# MATHS

## NCERT - NCERT MATHEMATICS (ENGLISH)

## STATISTICS

### Miscellaneous Exercise

**1.** Given that $\bar{x}$is the mean and $\sigma^2$is the variance of n observations $x_1 x_2$, ..., $x_n$. Prove that the mean and variance of the observations $ax_1$, $ax_2$, $ax_3$, $\vdots$ $ax_n$are $a\bar{x}$and $a^2\sigma^2$,

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**2.** The mean and standard deviation of 20 observations are found to be 10 and 2, respectively. One rechecking, it was found that an observation 8 was incorrect. Calculate the correct mean and standard deviation in each of the following cases. (i) If

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**3.** The mean and standard deviation of marks obtained by 50 students of a class in there subjects, mathematics, physics and chemistry are given below: Subject Mathematics Physics Chemistry Mean 42 32 40.9 Standard Deviation 12 15 20 Which of the three subjects shows the highest variability in marks and which shows the lowest?

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**4.** The mean and standard deviation of a group of 100 observations were found to be 20 and 3, respectively. Later on it was found that three observations were incorrect, which are recorded as 21, 21 and 18. Find the mean and standard deviation if the

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**5.** The mean and variance of 7 observations are 8 and 16, respectively. If five of the observations are 2, 4, 10, 12, 14. Find the remaining two observations.

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**6.** The mean and variance of eight observations are 9 and 9.25, respectively. If six of the observations are 6, 7, 10, 12, 12 and 13,

find the remaining two observations.

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**7.** The mean and standard deviation of six observations are 8 and 4, respectively. If each observation is multiplied by 3, find the new mean and new standard deviation of the resulting observations.

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## Solved Examples

**1.** Calculate variance and standard deviation for the following distribution.

| Classes | 70 – 75 | 75 – 80 | 80 – 85 | 85 – 90 | 90 – 95 | 95 – 100 | 100 – 105 | 105 – 110 | 110 – 115 |
|---|---|---|---|---|---|---|---|---|---|
| Frequency | 3 | 4 | 7 | 7 | 15 | 9 | 6 | 6 | 3 |

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**2.** Two plants A and B of a factory show following results about the number of workers and the wages paid to them.

| | A | B |
|---|---|---|
| No. of workers | 5000 | 6000 |
| Average monthly wages | Rs 2500 | Rs 2500 |
| Variance of distribution | 81 | 100 |

of wages.In which plant, A or B is there greater variability in individual wages?

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**3.** Calculate the mean, variance and standard deviation for the following distribution:

| Class | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90- |
|---|---|---|---|---|---|---|---|

100

Frequency 3 7 12 15 8 3

2

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**4.** Find the standard deviation for the following data :5,9,8,12,6,10,6,8

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**5.** The variance of 20 observations is 5. If each observation is multiplied by 2 find the variance of the resulting observations.

A. 20

B. 30

C. 40

D. 50

**Answer: A**

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**6.** The mean of 5 observation is 4.4 and their variance is 8.24. If three of the observations are 1, 2 and 6, find the other two observations.

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**7.** Coefficient of variation of two distributions are 60% and 70% and their standard deviations are 21 and 16 respectively. What are their arithmetic means?

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**8.** The following values are calculated in respect of heights and weights of the students of a section of class XI: Height Weight Mean 162.6 cm 52.36 kg Variance 127.69cm2 23.1361 kg2 Can we say that the weights show greater variation than the heights?

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**9.** If each of the observation $x_1, x_2, \vdots x_n$is increased by a where a is a negative or positive number, show that the variance remains unchanged.

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**10.** The mean and standard deviation of 100 observations were calculated as 40 and 5.1 respectively by a student who took by mistake 50 instead of 40 for one observation. What are the correct mean sand standard deviation?

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**11.** Find the variance and standard deviation of the following data

5,12,3,18,6,8,2,10

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**12.** Find the Variance of the following data:

$6, 8, 10, 12, 14, 16, 18, 20, 22, 24$

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**13.** Find the mean deviation about the median for the following data:4,6,9,3,10,13,2

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**14.** Find mean deviation about the mean for the following data :

$x_i$ 2 5 6 8 10 12 $f_i$ 2 8 10 7 8 5

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**15.** Calculate the mean deviation about median from the following data: 340, 150, 210, 240, 300, 310, 320.

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**16.** Find the mean deviation about the mean for the following data: Marks obtained , 10-20, 20-30, 30-40, 40-50, 50-60, 60-70, 70-80 Number of students, 2, 3, 8, 14, 8, 3, 2

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**17.** Find the mean deviation about the mean for the following data:$6, 7, 10, 12, 13, 4, 8, 12$

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**18.** Find the mean deviation about the median for the following data:$3, 9, 5, 3, 12, 10, 18, 4, 7, 19, 21.$

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## Exercise 15 1

**1.** Find the mean deviation about the mean for the data :$x_i$ 10 30 50 70 90$f_i$ 4 24 28 16 8

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**2.** Find the mean deviation about the median for the data in Question

| $x_i$ | 5 | 7 | 9 | 10 | 12 | 15 |
|---|---|---|---|---|---|---|
| $f_i$ | 8 | 6 | 2 | 2 | 2 | 6 |

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**3.** Find the mean deviation about the median for the data is

Question: 36,72,46,42,60,45,53,46,51,49.

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**4.** Find the mean deviation about the mean for the data :$x_i$ 5 10

15 20 25$f_i$ 7 4 6 3 5

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**5.** Find the mean deviation from the mean for the following data:

38, 70, 48, 40, 42, 55, 63, 46, 54, 44

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**6.** Find the mean deviation about the median for the data is

Question: 13,17,16,14,11,13,10,16,11,18,12,17.

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**7.** Find the mean deviation about the mean for the data :

$4, 7, 8, 9, 10, 12, 13, 17$

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**8.** Find the mean deviation about the median for the data : $x_i$ 15

21 27 30 35 $f_i$ 3 5 6 7 8

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**9.** Find the mean deviation about the mean for the data : Income

| | 0-100 | 100-200 | 200-300 | 300-400 | 400-500 | 500-600 | 600-700 | 700-800 |
|---|---|---|---|---|---|---|---|---|
| per day | | | | | | | | |
| Number of persons | 4 | 8 | 9 | 10 | 7 | 5 | 4 | 3 |

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**10.** Find the mean deviation about median for the following data :

| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|---|---|---|---|---|---|---|
| Number of Girls | 6 | 8 | 14 | 16 | 4 | 2 |

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**11.** Find the mean deviation about the mean for the data :

| Height | 95-105 | 105-115 | 115-125 | 125-135 | 135-145 |
|---|---|---|---|---|---|

145-155in cmsNumber of 9 13 26

30 12 10Boys

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**12.** Calculate the mean deviation about median age for the age distribution of 100 persons given below: Age 16-20 21-25 26-30 31-35 36-40 41-45 46-50 51-55 Number 5 6 12 14 26 12 16 9

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## Exercise 15 3

**1.** The following is ht record of goals scored by team A in a football session For the team b, mean number of goals scored

per match was 2 with a standard deviation 1.25 goals. Find which team may be considered more consistent?

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**2.** The sum and sum of squares corresponding to length $x$ (in cm) and weight $y$ (in gm) of 50 plant products are given below : $\sum_{i=1}^{50} x_i = 212, \sum_{i=1}^{50} \xi 2 = 902.8, \sum_{i=1}^{50} y_i = 261, \sum_{i=1}^{n} yi2 = 1457.6$ Which is more varying the length or weight?

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**3.** From the data given below state which group is more variable $G_1$ or $G_2$? Marks, 10-20, 20-30, 30-40, 40-50, 50-60, 60-70, 70-80 Group $G_1$ , 9, 17, 32, 33, 40, 10, 9 Group $G_2$ , 10, 20, 30, 25, 43, 15, 7

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**4.** From the prices of shares X and Y below, find out which is more stable in value X 35 54 52 53 56 58 52 50 51 49 . Y 108 107 105 105 106 107 104 103 104 101

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**5.** An analysis of monthly wages paid to workers in two firms A and B, belonging to the same industry, gives the following result and no. of workers of firm A and B are 586 and 648 respectively

| No. of wage earners | Firm A | Firm B |
|---|---|---|
| Mean of monthly wages | Rs 5253 | Rs 5253 |
| Variance of the distribution of wages | 100 | 121 |

(i) Which firm A or B pays larger amount as monthly wages? (ii) Which firm, A or B, show greater variability in individual wages?

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## Exercise 15 2

**1.** Find the mean of the following frequency distributions: Class interval: 0-8 8-16 16-24 24-32 32-40 Frequency: 6 7 10 8 9

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**2.** Find the mean and standard deviation using short cut method

| $x_i$ | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 |
|---|---|---|---|---|---|---|---|---|---|
| $f_i$ | 2 | 1 | 12 | 29 | 25 | 12 | 10 | 4 | 5 |

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**3.** Find the mean deviation from the mean for the data: 6,7,10,12,13,4,8,20.

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**4.** Find the mean deviation from the mean for the data: 6,7,10,12,13,4,8,20.

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**5.** Find the mean and variance for each of the data in Question:

First 10 multiples of 3.

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**6.** about to only mathematics

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**7.** Find the mean and variance for each of the data :

$6, 7, 10, 12, 13, 4, 8, 12$

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**8.** Find the mean and standard deviation using short cut method

| $x_i$ | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 |
|---|---|---|---|---|---|---|---|---|---|
| $f_i$ | 2 | 1 | 12 | 29 | 25 | 12 | 10 | 4 | 5 |

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**9.** Find the mean of the following frequency distributions: Class interval: 0-8 8-16 16-24 24-32 32-40 Frequency: 6 7 10 8 9

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**10.** Given below are the diameters of circles (in mm) drawn in a design.

| Diameter | $33-36$ | $37-40$ | $41-44$ | $45-48$ | $49-52$ |
|---|---|---|---|---|---|
| Number of Circles | 15 | 17 | 21 | 22 | 25 |

Calculate the mean diameter of the circles, variance and standard deviation.

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