## Descriptive Statistics and Histograms

Range: The range is a statistic that helps to describe the spread of the data. The range requires numerical data to find a difference between the highest and lowest data value.

Mode: The mode indicates which data value occurs most often.

Median: The median describes a middle point of the data values (half the data values are above the median and half the data values are below the median). The median requires arranging the data values in ascending or descending order to determine the middle point of the data.

Mean: The mean describes what would be a fair share of the data values or a balance point of the data values.

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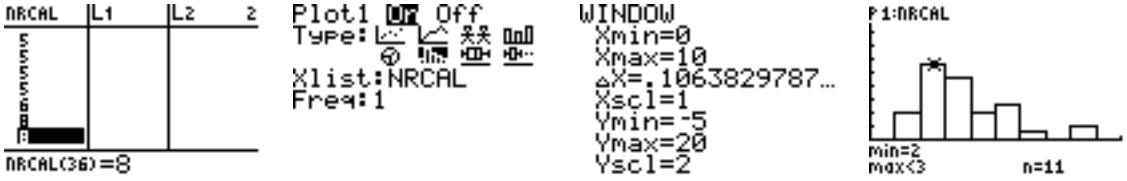
How many calculators (of any kind) do you own?




Range is 7; data values range from one calculator owned to 8 calculators owned.

Mode is 2; the most frequent data value is 2 calculators owned.

Median is 3; the middle of the data values is 3 calculators owned, or half the people surveyed own 3 or more calculators and half of the people surveyed own 3 or fewer calculators.

Mean is 3.2 (to the nearest tenth); if everyone surveyed owned the same number of calculators, it would be a little more than 3 calculators, or the balance point of the data is a little more than 3 calculators owned.

Possible conclusion: since the three measures of central tendency are relatively close in value, it is reasonable to conclude that the average number of calculators owned is about 3. The data value of 8 calculators is an outlier for this set of data and does pull the mean a little bit higher than the median and mode.

The histogram provides a visual image that shows most of the data is clumped around 2-3 and supports a claim of 2-3 calculators as a typical number of calculators owned by the people surveyed.

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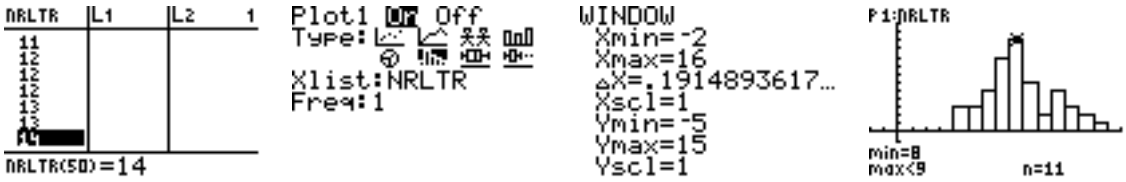
How many letters are in the name of each of the 50 states in the U.S.A.?




Range is 10; data values range from 4 to 14 letters in a state name.

Mode is 8; the most frequent data value is 8 letters in a state name.

Median is 8; the middle of the data values is 8 letters in a state name, or half the state names have 8 or more letters and half the state names have 8 or fewer letters.

Mean is 8.26; if all state names had the same number of letters, each name would have a little more than 8 letters, or the balance point of the data is a little more than 8 letters in a state name.

Possible conclusion: since the three measures of central tendency (mean, median, and mode) are all relatively close and cluster around 8 letters, it is reasonable to conclude that the average number of letters in a state's name is about 8 letters.

The histogram provides a visual image that shows the data in a generally symmetrical shape around 8 and supports a claim of 8 letters as the typical length of a state name in the U.S.A.

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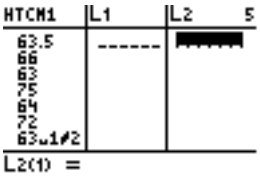
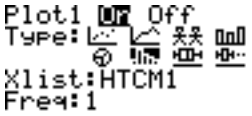
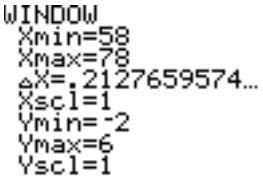
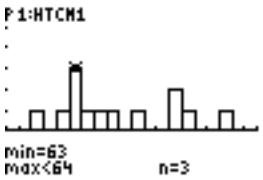
How tall are you in centimeters?




Range is 15 cm; data values range from 60 cm to 75 cm tall.

Mode is 63.5 cm tall; the most frequent data value is 63.5 cm tall. From the graph it appears that the mode is a data value that is equal to 63 cm and less than 64 cm tall. Based on the portion of the list of data shown above and the histogram, it is possible to see that the interval from 63 cm to less than 64 cm has the three data values visible in the data list of 63, 63.5, and $63\frac{1}{2}$. From the histogram, it is also possible to see that the interval from 71 cm to less than 72 cm has a frequency of two and might hold a second mode; however, what is not visible from the data list shown above is that this set of data does not have a second mode since the interval from 71 cm to less than 72 cm has two distinct heights: 71 cm and 71.5 cm. Thus, there is only one mode in this set of data (63.5 cm).

Median is 65 cm tall; the middle of the data values is 65 cm, or half the people surveyed are 65 cm or taller and half the people surveyed are 65 cm or shorter.

Mean is 66.5 cm tall (to the nearest tenth); if all the people surveyed were the same height, they would be about 66.5 cm tall, or 66.5 cm tall is a balance point for all the data values.

Possible conclusion: since the three measures of central tendency are relatively spread out – the mode is less than the median and the mean is greater than the median – the median is probably the best way to describe this set of data. The mean appears to be stretched to a higher value due to a high data value of 75 cm tall and the mode is not enough to counteract the highest data value. The histogram supports a conclusion that the data is relatively spread out and the median value of 65 cm tall as a reasonable average height of people surveyed.

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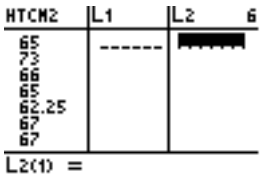
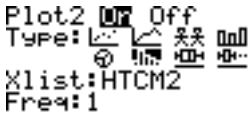
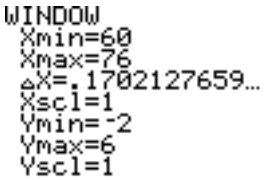
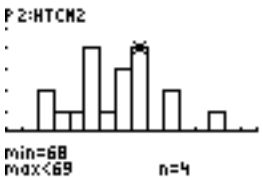
How tall are you in centimeters? (Note that this set of data is from a different class.)




Range is 10.75 cm; data values range from 62.5 cm to 73 cm tall.

Mode is 68 cm tall; the most frequent data value is 68 cm tall. From the graph it appears that there are two modes because the intervals may include multiple data values within the same interval. When using the TI-73 Explorer to calculate the mode for the set of data in the list for HTCM2, 68 is correctly calculated as the mode of this set of data with a frequency of 4 (note that 68 will appear on the TI-73 Explorer home screen within a set of braces); in this set of data there are three data values of 66 cm and one data value of 66.5 cm, which results in a frequency of 4 for the interval from 65 cm to less than 66 cm but does not result in a second mode for this set of data.

Median is 67 cm tall; the middle of the data values is 67 cm, or half the people surveyed are 67 cm or taller and half the people surveyed are 67 cm or shorter.

Mean is 66.5 cm tall (to the nearest tenth); if all the people surveyed were the same height, they would be about 66.5 cm tall, or 66.5 cm tall is a balance point for all the data values.

Possible conclusion: It is interesting to note that the mean is slightly lower than both the median and the mode, and there is an outlier value of 73 cm tall (the maximum data value); however, the mean and the median are relatively close in value. The histogram supports a conclusion that the data is relatively clumped together (except for the outlier data value), and 67 cm tall is a reasonable average height of people surveyed.