

MEDIAN

Median is the middle observation after the data is arranged in an ordered magnitude.

Median for ungrouped data

When N is odd

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

When N is even

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

Q1. From the monthly income of 7 employees given below, calculate the median.

12600,13800,11580,15700,14660,12900,13650.

Ans.

First arrange the data in ascending order.

11580,12600,12900,13650,13800,14660,15700

N = 7 (odd)

$$\begin{aligned}\text{Median} &= \left(\frac{N+1}{2}\right)^{\text{th}} \text{ observation} \\ &= \left(\frac{7+1}{2}\right)^{\text{th}} \text{ observation} \\ &= 4^{\text{th}} \text{ observation} \\ &= 13650 \\ \text{Median} &= 13650\end{aligned}$$

Q2. The marks of six students are given below. Find the median of the given data.

67,45,67,35,52,56

Ans.

35,45,52,56,67,67.

$N = 6$

$$\begin{aligned}\text{Median} &= \frac{\left(\frac{N}{2}\right)\text{th observation} + \left(\frac{N}{2} + 1\right)\text{th observation}}{2} \\ &= \frac{\left(\frac{6}{2}\right)\text{th observation} + \left(\frac{6}{2} + 1\right)\text{th observation}}{2} \\ &= \frac{3\text{rd observation} + 4\text{th observation}}{2} \\ &= \frac{52 + 56}{2} \Rightarrow \frac{108}{2} \\ \text{Median} &= 54\end{aligned}$$

Median for discrete data

Median is got by seeing the $(N/2)$ observation in cumulative frequency table.

STEPS:

1. Calculate the cumulative frequency
2. See where $n/2$ falls on the CF (cf greater than $n/2$)
3. Median is the x value corresponding to that CF.

Q1. Find the median of the following data.

X	1	2	3	4	5	6	7	8	9
f	8	10	11	16	20	25	15	9	6

Ans.

x	f	cf
1	8	8
2	10	8+10=18
3	11	18+11=29
4	16	45
5	20	65
6	25	90
7	15	105
8	9	114
9	6	120

$$N/2 = 120/2 = 60$$

cf greater than 60 is 65

median is 5.

Median for grouped data

$$\text{Median} = L + \frac{N/2 - \text{pcf}}{f} \times i$$

L = lower limit of the median class

pcf = preceding class frequency of the median class

f = frequency of the median class

i = class interval

STEPS:

1. Calculate the cumulative frequency
2. Find the median class [(N/2) in the CF lies in which class interval.]
3. Put the values in the formula

Q1. Find the median of the following data.

Age group	18-22	22-26	26-30	30-34	34-38	38-42	42-46	46-50	50-54	54-58
No of workers	120	125	280	260	155	184	162	86	75	53

Ans.

Age group	No of workers (f)	Cumulative frequency
18-22	120	120
22-26	125	120+125=245
26-30	280	245+280=525
30-34	260	785
34-38	155	940
38-42	184	1124
42-46	162	1286
46-50	86	1372
50-54	75	1447
54-58	53	1500

$(N/2)^{\text{th}}$ observation = $(1500/2)^{\text{th}}$ observation. = 750^{th} observation.

The median class lies between 30-34.

$L=30$

$pcf=525$

$i= 4 = (34-30)$

$f= 260$

$$\begin{aligned} \text{Median} &= L + \frac{N/2 - pcf}{f} \times i \\ &= 30 + \frac{1500/2 - 525}{260} \times 4 \end{aligned}$$

$$30 + \frac{750 - 525}{260} \times 4$$

$$= 30 + 3.46 = 33.46$$

Q1. Find the median wage from the following table.

Wages	20-30	30-40	40-50	50-60	60-70
No of workers	3	5	20	10	5

Q2. Find the median marks from the following table.

marks	30-40	40-50	50-60	60-70	70-80
No of students	5	18	15	21	10

Q3. Find the median of the following data.

X	1	2	3	4	5	6	7	8	9
f	3	15	21	30	10	5	18	9	16

Q4. Find the median of the following observations

15689,11280,13990,15960,15621,18303,10105,16528,17770

Q5. Find the median of the following observations

2420,2690,1560,6950,4860,4488.