



MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

MEASURES OF DISPERSION

Illustrative Examples

1. Find the mena deviation about the (a) median (b) mean in respect of the following

numbers :

46,79,26,85,39,65,99,29,56,72



2. Calculate the mean deviation from the (i) mean and (ii) median for the following data, relationg to heights of 100 children :



3. Calculate the mean deviation (i) from the mean and (ii) from the median for the following data :



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4. Find the mena deviation about median for

the following frequency distribution





5. Find the standard deviation of the following

data :

49,63,46,58,52,60,54

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6. Find the mean of coefficient of variation

=5~% and variance = 4.



the S.D. of y?

9. If the variance of first n even natural nembers if 65, find n.
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10. Find the S.D. of the following frequency distribution :



11. Find the A.M. and S.D from the folowing

frequency distribution :





12. The mean and S.D. of sample of size 10 were found to be 9.5 and 2.5 respectively. Later on an additional observation became available. This was 15 and was included in the original sample. Find the mean and S.D. of the 11

observations.



13. The mean and S.D. of 20 items were found to be 12 and 6 respectively. On checking it was discovered that items which should correctly read as 11 and 21 had been wrongly taken as 15 nd 27 respectively. Find the correct values of mean and S.D. **14.** The mean of 5 observations is 4.4 and the variance is 8.24. If three of the five observations are 1,2 and 6, find the other two.

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15. The means of two samples of sizes 500 and 600 were respectively 186 and 175. The corresponding standard deviations were respectively 9 and 10. The variable studied was height in centimetres. Obtain the mean and

variance of the combined sample.



16. Find the missing value from the following

table :





17. Find the coefficient of variation of the marks of Methematics and Physics, obtained by the students of a school.



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18. In two factories A and B engaged in the same industry in an area, the average weekly wages and the S.D. in rupees are as follows :



Which factory A or B pays out larger amount

as weekly wages ?



19. In two factories A and B engaged in the same industry in an area, the average weekly wages and the S.D. in rupees are as follows :

What is the average wage of all workers in the

two factories ?



20. In two factories A and B engaged in the same industry in an area, the average weekly wages and the S.D. in rupees are as follows :

Find the coefficient of variation in the case of each factory. What inference do you draw from a comparison of the two figures ?

21. Find the coefficient of variation if the sum

of squares of the deviations of 10 observations

taken from the mean 50 is 250.



22. From the following data determine in which factory X or Y, there is greater variability

in individual wages :



23. In an industrial establishment, the coefficients of variation of wages of male and female workers were 55% and 70% respectively. The standard deviations were Rs. 22 and Rs. 15.40 respectively. Calculate the combined average wages for all workers if 80% of the workers were male.



24. The values of mean and S.D. of the folowing frequency distribution are 35.16 and 19.76 respectively :



Find the original frequency distribution [here, $d = \frac{x - A}{h}$, x stands for mid-values of class intervals, A = assumed mean and h = equal width of class intervals].

25. Find appropriate measures of dispersion

from the following data :





Exercise 3 Mcq

1. For a frequency distribution mean deviation

from mean is computed by -

A.
$$M.~D.~=rac{\Sigma f}{\Sigma f |d|}$$

$$\begin{array}{lll} \mathsf{B.}\ M.\ D.\ &=\frac{\Sigma d}{\Sigma f}\\ \mathsf{C.}\ M.\ D.\ &=\frac{\Sigma f d}{\Sigma f}\\ \mathsf{D.}\ M.\ D.\ &=\frac{\Sigma f |d|}{\Sigma f}\end{array}$$

Answer: D



2. The mean deviation of the series a, a+d,a+2d,..., a+2n from its mean is -

A.
$$rac{(n+1)d}{2n+1}$$

B.
$$\displaystyle rac{nd}{2n+1}$$

C. $\displaystyle rac{n(n+1)d}{2n+1}$
D. $\displaystyle rac{(2n+1)d}{n(n+1)}$

Answer: C



3. If v is the variance and σ is the standard diveation then -

A.
$$v=rac{1}{\sigma^2}$$

B.
$$v = rac{1}{\sigma}$$

C.
$$v=\sigma^2$$

D.
$$v^2=\sigma$$

Answer: C

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4. A student gets marks in 10 subjects as 38, 70, 48, 34, 42, 55, 63, 46, 54 and 44. The mean deviation about mean is -

A. 6.6

B. 7.6

C. 8.6

D. 10.6

Answer: C



5. The mean deviation of the numbers 3,4,5,6,7

from the mean is -

A. 25

B. 5

C. 1.2

D. 0

Answer: C

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Exercise 3 Very Short Answer Type

1. What do you mean by a measure of dispersion ? What are the different measures of dispersion ?



2. Define : *Median*.



3. Give the definition of standard deviation. Discuss the advantages and disadvantages of using S.D. as a measure of dispersion.



4. Define : Mean



5. Find the mean deviation about the A.M. of

each of the following distributions :

7,9,24,14,26



6. Find the mean deviation about the A.M. of

each of the following distributions :

2,4,6,8,10,12,14,16

7. Find the mean deviation about the A.M. of

each of the following distributions :

70,65,68,70,75,73,80,70,83,86

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8. Calculate the value of M.D. about the median

of each of the following distributions :

8,15,53,49,19,62,7,15,95,77

9. Calculate the value of M.D. about the median

of each of the following distributions :

Rs. 46,79, 26,85,39,65,29,59,73

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10. Calculate the value of M.D. about the median of each of the following distributions :

12,48,30,62,98,75,94,112

11. Calculate the value of M.D. about the median of each of the following distributions : 10,15,54,59,19,62,8,25,95,77,46



12. Find the coefficuent of mean deviation (i)

about mean

(ii) about median of the following marks :

Marks: 70, 25, 50, 85, 45, 65, 20, 40

13. From the following array, find out the M.D. :

7,9,16,24,26,31,39

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14. Calculate the mean deviation about the

A.M. of the following distribution



15. Find the value of S.D. of each of the following distributions :4,5,6,6,7,8

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16. Find the value of S.D. of each of the following distributions :

4,8,10,12,16

17. Find the value of S.D. of each of the following distributions :1,2,3,4,...9,10

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18. Find the Mean and S.D. of first n natural

numbers

19. The S.D. of the first n odd integers is $\sqrt{85}$,

find n.

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20. The S.D. calculated from a set of 32 observations is 5 . If the sum of the observations is 80, what is the sum of the squares of these observations ?

21. The standard deviation of a set of 30 items is 9.5 Find the standard deviation if every items is decreased by 5.

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22. The standard deviation of a set of 50 items

is 8. Find the standard deviation, if each item

is multiplied by 2.

23. Prove that the standard deviation calculated from two values x_1 and x_2 of a vriable x is equal to half their difference.



24. Find the mean if coefficient of variation

$$=5~\%$$
 and variance = 4.

25. Find the coefficient of variation if the sum of squares of the deviations of 25 observations taken from the mean 40 is 900.



26. If the co-efficient variance and standerd deviation of two frequency distribution are 60% and 18, 15 respectively, then find the arithimetic mean of the two frequency distribution.





Exercise 3 Short Answer Type

1. Explain with examples the utility of measuring dispersion
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2. Define :*Mode*.
3. Discuss the relative merits of mean deviation and standard deviation as measures of dispersion.



4. Calculate the value of M.D. from the mean of

the following frequency distribution :



5. Find the mean deviation from the mean for

the following data :





6. Find the mean deviation from median of the

following data :



7. Find the mean deviation about the median

of the following frequency distribution :





8. Calculate the mean deviation from median

of the following frequency distribution :



9. Calculate the mean deviation from median

of the following frequency distribution :





10. Find the mean deciation about the median

for the following frequency distribution :





11. Find the mean deviation about median

from the following data :





12. Determine the mean deviation from the median for the following grouped frequency distribution :



13. Calculate the mean deviation about (a) median and (b) mean for the following frequency distribution :



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14. Calculate the average deviation from the

mean for the following data :





15. A student obtained the mean and standard deviation of 100 observations as 40 and 5.1 respectively. It was later found that he had wrongly copied one observation as 50, the correct figure being 40. Calculate the correct mean and correct standard deviation.

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16. The mean and the standard deviation of a characteristic of 100 items were found to be

60 and 10 respectively. At the time of calculations, two items were wrongly take as 5 and 45 instead of 30 and 20. Calculate the corrected mean and corrected standard deviation.

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17. Find the S.D. in respect of each of the following frequency distributions :Distribution of age of 570 members of a

Parliament :





18. Find the S.D. in respect of each of the

following frequency distributions :

Frequency distribution of daily wages of 550

workers :





19. Find the S.D. in respect of each of the following frequency distributions :Values of variable and corresponding

frequencies :



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20. Find the S.D. of each of the following grouped frequency distributions :

Frequency distribution of wt. of 100 students :





21. Find the S.D. of each of the following grouped frequency distributions :Frequency distribution of wages of 84 employee :





22. Find the S.D. of each of the following grouped frequency distributions :The distribution of heights of the students of

a college :





23. Find the S.D. of each of the following grouped frequency distributions :Frequency distribution of wages of 230

workers :



Find also the value of coefficient of variation

of the above data.



Exercise 3 Long Answer Type Questions

1. Find the standard deviation of the following



:





2. Define S.D. Find the standard deviation from

the following frequency distribution :





3. Two samples of sizes 60 and 90 have 52 and 48 as the respective A.Ms. and 9 and 12 as the respective S.Ds. Find the A.M and S.D. of the combined sample of size 150.



5. From the following data determine in which factory X or Y, there is greater variability in

individiual wages :





6. An analysis of weekly wages (in Rs.) paid to workers in two firms A and belonging to the same industry in an area shows the followinng result :

In which firm, a or B, there is greater variability

in individual wages.



7. Two distributions have the same mean Rs. 7500 and standard deviations Rs. 9 and Rs. 12 respectively. If C.V. of the first distribution is 24~%, find the C.V. of the second distribution.



8. In two firms X and Y engaged in the same industry, the average monthly wages and variances of distribution of wages are as

follows :



If C.V. of distribution of wages in firm X is 22.1~% find the C.V. of distribution of wages in firm Y.

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9. Two batsmen A and B made the following

scores in a series of criket matches :



Who is more consistent player in scoring.





10. From the following data determine in which firm, A or B there is greater variability in individual wages :



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11. In two factories A and B engaged in the same industry in an area, the average weekly wages in rupees and the S.D, are as follows :



Find the coefficient of variation of the two factories separately and in combination and comment on the result.



12. From the data given below, state with

reason which series is more variable.





13. Find the coefficient of variation of the following data :

14. Find the variance and coefficient of variation of the following frequency distribution :



15. Calculate the variance of the following distribution (correct upto 3 place afetr decimat) stating and necessary assumption :

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16. Find the semi-interquartile range for the

following distribution :





Find also the median and its difference from

the average of the two quartiles.



17. Calculate the appropriate measure of

dispersion from the following data :





18. The mean and variance of the six values of a variate are 8 and $8\frac{2}{3}$. If the four values of the variate be 4,9,11 and 12, find the other two values of the variate.

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19. The first of the two samples has 100 items with mean 15 and S.D. 3. If the whole group has items with mean 15.6 and variance 13.44, find the mean and the S.D. of the second sample.



20. The mean and S.D. of income of 50 men are Rs. 3200 and Rs. 525 respectively. The same for 40 women are Rs. 2,850 and Rs. 460 respectively. Find the S.D. of income for the combined group.

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21. From some financial statistics, it is found that the monthly average electricial charges

was 2,460 and S.D. Rs. 120. The monthly average direct wages was Rs. 42,000 and S.D. Rs. 1,200. State which is the more variable with proper reasons.

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22. The mean and the standard deviation of the following frequency distribution of continuous variable are 31 and 15.9. Find the original frequency distribution :



Here $d' = \frac{x-A}{h}$ where x stands for mid values, A is the assumed mean and h is the common width of the class intervals. Watch Video Solution Sample Question For Competitive Exams A

1. If the standard deviation z_1, x_2, \ldots, x^n is

Integer Answer Type

3.5, then standard deviation of

 $-2x_1,\ -3,\ -2x_2,\ -3,\ldots,\ -2x_n-3$ will

be -

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2. If the mean of 27 + x, 31 + x, 89 + x, 107 + x, 156 + x is and the mean of 130 + x, 126 + x, 68 + x, 50 + x, 1 + x is 15 M, then the value of M is -

3. If mean deviation is 12 and standard deviation is 5 K, then K is -Watch Video Solution **4.** The variance of 2,4,6,8,10 is -Watch Video Solution 5. The following table giving the height

distribution of the students



If the median is 31M, then the value of M is -



Sample Question For Competitive Exams B Matrix Match Type

1. Match the entries given in left column with

those given in right column.



2. Match the entries given in left column with those given in right column.



Sample Question For Competitive Exams C Comprehension Type

1. There are natural numbers. Answer the following questions considering first natural

numbers.

Mean of first n natural number is -

A.
$$rac{n+1}{2}$$

B. $rac{2^n+1}{2^n}$
C. $rac{n+1}{n-1}$
D. $rac{n-1}{2}$

Answer: A



2. There are natural numbers. Answer the following questions considering first natural numbers.

Variance of first n natural numbers is -

A.
$$\frac{n^2 - 1}{6}$$

B. $\frac{n^2 + 1}{12}$
C. $\frac{n^2 + 1}{12}$
D. $\frac{n^2 + 1}{6}$

Answer: B



3. There are natural numbers. Answer the following questions considering first natural numbers.

Mean of square of first n natural numbers is -

A.
$$\frac{(n+1)(2n+1)}{6}$$

B. $\frac{n+1}{12}$
C. $\frac{n-1}{12}$
D. $\frac{(n-1)(2n-1)}{6}$

Answer: A



4. $x_1, x_2, x_3, \ldots, x_n$ is a series. Mean and variance of this series are \bar{x} and σ^2 respectively.

If x_i is expressed by x_i ', then the new mean will be -

A.
$$ar{x} - x_i + x_i$$
 ' $extsf{B.} \ rac{(n-1)ar{x} + x_i}{n}$

C.
$$rac{nar{x}-x_i+x_i\,'}{n}$$

D. none of these

Answer: C

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5. $x_1, x_2, x_3, \ldots, x_n$ is a series. Mean and variance of this series are \bar{x} and σ^2 respectively.

If 7 be added to each term of the series, then the new variance will be -
A. σ^2

B.
$$\sigma^2 + 7$$

$\mathsf{C}.\,\sigma^2+6$

D. σ

Answer: A



Sample Question For Competitive Exams D Assertion Reason Type

1. Statement - I :Mean of square of first n natural numbers is $rac{(n+1)(2n+1)}{6}$ Statement - II : $\Sigma n = rac{n(n+1)}{2}$

A. Statement - I is true, Statement - II is true and Statement - II is a correct explanation for Statement - I.
B. Statement - I is true, Statement-II is true but Statement - II is not a correct

expalnation of Statement - I.

C. Statement - I is true, Statement -II is

false.

D. Statement -I is false, Statement -II is true.

Answer: B

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2. Statement I : Standard deviation of $\frac{ax+b}{c}$ is $\left|\frac{a}{c}\right|\sigma$

Statement - II : Statement - II Standard

deviation $= \sigma imes | ext{coefficient of } x |$

A. Statement - I is true, Statement - II is true and Statement - II is a correct explanation for Statement - I. B. Statement - II is true, Statement-II is true but Statement - II is not a correct expalnation of Statement - I. C. Statement - I is true, Statement -II is false.

D. Statement -I is false, Statement -II is true.

Answer: A

