NCERT solutions for class-9 maths Statistics Ex 14.4

Q1. The following number of goals were scored by a team in a series of 10 matches:

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

Find the mean, median and mode of these scores.

Ans: We know that, Mean = $\bar{x} = \frac{\sum x_i}{n}$

$$\Rightarrow \bar{x} = \frac{2+3+4+5+0+1+3+3+4+3}{10} = \frac{28}{10} = 2.8$$

For median,

Arrange the given data in the ascending order, we get

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

Here $n = 10$ which is even in number.

$$\therefore \text{ Median} = \frac{1}{2}\left[\left(\frac{n}{2}th \text{ term} + \left(\frac{n}{2}+1\right)th \text{ term}\right)\right]$$

$$\Rightarrow \text{Median} = \frac{3+3}{2} = \frac{6}{2} = 3$$

For mode

Goals	0	1	2	3	4	5
Frequency	1	1	1	4	2	1

Here, Goal – 3 has the maximum frequency is 4.
Therefore, mode = 3

Q2. In a mathematics test given to 15 students, the following marks (out of 100) are recorded:

41, 39, 48, 52, 46, 62, 54, 40, 96, 52, 98, 40, 42, 52, 60

Find the mean, median and mode of this data.

Ans: We know that, Mean = $\bar{x} = \frac{\sum x_i}{n}$

$$\Rightarrow \bar{x} = \frac{41+39+48+52+46+62+54+40+96+52+98+40+42+52+60}{15}$$

$$= \frac{822}{15} = 54.8$$

For median,

Arrange the given data in the ascending order, we get

39, 40, 40, 41, 42, 46, 48, 52, 52, 52, 54, 60, 62, 96, 98

Here $n = 15$ which is odd in number.

$\therefore$ Median = $\frac{n+1}{2}th$ term = $\frac{15+1}{2}th$ term = 8^{th} observation

$\Rightarrow$ Median = 52

$\Rightarrow$ Median = $\frac{3+3}{2} = \frac{6}{2} = 3$

For mode

Marks	39	40	41	42	46	48	52	54	60	62	96	98
Frequency	1	2	1	1	1	1	3	1	1	1	1	1

Here, Marks – 52 has the maximum frequency is 3. Therefore, mode = 52

Q3. The following observations have been arranged in the ascending order. If the median of the data is 63, find the value of x:

29, 32, 48, 52, x, $x+2$, 72, 78, 84, 95

Ans: Here number of observations = 10, which is an even number

$\therefore$ Median = $\frac{1}{2}\left[\left(\frac{n}{2}th \text{ term} + \left(\frac{n}{2}+1\right)th \text{ term}\right)\right]$

= $\frac{1}{2}$ (5^{th} term + 6^{th} term)

$\Rightarrow 63 = \frac{x+x+2}{2}$

$\Rightarrow 63 = \frac{2x+2}{2}$

$\Rightarrow 63 = \frac{2(x+1)}{2}$

$\Rightarrow x+1 = 63$

$\Rightarrow x = 62$

Q4. Find the mode of the following data in each case:

(i) 14, 25, 14, 28, 18, 17, 18, 14, 23, 22, 14, 18

(ii) 7, 9, 12, 13, 7, 12, 15, 7, 12, 7, 25, 18, 7

Ans: (i) Making a frequency table, we have

x_i	14	17	18	22	23	25	28
f_i	4	1	3	1	1	1	1

Here the observation 14 has the maximum frequency 4.

Therefore, mode = 14

(ii) Making a frequency table, we have

x_i	7	9	12	13	15	18	25
f_i	5	1	3	1	1	1	1

Here the observation 7 has the maximum frequency 5.

Therefore, mode = 7

Q5. Find the mean salary of 60 workers of a factory from the following table:

Salary (in Rs.)	**Number of employees**
3000	**16**
4000	**12**
5000	**10**
6000	**8**
7000	**6**
8000	**4**
9000	**3**
10000	**1**
Total	**60**

Ans:

Salaries in Rs. (x_i)	**No. of employees** (f_i)	$f_i x_i$
3000	16	48000
4000	12	48000
5000	10	50000
6000	8	48000
7000	6	42000
8000	4	32000
9000	3	27000

9000 10000	3 1	27000 10000
Total	$\sum f_i = N = 60$	$\sum f_i x_i = 305000$

$\therefore$ Mean $(\bar{x}) = \dfrac{\sum f_i x_i}{N} = \dfrac{305000}{60} = 5083.33$

Hence the mean of salary is Rs. 5083.33

Q6. Give an example of a situation in which:

(i) the mean is an appropriate measure of central tendency.

(ii) the mean is not an appropriate measure of central tendency but the median is an appropriate measure of central tendency.

Ans: (i) Mean is the suitable measure of central tendency because every term is taken in

calculation, it is effected by every item. It can further be subjected to algebraic treatment unlike other measures i.e. median and mode. As mean is rigidly defined, it is mostly used for comparing the various issues.

For example, the marks obtained by the seven students are 10, 15, 14, 18, 26, 24, 20, 14 and 27.

$\therefore$ Mean $= \dfrac{10+15+14+18+26+24+20+20+14+27}{9}$

$= \dfrac{168}{9} = 18.67$

But median of 10, 15, 14, 18, 26, 24, 20, 14 and 27 is 18 and mode is 14.

From above example we conclude that mean is rigidly defined and the marks 18.67 represent the performance of 9 students, but median and mode are not so rigidly defined.

(ii) (a) Mean is much affected by the extreme value but median is not much affected by these

extremes.

For example, if there are 5 terms: 4, 7, 12, 18, 19

Mean $(\bar{x})$ is 12 in this case and median is 12.

If we add two values 450 and 1000 the new mean = $\frac{4+7+12+18+19+450+1000}{7}$

$= \frac{1510}{7} = 215.7$

This is a big change as compared to the size of first five terms' mean but new median of 4, 7, 12, 18, 19, 450, 1000 is 18 which is not so much changed as compared to the size of first five terms' median.

So we conclude that the mean misrepresents the result if extreme values are present in the data.

(b) Sometimes mean gives impossible conclusion e.g. if there are 60, 50 and 42 students in three classes then mean number of students is $\frac{60+50+42}{3} = 50.67$, which is impossible as students cannot be in fractions. But median of 42, 50 and 60 is 50.

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