23. Data Handling-I (Classification Representation of Data as Histograms)

Exercise 23.1

1. Question

Define the following terms :

(i) Observations

(ii) Raw data

(iii) Fequency of an observation

(iv) Frequency distribution

(v) Discrete frequency distribution

(vi) Grouped frequency distribution

(vii) Class-interval

(viii) Class-size

(ix) Class limits

(x) True class limits

Answer

(i) Observations:-

Data obtains by the observer from the given problem is called observations.

(ii) Raw data:-

Data collected in its original form is called Raw Data.

(iii) Fequency of an observation:-

Number of times a certain value occurs is termed as frequency.

(iv) Frequency distribution:-

Organisation of Raw data in tabular form is called Frequency Distribution.

(v) Discrete frequency distribution:-

Frequency Distribution in which Raw Data is ungrouped is called Discrete frequency distribution.

(vi) Grouped frequency distribution:-

A frequency Distribution in which Raw data is grouped in specific class.

(vii) Class-interval:-

Class interval is a group under which large number of data is grouped to analyze its Range and Distribution.

(viii) Class-size:-

Class –size is defined as the difference between upper and lower boundaries of any class.

(ix) Class limits:-

Class limits works as separation of one class in a grouped frequency distribution from another.

(x) True class limits:-

The Exact class limits of frequency distribution are called True class limits.

2. Question

The final marks in mathematics of 30 students are as follows:

53, 61, 48, 60, 78, 68, 55, 100, 67, 90, 75, 88, 77, 37, 84,

58, 60, 48, 62, 56, 44, 58, 52, 64, 98, 59, 70, 39, 50, 60

(i) Arrange these marks in the ascending order, 30 to 39 one group, 40 to 49 second group etc.

Now answer the following:

(ii) What is the highest score?

(iii) What is the lowest score?

(iv) What is the range?

(v) If 40 is the pass mark how many have failed?

(vi) How many have scored 75 or more?

(vii) Which observations between 50 and 60 have not actually appeared?

(viii) How many have scored less than 50?

Answer

(i)

Groups	Marks in ascending order
30 – 39	37, 39
40 – 49	44,48,48
50 – 59	50,52,53,55,56,58,58,59
60 – 69	60,60,60,61,62,64,67,68
70 –79	70,75,77,78
80 – 89	84,88
90 – 100	90,98,100

(ii) High score is 100.

(iii) Lowest score is 37.

(iv) Range = 100 – 37 = 63.

(v) Number of students failed = 2. (37 , 39)

(vi) Number of students scored more than 75 are = 8.

(vii) Those observations are = 51 , 54 , 57

(viii) number of people scored less than 50 = 5. (37, 39, 44, 48, 48)

3. Question

The weights of new born babies (in kg) in a hospital on a particular day are as follows:

2.3, 2.2, 2.1, 2.7, 2.6, 3.0, 2.5, 2.9, 2.8, 3.1, 2.5, 2.8, 2.7, 2.9, 2.4

(i) Rearrange the weights in descending order.

(ii) Determine the highest weight.

(iii) Determine the lowest weight.

(iv) Determine the range.

(v) How many babies were born on that day?

(vi) How many babies weigh below 2.5 kg?

(vii) How many babies weigh more than 2.8 kg?

(viii) How many babies weigh 2.8 kg?

Answer

(i) Descending order :- 3.1, 3.0, 2.9, 2.9, 2.8, 2.8, 2.7, 2.7, 2.6, 2.5, 2.4, 2.4, 2.3, 2.2, 2.1

(ii) Highest weight is = 3.1 kg

(iii) Lowest weight is = 2.1 kg

(iv) Range = 3.1 – 2.1 = 1.0 kg

(v) Number of babies born on that day = 15

(vi) Number of babies weigh less than 2.5 kg = 4 (2.4, 2.3, 2.2, 2.1)

(vii) Number of babies weigh more than 2.8 kg = 4. (3.1, 3.0, 2.9, 2.9)

(viii) Number of babies weigh 2.8 kg = 2.

4. Question

Following data gives the number of children in 40 families :

1, 2, 6, 5, 1, 5, 1, 3, 2, 6, 2, 3, 4, 2, 0, 0, 4, 4, 3, 2, 2, 0, 0, 1, 2, 2, 4, 3, 2, 1, 0, 5, 1, 2, 4, 3, 4, 1, 6, 2, 2.

Represent it in the form of a frequency distribution.

Answer

The frequency distribution is given as:

Children	No. Of families
0	5
1	7
2	12
3	5
4	6
5	3
6	3

5. Question

Prepare a frequency table of the following scores obtained by 50 students in a test :

42, 51, 21, 42, 37, 37, 42, 49, 38, 52, 7, 33, 17,

44, 39, 7, 14, 27, 39, 42, 42, 62, 37, 39, 67, 51,

53, 53, 59, 41, 29, 38, 27, 31, 54, 19, 53, 51, 22,

61, 42, 39, 59, 47, 33, 34, 16, 37, 57, 43

Answer

Marks	No. Of student	Marks	No. Of student	Marks	No. Of student
7	2	33	2	49	1
14	1	34	1	51	3
16	1	37	4	52	1
17	1	38	2	53	3
19	1	39	4	54	1

21	1	41	1	57	1
22	1	42	6	59	2
27	2	43	1	61	1
29	1	44	1	62	1
31	1	47	1	67	1

6. Question

A die was thrown 25 times and following scores were obtained :

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

Prepare a frequency table of the scores.

Answer

The frequency table of the scores is shown below:

Score	No.of times
1	5
2	5
3	4
4	3
5	4
6	4

7. Question

In a study of number of accidents per day, the observations for 30 days were obtained as follows :

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

0, 5, 4, 6, 1, 6, 0, 5, 3, 6, 1, 5, 5, 2, 6

Prepare a frequency distribution table.

Answer

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

0, 5, 4, 6, 1, 6, 0, 5, 3, 6, 1, 5, 5, 2, 6As 0 occurs for 2 times,1 for 3,2 for 6,3 for 3,4 for 4,5 for 6,6 for 6 times.Frequency table is:

No.of Accidents	No.of days
0	2
1	3
2	6
3	3
4	4
5	6
6	6

8. Question

Prepare a frequency table of the following ages (in years) of 30 students of class VIII in your school :

13, 14, 13, 12, 14, 13, 14, 15, 13, 14, 13, 14, 16, 12, 14, 13, 14, 15, 16, 13, 14, 13, 12, 17, 13, 12, 13, 13, 13, 14

Answer

Ages (in years)	No.of students
12	4
13	13
14	8
15	2
16	2
17	1

9. Question

Following figures relate to the weekly wages (in Rs.) of 15 workers in a factory :

300, 250, 200, 250, 200, 150, 350, 200, 250, 200, 150, 300, 150, 200, 250

Prepare a frequency table.

(i) What is the range in wages (in Rs)?

(ii) How many workers are getting Rs. 350?

(iii) How many workers are getting the minimum wages?

Answer

Wages (in Rs.)	No. of workers
150	3
200	5
250	4
300	2
350	1

(i) Range of Wages = 350 – 150

(ii) Workers getting Rs.350 = 1.

(iii) Workers getting minimum wages = 3.

10. Question

Construct a frequency distribution table for the following marks obtained by 25 students in a history test in class VIII of a school :

9, 7, 12, 20, 9, 18, 25, 17, 19, 9, 12, 9, 12, 18, 17, 19, 20, 25, 9, 12, 17, 19, 19, 20, 9

(i) What is the range of marks?

(ii) What is the highest mark?

(iii) Which mark is occurring more frequently?

Answer

Marks	No.of students
9	6
12	4
17	4
18	2
19	4
20	3
25	2

(i) Range of marks = 25 – 9 = 16.

(ii) Highest marks is = 25.

(iii) Marks occurring more frequently = 9.

Exercise 23.2

1. Question

Themarks obtained by 40 students of class VIII in an examination are given below :

16, 17, 18, 3, 7, 23, 18, 13, 10, 21, 7, 1, 13, 21, 13, 15, 19, 24, 16, 3, 23, 5, 12, 18, 8, 12, 6, 8, 16, 5, 3, 5, 0, 7, 9, 12, 20, 10, 2, 23.

Divide the data into five groups namely 0-5, 5-10, 10-15, 15-20 and 20-25 and prepare a grouped frequency table.

Answer

Marks	No. of students
0 – 5	9
5 – 10	9
10 – 15	7
15 – 20	8
20 – 25	7

2. Question

The marks scored by 20 students in a test are given below:

54, 42, 68, 56, 62, 71, 78, 51, 72, 53, 44, 58, 47, 64, 41, 57, 89, 53, 84, 57.

Complete the following frequency table:

(Marks in class intervals)	Tally marks	Frequency (No. of children)
40-50		
50-60		
60-70		
70-80		
80-90		

What is the class interval in which the greatest frequency occurs?

Answer

Marks in class interval	Tally Marks	No.of children
40 – 50	IIII	4
50 – 60	JHT III	8
60 – 70	III	3
70 – 80	III	3
80 – 90	II	2

3. Question

The following is the distribution of weights (in kg) of 52 persons :

Weight in kg	Persons
30-40	10
40-50	15
50-60	17
60-70	6
70-80	4

(i) What is the lower limit of class 50-60?

(ii) Find the class marks of the classes 40-50, 50-60.

(iii) What is the class size?

Answer

(i) lower limit = 50.

(ii) Class marks of class 40 − 50 = $\frac{40+50}{2}$ = 45.

Class marks of class 50 − 60 = $\frac{50+60}{2}$ = 55

(iii) Class size = 40 − 30 = 10, or 60 − 50 = 10.

4. Question

Construct a frequency table for the following weights (in gm) of 35 mangoes using the equal class intervals, one of them is 40-45 (45 not included) :

30, 40, 45, 32, 43, 50, 55, 62, 70, 70, 61, 62, 53, 52, 50, 42, 35, 37, 53, 55, 65, 70, 73, 74, 45, 46, 58, 59, 60, 62, 74, 34, 35, 70, 68.

(i) What is the class mark of the class interval 40-45?

(ii) What is the range of the above weights?

(iii) How many classes are there?

Answer

Weight (in gram)	No.of mangoes
30 – 35	4
35 – 40	1
40 – 45	3
45 – 50	3
50 – 55	7
55 – 60	3
60 – 65	6
65 – 70	5
70 – 75	3

(i) Class mark of class interval 40 – 45 = $\frac{40+45}{2} = 42.5$.

(ii) Range of the weights = 74 – 30 = 44.

(iii) Number of classes = 9.

5. Question

Construct a frequency table with class-intervals 0-5 (5 noe included) of the following marks obtained by a group of 30 students in an examination :

0, 5, 7, 10, 12, 15, 20, 22, 25, 27, 8, 11, 17, 3, 6, 9, 17, 19, 21, 29, 31, 35, 37, 40, 42, 45, 49, 4, 50, 16.

Answer

Marks	No.of students
0 – 5	3
5 – 10	5
10 – 15	3
15 – 20	5
20 – 25	3
25 – 30	3
30 – 35	1

35 – 40	2
40 – 45	2
45 – 50	3

6. Question

The marks scored by 40 students of class VIII in mathematics are given below :

81, 55, 68, 79, 85, 43, 29, 68, 54, 73, 47, 35, 72, 64, 95, 44, 50, 77, 64, 35, 79, 52, 45, 54, 70, 83, 62, 64, 72, 92, 84, 76, 63, 43, 54, 38, 73, 68, 52, 54.

Prepare a frequency distribution with class size of 10 marks.

Answer

Marks	Frequency Distribution
20 – 30	1
30 – 40	3
40 – 50	6
50 – 60	7
60 – 70	9
70 – 80	8
80 – 90	34
90 – 100	2

7. Question

The heights (in cm) of 30 students of class VIII are given below :

155, 158, 154, 158, 160, 148, 149, 150, 153, 159, 161, 148, 157, 153, 157, 162, 159, 151, 154, 156, 152, 156, 160, 152, 147, 155, 163, 155, 157, 153.

Prepare a grequency distribution table with 160-164 as one of the class intervals.

Answer

Heights (in cm)	No.of students
145 – 149	4
150 – 154	9
155 – 160	12
160 – 164	6

8. Question

The monthly wages of 30 workers in a factory are given below :

830, 835, 890, 810, 835, 836, 869, 845, 898, 890, 820, 860, 832, 833, 855, 845, 804, 808, 812, 840, 885, 835, 836, 878, 840, 868, 890, 806, 840, 890.

Represent the data in the form of a frequency distribution with class size 10.

Answer

Wages	No.of Workers
800 – 809	3
810 – 819	2

820 – 829	1
830 – 839	8
840 – 849	5
850 – 859	1
860 – 869	3
870 – 879	1
880 – 889	1
890 – 899	5

9. Question

Construct a frequency table with equal class intervals from the following data on the monthly wages (in rupees) of 28 labourers working in a factory, taking one of the class intervals as 210-230 (230 not included) :

220, 268, 258, 242, 210, 268, 272, 242, 311, 290, 300, 320, 319, 304, 302, 318, 306, 292, 254, 278, 210, 240, 280, 316, 306, 215, 256, 236.

Answer

Wages	No.of workers
210 – 230	4
230 – 250	4
250 – 270	5
270 – 290	3
290 – 310	7
310 – 330	5

10. Question

The daily minimum temperatures in degrees Celsius recorded in a certain Arctic region are as follows :

- 12.5, -10.8, -18.6, -8.4, -10.8, -4.2, -4.8, -6.7, -13.2, -11.8, -2.3, 1.2, 2.6, 0, -2.4, 0, 3.2, 2.7, 3.4, 0, -2.4, -2.4, 0, 3.2, 2.7, 3.4, 0, -2.4, -5.8, -8.9, -14.6, -12.3, -11.5, -7.8, -2.9

Represent them as frequency distribution table taking -19.9 to -15 as the first class interval.

Answer

Temperature (in °C)	Frequency Distribution
-19.9 - -15	1
-15 - -11.1	6
-11.1 - -6.2	6
-6.2 - -1.3	9
-1.3 - 3.6	13