MATHS

BOOKS - S CHAND MATHS (ENGLISH)

MEASURES OF DISPERSION

Example

1. Find the mean deviation from the mean for following marks:

37, 48, 50, 23, 47, 58, 29, 31, 40.

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2. The scores of a batsman in ten innings are:

48, 80, 58, 44, 52, 65, 73, 56, 64, 54. Find the mean deviation from the median.

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3. Find the mean deviation from the mean for the followinng data:

x	5	10	15	20	25
f	7	4	6	3	5

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4. Find the mean deviation from the median for the following data:

34, 66, 30, 38, 44, 50, 40, 60, 42, 51.

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5. Calculate the mean deviation and coefft. of mean deviation for the following frequency distribution from both mean and median.

Variable (x)	8	10	15	20	25	32	35
Frequency (f)	3	2	4	7	4	3	7

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6. Find the mean deviation from the median for the following data:

x_i	15	21	27	30	35
f_i	3	5	6	7	8

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7. Calculate the mean deviation and coefficient of mean deviation for the following distribution:

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	7	3	5	2	8

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8. Find the standard deviation of the first five even natural numbers.

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9. Calculate the standard deviation from the following following set of observations:

8, 9, 15, 23, 5, 11, 19, 8, 10, 12

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10. Calculate the mean and standard deviation of first n natural numbers.

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11. Compute the standard deviation for the following distribution.

Variable (x)	10	15	18	20	25
Frequency (f)	3	2	5	8	2

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12. Calculate the standard deviation for the following distribution.

x	8	11	17	20	25	30	35
f	2	3	4	1	5	7	3

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13. Find the variance and standard deviation for the following distribution.

x	4.5	14.5	24.5	34.5	44.5	54.5	64.5
f	1	5	12	22	17	9	4

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14. Calculate the standard deviation of the following distribution:

Age	20–25	25–30	30–35	35–40	40–45	45–50
Number of persons	170	110	80	45	40	35

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15. Calculate the standard deviation of the following given in the following table.

Length of wire (in cm)	*No. of wires*	*Length of wire*	*No. of wires*
72.0–73.9	7	82.0–83.9	24
74.0–75.9	31	84.0–85.9	22
76.0–77.9	42	86.0–87.9	8
78.0–79.9	54	88.0–89.9	4
80.0–81.9	33		

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16. A purchasing agent obtained samples of 60 watt bulbs from a standard company. He had the samples tested in his own laboratory for length of life with the following results:

Length of life (in hours)	*Number*
1700 and under 1900	10
1900 and under 2100	16
2100 and under 2300	20
2300 and under 2500	8
2500 and under 2700	6

Calculate the standard deviation for these samples.

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17. The mean of 200 items is 48 and their standard deviation is 3. Find the sum of squares of all items.

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18. For the distribution given in the following table, find the mean and the standard deviation by the step deviation method.

Marks	*Frequency*	*Marks*	*Frequency*
0 – 4	2	20 – 24	21
5 – 9	5	25 – 29	16
10 – 14	7	30 – 34	8
15 – 19	13	35 – 39	3

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19. A standard obtained the mean and standard deviation of 100 observations as 40 and 5.1 respectively. Later it was discovered that he had wrongly copied down and observation as 50 instead of 40. Calculate the true mean and standard deviation.

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20. In two factories A and B engaged in the same industrial area, the average weekly wages (in rupees) and the standard deviations are as

follows:

Factory	Average	S.D.	No. of workers
A	34.5	5	476
B	28.5	4.5	524

(i) Which factory, A or B, pays out a larger amount as weekly wages?

(ii) Which factory, A or B, has greater variability in individual wages?

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Exercise 21 A

1. From the following data, using mean, calculate mean deviation and the coefficient of mean

deviation.

15, 17, 19, 25, 30, 35, 48

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2. From the following data, using mean, calculate mean deviation and the coefficient of mean deviation.

21, 23, 25, 28, 30, 32, 38, 39, 46, 48

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3. From the following data, using mean, calculate mean deviation and the coefficient of mean deviation.

10, 70, 50, 53, 20, 95, 42, 60, 48, 80

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4. Calculate the mean deviation from the mean for the following frequency distributions.

x_i	3	9	17	23	27
f_i	8	10	12	9	5

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5. Calculate the mean deviation from the mean for the following frequency distributions.

x_i	10	11	12	13	14
f_i	3	12	18	12	3

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6. Calculate the mean deviation from the mean for the following frequency distributions.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of students	5	8	15	16	6

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7. Calculate the mean deviation from the mean for the following frequency distributions.

Scores	140 – 150	150 – 160	160 – 170	170 – 180	180 – 190	190 – 200
No. of students	4	6	10	18	9	3

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8. Calculate the mean deviation from the mean for the following frequency distributions.

Class Interval	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
Frequency	3	50	84	32	10	3

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9. For the following, calculate mean deviation and coefficient of mean deviation.

3, 9, 5, 3, 12, 10, 18, 4, 7, 19, 21

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10. For the following, using median, calculate mean deviation and coefficient of mean deviation.

100, 150, 200, 250, 360, 490, 500, 600, 671

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11. For the following, using median, calculate mean deviation and coefficient of mean deviation.

x	10	11	12	13	14
f	3	12	18	12	3

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12. For the following, using median, calculate mean deviation and coefficient of mean deviation.

x	3	6	9	12	13	15	21	22
f	3	4	5	2	4	5	4	3

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Exercise 21 B

1. Five students secured marks as, 8, 10, 15, 30, 22.

Find the standard deviation.

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2. For a set of ungrouped values the following sums are found:

$$n = 15, \sum x = 480, \sum x^2 = 15735.$$

Find the standard deviation.

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3. The standard deviation of the numbers 2, 3, 11, 2x is $3\frac{1}{2}$. Calculate the values of x.

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4. Calculate the variance and standard deviation of the observations : 11, 12, 13, ... 20.

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5. Find the standard deviation of the following set of numbers:

25, 50, 45, 30, 70, 42, 36, 48, 34, 50

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6. Calculate the possible values of x, if the standard deviation of the numbers 2, 3, 2x and 11 is 3.5.

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7. Calculate the standard deviation for the following distribution:

Class interval	0–4	4–8	8–12	12–16
Frequency	4	8	2	1

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8. Calculate the standard deviation of the following data:

Size	4	5	6	7	8	9	10
Frequency	6	12	15	28	29	14	15

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9. Calculate the standard deviation of the following data:

Class interval	0–6	6–12	12–18	18–24	24–30	30–36	36–40
Frequency	19	25	36	72	51	43	28

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10. Calculate the standard deviation for the following data giving the age distribution of persons.

Age in years	20–30	30–40	40–50	50–60	60–70	70–80	80–90
No. of persons	3	61	132	153	140	51	2

Calculate the mean of these differences and their standard deviation.

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11. The heights, to the nearest cm, of 30 men are given below:

159	170	174	173	175	160	161	164	163	165
164	171	162	170	177	185	181	180	175	165
186	174	168	168	176	176	165	175	167	180

Using class intervals 155 - 160, 160 - 165, ... draw up a grouped frequency distribution and use this to estimate the Arithmetic mean and standard deviation.

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12. Find the mean and the standard deviation from the following:

Wages (in Rupees)	120 – 200	200 – 210	210 – 220	220 – 230
No. of workers	10	12	18	20
Wages (in Rupees)	230 – 240	240 – 250	250 – 260	260 – 270
No. of workers	25	18	16	5

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13. The following table shows the I.Q. of 480 schoolchildren. Find

(i) the mean.

(ii) the standard deviation using the step deviation method. Use Charlier's check to verify the computation of the standard deviation.

x	70	74	78	82	86	90	94	98	102	106	110	114	118	122	126
f	4	9	16	28	45	66	85	72	54	38	27	18	11	5	2

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14. In a certain test, the 30 scores were grouped as follows:

30 – 34	35 – 39	40 – 44	45 – 49	50 – 54	55 – 59	60 – 64
2	2	7	10	6	2	1

Calculate the mean and the standard deviation.

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15. The number of faults on the surface of each of 1000 tiles were distributed as follows:

No. of faults	0	1	2	3	4	5
Frequency	760	138	67	25	8	2

Calculate the mean and the standard deviation.

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16. The mean and the standard deviation of 25 observations are 60 and 3. Later on it was decided to omit an observation which was incorrectly recorded as 60. Calculate the mean and the standard deviation of the remaining 24 observations.

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17. The scores of two golfers for 10 rounds each are:

A	58	59	60	54	65	66	52	75	69	52
B	84	56	92	65	86	78	44	54	78	68

Which may be regarded as the more consistent player?

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18. Goals scored by two teams A and B in a football season were as follows:

Number of goals scored in a match	*Number of matches*	
	A	*B*
0	27	17
1	9	9
2	8	6
3	5	5
4	4	3

By calculating the coefficient of variation in each

case find which team may be considered more consistent.

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19. The mean of the numbers a, b, 8, 5, 10 is 6 and the variance is 6.80. Then which one of the following gives possible values of a and b?

A. $a = 0, b = 7$

B. $a = 5, b = 2$

C. $a = 1, b = 6$

D. $a = 3, b = 4$

Answer: D

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Chapter Test

1. 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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2. Find the mean deviation from the mean for the following data:

x_i	3	5	7	9	11	13
f_i	6	8	15	25	8	4

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3. Find the mean deviation for the mean for the following data:

Classes	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Frequencies	6	8	14	16	4	2

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4. Find the mean deviation about the median for the following data:

11, 3, 8, 7, 5, 14, 10, 2, 9

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5. Find the variance and standard deviation of the following data:

x_i	92	93	97	98	102	104	109
f_i	3	2	3	2	6	3	3

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6. Calculate the mean and variance after the following data:

Classes	0 – 30	30 – 60	60 – 90	90 – 120	120 – 150	150 – 180	180 – 210
Frequency (f)	2	3	5	10	3	5	2

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