MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

STATISTICS

Example

1. Find the mean deviation about the mean for the mean for the following data :

15, 17, 10, 13, 7, 18, 9, 6, 14, 11

A. 3.4

B. 4.5

C. 3.9

D. 5.4

Answer: A

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2. Find the mean deviation about the median for the data given below :

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

A. 4

B. 5

C. 3

D. 6

Answer: C

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3. Find the mean deviation about the median for the data given below.

$45, 36, 50, 60, 53, 46, 51, 48, 72, 42.$

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4. Find the mean deviation about 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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5. Find the mean deviation about the median for the following data :

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

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6. 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
Number of students	8	6	12	5	2	7

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7. Calculate the mean deviation about the median for the following data :

Height (in cm)	95–105	105–115	115–125	125–135	135–145	145–155
Number of boys	9	13	25	30	13	10

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8. Calculate the mean deviation about the median for the following data :

Class	16–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55
Frequency	5	6	12	14	26	12	16	9

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9. Find the mean, variance and the standard deviation for the following data :

5,9,8,12,6,10,6,8

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10. Find the mean, standard deviation and variance of first n natural numbers.

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11. Find the mean, standard deviation and variance of first 10 multiples of 3.

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12. Find the variance and standard deviation for the following data :

x_i	10	15	18	20	25
f_i	3	2	5	8	2

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13. Find the mean, variance and standard deviation for the following data 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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14. Find the standard deviation for the following data :

x_i	3	8	13	18	23
f_i	6	10	14	10	10

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15. Calculate mean, variance and standard deviation for the following frequency distribution:

Class	0–30	30–60	60–90	90–120	120–150	150–180	180–210
Frequency	2	3	5	10	3	5	2

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16. Given below are the dimaters 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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17. The following results show the number of workers and the wages paid to them in two factories A and B.

Factory	A	B
Number of workers	4000	5000
Mean wages	Rs 3500	Rs 3500
Variance of distribution of wages	64	81

Which factory has more variation in wages ?

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18. Coefficient of variation of two distributions are $60\,\%$ and $75\,\%$, and their standard deviations are 18 and 15 respectively. Find their arithmetic means.

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19. The mean and variance of the heights and weights of the students of a class are given below.

	Height	*Weight*
Mean	160 cm	50.4 kg
Variance	$116.64\ \text{cm}^2$	$17.64\ \text{kg}^2$

Show that the wieghts are more variable than heights.

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Miscellaneous Word Problems Example

1. The mean and variance of seven observations are 8 and 16 respectively. If five of these are 2,4,10,12,14, find the remaining two observations.

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2. The mean and variance of six observations are 8 and 16 respectively. If each observation is multiplied by 3, find the new mean and new variance of the resulting observations.

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3. 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 wrong item is omitted

(ii) If it is replaced by 12.

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

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6. If the mean and variance of the observations $x_1, x_2, x_3, \ldots, x_n$ are $\bar{x}$ and σ^2 respectively and a be a nonzero real number, then show that the mean and variance of $ax_1, ax_2, ax_3, \ldots, ax_n$ are $a\bar{x}$ and $a^2\sigma^2$ respectively.

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Exercise 30 A

1. Find the mean deviation about the mean for the following data :

Find the mean deviation about the mean for the following data :

7,8,4,13,9,5,16,18

A. 4.25

B. 3

C. 2

D. 9

Answer: A

2. Find the mean deviation about the mean for the following data :

39,72,48,41,43,55,60,45,54,43

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

17,20,12,13,15,16,12,18,15,19,12,11

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

:

12,5,14,6,11,13,17,8,10

A. 3

B. 1

C. 4

D. 7

Answer: A

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

4,15,9,7,19,13,6,21,8,25,11

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

34,23,46,37,40,28,32,50,35,44

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

70,34,42,78,65,45,54,48,67,50,56,63

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8. Find the mean deviation about the mean for the following data :

x_i	6	12	18	24	30	36
f_i	5	4	11	6	4	6

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9. Find the 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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10. Find the mean deviation about 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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11. Find the mean deviation about the median for the following data

:

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

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12. Find the mean deviation about the median for the following data

:

x_i	5	7	9	11	13	15	17
f_i	2	4	6	8	10	12	8

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13. Find the mean deviation about the median for the following data

:

x_i	10	15	20	25	30	35	40	45
f_i	7	3	8	5	6	8	4	9

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

Mark	0–10	10–20	20–30	30–40	40–50	50–60
Number of students	6	8	14	16	4	2

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15. Find the mean deviation about the mean for the following data :

Height (in cm)	95–105	105–115	115–125	125–135	135–145	145–155
Number of boys	9	16	23	30	12	10

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16. Find the mean deviation about the mean for the following data :

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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17. Find the mean deviation about the median for the following data

:

Class	0–10	10–20	20–30	30–40	40–50	50–60
Frequency	6	7	15	16	4	2

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18. Find the mean deviation about the median for the following data

:

Class	0–10	10–20	20–30	30–40	40–50	50–60
Frequency	6	8	11	18	5	2

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Exercise 30 B

1. Find the mean, variance and standard deviation for the numbers 4, 6, 10, 12, 7, 8, 13, 12.

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2. Find the mean, variance and standard deviation for first six odd natural numbers.

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3. Using short cut method, find the mean, variance and standard deviation for the data :

x_i	4	8	11	17	20	24	32
f_i	3	5	9	5	4	3	1

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4. Using short cut method, find the mean, variance and standard deviation for the data :

x_i	6	10	14	18	24	28	30
f_i	2	4	7	12	8	4	3

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5. Using short cut method, find the mean, variance and standard deviation for the data :

x_i	10	15	18	20	25
f_i	3	2	5	8	2

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6. Using short cut method, find the mean, variance and standard deviation for the data :

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

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7. Using short cut method, find the mean, variance and standard deviation for the data :

Class	0–10	10–20	20–30	30–40	40–50
Frequency	5	8	15	16	6

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8. Using short cut method, find the mean, variance and standard deviation for the data :

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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9. Using short cut method, find the mean, variance and standard deviation for the data :

Class	25–35	35–45	45–55	55–65	65–75
Frequency	64	132	153	140	51

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Exercise 30 C

1. If the standard deviation of the numbers 2, 3, a and 11 is 3.5, then which of the following is true ? (1) $3a^2 - 26a + 55 = 0$ (2) $3a^2 - 32a + 84 = 0$ (3) $3a^2 - 34a + 91 = 0$ (4) $3a^2 - 23a + 44 = 0$

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2. The variance of 15 observations is 6. If each observation is increased by 8, find the variance of the resulting observations.

A. 7

B. 8

C. 3

D. 6

Answer: D

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

A. 34

B. 5

C. 20

D. 22

Answer: C

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4. The mean and variance of five observations are 6 and 4 respectively. If three of these are 5, 7 and 9, find the other two observations.

A. $3 \& 6$

B. $6 \& 2$

C. $7 \& 1$

D. $8 \& 6$

Answer: A

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

A. $3 \& 6$

B. $4 \& 9$

C. $9 \& 3$

D. 5&5

Answer: B

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6. The mean and standard deviation of 18 observations are found to be 7 and 4 respectively. On rechecking it was found that an observation 12 was misread as 21. Calculate the correct mean and standard deviation.

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7. For a group of 200 candidates the mean and S.D. were found to be 40 and 15 respectively. Later on it was found that the score 43 was misread as 34. Find the correct mean and correct S.D.

A. 42.045, 14.995

B. 40.045, 14.995

C. 41.045, 15.995

D. 40.045, 19.995

Answer: B

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8. 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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Exercise 30 D

1. The following results show the number of workers and the wages paid to them in two factories F_1 and F_2.

Factory	A	B
Number of workers	3600	3200
Mean wages	Rs 5300	Rs 5300
Variance of distribution of wages	100	81

Which factory has more variation in wages?

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2. 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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3. The mean and variance of the heights and weights of the students of a class are given below:

	Heights	Weights
Mean	63.2 inches	63.2 kg
SD	11.5 inches	5.6 kg

Which shows more variability, heights or weights?

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4. The following results show the number of workers and the wages paid to them in two factories A and B of the same industry.

Firms	*A*	*B*
Number of workers	560	650
Mean monthly wages	Rs 5460	Rs 5460
Variance of distribution of wages	100	121

(i) Which firm pays larger amount as monthly wages?

(ii) Which firm shows greater variability in individual wages?

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5. The sum and the sum of squares of length x (in cm) and weight y (in g) of 50 plant products are given below :

$\Sigma_{i=1}^{50} x_i = 212, \Sigma_{i=1}^{50} x_i^2 = 902.8, \Sigma_{i=1}^{50} y_i = 261$ and $\Sigma_{i=1}^{50} y_i^2 = 1457.6.$

Which is more variable, the length or weight ?

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