Median

The median of a numerical data set is the numerical value in the middle when the data set is arranged in increasing order.

How to find the median?
The median is the middle value.
To find the median for a numerical data set first arrange the data in increasing order and then count the number of values. Two cases exist:
>   **1.** Odd set of values
>   **2.** Even set of values

1. The number of terms is odd: When the number of values in the data set is odd, the median will be the middle value in the order
   Example: Given the values 3   6   9   13   19, the median is 9.

2. The number of terms is even: When the number of values in the data set is even, the median will be the average of the two middle values in the ordered array. In other words take the average of both middle points.

   Example: Given the values 4   7   8   10   15   19, the median is $\dfrac{8+10}{2} = \dfrac{18}{2} = 9$

The set of data must be arranged in order, from highest to least, or visa versa.

Example 1: What is the median for the following sample values?
3 8 6 14 0 -4 2 12 -7 -1 -10
First of all, we need to arrange the data set in order. The ordered set is as follows:

$$-10 \quad -7 \quad -4 \quad -1 \quad 0 \quad 2 \quad 3 \quad 6 \quad 8 \quad 12 \quad 14$$
$$\uparrow$$
$$\text{6th}$$

Since the number of values is odd, the median will be the middle value in the ordered set.
Thus, the median will be found in the sixth position, since we have a total of 11 values.
That is, the value of the median is 2.

Why does the middle number in an ordered data set measure central tendency?
The following discussion will give an insight into the question.
 List of values that are above or below the median is shown in the following table:

Data	Deviations
3	Above
8	Above
6	Above
14	Above
-4	Below
0	Below
2	Neither
12	Above
-7	Below
-1	Below
-10	Below

When the values from above and below the median are counted, we see that if the "balancing point" is the sample median, then the number of values above the median balances (equals) the number of values below the median. This is depicted in the figure below:
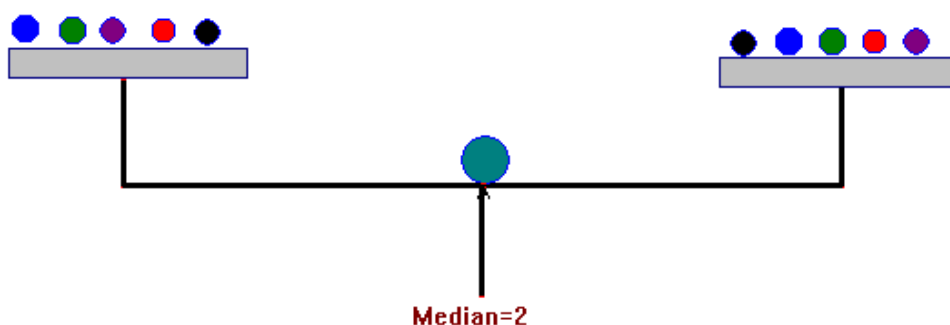
Median=2

Median is a balancing point for data values

We notice that there is the same number of values above the median as there are below the median. This is why the median is considered a measure of central tendency.

Rule 1: **Ungrouped data:** To find the median class for the numerical value set we find the cumulative frequency to which $\left\{(n+1)\div 2\right\}^{th} value$ belongs to.

The class containing the $\left\{(n+1)\div 2\right\}^{th} value$ in its cumulative frequency column is the median class.

*where **n** is the total frequency*