RS Aggarwal Solutions for Class 9 Maths Chapter 16 – Presentation of Data in Tabular Form

EXERCISE 16 PAGE: 623

1. Define statistics as a subject.
Solution:

Statistics is the science which deals with the collection, presentation, analysis and interpretation of numerical data.

2. Define some fundamental characteristics of statistics.
Solution:

(i) Numerical facts alone constitute data.
(ii) Qualitative characteristics like intelligence, poverty, etc., which cannot be measured numerically, do not form data.
(iii) Data are aggregate of facts. A single observation does not form data.
(iv) Data collected for a definite purpose may not be suited for another purpose.
(v) Data in different experiments are comparable.

3. What are primary data and secondary data? Which of the two is more reliable and why?
Solution:

Primary data: The data collected by the investigator himself with a definite plan in mind are known as primary data. These data are, therefore, highly reliable and relevant.
Secondary data: The data collected by someone, other than the investigator, are known as secondary data. Secondary data should be carefully used, since they are collected with a purpose different from that of the investigator and may not be fully relevant to the investigation.

4. Explain the meaning of each of the following terms:
(i) Variate
(ii) Class interval
(iii) Class size
(iv) Class mark
(v) Class limit
(vi) True class limits
(vii) Frequency of a class
(viii) Cumulative frequency of a class
Solution:

(i) Any character which is capable of taking several different values is called a variate.

(ii) Each group into which the raw data is condensed, is called a class interval.

(iii) The difference between the true upper limit and the true lower limit of a class is called its class size.

(iv) The average of upper limit and lower limit of class interval is called as a class mark.

(v) Each class is bounded by two figures, which are called class limits.

(vi) In the exclusive form, the upper and lower limits of a class are respectively known as the true upper limit and true lower limit.

(vii) The number of times an observation occurs in a class is called the frequency.

(viii) The cumulative frequency corresponding to a class is the sum of all frequencies up to and including that class.

5. The blood groups of 30 students of a class are recorded as under:
A, B, O, O, AB, O, A, O, A, B, O, B, A, O, O, A, AB, O, A, A, O, O, AB, B, A, O, B, A, B, O.
(i) Represent this data in the form of a frequency distribution table.
(ii) Find out which is the most common and which is the rarest blood group among these students.
Solution:

(i) Frequency distribution table

Blood Group	Number of students
A	9
B	6
O	12
AB	3

(ii) Based on the frequency distribution table it is clear that blood group O is the common and AB is the rarest.

6. Three coins are tossed 30 times. Each time the number of heads occurring was noted down as follows:
0, 1, 2, 2, 1, 2, 3, 1, 3, 0, 1, 3, 1, 1, 2, 2, 0, 1, 2, 1, 0, 3, 0, 2, 1, 1, 1, 3, 2, 0, 2.
Prepare a frequency distribution table.
Solution:

Frequency distribution table

Number of Heads	Frequency
0	6
1	10
2	9
3	5

7. 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, 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, taking classes 0-2, 2-4 etc.
Solution:

We know that the minimum observation is 0 and the maximum observation is 6. So the classes of equal size which covers the given data are 0-2, 2-4, 4-6 and 6-8.

Frequency distribution table

Class	Frequency

0-2	11
2-4	17
4-6	9
6-8	3

8. Thirty children were asked about the number of hours they watched TV programmes in the previous week. The results were found as under:
8, 4, 8, 5, 1, 6, 2, 5, 3, 12, 3, 10, 4, 12, 2, 8, 15, 1, 6, 17, 5, 8, 2, 3, 9, 6, 7, 8, 14, 12.
(i) Make a grouped frequency distribution table for this data, taking class width 5 and one of the class interval as 5-10.
(ii) How many children watched television for 15 or more hours a week?
Solution:

(i) Grouped Frequency Distribution Table

Class interval	Frequency
0-5	10
5-10	13
10-15	5
15-20	2

(ii) From the frequency distribution table we know that 2 children watch TV for 15 or more hours a week.

9. The marks obtained by 40 students of a class in examination are given below:
3, 20, 13, 1, 21, 13, 3, 23, 16, 13, 18, 12, 5, 12, 5, 24, 9, 2, 7, 18, 2, 3, 10, 12, 7, 18, 2, 5, 7, 10, 16, 8, 16, 17, 8, 23, 24, 6, 23, 15.
Present the data in the form of a frequency distribution using equal class size, one such class being 10-15 (15 not included).
Solution:

We know that the minimum observation is 1 and the maximum observation is 24. So the classes of equal size which covers the given data are 0-5, 5-10, 10-15, 15-20 and 20-25

Frequency distribution table

Class	Frequency
0-5	6
5-10	10
10-15	8
15-20	8
20-25	8

10. Construct a frequency table for the following ages (in years) of 30 students using equal class intervals, one of them being 9-12, where 12 is not included.
18, 12, 7, 6, 11, 15, 21, 9, 8, 13, 15, 17, 22, 19, 14, 21, 23, 8, 12, 17, 15, 6, 18, 23, 22, 16, 9, 21, 11, 16.

Solution:

Grouped frequency distribution table

Class	Frequency
6-9	5
9-12	4
12-15	4
15-18	7
18-21	3
21-24	7

11. Construct a frequency table with equal class intervals from the following data on the daily wages (in ₹) 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.
Solution:

We know that the minimum observation is 210 and maximum observation is 320
We get the range as 320 – 210 = 110
So the classes of equal size which covers the given data are
210-230, 230-250, 250-270, 270-290, 290-310 and 310-330

Frequency distribution table

Class	Frequency
210-230	4
230-250	4
250-270	5
270-290	3
290-310	7
310-330	5

12. The weights (in grams) of 40 oranges picked at random from a basket are as follows:
40, 50, 60, 65, 45, 55, 30, 90, 75, 85, 70, 85, 75, 80, 100, 110, 70, 55, 30, 35, 45, 70, 80, 85, 95, 70, 60, 70, 75, 40, 100, 65, 60, 40, 100, 75, 110, 30, 45, 84.
Construct a frequency table as well as a cumulative frequency table.
Solution:

We know that minimum observation is 30 and maximum observation is 110
The range = 100-30= 70
So the classes of equal size which covers the given data are
30-40, 40-50, 50-60, 60-70, 70-80, 80-90, 90-100, 100-110, 110-120

Frequency and cumulative frequency table

Class	Frequency	Cumulative frequency
30-40	4	4
40-50	6	10
50-60	3	13
60-70	5	18
70-80	9	27
80-90	6	33
90-100	2	35
100-110	3	38
110-120	2	40

13. The heights (in cm) of 30 students of a class are given below:
161, 155, 159, 153, 150, 158, 154, 158, 160, 148, 149, 162, 163, 159, 148, 153, 157, 151, 154, 157, 153, 156, 152, 156, 160, 152, 147, 155, 155, 157.
Prepare a frequency table as well as a cumulative frequency table with 160-165 (165 not included) as one of the class intervals.
Solution:

Grouped frequency distribution and cumulative frequency table

Class	Frequency	Cumulative frequency
145-150	4	4
150-155	9	13
155-160	12	25
160-165	5	30

14. Following are the ages (in years) of 360 patients, getting medical treatment in a hospital:

Age (in years)	**Number of patients**
10-20	**90**
20-30	**50**
30-40	**60**
40-50	**80**
50-60	**50**
60-70	**30**

Construct the cumulative frequency table for the above data.
Solution:

Age (in years)	Number of patients	Cumulative frequency
10-20	90	90

20-30	50	140
30-40	60	200
40-50	80	280
50-60	50	330
60-70	30	360

15. Present the following as an ordinary grouped frequency table:

Marks (below)	Number of students
10	**5**
20	**12**
30	**32**
40	**40**
50	**45**
60	**48**

Solution:

Grouped frequency table

Marks (below)	Number of students	Frequency
10	5	5
20	12	7
30	32	20
40	40	8
50	45	5
60	48	3

16. Given below is a cumulative frequency table:

Marks	Number of students
Below 10	**17**
Below 20	**22**
Below 30	**29**
Below 40	**37**
Below 50	**50**
Below 60	**60**

Extract a frequency table from the above.

Solution:

Frequency table

Marks	Number of students	Class intervals	Frequency
Below 10	17	0-10	17
Below 20	22	10-20	5
Below 30	29	20-30	7
Below 40	37	30-40	8
Below 50	50	40-50	13
Below 60	60	50-60	10

17. Make a frequency table from the following:

Marks obtained	**Number of students**
More than 60	**0**
More than 50	**16**
More than 40	**40**
More than 30	**75**
More than 20	**87**
More than 10	**92**
More than 0	**100**

Solution:

Frequency Table

Marks obtained	Number of students	Class interval	Frequency
More than 60	0	More than 60	0
More than 50	16	50-6	16
More than 40	40	40-50	24
More than 30	75	30-40	35
More than	87	20-30	12

20			
More than 10	92	Oct-20	5
More than 0	100	0-10	8

18. The marks obtained by 17 students in a mathematics test (out of 100) are given below:
90, 79, 76, 82, 65, 96, 100, 91, 82, 100, 49, 46, 64, 48, 72, 66, 88.
Find the range of the above data.
Solution:

Arrange the given data in ascending order
46, 48, 49, 64, 65, 66, 68, 72, 76, 79, 82, 82, 90, 91, 96, 100, 100
So from the data we know that
Minimum marks = 46 and Maximum marks = 100
We know that
Range of the given data = Maximum marks – Minimum marks = 100 – 46 = 54

Therefore, the range of the above data is 54.

19. (i) Find the class mark of the class 90-120.
(ii) In a frequency distribution, the mid value of the class is 10 and width of the class is 6. Find the lower limit of the class.
(iii) The width of each of five continuous classes in a frequency distribution is 5 and lower class limit of the lowest class is 10. What is th upper class limit of the highest class?
(iv) The class marks of a frequency distribution are 15, 20, 25, ……. .Find the class corresponding to the class mark 20.
(v) In the class intervals 10-20, 20-30, find the class in which 20 is included.
Solution:

(i) Class of the class 90-120 = (Upper limit + Lower limit) / 2
So we get
Class of the class 90-120 = (90 + 120)/2 = 105

(ii) Consider the lower limit of the class as a
So the upper limit can be written as a + 6
We get
(a + (a + 6))/ 2 = 10
By cross multiplication
2a + 6 = 20
On further calculation
2a = 14
By division
a = 7

(iii) We know that lower limit of the lowest class = 10
It is given that
Width of each class = 5
Total number of classes = 5

So we get
First class = 10-15
Second class = 15-20
Third class = 20-25
Fourth class = 25-30
Fifth class = 30-35

Therefore, the upper class limit of the highest class is 35.

(iv) We know that
Class size = 20 – 15 = 5
Consider a as the lower limit of the required class
Upper limit can be written as a + 5
So we get
(a + (a + 5))/ 2 = 20
On further calculation
2a + 5 = 40
So we get
2a = 35
By division
a = 17.5
Upper limit a + 5 = 17.5 + 5 = 22.5

Therefore, the required class is 17.5-22.5

(v) From the given data we know that 20 is included in the class 20-30.

20. Find the values of a, b, c, d, e, f, g from the following frequency distribution of the heights of 50 students in a class:

Height (in cm)	Frequency	Cumulative Frequency
160-165	15	a
165-170	b	35
170-175	12	c
175-180	d	50
180-185	e	55
185-190	5	f
	g	

Solution:

We know that
a = 15
b = 35 – 15 = 20
c = 35 + 12 = 47
d = 50 – 47 = 3
e = 55 – 50 = 5
f = 55 + 5 = 60

g = 60

Frequency Distribution Table

Height (in cm)	Frequency	Cumulative Frequency
160-165	15	15
165-170	20	35
170-175	12	47
175-180	3	50
180-185	5	55
185-190	5	60
	60	