

Exercise:

1. Find the mean of 8, 6, 10, 12, 1, 3, 4, 4.

Solution:

Given data,

8, 6, 10, 12, 1, 3, 4, 4

Here, $n = 8$

$\therefore$ Mean ($\bar{x}$)

$$\begin{aligned}\Sigma x_i / n &= (8 + 6 + 10 + 12 + 1 + 3 + 4 + 4) / 8 \\ &= 48 / 8 = 8\end{aligned}$$

Therefore, mean of the given data is 8.

2. 5 people were asked about the time in a week they spend in doing social work in their community. They replied 10, 7, 13, 20 and 15 hours, respectively. Find the mean time in a week devoted by them for social work.

Solution:

Given data,

10, 7, 13, 20, 15

Here, $n = 5$

$\therefore$ Mean ($\bar{x}$)

$$\begin{aligned}\Sigma x_i / n &= (10 + 7 + 13 + 20 + 15) / 5 \\ &= 65 / 5 = 13\end{aligned}$$

Therefore, the mean time in a week devoted by them for social work is 13 hours.

3. The enrollment of a school during six consecutive years was as follows: 1620, 2060, 2540, 3250, 3500, 3710.

Find the mean enrollment.

Solution:

Given data,

1620, 2060, 2540, 3250, 3500, 3710

Here, $n = 6$

$\therefore$ Mean ($\bar{x}$)

$$\begin{aligned}\Sigma x_i / n &= (1620 + 2060 + 2540 + 3250 + 3500 + 3710) / 6 \\ &= 16680 / 6 = 2780\end{aligned}$$

Therefore, the mean enrollment is 2780.

4. Find the mean of the first twelve natural numbers.

Solution:

The first twelve natural numbers are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Here, $n = 12$

$\therefore$ Mean ($\bar{x}$)

$$\Sigma x_i / n = (1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12) / 12$$

$$= 78/12 = 6.5$$

Therefore, the mean of the first twelve natural numbers is 6.5

5. (i) Find the mean of the first six prime numbers.

(ii) Find the mean of the first seven odd prime numbers.

Solution:

(i) First 6 prime numbers are 2, 3, 5, 7, 11, 13

Here, $n = 6$

$\therefore$ Mean ($\bar{x}$)

$$\begin{aligned}\sum x_i / n &= (2 + 3 + 5 + 7 + 11 + 13) / 6 \\ &= 41/6\end{aligned}$$

Therefore, the mean of the first six prime numbers is $41/6$.

(ii) First seven odd prime numbers are 3, 5, 7, 11, 13, 17, 19

Here, $n = 7$

$\therefore$ Mean ($\bar{x}$)

$$\begin{aligned}\sum x_i / n &= (3 + 5 + 7 + 11 + 13 + 17 + 19) / 7 \\ &= 75/7\end{aligned}$$

Therefore, the mean of the first six prime numbers is $75/7$.

6. (i) The marks (out of 100) obtained by a group of students in a Mathematics test are 81, 72, 90, 90, 85, 86, 70, 93 and 71. Find the mean marks obtained by the group of students.

(ii) The mean of the age of three students Vijay, Rahul and Rakhi is 15 years. If their ages are in the ratio 4 : 5 : 6 respectively, then find their ages.

Solution:

(i) The marks obtained by the group of students are:

81, 72, 90, 90, 85, 86, 70, 93, 71

Here, $n = 9$

$\therefore$ Mean ($\bar{x}$)

$$\begin{aligned}\sum x_i / n &= (81 + 72 + 90 + 90 + 85 + 86 + 70 + 93 + 71) / 9 \\ &= 738/9 = 82\end{aligned}$$

Therefore, the mean marks obtained by the group of students is 82.

(ii) Given, the mean of the age of three students Vijay, Rahul and Rakhi is 15 years.

So, $n = 3$

Now, the sum of ages of the 3 students = $15 \times 3 = 45$

Also given, ratio of their ages is 4 : 5 : 6

Sum of ratios = $4 + 5 + 6 = 15$

Hence,

Vijay's age = $(45/15) \times 4 = 12$ years

Rahul's age = $(45/15) \times 5 = 15$ years

Rakhi's age = $(45/15) \times 6 = 18$ years

7. The mean of 5 numbers is 20. If one number is excluded, mean of the remaining numbers

becomes 23. Find the excluded number.

Solution:

Given,

The mean of 5 numbers = 20

So, the total sum of the numbers = $20 \times 5 = 100$

After excluding one number,

The mean of the remaining 4 numbers = 23

So, the total sum of these numbers = $23 \times 4 = 92$

Hence,

The excluded number is = $100 - 92 = 8$.

8. The mean of 25 observations is 27. If one observation is included, the mean still remains 27.

Find the included observation.

Solution:

Given,

The mean of 25 observations is 27.

So,

The total sum of all the 25 observations = $27 \times 25 = 675$

After one observation is included,

Now the mean of 26 (25 + 1) numbers = 27

So,

The total sum of all the 26 observations = $27 \times 26 = 702$

Hence,

The included observation = $702 - 675 = 27$

9. The mean of 5 observations is 15. If the mean of first three observations is 14 and that of the last three is 17, find the third observation.

Solution:

Given,

The mean of 5 observations = 15

So, total sum of the 5 observations = $15 \times 5 = 75$

Also given,

Mean of first 3 observations = 14

So, the sum of the 3 observations = $14 \times 3 = 42$

And, the mean of last 3 observations = 17

So, the sum of last 3 observations = $17 \times 3 = 51$

Thus, the total of 3 + 3 observations = $42 + 51 = 93$

Hence,

The third observation = $93 - 75 = 18$.

10. The mean of 8 variate is 10.5. If seven of them are 3, 15, 7, 19, 2, 17 and 8 then find the 8th variate.

Solution:

Given,

Seven out of eight variates are: 3, 15, 7, 19, 2, 17 and 8

Mean of 8 variates = 10.5

So, the total of 8 variates = $10.5 \times 8 = 84$

Now,

Sum of seven variates = $(3 + 15 + 7 + 19 + 2 + 17 + 8) = 71$

Hence,

The 8th variate = $84 - 71 = 13$.

11. The mean weight of 8 students is 45.5 kg. Two more students having weights 41.7 kg and 53.3 kg join the group. What is the new mean weight?

Solution:

Given,

The mean weight of 8 students = 45.5 kg

So, the total weight of 8 students = $45.5 \times 8 = 364$ kg

Weight of two more students are 41.7 kg and 53.3 kg

Now,

The total weight of 10 (8 + 2) students = $364 + 41.7 + 53.3$
 $= 364 + 95$
 $= 459$ kg

Hence, the new mean weight of all the 10 students = $459/10 = 45.9$ kg

12. Mean of 9 observations was found to be 35. Later on, it was detected that an observation 81 was misread as 18. Find the correct mean of the observations.

Solution:

Given,

Mean of 9 observations = 35

So, the sum of all 9 observations = $35 \times 9 = 315$

Now, the difference due to misread = $81 - 18 = 63$

Thus, the actual sum = $315 + 63 = 378$

Hence,

The actual mean = $378/9 = 42$.

13. A student scored the following marks in 11 questions of a question paper:

7, 3, 4, 1, 5, 8, 2, 2, 5, 7, 6.

Find the median marks.

Solution:

Given,

Marks scored in 11 questions of a question paper by the student are:

7, 3, 4, 1, 5, 8, 2, 2, 5, 7, 6

Arranging it in descending order, we have

1, 2, 2, 3, 4, 5, 5, 6, 7, 7, 8

Here, $n = 11$ which is odd

$$\begin{aligned}\therefore \text{Median} &= (n + 1)/2^{\text{th}} \text{ term} \\ &= (11 + 1)/2 = 12/2 = 6^{\text{th}} \text{ term i.e. } 5\end{aligned}$$

Hence, the median mark is 5.

14. In a Science test given to a group of students, the marks scored by them (out of 100) are 1, 39, 52, 48, 54, 62, 46, 52, 40, 96, 42, 40, 98, 60, 52.

Find the mean and median of this data.

Solution:

On arranging the marks obtained by the students, we have

39, 40, 40, 41, 42, 46, 48, 52, 52, 52, 54, 60, 62, 96, 98

Here, $n = 15$ which is odd

$\therefore$ Mean ($\bar{x}$)

$$\begin{aligned}\Sigma x_i / n &= (39 + 40 + 40 + 41 + 42 + 46 + 48 + 52 + 52 + 52 + 54 + 60 + 62 + 96 + 98) / 15 \\ &= 822 / 15 = 54.8\end{aligned}$$

And,

$$\begin{aligned}\text{Median} &= (15 + 1)/2^{\text{th}} \text{ term} \\ &= 16/2 = 8^{\text{th}} \text{ term i.e. } 52\end{aligned}$$

Therefore, for the given data mean = 54.8 and median = 52.

15. The points scored by a Kabaddi team in a series of matches are as follow

17, 2, 5, 27, 15, 8, 14, 10, 48, 10, 7, 24, 8, 28, 18.

Find the mean and the median of the points scored by the Kabaddi team

Solution:

Let's arrange the given data in descending order:

2, 5, 7, 7, 8, 8, 10, 10, 14, 15, 17, 18, 24, 27, 28, 48

Here, $n = 16$ when is even

$\therefore$ Mean ($\bar{x}$)

$$\begin{aligned}\Sigma x_i / n &= (2 + 5 + 7 + 7 + 8 + 8 + 10 + 10 + 14 + 15 + 17 + 18 + 24 + 27 + 28 + 48) / 16 \\ &= 248 / 16 = 15.5\end{aligned}$$

And,

$$\begin{aligned}\text{Median} &= \frac{1}{2} [(16/2)^{\text{th}} \text{ term} + (16/2 + 1)^{\text{th}} \text{ term}] \\ &= \frac{1}{2} (8^{\text{th}} \text{ term} + 9^{\text{th}} \text{ term}) \\ &= \frac{1}{2} (10 + 14) \\ &= \frac{1}{2} \times 24 = 12\end{aligned}$$

Therefore, the mean and the median of the points scored by the Kabaddi team are 15.5 and 12 respectively.

16. The following observations have been arranged in ascending order. If the median the data is 47.5, find the value of x.

17, 21, 23, 29, 39, 40, x, 50, 51, 54, 59, 67, 91, 93

Solution:

Given data,

17, 21, 23, 29, 39, 40, x, 50, 51, 54, 59, 67, 91, 93

Here, $n = 14$ which is even

As the given data is arranged in descending order

$$\text{Median} = \frac{1}{2} [(14/2)^{\text{th}} \text{ term} + (14/2 + 1)^{\text{th}} \text{ term}]$$

$$= \frac{1}{2} (7^{\text{th}} \text{ term} + 8^{\text{th}} \text{ term})$$

$$\Rightarrow 47.5 = \frac{1}{2} (x + 50)$$

$$95 = x + 50$$

$$x = 95 - 50 = 45$$

Hence, the value of x is 45.

17. The following observations have been arranged in ascending order. If the median the data is 13, find the value of x.

3, 6, 7, 10, x, x + 4, 19, 20, 25, 28.

Solution:

Given observations in ascending order,

3, 6, 7, 10, x, x + 4, 19, 20, 25, 28

Here, $n = 10$ which is even and median = 13

So,

$$\text{Median} = \frac{1}{2} [(10/2)^{\text{th}} \text{ term} + (10/2 + 1)^{\text{th}} \text{ term}]$$

$$= \frac{1}{2} (5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term})$$

$$= \frac{1}{2} (x + x + 4)$$

$$= (2x + 4)/2$$

$$= x + 2$$

$$\Rightarrow x + 2 = 13$$

$$x = 13 - 2 = 11$$

Hence, the value of x is 11.

18. State which of the following variables are continuous and which are discrete:

(i) marks scored (out of 50) in a test.

(ii) daily temperature of your city.

(iii) sizes of shoes.

(iv) distance travelled by a man.

(v) time.

Solution:

(i) Discrete

(ii) Continuous

(iii) Discrete

(iv) Continuous

(v) Continuous

19. A Explain the meaning of the following terms :

(i) variate

(ii) class size

(iii) class mark

- (iv) class limits
- (v) true class limits
- (vi) frequency of a class
- (vii) cumulative frequency of a class.

Solution:

- (i) Variant: A particular value of a variable is called variate.
- (ii) Class size: The difference between the actual upper limit and the actual lower limit of a class is called its class size.
- (iii) Class mark: The class mark of a class is the value midway between its actual lower limit and actual upper limit.
- (iv) Class limits: In the frequency table the class interval is called class limits.
- (v) True class limits: In a continuous distribution, the class limits are called true or actual class limits.
- (vi) Frequency of a class: The number of tally marks opposite to a variate is its frequency and it is written in the next column opposite to tally marks of the variate.
- (vii) Cumulative frequency of a class: The sum of frequency of all previous classes and that particular class is called the cumulative frequency of the class.

20. Fill in the blanks:

- (i) The number of observations in a particular class is called of the class.
- (ii) The difference between the class marks of two consecutive classes is the of the class.
- (iii) The range of the data 16, 19, 23, 13, 11, 25, 18 is ...
- (iv) The mid-point of the class interval is called its ...
- (v) The class mark of the class 4 – 9 is

Solution:

- (i) The number of observations in a particular class is called frequency of the class.
- (ii) The difference between the class marks of two consecutive classes is the size of the class.
- (iii) The range of the data 16, 19, 23, 13, 11, 25, 18 is 14.
- (iv) The mid-point of the class interval is called its class marks.
- (v) The class mark of the class 4 – 9 is 6.5. [Class mark = $(4 + 9)/2 = 13/2 = 6.5$]

21. The marks obtained (out of 50) by 40 students in a test are given below:

28, 31, 45, 03, 05, 18, 35, 46, 49, 17, 10, 28, 31, 36, 40, 44, 47, 13, 19, 25, 24, 31, 38, 32, 27, 19, 25, 28, 48, 15, 18, 31, 37, 46, 06, 01, 20, 10, 45, 02.

- (i) Taking class intervals 1- 10, 11 – 20, .., construct a tally chart and a frequency distribution table.
- (ii) Convert the above distribution to continuous distribution.
- (iii) State the true class limits of the third class.
- (iv) State the class mark of the fourth class.

Solution:

- (i) A tally chart and a frequency distribution of given data is

Class	Tally	Frequency
1 - 10	 	7
11 - 20	 	8
21 - 30	 	7
31 - 40	 	10
41 - 50	 	8

(ii) Converting the above distribution to continuous distribution.

Class	Tally	Frequency
0.5 - 10.5	 	7
10.5 - 20.5	 	8
20.5 - 30.5	 	7
30.5 - 40.5	 	10
40.5 - 50.5	 	8

(iii) The true class limits of the third class = lower limit = 20.5 and upper limit = 30.5

(iv) The class mark of the fourth class $(31 + 40)/2 = 71/2 = 35.5$

22. The water bills (in rupees) of 32 houses in a locality are given below. Construct a frequency distribution table with a class size of 10.

80, 48, 52, 78, 103, 85, 37, 94, 72, 73, 66, 52, 92, 85, 78, 81, 64, 60, 75, 78, 108, 63, 71, 54, 59, 75, 100, 103, 35, 89, 95, 73.

Solution:

A frequency distribution with a class size of 10 is follows:

Class	Tally marks	Frequency
30 - 40		2
40 - 50		1
50 - 60		4
60 - 70		4
70 - 80	 	9

80 – 90		5
90 – 100		3
100 - 110		4

