EXERCISE 23.1 PAGE NO: 23.6

1. Ashish studies for 4 hours, 5 hours and 3 hours on three consecutive days. How many hours does he study daily on an average?

Solution:

Given Ashish studies for 4 hours, 5 hours and 3 hours on three consecutive days
Average number of study hours = sum of hours/ number of days
Average number of study hours = (4 + 5 + 3) ÷ 3
= 12 ÷ 3
= 4 hours
Thus, Ashish studies for 4 hours on an average.

2. A cricketer scores the following runs in 8 innings: 58, 76, 40, 35, 48, 45, 0, 100. Find the mean score.

Solution:

Given runs in 8 innings: 58, 76, 40, 35, 48, 45, 0, 100
Mean score = total sum of runs/number of innings
The mean score = (58 + 76 + 40 + 35 + 48 + 45 + 0 + 100) ÷ 8
= 402 ÷ 8
= 50.25 runs.

Myclass24
Your Class. Your Pace.

3. The marks (out of 100) obtained by a group of students in science test are 85, 76, 90, 84, 39, 48, 56, 95, 81 and 75. Find the
(i) Highest and the lowest marks obtained by the students.
(ii) Range of marks obtained.
(iii) Mean marks obtained by the group.

Solution:

In order to find the highest and lowest marks, we have to arrange the marks in ascending order as follows:
39, 48, 56, 75, 76, 81, 84, 85, 90, 95

(i) Clearly, the highest mark is 95 and the lowest is 39.

(ii) The range of the marks obtained is: (95 – 39) = 56.

(iii) From the following data, we have
Mean marks = Sum of the marks/ Total number of students
Mean marks = (39 + 48 + 56 + 75 + 76 + 81 + 84 + 85 + 90 + 95) ÷ 10
= 729 ÷ 10
= 72.9.
Hence, the mean mark of the students is 72.9.

4. The enrolment of a school during six consecutive years was as follows:
1555, 1670, 1750, 2019, 2540, 2820
Find the mean enrolment of the school for this period.

Solution:
Given enrolment of a school during six consecutive years as follows
1555, 1670, 1750, 2019, 2540, 2820
The mean enrolment = Sum of the enrolments in each year/ Total number of years
The mean enrolment = (1555 + 1670 + 1750 + 2019 + 2540 + 2820) ÷ 6
= 12354 ÷ 6
= 2059.
Thus, the mean enrolment of the school for the given period is 2059.

mc24 Myclass24 Your Class. Your Pace.

5. The rainfall (in mm) in a city on 7 days of a certain week was recorded as follows:

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Rainfall (in mm)	0.0	12.2	2.1	0.0	20.5	5.3	1.0

(i) Find the range of the rainfall from the above data.
(ii) Find the mean rainfall for the week.
(iii) On how many days was the rainfall less than the mean rainfall.

Solution:
(i) The range of the rainfall = Maximum rainfall – Minimum rainfall
= 20.5 – 0.0
= 20.5 mm.

(ii) The mean rainfall = (0.0 + 12.2 + 2.1 + 0.0 + 20.5 + 5.3 + 1.0) ÷ 7
= 41.1 ÷ 7
= 5.87 mm.

(iii) Clearly, there are 5 days (Mon, Wed, Thu, Sat and Sun), when the rainfall was less than the mean, i.e., 5.87 mm.

6. If the heights of 5 persons are 140 cm, 150 cm, 152 cm, 158 cm and 161 cm respectively, find the mean height.

Solution:
The mean height = Sum of the heights /Total number of persons
= (140 + 150 + 152 + 158 + 161) ÷ 5
= 761 ÷ 5
= 152.2 cm.

7. Find the mean of 994, 996, 998, 1002 and 1000.

Solution:
Mean = Sum of the given numbers/Total number of given numbers
Mean = (994 + 996 + 998 + 1002 + 1000) ÷ 5
= 4990 ÷ 5
= 998.

mc24 Myclass24 Your Class. Your Pace.

8. Find the mean of first five natural numbers.

Solution:
We know that first five natural numbers = 1, 2, 3, 4 and 5
Mean of first five natural numbers = (1 + 2 + 3 + 4 + 5) ÷ 5
= 15 ÷ 5
= 3

9. Find the mean of all factors of 10.

Solution:
We know that factors of 10 are 1, 2, 5 and 10
Arithmetic mean of all factors of 10 = (1 + 2 + 5 + 10) ÷ 4
= 18 ÷ 4
= 4.5

10. Find the mean of first 10 even natural numbers.

Solution:
The first 10 even natural numbers are 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20.
Mean of first 10 even natural numbers = (2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20) ÷ 10
= 110 ÷ 10
= 11

11. Find the mean of x, x + 2, x + 4, x + 6, x + 8

Solution:
Mean = Sum of observations ÷ Number of observations
Mean = (x + x + 2 + x + 4 + x + 6 + x + 8) ÷ 5
Mean = (5x + 20) ÷ 5
Mean = 5 (x + 4) ÷ 5
Mean = x + 4

12. Find the mean of first five multiples of 3.

mc24 Myclass24 Your Class. Your Pace.

Solution:
The first five multiples of 3 are 3, 6, 9, 12 and 15.
Mean of first five multiples of 3 are = (3 + 6 + 9 + 12 + 15) ÷ 5
= 45 ÷ 5
= 9

13. Following are the weights (in kg) of 10 new born babies in a hospital on a particular day: 3.4, 3.6, 4.2, 4.5, 3.9, 4.1, 3.8, 4.5, 4.4, 3.6 Find the mean $\overline{X}$

Solution:
We know that
$\overline{X}$ = sum of observations/ number of observations
= sum of weights of babies/ number of babies
$\overline{X}$ = (3.4 + 3.6 + 4.2 + 4.5 + 3.9 + 4.1 + 3.8 + 4.5 + 4.4 + 3.6) ÷ 10
$\overline{X}$ = (40) ÷ 10
$\overline{X}$ = 4 kg

14. The percentage of marks obtained by students of a class in mathematics are:

64, 36, 47, 23, 0, 19, 81, 93, 72, 35, 3, 1 Find their mean.

Solution:
Mean = sum of the marks obtained/ total number of students
= (64 + 36 + 47 + 23 + 0 + 19 + 81 + 93 + 72 + 35 + 3 + 1) ÷ 12
= 474 ÷ 12
= 39.5%

15. The numbers of children in 10 families of a locality are:
2, 4, 3, 4, 2, 3, 5, 1, 1, 5 Find the mean number of children per family.

Solution:
Mean number of children per family = sum of total number of children / total number of families
= (2 + 4 + 3 + 4 + 2 + 3 + 5 + 1 + 1 + 5) ÷ 10
= 30 ÷ 10
= 3
Thus, on an average there are 3 children per family in the locality.

16. The mean of marks scored by 100 students was found to be 40. Later on it was discovered that a score of 53 was misread as 83. Find the correct mean.

Solution:
Given n = the number of observations = 100, Mean = 40
Mean = sum of observations/total number of observations
40 = sum of the observations/ 100
Sum of the observations = 40 x 100
Thus, the incorrect sum of the observations = 40 x 100 = 4000.
Now,
The correct sum of the observations = Incorrect sum of the observations – Incorrect observation + Correct observation
The correct sum of the observations = 4000 – 83 + 53
The correct sum of the observations = 4000 – 30 = 3970
Correct mean = correct sum of the observations/ number of observations
= 3970/100
= 39.7

mc24 Myclass24 Your Class. Your Pace.

17. The mean of five numbers is 27. If one number is excluded, their mean is 25. Find the excluded number.

Solution:
We know that
Mean = sum of five numbers/5 = 27
So, sum of the five numbers = 5 x 27 = 135.
Now,
The mean of four numbers = sum of the four numbers/4 = 25
So, sum of the four numbers = 4 x 25 = 100.
Therefore, the excluded number = Sum of the five number – Sum of the four numbers
The excluded number = 135 – 100
= 35.

18. The mean weight per student in a group of 7 students is 55 kg. The individual weights of 6 of them (in kg) are 52, 54, 55, 53, 56 and 54. Find the weight of the seventh student.

mc24 Myclass24 Your Class. Your Pace.

Solution:
We know that
Mean = sum of weights of students/ number of students
Let the weight of the seventh student be x kg.
Mean = (52 + 54 + 55 + 53 + 56 + 54 + x)/ 7
55 = (52 + 54 + 55 + 53 + 56 + 54 + x)/ 7
55 x 7 = 324 + x
385 = 324 + x
x = 385 – 324
x = 61 kg.
Therefore weight of seventh student is 61kg.

19. The mean weight of 8 numbers is 15 kg. If each number is multiplied by 2, what will be the new mean?

Solution:
Let x_1, x_2, $x_3 \ldots x_8$ be the eight numbers whose mean is 15 kg. Then,
$15 = x_1 + x_2 + x_3 + \ldots\ldots + x_8 /8$
$x_1 + x_2 + x_3 + \ldots + x_8 = 15 \times 8$

$x_1 + x_2 + x_3 + \ldots + x_8 = 120$.
Let the new numbers be $2x_1, 2x_2, 2x_3 \ldots 2x_8$.
Let M be the arithmetic mean of the new numbers.
Then,
$M = 2x_1 + 2x_2 + 2x_3 + \ldots + 2x_8/8$
$M = 2 (x_1 + x_2 + x_3 + \ldots + x_8)/8$
$M = (2 \times 120)/8$
$= 30$

20. The mean of 5 numbers is 18. If one number is excluded, their mean is 16. Find the excluded number.

Solution:
Let x_1, x_2, x_3, x_4 and x_5 be five numbers whose mean is 18. Then,
18 = Sum of five numbers ÷ 5
Hence, sum of five numbers = 18 × 5 = 90
Now, if one number is excluded, then their mean is 16.
So,
16 = Sum of four numbers ÷ 4
Therefore sum of four numbers = 16 × 4 = 64.
The excluded number = Sum of five observations – Sum of four observations
The excluded number = 90 – 64
Therefore The excluded number = 26.

21. The mean of 200 items was 50. Later on, it was discovered that the two items were misread as 92 and 8 instead of 192 and 88. Find the correct mean.

Solution:
Given n = Number of observations = 200
Mean = sum of observations/ number of observations
50 = sum of observations/ 200
Sum of the observations = 50 x 200 = 10,000.
Thus, the incorrect sum of the observations = 50 x 200
Now,
The correct sum of the observations = Incorrect sum of the observations – Incorrect observations + Correct observations
Correct sum of the observations = 10,000 – (92 + 8) + (192 + 88)

Correct sum of the observations = 10,000 – 100 + 280
Correct sum of the observations = 9900 + 280
Correct sum of the observations = 10,180.
Therefore correct mean = correct sum of the observations/ number of observations
= 10180/200
= 50.9

22. The mean of 5 numbers is 27. If one more number is included, then the mean is 25. Find the included number.

Solution:
Given Mean = Sum of five numbers ÷ 5
Sum of the five numbers = 27 × 5 = 135.
Now, New mean = 25
25 = Sum of six numbers ÷ 6
Sum of the six numbers = 25 × 6 = 150.
The included number = Sum of the six numbers – Sum of the five numbers
The included number = 150 – 135
Therefore the included number = 15.

mc24 Myclass24 Your Class. Your Pace.

23. The mean of 75 numbers is 35. If each number is multiplied by 4, find the new mean.

Solution:
Let x_1, x_2, x_3…x_{75} be 75 numbers with their mean equal to 35. Then,
35 = $x_1 + x_2 + x_3 + \ldots + x_{75}/75$
$x_1 + x_2 + x_3 + \ldots + x_{75} = 35 \times 75$
$x_1 + x_2 + x_3 + \ldots + x_{75} = 2625$
The new numbers are 4 x 1, 4 x 2, 4 x 3…4 x 75
Let M be the arithmetic mean of the new numbers. Then,
$M = 4x_1 + 4x_2 + 4x_3 + \ldots + 4x_{75}/75$
$M = 4 (x_1 + x_2 + x_3 + \ldots + x_{75})/75$
M = (4 × 2625)/75
= 140