annual Exams are presented below. Learn the answers to the mentioned questions well to ensure 100% preparation.

Question Pattern	7x	5x	3x
MCQs with Answers	Learn each MCQs in this chapter thoroughly.		
Short Q/A	4, 9, 13, 20, 25, 32, 39, 43, 50	7, 15, 21, 28, 34, 40, 45, 52	2, 11, 18, 23, 30, 36, 41, 47, 54
Creative Q/A	2, 7, 13, 19, 26, 32, 39	4, 9, 16, 21, 28, 34,	5, 11, 17, 24, 31, 36



Assessment & Evaluation



A question bank presented in the form
of a class test to assess the preparation

Class Test

Time : 3 hours

Mathematics

Full marks : 100

Class : Eight

Multiple Choice Questions (Each question carries 1 mark)

 $1 \times 30 = 30$

[N.B. : Answer all the questions. Each question carries one mark. Block fully, with a ball-point pen, the circle of the letter that stands for the correct/best answer in the "Answer Sheet" for Multiple Choice Question Type Examination.]

1. How many ways are there for collection of data?
Ⓐ 5 Ⓑ 2 Ⓒ 3 Ⓓ 4
2. What is called a numerical information?
Ⓐ Mean Ⓑ Statistics
Ⓒ Statistical data Ⓒ Mode
3. What is the class interval of the class '6 – 10'?
Ⓐ 4 Ⓑ 5 Ⓒ 6 Ⓓ 10
4. What is the range of the data 121, 213, 107, 219, 199, 120?
Ⓐ 99 Ⓑ 100 Ⓒ 112 Ⓓ 113
5. What is the range of the number 21, 24, 18, 10, 6, 23, 30?
Ⓐ 9 Ⓑ 10 Ⓒ 24 Ⓓ 25

■ Answer to the questions No. 6 to 8 from the given table :

Class	42-47	48-53	54-59	60-65	66-71
Frequency	6	10	7	4	1

6. What is the class interval?
Ⓐ 4 Ⓑ 5 Ⓒ 6 Ⓓ 7
7. What is the lower limit of the class of mode?
Ⓐ 42 Ⓑ 48 Ⓒ 54 Ⓓ 60
8. Which one is the median class?
Ⓐ 42 – 47 Ⓑ 48 – 53
Ⓒ 54 – 59 Ⓒ 60 – 65
9. The number of tally marks in a class is called —.
Ⓐ Frequency Ⓑ Class mid-value
Ⓒ Range of class Ⓒ Class interval
10. How many steps are taken for making frequency table?
Ⓐ 3 Ⓑ 4 Ⓒ 5 Ⓓ 6
11. If range is 25, class interval is 4, what is number of class?
Ⓐ 6 Ⓑ 6.25 Ⓒ 7 Ⓓ 7.25

■ Answer to the question No. (12 to 14) in the light of the table below :

Class-interval	51-60	61-70	71-80	81-90	91-100
Frequency	7	12	15	10	6

12. Which is the class-interval of the given data?
Ⓐ 5 Ⓑ 6 Ⓒ 10 Ⓓ 11
13. Which is the mid-value of the last class?
Ⓐ 95 Ⓑ 96 Ⓒ 95.5 Ⓓ 96.5
14. Which is the upper limit of the mode class?
Ⓐ 70 Ⓑ 80 Ⓒ 100 Ⓓ 90

15. How many degree is found in the centre of pie-chart?
Ⓐ 90° Ⓑ 180° Ⓒ 270° Ⓓ 360°
16. How many degree is found in the centre of pie-chart?
Ⓐ 90° Ⓑ 180° Ⓒ 270° Ⓓ 360°
17. What is the another name of pie-chart?
Ⓐ Circular diagram Ⓑ Section area of circle
Ⓒ Histogram Ⓒ Circle distribution
18. Pie-chart is —.
 - i. a graph
 - ii. called circular diagram
 - iii. a statistics which is presented as a part of 360°

Which one is correct?

Ⓐ i & ii Ⓑ i & iii Ⓒ ii & iii Ⓓ i, ii & iii
19. Which is the height of a histogram?
Ⓐ Frequency Ⓑ Cumulative frequency
Ⓒ Class interval Ⓒ Range
20. How many degree is found in the pie-chart?
Ⓐ 90° Ⓑ 180° Ⓒ 270° Ⓓ 360°
21. What is pie-chart?
Ⓐ Graph Ⓑ Table Ⓒ Data Ⓓ Tally
22. Height of histogram is for —.
Ⓐ Frequency Ⓑ Cumulative frequency
Ⓒ Class interval Ⓒ Range
23. How many kinds are there to measure the central tendency?
Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4
24. What is the mean of the numbers 2, 1, 9, 0, 3, 4, 1, 6, 9, 0?
Ⓐ 3.89 Ⓑ 3.77 Ⓒ 3.50 Ⓓ 2.40
25. What is the arithmetic mean of the data 0, 0, 2, 4, 6, 8, 7, 3?
Ⓐ 3.75 Ⓑ 5 Ⓒ 5.75 Ⓓ 6
26. What is the mean of the numbers 8, 12, 16, 17, 20?
Ⓐ 10.5 Ⓑ 12.5 Ⓒ 13.6 Ⓓ 14.6
27. Which one is the median of the data 8, 0, 6, 1, 4, 7?
Ⓐ 1 Ⓑ 4 Ⓒ 5 Ⓓ 6
28. What is the median of the number 18, 25, 10, 14, 12 and 19?
Ⓐ 11.5 Ⓑ 14.5 Ⓒ 16 Ⓓ 18
29. What is the median of the numbers 8, 10, 12, 14, 18, 20?
Ⓐ 12 Ⓑ 13 Ⓒ 14 Ⓓ 412
30. What was the mode of the data?
Ⓐ 92 Ⓑ 95 Ⓒ 97 Ⓓ 99



Short-Answer Question (Each question carries 2 marks)**Answer any 10 of the following questions :**

1. What is data? How many types of data are there and what are they?
2. What is meant by statistics and statistical data?
3. What are primary and secondary data?
4. What are the steps to create a frequency distribution table?
5. What is range? Write the formula for determining the range.
6. Find the range of the numbers 7, 5, 14, 13, 10, 8, 9, 11, 12, 6.
7. What is class number? Write the formula for determining the class number.
8. If the range of a data is 34 and the highest value is 75, find the lowest value of the data.

 $2 \times 10 = 20$

9. What is a histogram?
10. What is the angle in a pie-chart for 200 out of 600 students?
11. If the angle for girls in a pie-chart of 270 students is 80° , then how many girls are there?
12. Out of 240 students, 106 got a GPA of 5. Show the data in a pie-chart.
13. How many measures of central tendency are there and what are they?
14. What is the arithmetic mean of the numbers 2, 1, 9, 0, 3, 5, 7, 9, 11, and 6?
15. What is the median of the prime numbers from 1 to 20?

Creative Question (Each question carries 10 marks)**Answer any 5 of the following questions :**

1. The secured marks in Mathematics of 15 students of class six in S. H. Khan School are : 95, 62, 87, 32, 59, 92, 82, 66, 75, 99, 44, 37, 58, 51, 62.
 - a. Is the data an organized data? Bring the data in an organized form. 2
 - b. Determine arithmetic mean of the data. 4
 - c. Find median and mode of the data. 4
2. The marks obtained in Bangla by 30 students of class viii are : 50, 36, 62, 80, 72, 59, 54, 60, 86, 63, 84, 70, 85, 88, 64, 78, 44, 55, 72, 63, 56, 60, 42, 82, 75, 62, 38, 46, 40, 72.
 - a. Determine the range. 2
 - b. Determine the median. 4
 - c. Make a frequency distribution table taking 5 as class interval. 4
3. The frequency distribution table of the marks obtained in Mathematics by 60 students of class VIII is given :

Marks obtained	41–45	46–50	51–55	56–60	61–65	66–70
Frequency	6	9	15	12	10	8

 - a. Determine the mid value of mode class. 2
 - b. Determine the mean. 4
 - c. Draw the histogram of given data. 4
4. The frequency distribution table of marks in Mathematics obtained by 50 students of a school is given below :

Obtained Marks	41–50	51–60	61–70	71–80	81–90	91–100
No of students	6	8	13	10	8	5

 - a. What obtained marks out of 60 for a student indicate 150° angle in pie-chart? 2
 - b. Find the arithmetic mean from table. 4
 - c. Draw the histogram of the data with description. 4

 $10 \times 5 = 50$

5. Marks obtained in Mathematics by 35 students of class eight are given below : 71, 66, 86, 78, 75, 69, 93, 76, 65, 63, 78, 72, 86, 78, 84, 91, 77, 88, 67, 73, 83, 66, 91, 81, 72, 86, 82, 80, 74, 81, 77, 79, 74, 61, 83.
 - a. What does central tendency mean? 2
 - b. Make a frequency distribution table with 5 as class interval. 4
 - c. Find out the median of the given data. 4
6. The marks obtained by 30 students in annual exam is given below : 55, 64, 79, 61, 42, 70, 85, 75, 68, 53, 88, 71, 47, 62, 64, 74, 95, 48, 50, 64, 93, 68, 77, 64, 79, 60, 52, 89, 58, 66.
 - a. Determine the number of classes with 10 as class interval. 2
 - b. Make a cumulative frequency distribution table. 4
 - c. Find the median and mode of the given data. 4
7. In the World Cup Cricket, run of 25 batsman are given below : 87, 85, 20, 15, 17, 22, 28, 30, 35, 37, 42, 46, 50, 51, 55, 59, 61, 63, 78, 84, 55, 51, 55, 43, 31
 - a. Determine the mode of the data. 2
 - b. Making a frequency distribution table with 15 as class interval, determine the arithmetic mean. 4
 - c. Draw the histogram of the data. 4
8. The numbers are : 42, 27, 45, 22, 41, 23, 46, 48, 50, 48, 48, 29, 52, 55, 65, 70, 32, 38.
 - a. 40, 43, 40, 40; 43, 44, 44, 46, 48, 40, 44, 54, 64, 60, 55, 57, 44; Find the mode of the above data. 2
 - b. Find the median of the given numbers of the stem. 4
 - c. Find the arithmetic mean by class interval 10. 4

Answer Sheet ▶ Multiple Choice Questions

1	(b)	2	(c)	3	(b)	4	(d)	5	(d)	6	(c)	7	(b)	8	(d)	9	(a)	10	(b)	11	(a)	12	(d)	13	(c)	14	(b)	15	(d)
16	(d)	17	(a)	18	(d)	19	(a)	20	(d)	21	(a)	22	(a)	23	(d)	24	(c)	25	(a)	26	(d)	27	(c)	28	(c)	29	(d)	30	(d)

Solving Reference ▶ Short-Answer Questions

- | | | | |
|----------------------------|----------------------------|-----------------------------|-----------------------------|
| 1 ▶ See Page 391; Ques. 01 | 5 ▶ See Page 392; Ques. 08 | 9 ▶ See Page 392; Ques. 18 | 13 ▶ See Page 394; Ques. 31 |
| 2 ▶ See Page 391; Ques. 02 | 6 ▶ See Page 392; Ques. 09 | 10 ▶ See Page 393; Ques. 20 | 14 ▶ See Page 394; Ques. 32 |
| 3 ▶ See Page 391; Ques. 03 | 7 ▶ See Page 392; Ques. 11 | 11 ▶ See Page 393; Ques. 22 | 15 ▶ See Page 395; Ques. 43 |
| 4 ▶ See Page 391; Ques. 06 | 8 ▶ See Page 392; Ques. 13 | 12 ▶ See Page 393; Ques. 26 | |

Solving Reference ▶ Creative Questions

- | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|
| 1 ▶ See Page 397; Ques. 01 | 3 ▶ See Page 398; Ques. 04 | 5 ▶ See Page 401; Ques. 08 | 7 ▶ See Page 405; Ques. 17 |
| 2 ▶ See Page 398; Ques. 03 | 4 ▶ See Page 400; Ques. 07 | 6 ▶ See Page 403; Ques. 12 | 8 ▶ See Page 406; Ques. 18 |