Stat Support Activity: Median Average Intro

Notes about the Median Average:

- A measure of center or average which is the center of quantitative data when the numbers are put in order.

- It is also called the "2nd Quartile" (Q_2) or "50th Percentile" (P_{50}) since approximately 50% of the numbers in the data are less than or equal to the median.

- The median is the most accurate average in most cases.

- We use the median (Q_2) as our average (center) when the quantitative data is <u>not</u> normal. This usually means the data is skewed right or skewed left.

- To calculate the median:
    - Put the numbers in the quantitative data set in order from lowest to highest. If you have the data in excel, you can use the sort button.

    - If there is an odd amount of numbers in the data (sample size "n" is odd), the median will be the number in the exact middle. For example, if there are 21 numbers in the data set, then the median will be the 11th number on the in-order list. So there would be 10 numbers above the median and 10 numbers below the median.

    - If there is an even number of values in the data (sample size "n" is even), the median will be half-way in-between the two numbers in the middle. For example, if there are 30 numbers in the data set, then the median will be half-way between the 15th and 16th numbers in the data set. This can be calculated by adding the two numbers in the middle and dividing the answer by two. $(\# + \#) \div 2$. So for 30 numbers in order, there will be 15 numbers above the median and 15 numbers below the median.

    - Notice if the sample size "n" is odd, the median is a number in the data set. When the sample size "n" is even, the median is not a number in the data set. It is half way between the two numbers in the middle.

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Problems

1.

Look at the following weights in kilograms.

2.2 , 3.1 , 1.7 , 4.4 , 1.9 , 2.5 , 2.7 , 5.3 , 2.8 , 0.4 , 6.1 , 1.3 , 5.2 , 3.6

a) How many numbers are in the data? (This is called the sample size "n".)

b) Put the data in order from smallest to largest.

c) Find the median average. If sample size "n" is odd find the number in the middle. If the sample size "n" is even, add the two numbers in the middle and divide by 2.

d) How many numbers in the top half of the data? *(Include the median in the top half if the median is a number in the data. Do not include the median in the top half if the median is not a number in the data.)*

e) How many numbers in the bottom half of the data? *(Include the median in the bottom half if the median is a number in the data. Do not include the median in the bottom half if the median is not a number in the data.)*

f) Are the answers to (d) and (e) the same? They should be.

2.

Look at the following dollar amounts spent on gas for one trip to the gas station.

45, 60 , 91, 64, 85, 66, 80, 79, 72, 56, 73, 49, 63, 70, 54

a) How many numbers are in the data? (This is called the sample size "n".)

b) Put the data in order from smallest to largest.

c) Find the median average. If sample size "n" is odd find the number in the middle. If the sample size "n" is even, add the two numbers in the middle and divide by 2.

d) How many numbers in the top half of the data? *(Include the median in the top half if the median is a number in the data. Do not include the median in the top half if the median is not a number in the data.)*

e) How many numbers in the bottom half of the data? *(Include the median in the bottom half if the median is a number in the data. Do not include the median in the bottom half if the median is not a number in the data.)*

f) Are the answers to (d) and (e) the same? They should be.

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3.

Look at the heights in inches of the following sample of men. We also included the height of NBA basketball player Victor Wembanyama who is 7 ft. 4 in (88 inches).

69, 66, 69.5, 66, 70.5, 88, 68.5, 67, 70, 67.5, 70, 68

a) How many numbers are in the data? (This is called the sample size "n".)

b) Put the data in order from smallest to largest.

c) Find the median average. If sample size "n" is odd find the number in the middle. If the sample size "n" is even, add the two numbers in the middle and divide by 2.

d) How many numbers in the top half of the data? *(Include the median in the top half if the median is a number in the data. Do not include the median in the top half if the median is not a number in the data.)*

e) How many numbers in the bottom half of the data? *(Include the median in the bottom half if the median is a number in the data. Do not include the median in the bottom half if the median is not a number in the data.)*

f) Are the answers to (d) and (e) the same? They should be.

g) The mean average for this data set is 70 inches. Since Victor's height is a high outlier, it skews the data to the right and makes the mean larger than the median. Is the mean average of 70 inches larger than the median you calculated in part (c)? Which average is more accurate in this situation, the mean average or the median average?

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4.

Look at the temperatures in degrees Fahrenheit. We included a particularly cold day of 30 degrees Fahrenheit. This was a low outlier.

85 , 82 , 88 , 89 , 92 , 81 , 79 , 94 , 97 , 83 , 30

a) How many numbers are in the data? (This is called the sample size "n".)

b) Put the data in order from smallest to largest.

c) Find the median average. If sample size "n" is odd find the number in the middle. If the sample size "n" is even, add the two numbers in the middle and divide by 2.

d) How many numbers in the top half of the data? *(Include the median in the top half if the median is a number in the data. Do not include the median in the top half if the median is not a number in the data.)*

e) How many numbers in the bottom half of the data? *(Include the median in the bottom half if the median is a number in the data. Do not include the median in the bottom half if the median is not a number in the data.)*

f) Are the answers to (d) and (e) the same? They should be.

g) The mean average for this data set is approximately 81.8 degrees Fahrenheit. Since the cold day is a low outlier, it skews the data to the left and makes the mean smaller than the median. Is the mean average of 81.8 degrees Fahrenheit smaller than the median you calculated in part (c)? Which average is more accurate in this situation, the mean average or the median average?