

# MEDIAN

## मध्यांक

### LECTURE 3

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## ♥ Calculating the median

### Ungrouped frequency distribution

In order to find the median using cumulative frequencies (or the number of observations that lie above or below a particular value in a data set), you must calculate the first value with a cumulative frequency greater than or equal to the median. If the median's value is exactly 0.5 more than the cumulative frequency of the previous value, then the median is the midpoint between the two values.

### Example 3 - Ungrouped frequency table (discrete variables)



Imagine that your school baseball team scores the following number of home runs in 10 games:



4, 5, 8, 5, 7, 8, 9, 8, 8, 7

If you were to place the total home runs in a frequency table, what would the median be?

First, put the scores in ascending order:

4, 5, 5, 7, 7, 8, 8, 8, 8, 9

Then, make a table with two columns. Label the first column "Number of home runs" and then list the possible number of home runs the team could get. You can start from 0 and list up until the number 10, but since the team never scored less than 4 home runs, you may wish to start listing at the number 4.

Label the second column "Frequency." In this column, record the number of times 4 home runs were scored, 5 home runs were scored and so on. In this case, there was only one time that 4 home runs were scored, but two times that 5 home runs were scored. If you add all of the numbers in the Frequency column, they should equal 10 (for the 10 games played).

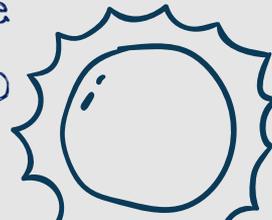


Table 1. Number of home runs in 10 baseball games

Number of home runs (x)	Frequency (f)
4	1
5	2
6	0
7	2
8	4
9	1

To find the median, again use the same formula:

$$\text{Median} = \{(n + 1) \div 2\}^{\text{th}} \text{ value}$$

$$= (10 + 1) \div 2$$

$$= 11 \div 2$$

$$= 5.5$$

= the median is the 5.5<sup>th</sup> value in the data set

To get the median, add up the numbers in the Frequency column until you get to 5 (and since the total number of games is 10, the remaining numbers in that column should also equal 5). You will reach 5 after adding all of the frequencies up to and including those for the 7 home runs. The next set of five will begin with the frequencies for 8 home runs. The median (the 5.5th value) lies between the fifth value and the sixth value. Thus, the median lies between 7 home runs and 8 home runs.

If you calculate the average of these values (using the same formula used in Example 2), the result is 7.5.

$$\begin{aligned}\text{Average} &= (\text{middle value before} + \text{middle value after}) \div 2 \\ &= (\text{fifth value} + \text{sixth value}) \div 2 \\ &= (7 + 8) \div 2 \\ &= 15 \div 2 \\ &= 7.5\end{aligned}$$

Technically, the median should be a possible variable. In the above example, the variables are discrete and always whole numbers. Therefore, 7.5 is not a possible variable-no one can hit 7 and a half home runs. Thus, this number only makes sense statistically. Some mathematicians may argue that 8 is a more appropriate median.

# THANKS !

ANY QUESTION

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