ESTIMATING THE VARIANCE AND STANDARD DEVIATION OF GROUPED DATA

Heights of females (in inches)	Frequency
60 – 62	4
63 – 65	5
66 – 68	8
69 – 71	1

To the left is a grouped frequency distribution of the heights (in inches) of female students in a physical education class. Use the calculator to assist you with estimating the variance and standard deviation of the grouped distribution.

Remember, variance and standard deviation are based on finding the "average deviation" of elements from the mean of the set.

STEP 1: Find the mean of the grouped data
After entering the class marks into L1 and their corresponding frequencies in L2, **STEP 1** would be to find the mean of the grouped data based on using class marks entered into L1.
(See Estimating the Mean of Grouped Data beginning on page 6).

For this grouped data set the mean was found to be 65.

Screen 29

STEP 2: Find the total deviations squared for each class mark
First, we will find the deviations squared for each class mark from the mean without regard to the associated weight. We will place the deviations squared into L3. Enter the following and Screen 30 will appear:

Highlight L3 > (L1 - 65) ^2

Hit **ENTER**.

Screen 30

Screen 31

Mark   Freq   Dev Squared

The results are shown on Screen 31.

The values showing in L3 are the deviation squared of the class mark from the mean of the set.

Next, remember that the class mark is weighted by the frequency, (the number of members assigned to its interval). Therefore, we must find the total deviations squared for each mark by multiplying the single deviation in L3 by the frequency in L2. We will put the total deviations squared into L4. Enter the following and Screen 32 will appear:

*Arrow to right to L4 > Highlight L4 > L3 * L2*

Screen 32

Hit **ENTER**.

The results are shown on Screen 33.

Each value in L4 represents the total deviations squared for the corresponding mark.

STEP 3: Find the variance

Since the variance is an average, we must find the sum of L4 (the total deviations squared for each mark) and divide by the sum of L2 (the frequency for each mark).

First, enter the following to exit the Lists:

2nd > **QUIT** (above MODE)

Then, add L4 by entering the following:

2nd > **LIST** (above STAT) > **MATH** > **5** > **L4** > **)** > **ENTER**

Your screen will look like Screen 34. The number 126 represents the sum of the deviations squared.

Now we must divide by the total frequency, that is the number of elements in the data set. To find this number, we must sum L2 were the frequencies are located. Enter the following:

2nd > **LIST** (above STAT) > **MATH** > **5** > **L2** > **)** > **ENTER**

Your screen will look like Screen 35.

There are a total of 18 elements in the set. We can now compute the average by dividing by 17 (n – 1 since this is a sample and we always divide by 1 less than the total number of elements for a sample as opposed to a population).

126/17 gives 7.4117.64706 = s^2 which is the estimate for the variance of the sample. See Screen 36.

STEP 4: Compute the standard deviation

Enter the following and your screen will look like Screen 37:

2nd >   (above x^2) >2nd >**ANS** (above (-) next to ENTER) > **)** > **ENTER**

s = 2.72 inches which is the standard deviation. See Screen 37.

Interpretation: The heights of females deviate an average of 2.72 inches from the mean 65 inches.

NOTE: If this grouped data was for a population we would divide by 18 back in STEP 3.