# Activity 6
# Standard Deviation

**Topic Area:** Data Analysis and Probability
**NCTM Standard:** Select and use appropriate statistical methods to analyze data.

**Objective:** The student will be able to utilize the Casio fx-9860G Plus calculator to determine other forms of measures of variability for the data in the various activities included in this unit.

**Introduction:** This activity is designed to demonstrate the procedure to enter data into the Casio fx-9860G Plus graphing calculator in order to determine other measures of variability that students will need to evaluate a given set of data.

The students should be familiar with the following vocabulary.

Mean deviation
Standard deviation
Standard deviation of frequency distribution tables
Variance

# Calculator Notes for Activity 6

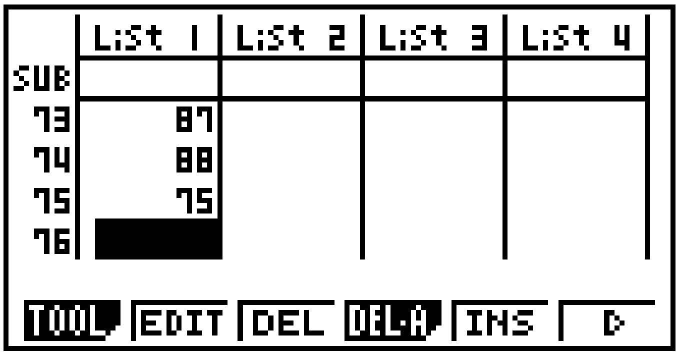
**Objective:** The student will be able to utilize the Casio fx-9860G Plus calculator to determine other forms of measures of variability for the data in the various activities included in this unit.

## Steps for Determining Other Measures of Variability

Problem: The following are scores that 75 students received on a 100 point exam. Use the fx-9860G Plus graphing calculator to determine mean deviation, standard deviation and variance.

98, 85, 76, 83, 74, 85, 62, 79, 85, 89, 98, 87, 92, 84, 63, 28, 49, 88, 87, 92, 83, 79, 75, 68, 75, 96, 90, 83, 85, 68, 82, 85, 95, 100, 83, 79, 63, 85, 68, 86, 86, 85, 94, 89, 69, 98, 89, 89, 67, 84, 75, 76, 79, 87, 89, 95, 93, 86, 87, 88, 96, 57, 78, 64, 89, 75, 79, 82, 94, 96, 85, 95, 87, 88, 75.

Start by entering the data into List 1 of the Stat Menu. If you do not remember how to enter the data, refer to Activity 5. You should see the following screen when finished:



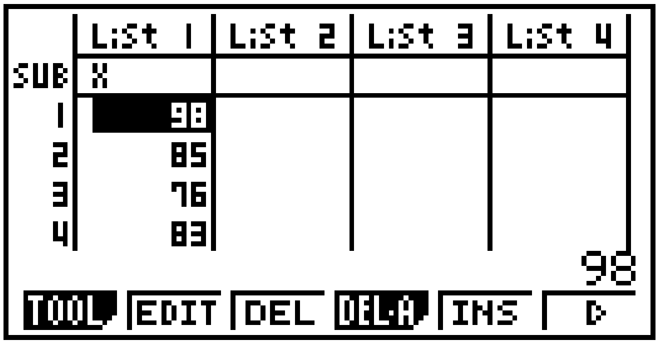

To calculate the mean deviation, use this formula:

$$M.D. = \frac{1}{n}\sum_{i=1}^{n} \left| X_i - \bar{X} \right|$$

To help remember what numbers we are storing in each list, label each list. Label list 1, X, since $X_i$ is the stored data. Use the following key strokes:

NNa+l

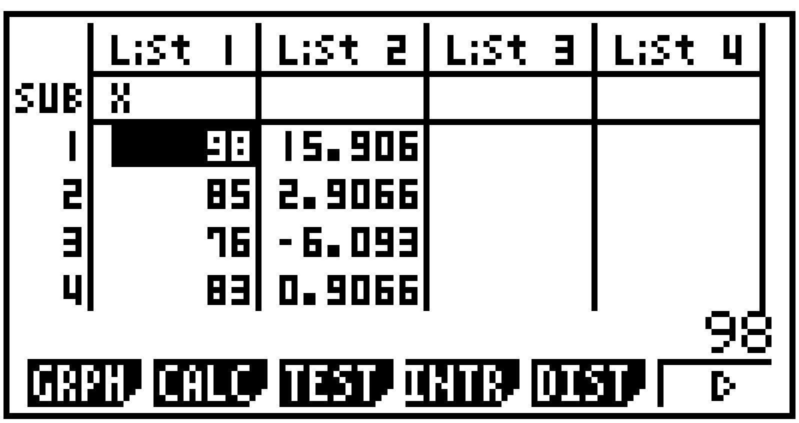
Your screen should look like this:




The next step is to determine the mean of list 1 and subtract the mean from all 75 entries of data and store those numbers in list 2. This is easy to do on the calculator. As you follow the keystrokes, pay attention to where we find the commands.

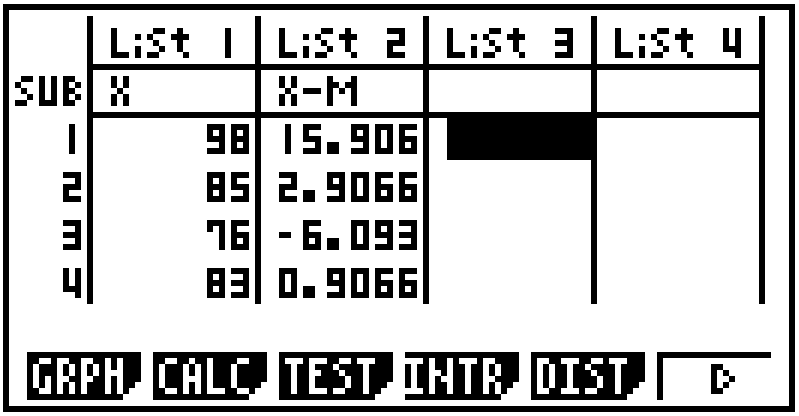
p!ljiqq1-ueuuq1kkbq2lp$l

Your screen should have all the numbers stored in list 2, like this:



Use the following key strokes to label the list.  The screen shot will follow.

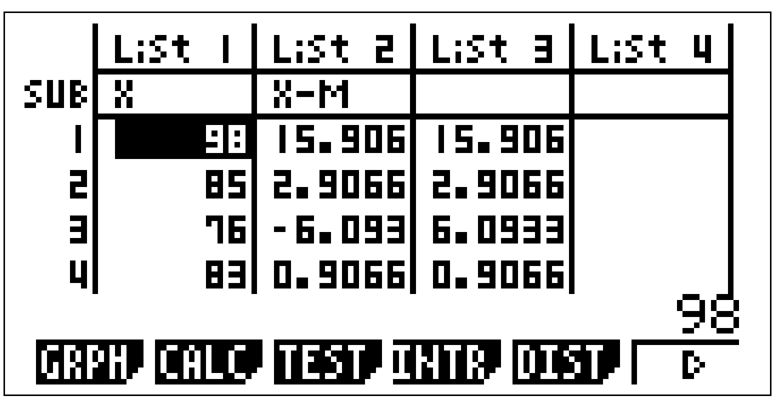
$Ba+-a7l




Next, take the absolute value of list 2 and store it into list 3 using the following key strokes:

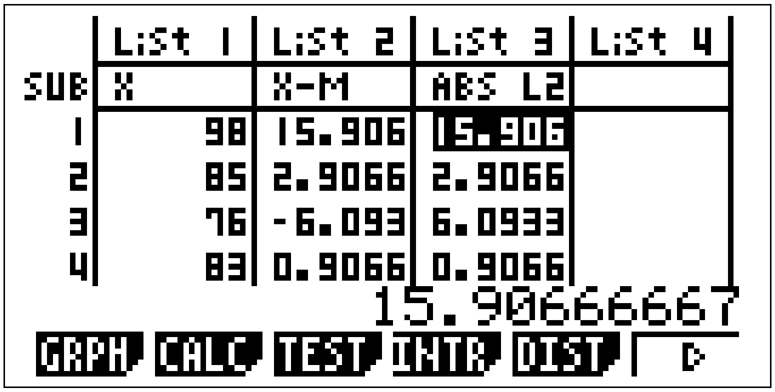
p!ljiurqduuqq2kbq3lp$l

You screen should look like this:



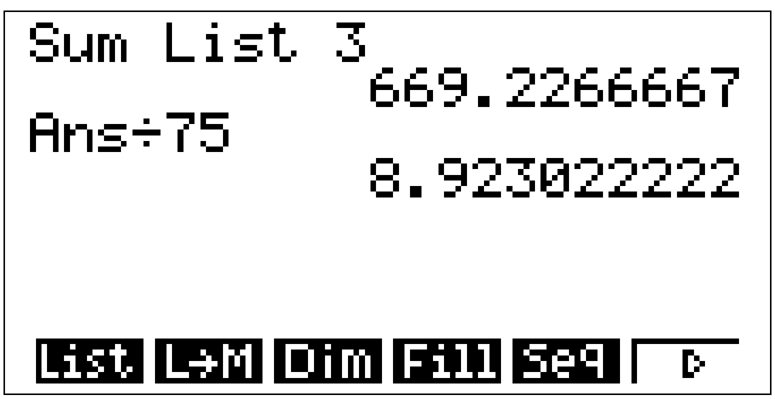
Label list 3 ABS L2, using the these key strokes to get the following screen:

$$Bafagama.ab2l




Now, all you need to do is to determine the sum of list 3 and divide by the number of entries in the list (75). Use the following key strokes to get to the next screen.

p!liquuquq3lM75l



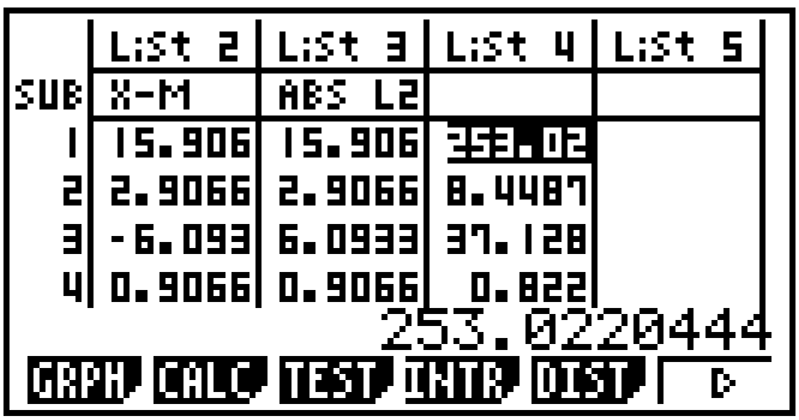

Therefore, the Mean Deviation = 8.923022222

Next, to calculate the standard deviation of the data, use this formula:

$$s = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(X_i - \bar{X})^2}$$

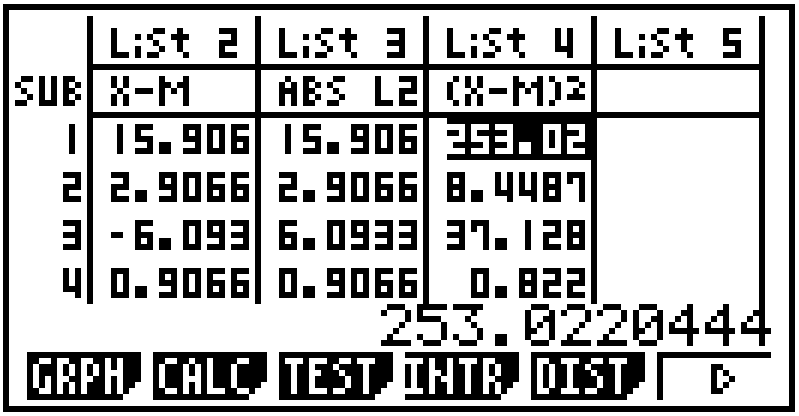
On the fx-9860G Plus graphing calculator, use the same screen from the mean deviation. Start by squaring all the entries in list 2 and store them into list 4 using these key strokes to get the following screen.

jiqq2ksbq4lp$l$$$$!



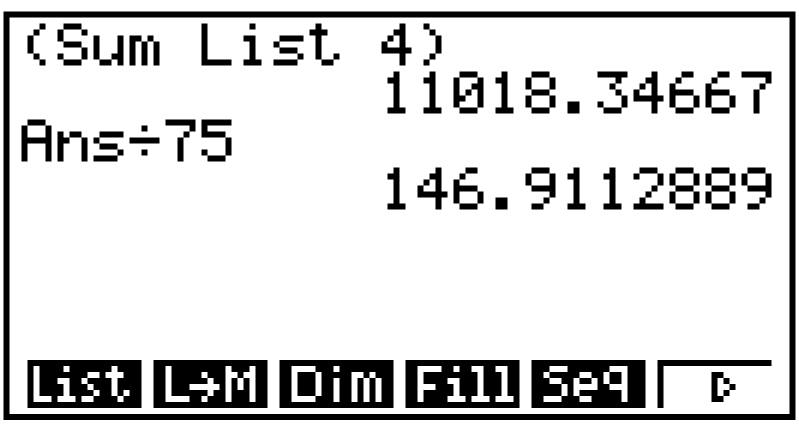

Label list 4 (X-M)2 using these key strokes to get the following screen.

Bja+-a7ksl



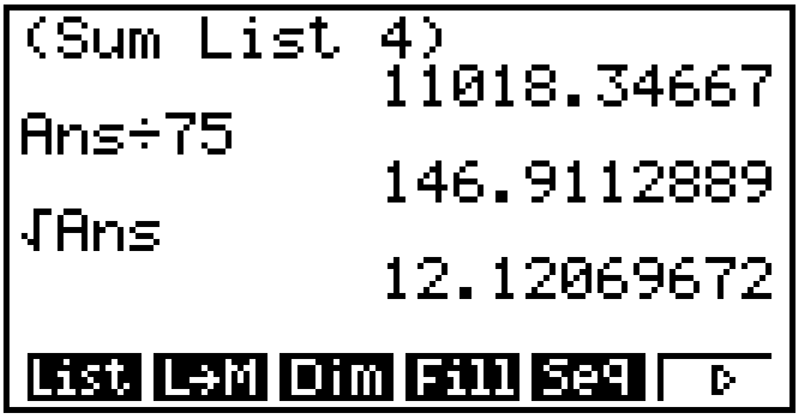

Next, take the sum of list 4 and divide by the number of entries (75) using these key strokes to get the following screen.

p!ljiquuquq4klM75l




Take the square root of the answer using these key strokes to get the following screen.

LsLnl




The standard deviation = 12.12069672.

Use the following formula to find Variance.

$$Variance = s^{2}$$

Therefore, the variance is the answer on the previous screen before you took the square root of the answer.

The variance = 146.9112889.

**Name______________________Class_______Date______**

# Activity 6: Worksheet
# Standard Deviation

Find the mean deviation, standard deviation and variance of the following sets of data.

1. 11, 94, 46, 33, 25, 58, 55, 52, 31, 29, 36, 45, 51, 56, 51, 43, 32, 29, 31, 40, 42, 30, 35, 35, 39, 47, 26, 51, 57, 55, 42, 46, 53, 42, 41, 33, 35, 38, 50, 51, 52, 37, 38, 43, 47, 44, 52, 52, 38, 32, 53, 39, 31, 49, 48, 48, 45, 43, 46, 39, 52, 49, 38.

2. 20, 62, 55, 58, 53, 43, 39, 23, 16, 21, 28, 53, 61, 62, 60, 50, 45, 55, 53, 58, 57, 58, 58, 51, 37, 36, 29, 45, 33, 32, 26, 25, 17, 26, 29, 39, 33, 37, 48, 42, 26, 47, 42, 49, 39, 40, 42, 38, 37, 30, 21, 20, 19, 29, 52, 47, 36, 31, 52, 28, 37, 41, 49.

# Solutions to Activity 6: Worksheet

1. Mean Deviation = 8.382464097

   Standard Deviation = 11.33328887

   Variance = 128.4434366

2. Mean Deviation = 10.97203326

   Standard Deviation = 12.90662631

   Variance = 166.5810028