## Class 9 -Chapter 24 Measure of Central Tendency

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## RD Sharma Solutions for Class 9 Maths Chapter 24–Measure of Central Tendency

Class 9: Maths Chapter 24 solutions. Complete Class 9 Maths Chapter 24 Notes.

# RD Sharma Solutions for Class 9 Maths Chapter 24–Measure of Central Tendency

RD Sharma 9th Maths Chapter 24, Class 9 Maths Chapter 24 solutions



#### Exercise 24.1 Page No: 24.9

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)



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= 15/5
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= 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

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

=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

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Sum of marks = 64+36+47+23+0+19+81+93+72+35+3+1 = 474
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Total students = 12

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

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

| <b>x</b> : | 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



 $\Rightarrow$  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:

| х  | 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

 $\Rightarrow$  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 | р  | 25 | 35 |
|-----|----|----|----|----|----|
| f : | 3  | 10 | 25 | 7  | 5  |

Solution:

| x  | f      | fx                    |
|----|--------|-----------------------|
|    |        |                       |
| 10 | 3      | 30                    |
| 15 | 10     | 150                   |
| р  | 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



 $\Rightarrow$  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 | р  | 6  | 10 | 5  |

#### Solution:

| x  | f      | fx                    |
|----|--------|-----------------------|
|    |        |                       |
| 5  | 6      | 30                    |
| 10 | р      | 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

 $\Rightarrow$  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 | р  | 20 | 25 | 30 |
|-----|----|----|----|----|----|----|----|
| f : | 12 | 16 | 20 | 24 | 16 | 8  | 4  |

Solution:

| x  | f     | fx                     |
|----|-------|------------------------|
| 8  | 12    | 96                     |
| 12 | 16    | 192                    |
| 15 | 20    | 300                    |
| р  | 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

p = 432/24 = 18

 $\Rightarrow$  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 | р | 20 | 25 |
|-----|---|---|----|----|---|----|----|
| f : | 2 | 5 | 8  | 22 | 7 | 4  | 2  |

Solution:

| 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

 $\Rightarrow$  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 | р | 8  | 4  |

Solution:

| х  | f      | fx                   |
|----|--------|----------------------|
|    |        |                      |
| 3  | 6      | 18                   |
| 5  | 8      | 40                   |
| 7  | 15     | 105                  |
| 9  | р      | 9р                   |
| 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  $\Rightarrow$  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:**



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#### 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)

$$\therefore median = \frac{\frac{n}{2}th \ value + \left(\frac{n}{2}+1\right)th \ value}{2}$$
$$= \frac{\frac{8}{2}th \ value + \left(\frac{8}{2}+1\right)th \ value}{2}$$
$$= \frac{4th \ value + 5th \ value}{2}$$
$$= \frac{31+35}{2}$$
$$= \frac{66}{2} = 33$$

#### 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 =  $n = 9 \pmod{100}$ 

$$\therefore Median = \left(\frac{n+1}{2}\right) th \text{ term}$$
$$= \left(\frac{9+1}{2}\right) th \text{ term}$$
$$= 5th \text{ term} = 71$$

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

 ${\tt 25}\;,\,{\tt 34}\;,\,{\tt 31}\;,\,{\tt 23}\;,\,{\tt 22}\;,\,{\tt 26}\;,\,{\tt 35}\;,\,{\tt 29}\;,\,{\tt 20}\;,\,{\tt 32}$ 

#### 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)



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 $\therefore median = \frac{\frac{n}{2}th \ value + \left(\frac{n}{2} + 1\right)th \ value}{2}$  $= \frac{\frac{10}{2}th \ value + \left(\frac{10}{2} + 1\right)th \ value}{2}$  $= \frac{5th \ value + 6th \ value}{2}$  $= \frac{26 + 29}{2}$  $= \frac{55}{2} = 27.5$ 

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:

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:

| 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

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

 $\Rightarrow$  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 =  $24 + Median \dots (1)$ 

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

24 + Median = 3 Median – 2 Mean



(Using (1))

24 = 2 Median – 2 Mean

or 12 = Median – Mean

Therefore, the difference of median and mean is 12.





# Chapterwise RD Sharma Solutions for Class 9 Maths :

- <u>Chapter 1–Number System</u>
- <u>Chapter 2–Exponents of Real</u>
  <u>Numbers</u>
- <u>Chapter 3–Rationalisation</u>
- <u>Chapter 4–Algebraic Identities</u>
- <u>Chapter 5–Factorization of</u> <u>Algebraic Expressions</u>
- <u>Chapter 6–Factorization Of</u> <u>Polynomials</u>
- <u>Chapter 7–Introduction to</u> <u>Euclid's Geometry</u>
- <u>Chapter 8–Lines and Angles</u>
- <u>Chapter 9–Triangle and its</u> <u>Angles</u>
- <u>Chapter 10–Congruent Triangles</u>
- <u>Chapter 11–Coordinate Geometry</u>
- <u>Chapter 12–Heron's Formula</u>
- <u>Chapter 13–Linear Equations in</u>
  <u>Two Variables</u>
- <u>Chapter 14–Quadrilaterals</u>

- <u>Chapter 15–Area of</u>
  <u>Parallelograms and Triangles</u>
- <u>Chapter 16–Circles</u>
- <u>Chapter 17–Construction</u>
- <u>Chapter 18–Surface Area and</u> <u>Volume of Cuboid and Cube</u>
- <u>Chapter 19–Surface Area and</u> <u>Volume of A Right Circular</u> <u>Cylinder</u>
- <u>Chapter 20–Surface Area and</u>
  <u>Volume of A Right Circular Cone</u>
- <u>Chapter 21–Surface Area And</u>
  <u>Volume Of Sphere</u>
- <u>Chapter 22–Tabular</u>
  <u>Representation of Statistical Data</u>
- <u>Chapter 23–Graphical</u>
  <u>Representation of Statistical Data</u>
- <u>Chapter 24–Measure of Central</u> <u>Tendency</u>
- <u>Chapter 25–Probability</u>



## **About RD Sharma**

RD Sharma isn't the kind of author you'd bump into at lit fests. But his bestselling books have helped many CBSE students lose their dread of maths. Sunday Times profiles the tutor turned internet star

He dreams of algorithms that would give most people nightmares. And, spends every waking hour thinking of ways to explain concepts like 'series solution of linear differential equations'. Meet Dr Ravi Dutt Sharma — mathematics teacher and author of 25 reference books — whose name evokes as much awe as the subject he teaches. And though students have used his thick tomes for the last 31 years to ace the dreaded maths exam, it's only recently that a spoof video turned the tutor into a YouTube star.

R D Sharma had a good laugh but said he shared little with his on-screen persona except for the love for maths. "I like to spend all my time thinking and writing about maths problems. I find it relaxing," he says. When he is not writing books explaining mathematical concepts for classes 6 to 12 and engineering students, Sharma is busy dispensing his duty as vice-principal and head of department of science and humanities at Delhi government's Guru Nanak Dev Institute of Technology.

