CBSE Test Paper 04

CH-14 Statistics

1. The following observations have been arranged in an ascending order:18, 20, 25, 26, 30, x, 37, 38, 39, 48. If the median of the data is 35, then the value of x is

   a. 45

   b. 35

   c. 50

   d. 40

2. A set of data consists of six numbers: 7, 8, 8, 9, 9 and x. The difference between the modes when x = 9 and x = 8 is

   a. 4

   b. 2

   c. 3

   d. 1

3. The mode of 4, 6, 7, 8, 12, 11, 13, 9, 13, 9, 7, 8, 9 is

   a. 6

   b. 9

   c. 7

   d. 13

4. 'More than' cumulative frequency table for a given data is as follows: Then, the frequency of the class interval 70-80 is

	More than	**More than**	**More than**	

Marks	**89**	**79**	**69**	**More than 59**
Cumulative frequency	**8**	**18**	**30**	**65**

a. 12

b. 10

c. 22

d. 35

5. In a bar graph, 0.25 cm length of a bar represents 100 people. Then, the length of bar which represents 2000 people is

   a. 4.5 cm

   b. 4 cm

   c. 5 cm

   d. 3.5 cm

6. Fill in the blanks:

   If each observation of the data is decreased by 5, then the mean is _____ by 5.

7. Fill in the blanks:

   The mid-value of a class interval is 42 and the class size is 10. Then the lower and upper limits are _____ and _____ respectively.

8. The mean weight of 8 numbers is 15. If each number is multiplied by 2, what will be the new mean?

9. If the heights of 5 persons are 144 cm, 152 cm, 151 cm, 158 cm, and 155 cm respectively. Find the mean height.

10. The demand of different shirt sizes, as obtained by a survey, is given below :

Size	38	39	40	41	42	43	44	Total
Number of persons (wearing it)	26	39	20	15	13	7	5	125

Find the modal shirt size, as observed from the survey.

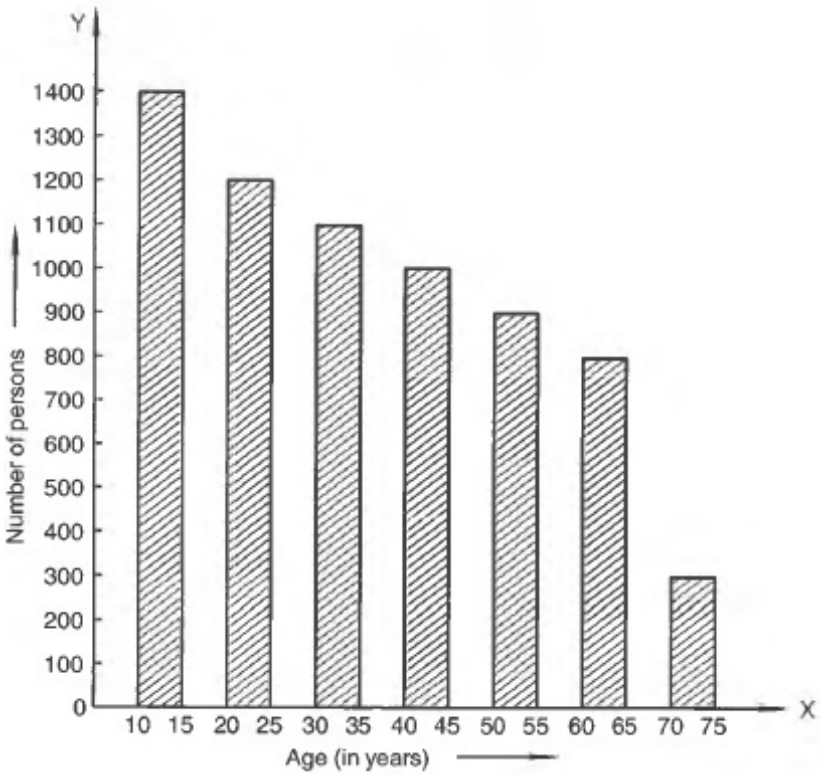
11. Find the median of the following data:19, 25, 59, 48, 35, 31, 30, 32, 51. If 25 is replaced by 52, what will be the new median?

12. If the ratio of mean and median of a certain data is 2:3, then find the ratio of its mode and mean.

13. The weights in grams of 50 oranges picked at random from a consignment are as follows:
    131, 113, 82, 75, 204, 81, 84, 118, 104, 110, 80, 107, 111, 141, 136, 123, 90, 78, 90, 115, 110, 98, 106, 99, 107, 84, 76, 186, 82,100, 109,128, 115, 107,115,119, 93,187, 139,129, 130, 68, 195, 123,125, 111, 92, 86, 70, 126
    Form the grouped frequency table by dividing the variable range into intervals of equal width, each corresponding to 20 gms in such a way that the mid-value of the first class corresponds to 70 gms.

14. The sums of the deviations of a set of n values x_1, x_2, ..., x_n measured from 15 and - 3 are - 90 and 54 respectively. Find the value of n and mean.

15. Observe the bar graph and answer the following questions:



i. What is the percentage of the youngest age-group persons over those in the oldest age group?
ii. What is the total population of the town?
iii. What is the number of persons in the age-group 60-65?
iv. How many persons are more in the age-group 10-15 than in the age group 30-35?
v. What is the age-group of exactly 1200 persons living in the town?
vi. What is the total number of persons living in the town in the age-group 50-55?
vii. What is the total number of persons living in the town in the age-groups 10-15 and 60-65?
viii. Whether the population in general increases decreases or remains constant with the increase in the age-group.

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Solution

1. (d) 40

   Explanation: The median is the middle score for a set of data that has been arranged in ascending or descending order of magnitude.

   for even number of observations, median is calculated as average of two middle number.

   for the given example 30 and x are in the middle and median is 35

   So,

   $35 = \frac{30+x}{2}$

   $70 = 30 + x$

   x = 40

2. (d) 1

   Explanation: The mode in a list of numbers refers to the integers that occurs most number of times.

   In the given list both 8 and 9 occur two times.

   so the value of will decide the mode

   if x=8, then mode will be 8

   if x=9, then mode will be 9

   hence, differnce between two modes is 1

3. (b) 9

   Explanation: In statistics, the mode in a list of numbers refers to the integers that occurs most number of times.

   for the set of numbers, 9 occurs three times i.e more than any other number in the

list.

4. (a) 12
   Explanation: A cumulative frequency distribution is the sum of the class and all classes below it in a frequency distribution.

   Subtract cumulative frequency of class more than 70 from the next cumulative Frequency of class more than 69.

   30 - 18 = 12

5. (c) 5 cm
   Explanation: Use unitary method

   0.25 cm - 100 people

   so 1 cm - 400 people

   so for 2000 people:

   $\frac{2000}{400} = 5\ cm$

6. decreased

7. 37, 47

8. We have,
   The mean weight of 8 numbers is 15.
   then, the sum of 8 numbers = 8 $\times$ 15 = 120
   If each number is multiplied by 2
   Then, new sum = 120 $\times$ 2 = 240
   $\therefore$ New mean = $\frac{240}{8}$ = 30

9. Mean height = $\frac{144+152+151+158+155}{5}$ = $\frac{760}{5}$ cm = 152 cm.

10. Since the frequency of the size 39 is maximum (39)
    $\therefore$ Mode = 39

11. Arranging the given data in ascending order, we have

19, 25, 30, 31,32, 35, 48, 51, 59

Here, the number of observations n = 9 (odd)

Since the number of observations is odd. Therefore,

Median = Value of $(\frac{9+1}{2})^{th}$ observation

$\Rightarrow$ Median = Value of 5^{th} observation = 32

Hence, Median = 32

If 25 is replaced by 52, then the new observations arranged in ascending order are:

19, 30, 31, 32, 35,48,51, 52, 59

$\therefore$ New median = Value of 5^{th} observation = 35

12. Let the mean of the data be 2x.

    and let the median of the data be 3x.

    Since Mode = 3 Median - 2 Mean

    Mode = 3 $\times$ 3x - 2 $\times$ 2x

    Mode = 9x - 4x

    Mode = 5x

    Ratio of Mode and Mean = 5x:2x = 5:2

13. We have,

    Size of each class = 20, Mid-value of first-class = 70

    We know that if a is the mid-value of a class and h is the class size, then the lower and upper limits of the class are (a - $\frac{h}{2}$) and (a + $\frac{h}{2}$) respectively.

    Here, a = 70 and h = 20.

    So, the lower limit of the first class interval = 70 - 10 = 60.

    And, the upper limit of the first class interval = 70 + 10 = 80.

    $\therefore$ The first class interval is 60 - 80.

    In view of the above, we obtain the following frequency distribution.

Weights (in gms)	Frequency
60-80	5

80-100	13
100-120	17
120-140	10
140-160	1
160-180	0
180-200	3
200-220	1
Total	50

14. Given,

$\sum_{i=1}^{n}(x_i - 15)$ = -90

$\Rightarrow (x_1 - 15) + (x_2 - 15) + ...+ (x_n - 15) = -90$

$\Rightarrow (x_1 + x_2 + ...+ x_n) - (15 + 15 + ... + 15) = -90$

$\Rightarrow \sum x$ - 15n = -90.....(i)

And $\sum_{i=1}^{n}(x_i + 3)$ = 54

$\Rightarrow (x_1 + 3) + (x_2 + 3) + ...+(x_n + 3) = 54$

$\Rightarrow (x_1 + x_2 + ... + x_n) + (3 + 3 + ...+ 3) = 54$

$\Rightarrow \sum x$ + 3n = 54 .....(ii)

Subtract equation (i) from equation (ii),

$\sum x$ + 3n - $\sum x$ + 15n = 54 + 90

$\Rightarrow$ 18n = 144

$\Rightarrow$ n = $\frac{144}{18}$ = 8

Put value of n in equation (i),

$\sum x$ - 15 $\times$ 8 = -90

$\Rightarrow \sum x$ - 120 = -90

$\Rightarrow \sum x$ = -90 + 120 = 30

$\therefore$ Mean = $\frac{\sum x}{n}$ = $\frac{30}{8}$ = $\frac{15}{4}$

15. i. The percentage of the youngest age-group persons over those in the oldest, age

group

$= \frac{1400}{300} \times 100$

$= 466\frac{2}{3}$

ii. Total population of the town =1400 + 1200 + 1100 + 1000 + 900 + 800 + 300 = 6700

iii. The number of persons in the age-group of 60-65 is 800.

iv. The number of persons is more in the age-group 10-15 than in the age-group 30-35

= 1400 - 1100

= 300

v. The age-group in which exactly 1200 persons living in the town is 20-25.

vi. The total number of persons living in the town in the age-group 50-55 is 900.

vii. The total number of persons living in the town in the age-groups 10-15 and 60-65 = 1400 + 800

= 2200

viii. The population decreases with the increase in the age-group