CBSE TEST PAPER-04

CLASS - IX Mathematics (Statistics)

General Instruction: All questions are compulsory. Question No. 1 to 4 carry one mark each. No. 5 to 8 carry two marks each. Question No. 9 to 12 carry 3 marks each. Question number 13 carry 5 marks.

1. Find the arithmetic mean of first 6 natural numbers?
(a) 3.5 (b) 4.5 (c) 2.5 (d) none of these

2. What is the mid-point of interval 3-6?
(a) 3.5 (b) 4.5 (c) 5.5 (d) none of these

3. Find out the range of the following: 5, 10, 15, 20, 25, 30
(a) 25 (b) 20 (c) 30 (d) none of these

4. Find out the mode of the following: 5, 4, 3, 5, 6, 6, 6, 5, 4, 5, 5, 3, 2, 1
(a) 6 (b) 4 (c) 5 (d) none of these

5. The class marks of a distribution are 26, 31, 41, 36, 46, 51, 56, 61, 66, 71.Find the true class limits.

6. The marks obtained by 15 students in an examination are given below;
125, 130, 130, 120, 141, 146, 162, 163, 169, 173, 179, 188, 192, 195, 199.
Form a cumulative frequency table with class interval of length 20.

7. For the following data, draw a histogram and a frequency polygon:

Mark	0-10	10-20	20-30	30-40	40-50
No. of student	5	10	4	6	7

8. If $\bar{X}$ is the mean of n observation $x_1, x_2 \ldots\ldots x_n$, then prove that the mean of $x_1 - a, x_2 - a \ldots\ldots x_n - a$, is $\bar{X} - a$, *where* a is any real number.

9. The mean of 16 numbers is 8. If 2 is added to every number, what will be new mean?

10. There are 50 students in a class out of which 40 are boys and rest girls. The average weight of the class is 44 kg and the average weight of the girls is 40 kg. Find the average weight of the boys.

11. The means of 100 items was found to be 300. If at the time of calculation two items were wrongly taken as 32 and 12 instead of 23 and 11, find the correct mean.

12. The mean of 10 numbers is 20. If 5 is subtracted from every number, what will be the new mean?

13. The average score of girls in class examination in a school is 67 and that of boys is 63. The average score for the whole class is 64.5 find the percentage of girls and boys in the class.

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[ANSWERS]

Ans01. (a)

Ans02. (b)

Ans03. (a)

Ans04. (c)

Ans05. Hence the class marks are uniformly spaced. So, the class size is the difference between any two consecutive class marks.

∴ Class size = 31-26 = 5

If a is the class mark of a class interval of size h, then the lower and upper limits of the class intervals are $a-\frac{h}{2}$ and $a+\frac{h}{2}$ respectively.

Here h = 5

∴ Lower limit of first class interval = $26-\frac{5}{2}=23.5$

and upper limit of first class interval = $26+\frac{5}{2}=28.5$

∴ First class interval is 23.5-28.5

Thus, true class limits:-

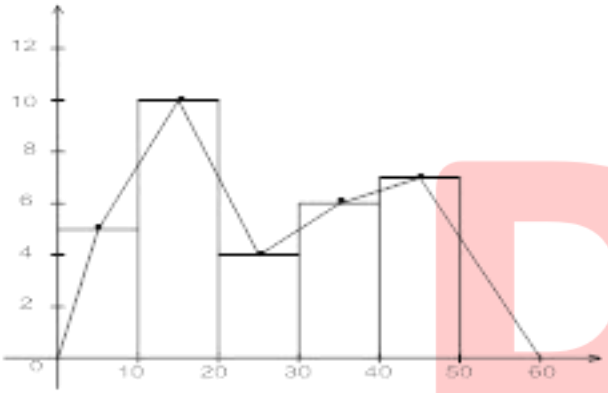
23.5-28.5, 28.5-33.5, 33.5-38.5, 38.5-43.5, 43.5-48.5, 48.5-53.5.

Ans06.

Cumulative Frequency Distribution of Marks

Class interval	Tally Mark	Frequency	Cumulative frequency
120-140	||||	4	4
140-160	||	2	6
160-180	𝍸	5	11
180-200	||||	4	15
Total		15	15

Ans07.



Ans08. We have $\bar{X} = \frac{1}{n}\left[\sum_{i=1}^{n} X_i\right]$ (i)

Let $\bar{X}$ be the mean of $x_1 - a$, $x_2 - a$.....$x_3 - a$. Then,

$$\bar{X} = \frac{(x_1 - a) + (x_2 - a) + ... + (x_n - a)}{n}$$

$$= \frac{(x_1 + x_2 + ...x_n) - na}{n}$$

$$= 1/n[\sum_{i=1}^{n} Xi] - na/n$$

$$= \bar{X} - a$$

Ans09. Let x_1, x_2, x_3... x_{16} be 16 numbers with their mean equal to 8. Then,

$$\bar{X} = \frac{1}{n}\left(\sum x_i\right)$$

$$\Rightarrow 8 = \frac{x_1 + x_2 + \ldots\ldots + x_{16}}{16}$$

$$\Rightarrow 16 \times 8 = x_1 + x_2 + \ldots\ldots x_{16} = 128 \quad (i)$$

New numbers are $x_1 + 2,\ x_2 + 2,\ x_3 + 2, \ldots\ldots x_{16} + 2$

Let $\bar{X}$ be the mean of new numbers. Then,

$$\bar{X} = \frac{(x_1 + 2) + (x_2 + 2) + \ldots\ldots + (x_{16} + 2)}{16}$$

$$= \frac{(x_1 + x_2 + \ldots\ldots + x_{16}) + 2 \times 16}{16} \quad \text{[using(i)]}$$

$$= \frac{128 + 32}{16}$$

$$= \frac{160}{16} = 10$$

Ans10. We have: n = No. of students in a class = 50

n_1= No. of boys in a class = 40

n_2= No. of girls in a class = 10

$\bar{X}_1$ = Average weight of boys =?

$\bar{X}_2$ = Average weight of girls = 40 kg

$$\bar{X} = \frac{n_1 \bar{X}_1 + n_2 + \bar{X}_2}{n_1 + n_2}$$

$$\Rightarrow 44 = \frac{40x_1 + 10 \times 40}{40 + 10}$$

$$\Rightarrow 50 \times 44 = 40\bar{X}_1 + 400$$

$$\Rightarrow 2200 = 40\bar{X}_1 + 400$$

$$\therefore \Rightarrow \bar{X}_1 = 45$$

Hence the average weight of boys is 45 kg.

Ans11. Here, n = 100, $\bar{X}$ = 30

So, $\bar{X} = \frac{1}{n}\left(\sum x_i\right) \Rightarrow \sum x_i = n\bar{X}$

$$\Rightarrow \sum x_i = 100 \times 30$$

=3000

$\therefore$ Incorrect value of $\sum x_i = 3000$

New correct value of $\sum x_i$ =Incorrect value of $\sum^{x_i - (\text{sum of incorrect value})}_{+(\text{sum of correct value})}$. = 3000 - (32+12) + (23+11)=299

$\therefore$ Correct mean= $\frac{\text{Correct value of } \sum x_i}{n} = \frac{2990}{100}$

=29.9

Ans12. Let $x_1, x_2, \ldots x_{10}$ be 10 numbers with their mean equal to 20.

Then,

$$\bar{X} = \frac{1}{n}\left(\sum x_i\right)$$

$$20 = \frac{x_1 + x_2 + \ldots + x_{10}}{10}$$

$$\Rightarrow \quad 200 = x_1 + x_2 + \ldots + x_{10} \quad \text{(i)}$$

New numbers are $x_1 - 5, x_2 - 5, \ldots x_{10} - 5$.

Let $\bar{X}$ be the mean of new number. Then,

$$\bar{X} = \frac{(x_1 - 5) + (x_2 - 5) + \ldots + (x_{10} - 5)}{10}$$

$$\bar{X} = \frac{(x_1 + x_2 + \ldots + x_{10}) - 5 \times 10}{10} \rightarrow \text{(i)}$$

$$= \frac{200 - 50}{10} = 15$$

Ans13. Let the number of girls and boys be n_1 and n_2 respectively.

We have:

$\bar{X}_1$ = Average score of girls=67

$\bar{X}_2$ = Average score of boys=63

$\bar{X}$ =Average score of whole class=64.5

$$\bar{X} = \frac{n_1\bar{X}_1 + n_2\bar{X}_2}{n_1 + n_2}$$

$$\Rightarrow 64.5 = \frac{67n_1 + 63n_2}{n_1 + n_2}$$

$$\Rightarrow 64.5n_1 + 64.5n_2 = 67n_1 + 63n_2$$

$$\Rightarrow 2.5n_1 = 1.5n_2$$

$$\Rightarrow 25n_1 = 15n_2$$

$$\Rightarrow 5n_1 = 3n_2$$

Total number of students in the class= $n_1 + n_2$

$\therefore$ Percentage of girls= $\frac{n_1}{n_1 + n_2} \times 100$

$$= \frac{n_1}{n_1 + \frac{5n_1}{3}} \times 100 \quad [\because 5n_1 = 3n_2]$$

$$= \frac{3n_1}{3n_1 + 5n_1} \times 100$$

$$= \frac{3}{8} \times 100 = 37.5$$

And percentage of boys,

$$= \frac{n_2}{n_1 + n_2} \times 100$$

$$= \frac{n_2}{\frac{3n_2}{5} + n_2} \times 100$$

$$= \frac{5n_2}{3n_2 + 5n_2} \times 100 = 62.5$$