Intro to Statistics Warm up

Work with a partner to complete the following:
An interviewer asked 21 people, "How many children live in your home?" Here are their responses.

2, 1, 3, 0, 4, 2, 2, 1, 0, 3, 2, 2, 1, 1, 3, 0, 0, 2, 1, 1, 2

Find the mean, median, and mode of the data.

In your own words: define

Mean:

_____

Mode:

_____

Median:

_____

WHAT IS STATISTICS?

Statistics is a branch of mathematics that collects, organizes, analyzes, and interprets numerical data. Two main purposes for studying statistics are to DESCRIBE and understand characteristics (sometimes called variables) of groups and, when possible, to make PREDICTIONS based on the patterns discovered.

What are some examples of data that might be part of statistics?

One big way to analyze data is to look at the center of the data using a measure of central tendency. You have worked with these already!

Measures of Central Tendency

1. **mean** – the average - the sum of the data divided by the number of data. Do not round your answer unless directed to do so.

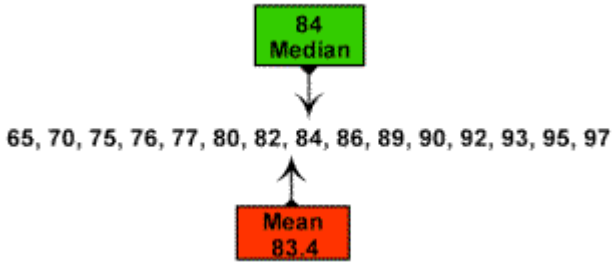
2. **median** – the middle value or the mean of the two middle values, when the data is arranged in numerical order.

3. **mode** – the value (number) that appears the most. It is possible to have more than one mode, and it is possible to have no mode. If there is no mode, write "no mode", do not write zero (0).

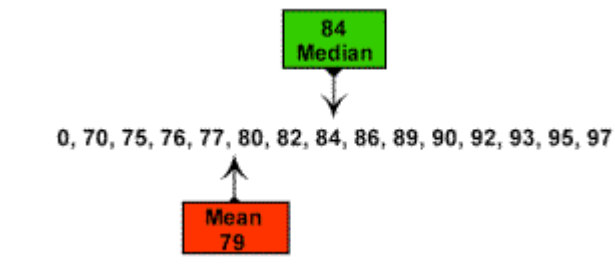
Measure of Dispersion

Another common statistics term is range. The **range** of a set of data is the difference between the highest and lowest values in the set. This gives us some information about how spread out the data are.

Consider this set of test score values:



Normal listing of scores



Scores with the lowest score replaced with outlier.

The two sets of scores above are identical except for the first score. The set on the left shows the actual scores. The set on the right shows what would happen if one of the scores was changed so that is was VERY DIFFERENT from the other scores. **Such a term is called an outlier. With the outlier, the mean changed. With the outlier, the median did NOT change.**

What is an outlier?

Measures of Central Tendency

Measure of Central Tendency	What is it?	Things to Know:	Example:
Mean	The **sum** of the scores divided by the number of score.	**"average" =** $\bar{x}$	
Median	The **middle** value, or the mean of the middle two values, when the data is arranged in numerical order.	Think of a "median" being in the middle of a highway. Remember to put in rank order!!	
Mode	The value (number) that appears the **most**.	It is possible to have: 1) more than one mode **OR…** 2) **no** mode. If there is no mode-write "no mode" **Do NOT write zero!**	

Other Things to Know:	What is it?	How to Find it?	Example:
Range	The difference between the largest value and the smallest value.	Maximum – Minimum	
Outlier	a score that is **WAY out** compared to the other scores.		

Example: The test scores for five students were 59, 60, 63, 76, and 87. How many points greater than the median is the mean?

Find the following:

Mean

Median

Mode

Range

Are there any outliers?

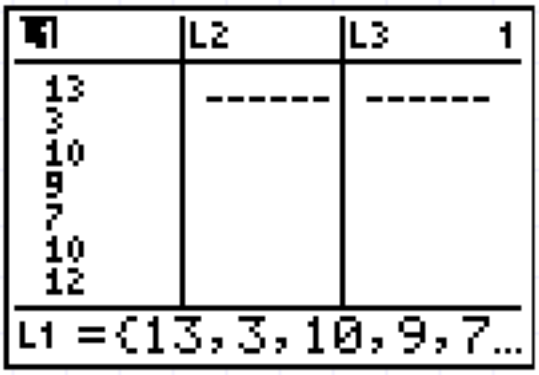
Steps to use the Graphing Calculator:

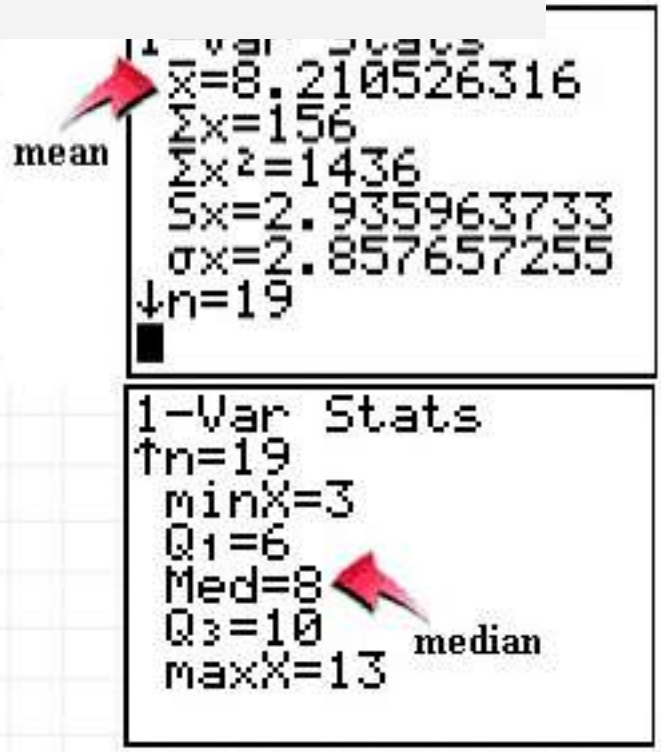
1. Press STAT.
2. Press 1 to choose Edit.
3. Enter the data in List 1 (L_1). Be sure to press ENTER or the down arrow after each entry.
4. To find basic statistical information on your list, press STAT, go over to CALC, choose #1 (1-Var Stats).

Practice using the calculator:

Given the data set:
{13, 3, 10, 9, 7, 10, 12, 8, 6, 3, 9, 6, 11, 5, 9, 13, 8, 7, 7}

Find the **mean**, **median** and **mode**.





Things to Know about the Calculator:

$\bar{x}$: mean (average)
n = # of items in data list
Minx = lowest value
Q1 = 25th percentile (lower quartile). **Med** =Median (middle quartile) aka. 50% percentile.
Q3 = 75th percentile (upper quartile) Note→ 75% of the data is at or below this value.
Max= highest value
Range: |max - min|

Practice: What will happen to the measures of central tendency if we add the same amount to all data values, or multiply each data value by the same amount?

Directions: Grab your graphing calculator.
In January of 2006, the Benson family moved to a tropical and rather rainy, climate. For the year that followed, Terry Benson recorded the number of rainy days that occurred each month. His data contained 14,14,10,12,11,13,11,11,14,10,13,8.
a. Find:

Mode	Median	Mean	Range

b. If the number of rainy days doubles each month in the year 2007, what will be the mean, mode and median and range for the year 2007 data?

Mode	Median	Mean	Range

C. If instead, there are three more rainy days per month in the year 2007, what will be the mean, mode, median and range for the 2007 data?

Mode	Median	Mean	Range

Algebraically Speaking…

Example 1: On her first five biology tests, Carolyn received the following scores: 72, 86, 92, 63, and 77. What test score must Carolyn earn on her sixth test so that her average (mean score) for all six tests will be 80?

Example 2: Andy has grades of 84, 65, and 76 on three math tests. What grade must he obtain on the next test to have an average of exactly 80 for the four tests?

Example 3: Find, in terms of x, the mean of 3x -5 , 5x – 6, and 4x + 11.

Example 4: Test scores for a class of **20** students are as follows:

93, 84, 97, 98, 100, 78, 86, 100, 85, 92, 72, 55, 91, 90, 75, 94, 83, 60, 81, 95

Test Scores	Frequency
91-100	
81-90	
71-80	
61-70	
51-60	

a) Copy and complete the table shown at the left.

b) Find the modal interval. The "**modal interval**" is the interval containing the greatest frequency. It is not the mode.

c) Find the interval that contains the median

1) Which statement is true about the data set 3, 4, 5, 6, 7, 7, 10?

[A] mean = mode [C] mean = median
[B] mean > mode [D] mean < median

2) The weekly salaries of six employees at McDonalds are $140, $220, $90, $180, $140, $200. For these six salaries, find:

(a) the mean

(b) the median

(c) the mode

3) The values of 11 houses on Washington St. are shown in the table below.

Value per House	Number of Houses
$100,000	1
$175,000	5
$200,000	4
$700,000	1

a) Find the mean value of these houses in dollars.

b) Find the median value of these houses in dollars.

4) If the scores 18, 20, 25, 11 and x have a mean of 19. What is the value of x.

5) Alex earned scores of 60, 74, 82, 87, 87, and 94 on his first six algebra tests. What is the relationship between the measures of central tendency of these scores?

(1) median < mode < mean
(2) mean < mode < median
(3) mode < median < mean

(4) mean < median < mode

6) Your teacher recorded the math test scores of six students in the table below.

Student	Student Score
Andrew	72
John	80
George	85
Amber	93
Betty	78
Roberto	80

Determine the mean of the student scores, to the *nearest tenth*. Determine the median of the student scores. **Describe** the effect on the mean and the median if Your teacher adds 5 bonus points to each of the six students' scores.

How do I know which measure of central tendency to use? Discussion

7) a. A storeowner kept a tally of the sizes of suits purchased in her store. Which measure of central tendency should the storeowner use to describe the average size suit sold?

b. A tally was made of the number of times each color of crayon was used by a kindergarten class. Which measure of central tendency should the teacher use to determine which color is the favorite of her class?

c. The science test grades are posted. The class did very well. All students taking the test scored over 75. Unfortunately, 4 students were absent for the test and the computer listed their scores as 0 until the test is taken. Assuming that no score repeated more times than the 0's, what measure of central tendency would most likely give the best representation of this data.