EXERCISE 22.1   PAGE NO: 22.15

Question 1: What do you understand by the word "statistics" in:

(i) singular form (ii) plural form?

Solution:

The word statistics is used in both its singular and plural senses.

(i) In the singular sense, statistics may be defined as the science of collection, presentation, analysis and interpretation of numerical data.

(ii) In the plural sense, statistics means numerical facts or observations collected with a definite purpose.

Question 2: Describe some fundamental characteristics of statistics.

Solution:

Below are some of the fundamental characteristics:

(1) Statistics are collected with a definite purpose.

(2) Statistics are expressed quantitatively, not qualitatively.

(3) Statistics in an experiment are comparable and can be classified into different groups.

Question 3: What are (i) primary data (ii) secondary data? Which of the two—the primary or the secondary data—is more reliable and why?

Solution:

(i) Primary data: When an investigator collects raw data with a definite plan without using existing sources is called primary data.

(ii) Secondary data: Data which is obtained from other published or unpublished sources is called secondary data.

Secondary data are collected by an individual or an institution for some purpose and are used by someone else in another context.

Primary data are reliable and relevant because it is original in character and is collected by some individuals or by research bodies.

Question 4: Why do we group data?

Solution: The data obtained in its original form is called raw data. It is difficult to get information from the raw data and is rather confusing sometimes. Data is grouped so that it becomes understandable and can be interpreted. Grouped data is helpful in making calculations of certain values which will help in describing and analyzing the data.

Question 5: Explain the meaning of the following terms:

(i) Variate

(ii) Class-interval

(iii) Class-size

(iv) Class-mark

(v) Frequency

(vi) Class limits

(vii) True class limits

Solution:

(i) Variate: Any character that can vary from one individual to another.

(ii) Class-interval: In the data of each group into which raw data is considered.

(iii) Class-size: The difference between the upper limit and lower limit.

(iv) Class-mark: The middle value of the selected class.

It can be calculated as :

Class-mark = (Upper limit + Lower limit) /2

(v) Frequency: The number of observations corresponding to the class.

(vi) Class limits: Each class is bounded by two figures, called the class limits. The figure on the right side is called the upper limit, while the figure on the left side of the class is called the lower limit.

(vii) True class limits:

If classes are inclusive, for example, 5-9, 10-14, 15-19 and so on

Then, the true lower limit of class = Lower limit of class – 0.5

And, the true upper limit of class = Upper limit of class + 0.5

In this case, the true limit of the class 5-9 are 4.5 and 9.5

But if classes are exclusive, like 20-30, 30-40, 40-50 and so on, then class limits and true class limits are the same.

Question 6: The ages of ten students of a group are given below. The ages have been recorded in years and months:

8 – 6, 9 – 0, 8 – 4, 9 – 3, 7 – 8, 8 – 11, 8 – 7, 9 – 2, 7 – 10, 8 – 8

(i) What is the lowest age?

(ii) What is the highest age?

(iii) Determine the range?

Solution:

The ages of ten students of a group are:

8 – 6, 9 – 0, 8 – 4, 9 – 3, 7 – 8, 8 – 11, 8 – 7, 9 – 2, 7 – 10, 8 – 8.

(i) Lowest age = *7 years 8 months*

(ii) Highest age = *9 years 3 months*

(iii) Range = Highest age – Lowest age

= (9 years 3 months) – (7 years 8 months)

= *1 year 7 months*

Question 7: The monthly pocket money of six friends is given below:

Rs 45, Rs 30, Rs 40, Rs 50, Rs 25, Rs 45.

(i) What is the highest pocket money?

(ii) What is the lowest pocket money?

(iii) What is the range?

(iv) Arrange the amounts of pocket money in ascending order.

Solution:

The monthly pocket money of six friends is given below:

Rs 45, Rs 30, Rs 40, Rs 50, Rs 25, Rs 45

(i) Highest pocket money = *Rs 50*

(ii) Lowest pocket money = *Rs 25*

(iii) Range = Highest pocket money – Lowest pocket money

= Rs 50 – Rs 25

= *Rs 25*

(iv) Ascending order is: *Rs 25, Rs 30, Rs 40, Rs 45, Rs 45, Rs 50.*

Question 8: Write the class -size in each of the following:

(i) 0-4, 5-9, 10-14

(ii) 10-19, 20-29, 30-39

(iii) 100-120, 120-140, 160-180

(iv) 0-0.25, 0.25-00.50, 0.50-0.75

(v) 5-5.01, 5.01-5.02, 5.02-5.03.

Solution:

(i) 0-4, 5-9, 10-14

Since classes are inclusive, so

The true lower limit of class = Lower limit of class – 0.5

and, True upper limit of class = Upper limit of class + 0.5

True class limits are 0.5-4.5, 4.5-9.5, 9.5-14.5

Therefore class size = 14.5 – 9.5 = *5*

(ii) 10-19, 20-29, 30-39

Since classes are inclusive, so

The true lower limit of class = Lower limit of class – 0.5

and, True upper limit of class = Upper limit of class + 0.5

True class limits 19.5-19.5, 19.5-29.5, 29.5-29.5

Class size = 39.5-29.5 = *10*

(iii) 100-120, 120-140, 160-180

Here the class limits and true class limits are the same

So, class size = 120 – 100 = *20*

(iv) 0-0.25, 0.25-00.50, 0.50-0.75

Here the class limits and true class limits are the same

So, class size = 0.25 – 0 = *0.25*

(v) 5-5.01, 5.01-5.02, 5.02-5.03

Here, class limits and true class limits are the same

So, class size = 5.01 – 5.0 = *0.01*.

Question 9: 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 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?

Solution:

(i) Arrange marks in ascending order:

Class Marks	Observations	Frequency
30-39	37, 39	2
40-49	44,48,48	3

50-59	50, 52, 53, 55, 56, 58, 58, 59	8
60-69	60, 60, 60, 61, 62, 64, 67, 68	8
70-79	70, 75, 77, 78	4
80-89	84,88	2
90-99	90, 98	2
100-109	100	1

(ii) Highest score = *100*

(iii) Lowest score = *37*

(iv) Range = Highest score – Lowest score = 100 – 37 = *63*

(v) *2*

(vi) *8*

(vii) *51, 54, 57*

(viii) *5*

Question 10: The weights of newborn 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 highest weight.

(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?

Solution:

(i) Arrange weights in descending order:

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

(ii) Highest weight = *3.1 Kg*

(iii) Lowest weight = *2.1 Kg*

(iv) Range = 3.1 kg – 2.1 kg = *1.0 Kg*

(v) *15 babies* were born on that particular day.

(vi) *4 babies* weigh below 2.5 Kg.

(vii) Babies more than 2.8 Kg weight are *4*.

(viii) Babies weighing 2.8 Kg are *2*.

Question 11: The number of runs scored by a cricket player in 25 innings is as follows:

26, 35, 94, 48, 82, 105, 53, 0, 39, 42, 71, 0, 64, 15, 34, 15, 34, 6, 71, 0, 64, 15, 34, 15, 34, 67, 0, 42, 124, 84, 54, 48, 139, 64, 47

(i) Rearrange these runs in ascending order.

(ii) Determine the player's highest score.

(iii) How many times did the player not score a run?

(iv) How many centuries did he score?

(v) How many times did he score more than 50 runs?

Solution:

(i) Runs in ascending order:

0, 0, 0, 0, 6, 15, 15, 15, 15, 26, 34, 34, 34, 34, 35, 39, 42, 42, 47, 48, 48, 53, 54, 64, 64, 64, 67, 71, 71, 82, 84, 90, 94, 124, 139.

(ii) *Highest Score = 139*

(iii) *3 times,* he did not score any run.

(iv) He scored *3 centuries.*

(v) He scored more than 50 runs *12 times.*

EXERCISE 22.2   **PAGE NO: 22.24**

Question 1: Define cumulative frequency distribution.

Solution:

A table which displays the manner in which cumulative frequencies are distributed over various classes.

Question 2: Explain the difference between a frequency distribution and a cumulative frequency distribution.

Solution:

Frequency distribution is a method to represent raw data in the form from which one can easily understand the information contained in raw data, where a table which plays the manner in which cumulative frequencies are distributed over various classes is called a cumulative frequency distribution.

Question 3: The marks scored by 55 students in a test are given below:

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35
No. of students	2	6	13	17	11	4	2

Prepare a cumulative frequency table.

Solution:

Cumulative frequency table from the given data:

Marks	No. of students	Marks	Cumulative Frequency
0-5	2	Less than 5	2
5-10	6	Less than 10	8
10-15	13	Less than 15	21
15-20	17	Less than 20	38
20-25	11	Less than 25	49
25-30	4	Less than 30	53
30-35	2	Less than 35	55
	N=55		