# D Sharma Solutions for Class 9 Chapter 24 Measure of Central Tendency

**Question 1: 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 heights of 5 persons are 140 cm , 150 cm , 152 cm , 158 cm and 161 cm (Given)

Mean height = (Sum of heights) / (Total number of persons)

Sum of heights = 140 + 150 + 152 + 158 + 161 = 761

Total number of persons = 5

So, Mean height = 761/5 =152.2

**Question 2: Find the mean of 994 , 996 , 998 , 1002 , 1000.**

**Solution:**

Sum of numbers = 994+996+998+1000+100 = 4990

Total counts = 5

Therefore, Mean = (Sum of numbers)/(Total Counts)

= 4990/5

= 998

Mean = 998

**Question 3: Find the mean of first five natural numbers.**

**Solution:**

First five natural numbers are 1 , 2 , 3 , 4 , 5.

Sum of all the numbers = 1+2+3+4+5 = 15

Total Numbers = 5

Therefore, Mean = (Sum of numbers)/(Total Numbers)

= 15/5

= 3

Mean = 3

**Question 4: Find the mean of all factors of 10.**

**Solution:**

Factors of 10 are 1, 2, 5, 10.

Sum of all the factors = 1+2+5+10 = 18

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Total Numbers = 4

Therefore, Mean = (Sum of factors)/(Total Numbers)

= 18/4

= 4.5

Mean = 4.5

**Question 5: Find the mean of first 10 even natural numbers.**

**Solution:**

First 10 even natural numbers = 2 , 4 , 6 , 8 , 10 , 12 , 14 , 16 , 18 , 20

Sum of numbers = 2+4+6+8+10+12+14+16+18+20 = 110

Total Numbers = 10

Now,

Mean = (Sum of numbers) / (Total Numbers)

= 110/10

Mean = 11

**Question 6: Find the mean of x , x + 2 , x + 4 , x + 6 , x + 8.**

**Solution:**

Given numbers are x , x + 2 , x + 4 , x + 6 , x + 8.

Sum of numbers = x+(x+2) + (x+4) + (x+6) + (x+8) = 5x+20

Total Numbers = 5

Now,

Mean = (Sum of numbers) / (Total Numbers)

= (5x+20)/5

= 5(x + 4)/5

= x + 4

Mean = x + 4

**Question 7: Find the mean of first five multiples of 3.**

**Solution:**

First five multiples of 3 are 3 , 6 , 9 , 12 , 15.

Sum of numbers = 3+6+9+12+15 = 45

Total Numbers = 5

Now,

Mean = (Sum of numbers) / (Total Numbers)

= 45/5

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=9

Mean = 9

**Question 8: 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.**

**Solution:**

The weights of 10 new born babies (in kg): 3.4 , 3 .6 , 4.2 , 4.5 , 3.9 , 4.1 , 3.8 , 4.5 , 4.4 , 3.6

Sum of weights = 3.4+3.6+4.2+4.5+3.9+4.1+3.8+4.5+4.4+3.6 = 40

Total number of babies = 10

No, Mean = (Sum of weights) / (Total number of babies)

= 40/10

= 4

Mean weight = 4 kg

**Question 9: The percentage 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:**

The percentage marks obtained by students: 64 , 36 , 47 , 23 , 0 , 19 , 81 , 93 , 72 , 35 , 3 , 1

Sum of marks = 64+36+47+23+0+19+81+93+72+35+3+1 = 474

Total students = 12

Now, Mean marks = (Sum of marks ) / (Total students )

=474/12

= 39.5

Mean Marks = 39.5

**Question 10: The numbers of children in 10 families of a locality are:**

**2 , 4 , 3 , 4 , 2 , 3 , 5 , 1 , 1 , 5. Find the number of children per family.**

**Solution:**

The numbers of children in 10 families: 2 , 4 , 3 , 4 , 2 , 3 , 5 , 1 , 1 , 5

Total number of children = 2+4+3+4+2+3+5+1+1+5 = 30

Total Families = 10

Number of children per family = Mean = (Total number of children) / (Total Families) = 30/10

= 3

Therefore, Number of children per family is 3.

## Exercise 24.2 Page No: 24.14

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**Question 1: Calculate the mean for the following distribution:**

| x : | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|
| f : | 4 | 8 | 14 | 11 | 3 |

**Solution:**

| x | f | fx |
|---|---|---|
| 5 | 4 | 20 |
| 6 | 8 | 48 |
| 7 | 14 | 98 |
| 8 | 11 | 88 |
| 9 | 3 | 27 |
| | N=40 | $\sum fx = 281$ |

Formula to calculate mean:

$$Mean(\bar{x}) = \frac{\sum fx}{N}$$

= 281/40

= 7.025

⇒ Mean for the given distribution is 7.025.

**Question 2: Find the mean of the following data:**

| x : | 19 | 21 | 23 | 25 | 27 | 29 | 31 |
|---|---|---|---|---|---|---|---|
| f : | 13 | 15 | 16 | 18 | 16 | 15 | 13 |

**Solution:**

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| x | f | fx |
|---|---|---|
| 19 | 13 | 247 |
| 21 | 15 | 315 |
| 23 | 16 | 368 |
| 25 | 18 | 450 |
| 27 | 16 | 432 |
| 29 | 15 | 435 |
| 31 | 13 | 403 |
| | N=106 | $\sum fx = 2650$ |

Formula to calculate mean:

$$Mean(\bar{x}) = \frac{\sum fx}{N}$$

= 2650/106

= 25

⇒ Mean for the given data is 25.

**Question 3: The mean of the following data is 20.6 .Find the value of p.**

| x : | 10 | 15 | p | 25 | 35 |
|---|---|---|---|---|---|
| f : | 3 | 10 | 25 | 7 | 5 |

**Solution:**

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| x | f | fx |
|---|---|---|
| 10 | 3 | 30 |
| 15 | 10 | 150 |
| p | 25 | 25p |
| 25 | 7 | 175 |
| 35 | 5 | 175 |
| | N = 50 | $\sum fx = 25p + 530$ |

Formula to calculate mean:

$$Mean(\bar{x}) = \frac{\sum fx}{N}$$

= (25p + 530)/50

Mean = 20.6 (Given)

So,

20.6 = (25p + 530)/50

25p + 530 = 1030

25p = 1030 − 530 = 500

or p = 20

⇒ The value of p is 20.

**Question 4: If the mean of the following data is 15, find p.**

| x : | 5 | 10 | 15 | 20 | 25 |
|---|---|---|---|---|---|
| f : | 6 | p | 6 | 10 | 5 |

**Solution:**

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| x | f | fx |
|---|---|---|
| 5 | 6 | 30 |
| 10 | p | 10p |
| 15 | 6 | 90 |
| 20 | 10 | 200 |
| 25 | 5 | 125 |
| | N=p+27 | $\sum fx = 10p + 445$ |

Formula to calculate mean:

$$Mean(\bar{x}) = \frac{\sum fx}{N}$$

= (10p + 445)/(p + 27)

Mean = 15 (Given)

So, (10p + 445)/(p + 27) = 15

10p + 445 = 15(p + 27)

10p – 15p = 405 – 445 = -40

-5p = -40

or p = 8

⇒ The value of p is 8.

**Question 5: Find the value of p for the following distribution whose mean is 16.6.**

| x : | 8 | 12 | 15 | p | 20 | 25 | 30 |
|---|---|---|---|---|---|---|---|
| f : | 12 | 16 | 20 | 24 | 16 | 8 | 4 |

**Solution:**

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| x | f | fx |
|---|---|---|
| 8 | 12 | 96 |
| 12 | 16 | 192 |
| 15 | 20 | 300 |
| p | 24 | 24p |
| 20 | 16 | 320 |
| 25 | 8 | 200 |
| 30 | 4 | 120 |
| | N=100 | $\sum fx = 24p + 1228$ |

Formula to calculate mean:

$$Mean(\bar{x}) = \frac{\sum fx}{N}$$

= (24p + 1228)/100

Mean = 16.6 (given)

So, (24p + 1228)/100 = 16.6

24p + 1228 = 1660

24p = 1660 – 1228 = 432

p = 432/24 = 18

⇒ The value of p is 18.

**Question 6: Find the missing value of p for the following distribution whose mean is 12.58.**

| x : | 5 | 8 | 10 | 12 | p | 20 | 25 |
|---|---|---|---|---|---|---|---|
| f : | 2 | 5 | 8 | 22 | 7 | 4 | 2 |

**Solution:**

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| x | f | fx |
|---|---|---|
| 5 | 2 | 10 |
| 8 | 5 | 40 |
| 10 | 8 | 80 |
| 12 | 22 | 264 |
| p | 7 | 7p |
| 20 | 4 | 80 |
| 25 | 2 | 50 |
| | N = 50 | $\sum fx = 7p + 524$ |

Formula to calculate mean:

$$Mean(\bar{x}) = \frac{\sum fx}{N}$$

= (7p + 524)/50

Mean = 12.58 (given)

So, (7p + 524)/50 = 12.58

7p + 524 = 12.58 x 50

7p + 524 = 629

7p = 629 – 524 = 105

p = 105/7 = 15

⇒ The value of p is 15.

**Question 7: Find the missing frequency (p) for the following distribution whose mean is 7.68.**

| x : | 3 | 5 | 7 | 9 | 11 | 13 |
|---|---|---|---|---|---|---|
| f : | 6 | 8 | 15 | p | 8 | 4 |

**Solution:**

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| x | f | fx |
|---|---|---|
| 3 | 6 | 18 |
| 5 | 8 | 40 |
| 7 | 15 | 105 |
| 9 | p | 9p |
| 11 | 8 | 88 |
| 13 | 4 | 52 |
| | N=p+41 | $\sum fx = 9p + 303$ |

Formula to calculate mean:

$$Mean(\bar{x}) = \frac{\sum fx}{N}$$

= (9p + 303)/(p+41)

Mean = 7.68 (given)

So, (9p + 303)/(p+41) = 7.68

9p + 303 = 7.68 (p + 41)

9p + 303 = 7.68p + 314.88

9p − 7.68p = 314.88 − 303

1.32p = 11.88

or p = (11.881)/(1.32) = 9

⇒ The value of p is 9.

## Exercise 24.3 Page No: 24.18

**Question 1: Find the median of the following data:**

**83 , 37 , 70 , 29 , 45 , 63 , 41 , 70 , 34 , 54**

**Solution:**

Arranging given numbers in ascending order:

29 , 34 , 37 , 41 , 45 , 54 , 63 , 70 , 70 , 83

Here, Total number of terms = n = 10 (even)

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$$\therefore median = \frac{\frac{n}{2}th\ value + \left(\frac{n}{2}+1\right)th\ value}{2}$$

$$= \frac{\frac{10}{2}th\ value + \left(\frac{10}{2}+1\right)th\ value}{2}$$

$$= \frac{5th\ value + 6th\ value}{2}$$

$$= \frac{45+54}{2}$$

$$= \frac{99}{2} = 49.5$$

**Question 2: Find the median of the following data:**

**133 , 73 , 89 , 108 , 94 , 104 , 94 , 85 , 100 , 120**

**Solution:**

Arranging given numbers in ascending order:

73 , 85 , 89 ,94 , 94 , 100 , 104 , 108 , 120 , 133

Here, total number of terms = n = 10 (even)

$$\therefore median = \frac{\frac{n}{2}th\ value + \left(\frac{n}{2}+1\right)th\ value}{2}$$

$$= \frac{\frac{10}{2}th\ value + \left(\frac{10}{2}+1\right)th\ value}{2}$$

$$= \frac{5th\ value + 6th\ value}{2}$$

$$= \frac{94+100}{2}$$

$$= \frac{194}{2} = 97$$

**Question 3: Find the median of the following data:**

**31 , 38 , 27 , 28 , 36 , 25 , 35 , 40**

**Solution:**

Arranging given numbers in ascending order

25 , 27 , 28 , 31 , 35 , 36 , 38 , 40

Here, total number of terms = n = 8 (even)

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$$\therefore median = \frac{\frac{n}{2}th\ value + \left(\frac{n}{2}+1\right)th\ value}{2}$$

$$= \frac{\frac{8}{2}th\ value + \left(\frac{8}{2}+1\right)th\ value}{2}$$

$$= \frac{4th\ value + 5th\ value}{2}$$

$$= \frac{31+35}{2}$$

$$= \frac{66}{2} = 33$$

**Question 4: Find the median of the following data:**

15 , 6 , 16 , 8 , 22 , 21 , 9 , 18 , 25

**Solution:**

Arranging given numbers in ascending order

6 , 8 , 9 , 15 , 16 , 18, 21 , 22 , 25

Here, total number of terms = n = 9 (odd)

$$\therefore Median = \left(\frac{n+1}{2}\right) th \text{ term}$$

$$= \left(\frac{9+1}{2}\right) th \text{ term}$$

$$= 5th \text{ term } = 16$$

**Question 5: Find the median of the following data:**

**41 , 43 , 127 , 99 , 71 , 92 , 71 , 58 , 57**

**Solution:**

Arranging given numbers in ascending order

41 , 43 , 57 , 58 , 71 , 71 , 92 , 99 , 127

Here, total number of terms = n = 9 (odd)

$$\therefore Median = \left(\frac{n+1}{2}\right) th \text{ term}$$

$$= \left(\frac{9+1}{2}\right) th \text{ term}$$

$$= 5th \text{ term } = 71$$

**Question 6: Find the median of the following data:**

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**25 , 34 , 31 , 23 , 22 , 26 , 35 , 29 , 20 , 32**

**Solution:**

Arranging given numbers in ascending order

20 , 22 , 23 , 25 , 26 , 29 , 31 , 32 , 34 , 35

Here, total number of terms = n = 10 (even)

$$\therefore median = \frac{\frac{n}{2}th\ value + \left(\frac{n}{2}+1\right)th\ value}{2}$$

$$= \frac{\frac{10}{2}th\ value + \left(\frac{10}{2}+1\right)th\ value}{2}$$

$$= \frac{5th\ value + 6th\ value}{2}$$

$$= \frac{26+29}{2}$$

$$= \frac{55}{2} = 27.5$$

**Question 7: Find the median of the following data:**

**12 , 17 , 3 , 14 , 5 , 8 , 7 , 15**

**Solution:**

Arranging given numbers in ascending order

3 , 5 , 7 , 8 , 12 , 14 , 15 , 17

Here, total number of terms = n = 8(even)

$$\therefore median = \frac{\frac{n}{2}th\ value + \left(\frac{n}{2}+1\right)th\ value}{2}$$

$$= \frac{\frac{8}{2}th\ value + \left(\frac{8}{2}+1\right)th\ value}{2}$$

$$= \frac{4th\ value + 5th\ value}{2}$$

$$= \frac{8+12}{2}$$

$$= \frac{20}{2} = 10$$

**Question 8: Find the median of the following data:**

**92 , 35 , 67 , 85 , 72 , 81 , 56 , 51 , 42 , 69**

**Solution:**

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Arranging given numbers in ascending order

35 , 42 , 51 , 56 , 67 , 69 , 72 , 81 , 85 , 92

Here, total number of terms = n = 10(even)

$$\therefore median = \frac{\frac{n}{2}th\ value + \left(\frac{n}{2}+1\right)th\ value}{2}$$

$$= \frac{\frac{10}{2}th\ value + \left(\frac{10}{2}+1\right)th\ value}{2}$$

$$= \frac{5th\ value + 6th\ value}{2}$$

$$= \frac{67+69}{2}$$

$$= \frac{136}{2} = 68$$

## Exercise 24.4 Page No: 24.20

**Question 1: Find out the mode of the following marks obtained by 15 students in a class:**

**Marks : 4 , 6 , 5 , 7 , 9 , 8 , 10 , 4 , 7 , 6 , 5 , 9 , 8 , 7 , 7.**

**Solution:**

Mode is the value which occurs most frequently in a set of observations.

Frequency of given set of observations are:

| Marks | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| No.of Students | 2 | 2 | 2 | 4 | 2 | 2 | 1 |

Here, we can see that 7 occurred most frequently.

So, Mode = 7

**Question 2: Find out the mode from the following data :**

**125 , 175 , 225 , 125 , 225 , 175 , 325 , 125 , 375 , 225 , 125**

**Solution:**

Find the frequency of given set of observations:

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| Values | 125 | 175 | 225 | 325 | 375 |
|---|---|---|---|---|---|
| Frequency | 4 | 2 | 3 | 1 | 1 |

125 occurred for 4 times than any other values.

So, Mode = 125

**Question 3: Find the mode for the following series:**

**7.5 , 7.3 , 7.2 , 7.2 , 7.4 , 7.7 , 7.7 , 7.5 , 7.3 , 7.2 , 7.6 , 7.2**

**Solution:**

Find the frequency:

| Values | 7.2 | 7.3 | 7.4 | 7.5 | 7.6 | 7.7 |
|---|---|---|---|---|---|---|
| Frequency | 4 | 2 | 1 | 2 | 1 | 2 |

Maximum frequency 4 corresponds to the value 7.2.

So, mode = 7.2

## Exercise VSAQs Page No: 24.21

**Question 1: If the ratio of mean and median of a certain data is 2:3, then find the ratio of its mode and mean.**

**Solution:**

Empirical formula: Mode = 3 median – 2 mean

Since, ratio of mean and median of a certain data is 2:3, then mean = 2x and median = 3x

Mode = 3(3x) – 2(2x)

= 9x – 4x

= 5x

Therefore,

Mode: Mean = 5x:2x or 5: 2

**Question 2: If the ratio of mode and median of a certain data is 6 : 5, then find the ratio of its mean and median.**

**Solution:** We know, Empirical formula: Mode = 3 Median – 2 Mean

Since, ratio of mode and median of a certain data is 6:5.

⇒ Mode/Median = 6/5

or Mode = (6 Median)/5

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Now,

(6 Median)/5 = 3 Median – 2 Mean

(6 Median)/5 – 3 Median = – 2 Mean

or 9/10 (Median) = Mean

or Mean/ Median = 9/10 or 9:10.

**Question 3: If the mean of x+2, 2x+3, 3x+4, 4x+5 is x+2, find x.**

**Solution:**

Given: Mean of x+2, 2x+3, 3x+4, 4x+5 is x+2

We know, Mean = (Sum of all the observations) / (Total number of observations)

Sum of all the observations = x+2 + 2x+3 + 3x+4 + 4x+5 = 10x + 14

Total number of observations = 4

⇒ Mean = (10x + 14)/4

or (x + 2) = (10x + 14)/4 (using given)

4x + 8 = 10x + 14

x = -1

**Question 4: The arithmetic mean and mode of a data are 24 and 12 respectively, then find the median of the data.**

**Solution:**

Given: The arithmetic mean and mode of a data are 24 and 12 respectively

We know, Empirical formula: Mode = 3 Median – 2 Mean

or 3 Median = Mode + 2 Mean

Using given values, we get

3 Median = 12 + 2(24) = 60

or Median = 20

**Question 5: If the difference of mode and median of a data is 24, then find the difference of median and mean.**

**Solution:**

Given: difference of mode and median of a data is 24.

That is, Mode – Median = 24

or Mode = 24 + Median …(1)

We know, Empirical formula: Mode = 3 Median – 2 Mean

24 + Median = 3 Median – 2 Mean

(Using (1))

24 = 2 Median – 2 Mean

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or 12 = Median – Mean

Therefore, the difference of median and mean is 12.

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