

Median

Median is the middle value of the series. It is also called 50th percentile or second quartile.

Individual series:

1. First arrange the series the series in ascending or descending order.
2. If the number of values is odd then

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

If number of values is even then

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

Where N = number of items

Example: To find the median of 1,2,5,7,3,6,4

Arrange the series in ascending order

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

N = 7

$$\begin{aligned} \text{Median} &= \left(\frac{N+1}{2} \right)^{\text{th}} \text{ value} = \left(\frac{7+1}{2} \right)^{\text{th}} \text{ value} \\ &= 4^{\text{th}} \text{ value} = 4. \end{aligned}$$

Discrete series:

1. First arrange the series in ascending or descending order.
2. Find commulative frequency.

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

N = Number of items

Example: To find the median of

Value	Frequency	Commulative frequency
2	1	1
3	5	6
4	10	16
5	15	31

$$\begin{aligned} \text{Median} &= \left(\frac{31+1}{2} \right)^{\text{th}} \text{ value} \\ &= 16^{\text{th}} \text{ value} \\ &= 4 \end{aligned}$$

Continuous Series:

1. First find commulative frequency.
2. Find median class by using the formula $N / 2$.

$$\text{Median} = l_1 + \left(\frac{\frac{N}{2} - c}{f} \right) (l_2 - l_1)$$

Where l_1 = lower limit of median class

l_2 = upper limit of median class

N = Number of items

c = Commulative frequency of class preceding median class

f = Frequency of median class.

Example: To find the median of

Marks	Frequency	Commulative frequency
10 – 20	10	10
20 – 30	15	25
30 – 40	20	45
40 - 50	30	75

Here $N / 2 = 75 / 2 = 37.5$

Therefore median class is 30 – 40

$l_1 = 30, l_2 = 40, c = 25, f = 20$

$$\text{Median} = l_1 + \left(\frac{\frac{N}{2} - c}{f} \right) (l_2 - l_1)$$

$$= 30 + \left(\frac{37.5 - 25}{20} \right) 10$$

$$= 36.25$$