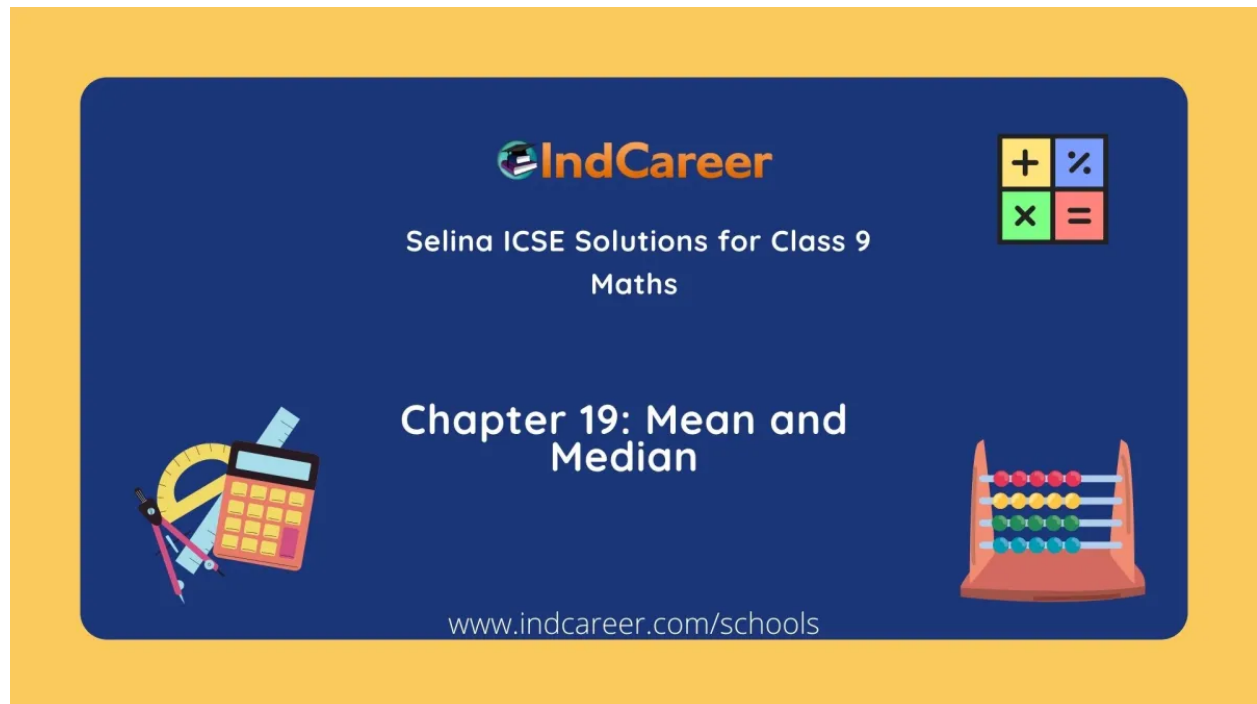


Selina Class 9 ICSE Solutions Mathematics :

Chapter 19- Mean and Median



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Selina Class 9 ICSE Solutions Mathematics :

Chapter 19- Mean and Median

Class 9: Maths Chapter 19 solutions. Complete Class 9 Maths Chapter 19 Notes.

Selina Class 9 ICSE Solutions Mathematics : Chapter 19- Mean and Median

Selina 9th Maths Chapter 19, Class 9 Maths Chapter 19 solutions

Exercise 19(A)

Solution 1:

The numbers given are 43, 51, 50, 57, 54

The mean of the given numbers will be

$$\begin{aligned} &= \frac{43 + 51 + 50 + 57 + 54}{5} \\ &= \frac{255}{5} \\ &= 51 \end{aligned}$$

Solution 2:

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The first six natural numbers are 1, 2, 3, 4, 5, 6

The mean of first six natural numbers

$$= \frac{1+2+3+4+5+6}{3}$$

$$= \frac{21}{3}$$

$$= 3.5$$

Solution 3:

The first ten odd natural numbers are 1, 3, 5, 7, 9, 11, 13, 15, 17, 19

The mean of first ten odd numbers

$$= \frac{1+3+5+7+9+11+13+15+17+19}{10}$$

$$= \frac{100}{10}$$

$$= 10$$

Solution 4:

The all factors of 10 are 1, 2, 5, 10

The mean of all factors of 10 are

$$= \frac{1+2+5+10}{4}$$

$$= \frac{18}{4}$$

$$= 4.5$$

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Solution 5:

The given values are $x + 3, x + 5, x + 7, x + 9, x + 11$

The mean of the values are

$$\begin{aligned} &= \frac{x + 3 + x + 5 + x + 7 + x + 9 + x + 11}{5} \\ &= \frac{5x + 35}{5} \\ &= \frac{5(x + 7)}{5} \\ &= x + 7 \end{aligned}$$

Solution 6:

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(i) The given numbers are 9.8, 5.4, 3.7, 1.7, 1.8, 2.6, 2.8, 8.6, 10.5, 11.1

$$\begin{aligned}\bar{x} &= \frac{x_1 + x_2 + x_3 + x_4 + x_5 + \dots + x_n}{n} \\ &= \frac{9.8 + 5.4 + 3.7 + 1.7 + 1.8 + 2.6 + 2.8 + 8.6 + 10.5 + 11.1}{10} \\ &= 5.8\end{aligned}$$

(ii) The value of $\sum_{i=1}^{10} (x_i - \bar{x})$

We know that

$$\sum_{i=1}^n (x_i - \bar{x}) = (x_1 - \bar{x}) + (x_2 - \bar{x}) + \dots + (x_n - \bar{x}) = 0$$

Here

$$\bar{x} = 5.8$$

Therefore

$$\begin{aligned}&\sum_{i=1}^{10} (x_i - \bar{x}) \\ &= (9.8 - 5.8) + (5.4 - 5.8) + (3.7 - 5.8) + (1.7 - 5.8) + (1.8 - 5.8) \\ &\quad + (2.6 - 5.8) + (2.8 - 5.8) + (8.6 - 5.8) + (10.5 - 5.8) + (11.1 - 5.8) \\ &= 4 - 4 - 2.1 - 4.1 - 4 - 3.2 - 3 + 2.8 + 4.7 + 5.3 \\ &= 0\end{aligned}$$

Solution 7:

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Given that the mean of 15 observations is 32

(i)resulting mean increased by 3

$$= 32 + 3$$

$$= 35$$

(ii)resulting mean decreased by 7

$$= 32 - 7$$

$$= 25$$

(iii)resulting mean multiplied by 2

$$= 32 \times 2$$

$$= 64$$

(iv)resulting mean divide by 0.5

$$= \frac{32}{.5}$$

$$= 64$$

(v)resulting mean increased by 60%

$$= 32 + \frac{60}{100} \times 32$$

$$= 32 + 19.2$$

$$= 51.2$$

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(vi) resulting mean decreased by 20%

$$\begin{aligned} &= 32 - \frac{20}{100} \times 32 \\ &= 32 - 6.4 \\ &= 25.6 \end{aligned}$$

Solution 8:

Given the mean of 5 numbers is 18

Total sum of 5 numbers

$$= 18 \times 5$$

$$= 90$$

On excluding an observation, the mean of remaining 4 observation is 16

$$= 16 \times 4$$

$$= 64$$

Therefore sum of remaining 4 observations

$$= \text{total of 5 observations} - \text{total of 4 observations}$$

$$= 90 - 64$$

$$= 26$$

Solution 9:

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(i) Given that the mean of observations $x, x + 2, x + 4, x + 6$ and $x + 8$ is 11

$$\text{Mean} = \frac{\text{observations}}{n}$$

$$11 = \frac{x + x + 2 + x + 4 + x + 6 + x + 8}{5}$$

$$11 = \frac{5x + 20}{5}$$

$$x = \frac{35}{5}$$

$$x = 7$$

(ii) The mean of first three observations are

$$= \frac{x + x + 2 + x + 4}{3}$$

$$= \frac{3x + 6}{3}$$

$$= \frac{3 \cdot 7 + 6}{3} \quad [\text{since } x=7]$$

$$= \frac{21 + 6}{3}$$

$$= 9$$

Solution 10:

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Given the mean of 100 observations is 40.

$$\begin{aligned}\frac{\sum x}{n} &= \bar{x} \\ \Rightarrow \frac{\sum x}{100} &= 40 \\ \Rightarrow x &= 40 \times 100 \\ \Rightarrow x &= 4000\end{aligned}$$

Incorrect value of $x=4000$

Correct value of x = Incorrect value of x - Incorrect observation + correct observation

$$= 4000 - 83 + 53$$

$$= 3970$$

Correct mean

$$\begin{aligned}&= \frac{\text{correct value of } \sum x}{n} \\ &= \frac{3970}{100} \\ &= 39.7\end{aligned}$$

Solution 11:

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Given that the mean of 200 items was 50.

$$\text{Mean} = \frac{\sum x}{n}$$

$$\Rightarrow 50 = \frac{\sum x}{200}$$

$$\Rightarrow x = 10000$$

Incorrect value of $\sum x = 10000$

Correct value of

$$\begin{aligned}\sum x &= 10000 - (92 + 8) + (192 + 88) \\ &= 10000 - 100 + 280 \\ &= 10180\end{aligned}$$

Correct mean

$$\begin{aligned}&= \frac{\text{correct value of } \sum x}{n} \\ &= \frac{10180}{200} \\ &= 50.9\end{aligned}$$

Solution 12:

Mean of 45 numbers = 18

$$\Rightarrow \text{Sum of 45 numbers} = 18 \times 45 = 810$$

Mean of remaining (75 - 45) 30 numbers = 13

$$\Rightarrow \text{Sum of remaining 30 numbers} = 13 \times 30 = 390$$

$$\Rightarrow \text{Sum of all the 75 numbers} = 810 + 390 = 1200$$

$$\Rightarrow \text{Mean of all the 75 numbers} = \frac{1200}{75} = 16$$

Solution 13:

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Mean weight of 120 students = 52.75 kg

$\Rightarrow$ Sum of the weight of 120 students = $120 \times 52.75 = 6330$ kg

Mean weight of 50 students = 51 kg

$\Rightarrow$ Sum of the weight of 50 students = $50 \times 51 = 2550$ kg

$\Rightarrow$ Sum of the weight of remaining (120 - 50) 70 students

= Sum of the weight of 120 students - Sum of the weight of 50 students

= $(6330 - 2550)$ kg

= 3780 kg

$\Rightarrow$ Mean weight of remaining 70 students = $\frac{3780}{70} = 54$ kg

Solution 14:

Let the number of boys and girls be x and y respectively.

Now,

Given, Mean marks of x boys in the examination = 70

$\Rightarrow$ Sum of marks of x boys in the examination = $70x$

Given, Mean marks of y girls in the examination = 73

$\Rightarrow$ Sum of marks of y girls in the examination = $73y$

Given, Mean marks of all students ($x + y$) in the examination = 71

$\Rightarrow$ Sum of marks of all students ($x + y$) students in the examination = $71(x + y)$

Now, Sum of marks of all students ($x + y$) students in the examination

= Sum of marks of x boys in the examination

+ Sum of marks of y girls in the examination

$\Rightarrow 71(x + y) = 70x + 73y$

$\Rightarrow 71x + 71y = 70x + 73y$

$\Rightarrow x = 2y$

$\Rightarrow \frac{x}{y} = \frac{2}{1}$

$\Rightarrow x : y = 2 : 1$

Thus, the ratio of number of boys to the number of girls is 2 : 1.

Exercise 19(B)

Solution 1:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-19-mean-and-median/>

(i) Firstly arrange the numbers in ascending order

16, 16, 19, 25, 26, 28, 31, 32, 35

Now since

$n=9$ (odd)

Therefore Median

$$\begin{aligned} &= \left(\frac{n+1}{2} \right)^{\text{th}} \\ &= \left(\frac{9+1}{2} \right)^{\text{th}} \\ &= 5^{\text{th}} \end{aligned}$$

Thus the median is 26

(ii)

Firstly arrange the numbers in ascending order

241, 243, 257, 258, 261, 271, 292, 299, 327, 347, 350

Now since $n=11$ (Odd)

$$\begin{aligned} \text{Median} &= \text{value of } \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term} \\ &= 6^{\text{th}} \text{ term} \\ &= 271 \end{aligned}$$

Thus median is 271.

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(iii) Firstly arrange the numbers in ascending order

9, 14, 17, 21, 25, 34, 43, 50, 50, 63

Now since $n=10$ (even)

$$\begin{aligned}\text{Median} &= \frac{1}{2} \left[\text{value of } \left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} \left[\text{value of } \left(\frac{10}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} [25 + 34] \\ &= \frac{1}{2} [59] \\ &= 29.5\end{aligned}$$

Thus the median is 29.5

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(iv) Firstly arrange the numbers in ascending order

173,185,189,194,194,200,204,208,220,223

$$\begin{aligned}\text{Median} &= \frac{1}{2} \left[\text{value of } \left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} \left[\text{value of } \left(\frac{10}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} [200 + 194] \\ &= \frac{1}{2} [394] \\ &= 197\end{aligned}$$

Thus the median is 197

Solution 2:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-19-mean-and-median/>

Given numbers are 34, 37, 53, 55, x, x+2, 77, 83, 89, 100

Here n = 10(even)

$$\begin{aligned}\text{Median} &= \frac{1}{2} \left[\text{value of } \left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} \left[\text{value of } \left(\frac{10}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} [\text{value of } (5)^{\text{th}} \text{ term} + \text{value of } (5 + 1)^{\text{th}} \text{ term}] \\ &= \frac{1}{2} [\text{value of } (5)^{\text{th}} \text{ term} + \text{value of } (6)^{\text{th}} \text{ term}]\end{aligned}$$

$$63 = \frac{1}{2} [x + x + 2]$$

$$\Rightarrow \frac{[2 + 2x]}{2} = 63$$

$$\Rightarrow x + 1 = 63$$

$$\Rightarrow x = 62$$

Solution 3:

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For any given set of data, the median is the value of its middle term.

Here, total observations = $n = 10$ (even)

If n is even, we have

$$\text{Median} = \frac{1}{2} \left[\text{value of } \left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term} \right]$$

Thus, for $n = 10$, we have

$$\begin{aligned} \text{Median} &= \frac{1}{2} \left[\text{value of } \left(\frac{10}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} \left[\text{value of } 5^{\text{th}} \text{ term} + \text{value of } 6^{\text{th}} \text{ term} \right] \end{aligned}$$

Hence, if 7th number is diminished by 8, there is no change in the median value.

Solution 4:

Here, total observations = $n = 10$ (even)

Thus, we have

$$\begin{aligned} \text{Median} &= \frac{1}{2} \left[\text{value of } \left(\frac{10}{2} \right)^{\text{th}} \text{ term} + \text{value of } \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} \left[\text{value of } 5^{\text{th}} \text{ term} + \text{value of } 6^{\text{th}} \text{ term} \right] \end{aligned}$$

According to given information, data in ascending order is as follows:

	1 st Term	2 nd Term	3 rd Term	4 th Term	5 th Term	6 th Term	7 th Term	8 th Term	9 th Term	10 th Term
Marks	Less than 30			35	40	48	66	More than 75		

$$\therefore \text{Median} = \frac{1}{2} (40 + 48) = \frac{88}{2} = 44$$

Hence, the median score of the whole group is 44.

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Solution 5:

Total number of observations = 9 (odd)

Now, if $n = \text{odd}$

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

$$\Rightarrow \text{Median} = \left(\frac{9+1}{2} \right)^{\text{th}} \text{ term} = 5^{\text{th}} \text{ term} = x + 5$$

Now, Median = 18 (given)

$$\therefore x + 5 = 18$$

$$\Rightarrow x = 13$$

Exercise 19(C)**Solution 1:**

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$$\begin{aligned}\text{Mean of the given data} &= \frac{8 + 12 + 16 + 22 + 10 + 4}{6} \\ &= \frac{72}{6} = 12\end{aligned}$$

(i) Multiplied by 3

If $\bar{x}$ is the mean of n number of observations $x_1, x_2, x_3, \dots, x_n$,
then mean of $ax_1, ax_2, ax_3, \dots, ax_n$ is $a\bar{x}$.

Thus, when each of the given data is multiplied by 3,
the mean is also multiplied by 3.

Mean of the original data is 12.

Hence, the new mean = $12 \times 3 = 36$.

(ii) Divided by 2

If $\bar{x}$ is the mean of n number of observations $x_1, x_2, x_3, \dots, x_n$,

then mean of $\frac{x_1}{a}, \frac{x_2}{a}, \frac{x_3}{a}, \dots, \frac{x_n}{a}$ is $\frac{\bar{x}}{a}$.

Thus, when each of the given data is divided by 2,
the mean is also divided by 2.

Mean of the original data is 12.

Hence, the new mean = $\frac{12}{2} = 6$.

(iii) multiplied by 3 and then divided by 2

If $\bar{x}$ is the mean of n number of observations $x_1, x_2, x_3, \dots, x_n$,

then mean of $\frac{a}{b}x_1, \frac{a}{b}x_2, \frac{a}{b}x_3, \dots, \frac{a}{b}x_n$ is $\frac{a}{b}\bar{x}$.

Thus, when each of the given data is multiplied by $\frac{3}{2}$,

the mean is also multiplied by $\frac{3}{2}$.

Mean of the original data is 12.

Hence, the new mean = $\frac{3}{2} \times 12 = \frac{36}{2} = 18$

(iv) increased by 25%

New mean = Original mean + 25% of original mean

$\Rightarrow$ New mean = 12 + 25% of 12

$\Rightarrow$ New mean = $12 + \frac{25}{100} \times 12$

$\Rightarrow$ New mean = $12 + \frac{1}{4} \times 12$

$\Rightarrow$ New mean = 12 + 3

$\Rightarrow$ New mean = 15

(v) decreased by 40%

New mean = Original mean - 40% of original mean

$\Rightarrow$ New mean = 12 - 40% of 12

$\Rightarrow$ New mean = $12 - \frac{40}{100} \times 12$

$\Rightarrow$ New mean = $12 - \frac{2}{5} \times 12$

$\Rightarrow$ New mean = 12 - 0.4 $\times$ 12

$\Rightarrow$ New mean = 12 - 4.8

$\Rightarrow$ New mean = 7.2

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Solution 2:

$$\text{Mean of given data} = \frac{18 + 24 + 15 + 2x + 1 + 12}{5}$$

$$\Rightarrow 21 = \frac{70 + 2x}{5}$$

$$\Rightarrow 5 \times 21 = 70 + 2x$$

$$\Rightarrow 105 = 70 + 2x$$

$$\Rightarrow 2x = 105 - 70$$

$$\Rightarrow 2x = 35$$

$$\Rightarrow x = \frac{35}{2}$$

$$\Rightarrow x = 17.5$$

Solution 3:

Let $\bar{x}$ be the mean of n number of observations $x_1, x_2, x_3, \dots, x_n$

$$\text{Mean of given data} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Given that mean of 6 numbers is 42.

That is,

$$\frac{x_1 + x_2 + x_3 + \dots + x_6}{6} = 42$$

$$\Rightarrow x_1 + x_2 + x_3 + \dots + x_6 = 6 \times 42$$

$$\Rightarrow x_1 + x_2 + x_3 + x_4 + x_5 = 252 - x_6 \dots (1)$$

Also, given that the mean of 5 numbers is 45.

That is,

$$\frac{x_1 + x_2 + x_3 + x_4 + x_5}{5} = 45$$

$$\Rightarrow x_1 + x_2 + x_3 + x_4 + x_5 = 5 \times 45$$

$$\Rightarrow x_1 + x_2 + x_3 + x_4 + x_5 = 225 \dots (2)$$

From equations (1) and (2), we have,

$$x_1 + x_2 + x_3 + x_4 + x_5 = 252 - x_6 = x_1 + x_2 + x_3 + x_4 + x_5 = 225$$

$$252 - x_6 = 225$$

$$\Rightarrow x_6 = 252 - 225 = 27$$

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Solution 4:

Let $\bar{x}$ be the mean of n number of observations $x_1, x_2, x_3, \dots, x_n$

$$\text{Mean of given data} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Given that mean of 10 numbers is 24.

That is,

$$\frac{x_1 + x_2 + x_3 + \dots + x_{10}}{10} = 24$$

$$\Rightarrow x_1 + x_2 + x_3 + \dots + x_{10} = 10 \times 24$$

$$\Rightarrow x_1 + x_2 + x_3 + \dots + x_{10} = 240$$

$$\Rightarrow x_1 + x_2 + x_3 + \dots + x_{10} + x_{11} = 240 + x_{11} \dots (1)$$

Also, given that mean of 11 numbers is 25.

That is,

$$\frac{x_1 + x_2 + x_3 + \dots + x_{10} + x_{11}}{11} = 25$$

$$\Rightarrow x_1 + x_2 + x_3 + \dots + x_{10} + x_{11} = 11 \times 25$$

$$\Rightarrow x_1 + x_2 + x_3 + \dots + x_{10} + x_{11} = 275 \dots (2)$$

From equations (1) and (2), we have:

$$x_1 + x_2 + x_3 + \dots + x_{10} + x_{11} = 240 + x_{11} = 275$$

$$240 + x_{11} = 275$$

$$\Rightarrow x_{11} = 275 - 240 = 35$$

Solution 5:

Consider the given data:

44, 47, 63, 65, $x+13$, 87, 93, 99, 110

Here the number of observations is 9, which is odd.

Thus, the median of the given data is $\left(\frac{n+1}{2}\right)^{\text{th}}$ observation.

From the given data, $\left(\frac{9+1}{2} = 5\right)^{\text{th}}$ observation is $x + 13$

Also, given that the median is 78.

Thus, we have

$$x + 13 = 78$$

$$\Rightarrow x = 78 - 13$$

$$\Rightarrow x = 65$$

Solution 6:

Consider the given data:

24, 27, 43, 48, $x - 1$, $x + 3$, 68, 73, 80, 90.

Here the number of observations is 10, which is even.

Thus, the median of given data is $\frac{1}{2} \left[\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term} \right]$.

From the given data, $\left(\frac{10}{2} = 5\right)^{\text{th}}$ observation is $x - 1$

and $\left(\frac{10}{2} + 1 = 6\right)^{\text{th}}$ observation is $x + 3$.

Also, given that the median is 58.

Thus, we have

$$\frac{1}{2} [x - 1 + x + 3] = 58$$

$$\Rightarrow 2x + 2 = 116$$

$$\Rightarrow 2x = 116 - 2$$

$$\Rightarrow 2x = 114$$

$$\Rightarrow x = \frac{114}{2}$$

$$\Rightarrow x = 57$$

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Solution 7:

Let $\bar{x}$ be the mean of n number of observations $x_1, x_2, x_3, \dots, x_n$

$$\text{Mean} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Therefore,

$$\begin{aligned}\text{Mean of given data} &= \frac{30 + 32 + 24 + 34 + 26 + 28 + 30 + 35 + 33 + 25}{10} \\ &= \frac{297}{10} \\ &= 29.7\end{aligned}$$

(i)

Let us tabulate the observations and their deviations from the mean

Observations x_i	Deviations $x_i - \bar{x}$
30	0.3
32	2.3
24	-5.7
34	4.3
26	-3.7
28	-1.7
30	0.3
35	5.3
33	3.3
25	-4.7
Total	0

From the table, it is clear that the sum of the deviations from the mean is zero.

(ii)

Consider the given data:

30, 32, 24, 34, 26, 28, 30, 35, 33, 25

Let us rewrite the above data in ascending order.

24, 25, 26, 28, 30, 30, 32, 33, 34, 35

There are 10 observations, which is even.

$$\begin{aligned}\text{Therefore, median} &= \frac{1}{2} \left[\left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} \left[\left(\frac{10}{2} \right)^{\text{th}} \text{ term} + \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} [5^{\text{th}} \text{ term} + (5 + 1)^{\text{th}} \text{ term}] \\ &= \frac{1}{2} [5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}] \\ &= \frac{1}{2} [30 + 30] \\ &= \frac{1}{2} [60] \\ &= 30\end{aligned}$$

Solution 8:

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Let $\bar{x}$ be the mean of n number of observations $x_1, x_2, x_3, \dots, x_n$

$$\text{Mean} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Therefore,

$$\begin{aligned}\text{Mean of given data} &= \frac{35 + 48 + 92 + 76 + 64 + 52 + 51 + 63 + 71}{9} \\ &= \frac{552}{9} \\ &= 61.33\end{aligned}$$

Let us rewrite the given data in ascending order:

Thus, we have

35, 48, 51, 52, 63, 64, 71, 76, 92

There are 9 observations, which is odd.

Therefore, median = $\left(\frac{n+1}{2}\right)^{\text{th}}$ observation

$$\Rightarrow \text{Median} = \left(\frac{9+1}{2}\right)^{\text{th}} \text{ observation}$$

$$\Rightarrow \text{Median} = \left(\frac{10}{2}\right)^{\text{th}} \text{ observation}$$

$$\Rightarrow \text{Median} = 5^{\text{th}} \text{ observation}$$

$$\Rightarrow \text{Median} = 63$$

If 51 is replaced by 66, the new set of data in ascending order is:

35, 48, 52, 63, 64, 66, 71, 76, 92

Since median = 5^{th} observation,

We have, new median = 64

Solution 9:

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Let $\bar{x}$ be the mean of n number of observations $x_1, x_2, x_3, \dots, x_n$

$$\text{Mean} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Therefore,

$$\begin{aligned}\text{Mean of given data} &= \frac{x + x + 2 + x + 4 + x + 6 + x + 8}{5} \\ &= \frac{5x + 20}{5} \\ &= x + 4\end{aligned}$$

Also, it's given that mean of the given data is 11.

$$\Rightarrow x + 4 = 11$$

$$\Rightarrow x = 7$$

$$\begin{aligned}\text{Hence the mean of the first three observations} &= \frac{x + x + 2 + x + 4}{3} \\ &= \frac{3x + 6}{3} \\ &= x + 2 \\ &= 7 + 2 \\ &= 9\end{aligned}$$

Solution 10:

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Let us find the factors of 72:

$$\begin{aligned}72 &= 1 \times 72 \\&= 2 \times 36 \\&= 3 \times 24 \\&= 4 \times 18 \\&= 6 \times 12 \\&= 8 \times 9 \\&= 9 \times 8 \\&= 12 \times 6 \\&= 18 \times 4 \\&= 24 \times 3 \\&= 36 \times 2 \\&= 72 \times 1\end{aligned}$$

Therefore, the data set is:

1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72

$$\begin{aligned}\text{Mean of the above data set} &= \frac{1+2+3+4+6+8+9+12+18+24+36+72}{12} \\&= \frac{195}{12} \\&= 16.25\end{aligned}$$

Since the number of observations is 12, which is even, median is given by

$$\begin{aligned}\text{Median} &= \frac{1}{2} \left[\left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\&= \frac{1}{2} \left[\left(\frac{12}{2} \right)^{\text{th}} \text{ term} + \left(\frac{12}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\&= \frac{1}{2} [6^{\text{th}} \text{ term} + 7^{\text{th}} \text{ term}] \\&= \frac{1}{2} [8 + 9] \\&= \frac{1}{2} \times 17 \\&= 8.5\end{aligned}$$

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