

EXERCISE 23.3

PAGE NO: 23.16

Find the median of the following data (1 – 8)

1. 83, 37, 70, 29, 45, 63, 41, 70, 34, 54

Solution:

First we have to arrange given data into ascending order,

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

Given number of observations, $n = 10$ (even)

Therefore median = $(n/2)^{\text{th}}$ term + $((n + 1)/2)^{\text{th}}$ term

Median = (value of 5th term + value of 6th term)/2

$$= (45 + 54)/2$$

$$= 49.5$$

Hence median for given data = 49.5

2. 133, 73, 89, 108, 94, 104, 94, 85, 100, 120

Solution:

First we have to arrange given data into ascending order,

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

Given number of observations, $n = 10$ (even)

Therefore median = $(n/2)^{\text{th}}$ term + $((n + 1)/2)^{\text{th}}$ term

Median = (value of 5th term + value of 6th term)/2

$$= (94 + 100)/2$$

$$= 97$$

Hence median for given data = 97

3. 31, 38, 27, 28, 36, 25, 35, 40

Solution:

First we have to arrange given data into ascending order

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

Given number of observations, $n = 8$ (even)

Therefore median = $(n/2)^{\text{th}}$ term + $((n + 1)/2)^{\text{th}}$ term

Median = (value of 4th term + value of 5th term)/2

$$= (31 + 35)/2$$

= 33

Hence median for given data = 33

4. 15, 6, 16, 8, 22, 21, 9, 18, 25

Solution:

First we have to arrange given data into ascending order

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

Given number of observations, $n = 9$ (odd)

Therefore median = $((n+1)/2)^{\text{th}}$ term

Median = value of 5th term

= 16

5. 41, 43, 127, 99, 71, 92, 71, 58, 57

Solution:

First we have to arrange given data into ascending order

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

Given number of observations, $n = 9$ (odd)

Therefore median = $((n+1)/2)^{\text{th}}$ term

Median = value of 5th term

= 71

6. 25, 34, 31, 23, 22, 26, 35, 29, 20, 32

Solution:

First we have to arrange given data into ascending order,

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

Given number of observations, $n = 10$ (even)

Therefore median = $(n/2)^{\text{th}}$ term + $((n + 1)/2)^{\text{th}}$ term

Median = (value of 5th term + value of 6th term)/2

= $(26 + 29)/2$

= 27.5

Hence median for given data = 27.5

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

Solution:

First we have to arrange given data into ascending order,

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

Given number of observations, $n = 8$ (even)

Therefore median = $(n/2)^{\text{th}}$ term + $((n+1)/2)^{\text{th}}$ term

Median = (value of 4th term + value of 5th term)/2

$$= (8 + 12)/2$$

$$= 10$$

Hence median for given data = 10

8. 92, 35, 67, 85, 72, 81, 56, 51, 42, 69

Solution:

First we have to arrange given data into ascending order,

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

Given number of observations, $n = 10$ (even)

Therefore median = $(n/2)^{\text{th}}$ term + $((n+1)/2)^{\text{th}}$ term

Median = (value of 5th term + value of 6th term)/2

$$= (67 + 69)/2$$

$$= 68$$

Hence median for given data = 68

9. Numbers 50, 42, 35, $2x + 10$, $2x - 8$, 12, 11, 8, 6 are written in descending order and their median is 25, find x .

Solution:

Here, the number of observations n is 9.

Since n is odd, the median is the $(n+1)/2$ th observation, i.e., the 5th observation.

As the numbers are arranged in the descending order, we therefore observe from the last.

Median = 5th observation.

$$\Rightarrow 25 = 2x - 8$$

$$\Rightarrow 2x = 25 + 8$$

$$\Rightarrow 2x = 33$$

$$\Rightarrow x = (33/2)$$

$$x = 16.5$$

10. Find the median of the following observations: 46, 64, 87, 41, 58, 77, 35, 90, 55, 92, 33. If 92 is replaced by 99 and 41 by 43 in the above data, find the new median?

Solution:

Arranging the given data in ascending order, we have:

33, 35, 41, 46, 55, 58, 64, 77, 87, 90, 92

Here, the number of observations n is 11 (odd).

Since the number of observations is odd, therefore,

Therefore median = $((n+1)/2)^{\text{th}}$ term

Median = value of 5th term

= 58.

Hence, median = 58.

If 92 is replaced by 99 and 41 by 43, then the new observations arranged in ascending order are:

33, 35, 43, 46, 55, 58, 64, 77, 87, 90, 99

New median = Value of the 6th observation = 58.

11. Find the median of the following data: 41, 43, 127, 99, 61, 92, 71, 58, 57, If 58 is replaced by 85, what will be the new median?

Solution:

Arranging the given data in ascending order, we have:

41, 43, 57, 58, 61, 71, 92, 99, 127

Here, the number of observations, n , is 9(odd).

Therefore median = $((n+1)/2)^{\text{th}}$ term

Median = value of 5th term

Hence, the median = 61.

If 58 is replaced by 85, then the new observations arranged in ascending order are:

41, 43, 57, 61, 71, 85, 92, 99, 127

New median = Value of the 5th observation = 71.

12. The weights (in kg) of 15 students are: 31, 35, 27, 29, 32, 43, 37, 41, 34, 28, 36, 44, 45, 42, 30. Find the median. If the weight 44 kg is replaced by 46 kg and 27 kg by 25 kg, find the new median.

Solution:

Arranging the given data in ascending order, we have:

27, 28, 29, 30, 31, 32, 34, 35, 36, 37, 41, 42, 43, 44, 45

Here, the number of observations n is 15(odd).

Since the number of observations is odd, therefore,

Therefore median = $((n+1)/2)^{\text{th}}$ term

Median = value of 8th term

Hence, median = 35 kg.

If 44 kg is replaced by 46 kg and 27 kg by 25 kg, then the new observations arranged in ascending order are:

25, 28, 29, 30, 31, 32, 34, 35, 36, 37, 41, 42, 43, 45, 46

\therefore New median = Value of the 8th observation = 35 kg.

13. The following observations have been arranged in ascending order. If the median of the data is 63, find the value of x : 29, 32, 48, 50, x , $x + 2$, 72, 78, 84, 95

Solution:

Here, the number of observations n is 10. Since n is even,

Therefore median = $(n/2)^{\text{th}}$ term + $((n + 1)/2)^{\text{th}}$ term

Median = (value of 5th term + value of 6th term)/2

$$63 = x + (x + 2)/2$$

$$63 = (2x + 2)/2$$

$$63 = 2(x + 1)/2$$

$$63 = x + 1$$

$$x = 63 - 1$$

$$x = 62$$