

Activity 10

Stem-and-Leaf Plot and Box-and-Whisker Plot

TEACHER NOTES

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-9750G Plus calculator to construct a Stem-and-Leaf Plot and Box-and-Whisker Plot using univariate data entered into the calculator.

Introduction: The Stem-and-Leaf Plot and Box-and-Whisker Plots are two statistical constructions that are highly used in state exams. This activity will help the students to understand the use of these plots in analyzing statistical data.

The students should be familiar with the following vocabulary.

Box-and-Whisker Plot

Stem-and-Leaf Plot

Calculator Notes for Activity 10

Objective: The student will be able to utilize the Casio fx-9750G Plus calculator to construct a stem-and-Leaf Plot and Box-and-Whisker Plot using univariate data entered into the calculator.

Steps for Constructing Stem-and-Leaf Plots and Box-and-Whisker Plots

For both the stem-and-leaf plot and the box-and-whisker plot, we will use the same example that was used in Activity 9.

Problem: The following are scores that students received on a 25 point quiz: 24, 23, 22, 22, 24, 19,25, 20, 20, 19, 14, 12, 23, 22, 22, 20, 18, 22, 25, 24, 23, 23, 21, 22, 25, 22, 21, 20, 24, 25.

1. Stem-and-Leaf Plot:

The calculator does not construct a stem-and-leaf plot but it does organize the data to make the construction easier. Always remember that this plot consists of two sections; the stem on the left side and the leaves on the right side. The leaves will only consist of the last digit of each number. The stem consists of the first digit in this problem. If the data consists of three digit numbers, the stem would include the first two digits of each number and the leaves will still consist of only the last digit of each number. The stem does not repeat numbers that are the same but the leaves will repeat as many times as the numbers are repeated.

Start by entering your data into the calculator the same way you entered the data in Activity 9. Turn the calculator on, then use the arrow keys to highlight the **STAT** Menu, press **EXE**. Notice that there is an arrow over **F6** which means there are more choices. Press **F6** to see the other choices. The screens should look like the following.



If you need to remove any data from the lists, use the arrow keys to move the cursor to the column you need to delete, press **F4** on the second screen (DEL-A), then press **F1**.

Use the arrow keys to move the cursor to **List 1**. Enter the data by pressing **24**, **EXE**, **23**, **EXE**, **22**, **EXE**, and so on until all data is entered into **List 1**.

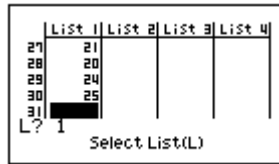
Don't forget to press **EXE** after every number. When all numbers are entered, your screen should look like the following screen.



Once the data is entered, all you need to do is sort the data. Press **F6** to display the second screen of choices. Press **F1** (SRT-A) which sorts the data from smallest to largest numbers. (If you should ever want to sort your data from largest to smallest, you would press **F2** which is SRT-D.) Before the calculator sorts the data, it will ask you two questions. The first question is "How Many Lists?(H)", and you should answer 1 since you entered data into only one list.



Press **EXE**. The second question will read “L? Select List(L)” and you should answer 1 because you entered the data into List 1.



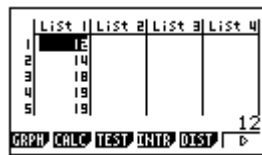
Press **EXE**. Your data should be arranged from smallest to largest.

Follow the directions from above to construct the Stem-and-Leaf Plot.

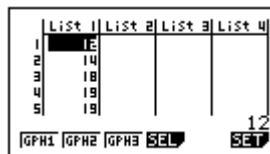
STEM	LEAVES
1	2,4,8,9,9
2	0,0,0,0,1,1,2,2,2,2,2,2,2,2,3,3,3,3,4,4,4,4,5,5,5,5

2. Box-and-Whisker Plot:

The calculator will construct a box-and-whisker plot. To do this, you will enter the data like you did in Step 1. The data does not have to be sorted. Since this data is already entered, we will use it. Your screen will look like the following screen.



This time, choose **F1** (GRAPH).



Press **F6** (SET).

```
StatGraph1
Graph Type :Scatter
XList      :List1
YList      :List2
Frequency   :1
Mark Type   :••
|GPH1|GPH2|GPH3|
```

Use the arrow keys to highlight Graph Type. Notice you are given four screens of choices. Press **F6** to see each screen of choices. These are the different screens you will see.

```
StatGraph1
Graph Type :Scatter
XList      :List1
YList      :List2
Frequency   :1
Mark Type   :••
|Scat|XY|NFP|
```

```
StatGraph1
Graph Type :Scatter
XList      :List1
YList      :List2
Frequency   :1
Mark Type   :••
|Hist|Box|Box|NDIS|Brkn|
```

```
StatGraph1
Graph Type :Scatter
XList      :List1
YList      :List2
Frequency   :1
Mark Type   :••
|X|Med|X^2|X^3|X^4|
```

```
StatGraph1
Graph Type :Scatter
XList      :List1
YList      :List2
Frequency   :1
Mark Type   :••
|Lo3|Exp|Fwr|Sin|L95t|
```

Choose the second screen and press **F2** (Box). The screen will label MedBox.

```
StatGraph1
Graph Type :MedBox
XList      :List1
Frequency   :1
Outliers    :Off
|Hist|Box|Box|NDIS|Brkn|
```

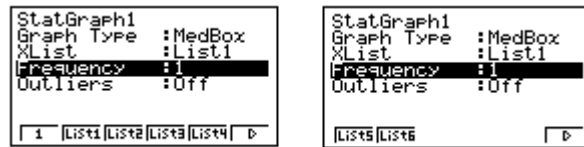
Use the arrow keys to move the cursor to XList.

```
StatGraph1
Graph Type :MedBox
XList      :List1
Frequency   :1
Outliers    :Off
|List1|List2|List3|List4|List5|List6|
```

Choose **F1** (List1) because your data was entered into List 1.

```
StatGraph1
Graph Type :MedBox
XList      :List1
Frequency   :1
Outliers    :Off
|List1|List2|List3|List4|List5|List6|
```

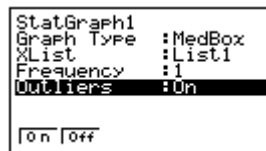
Use the arrow keys to move the cursor to Frequency. You have two screens of choices.



Choose **F1** (1). Use the arrow keys to move the cursor to Outliers.



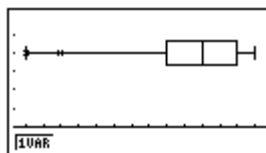
Press **F1** (On) to turn outliers on.



Press **EXIT** to get back to the list and press **F1** (GPH1).



Your box-and-whisker plot is displayed.

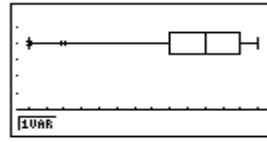


If you press **F1** (1Var), you will display all the measures of central tendency and dispersion. **F6** (Draw) will take you back to the drawing.

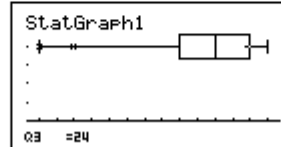
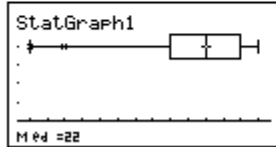
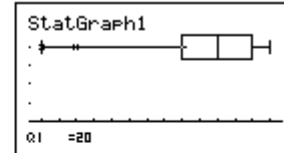
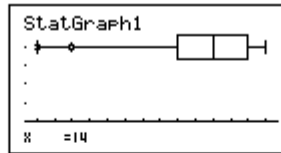
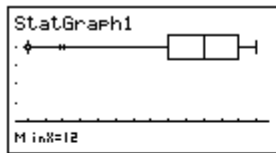
```

1-Variable
Σx =21.5333333
Σx² =646
Σx³ =14176
x̄ =2.9747082
x̄³ =3.02556159
n =30
DRAW

```



Press **SHIFT**, then **F5** (G-solv) and then use the arrow keys to label the different parts of the box-and-whisker plot as you move the cursor from left to right.



The first screen displays $\text{Min}x = 12$ and is an outlier. The second screen labels $x = 14$ and is the left end of the whisker. The third screen labels $Q1 = 20$ which is the left end of the box and represents quartile 1. The fourth screen displays $\text{Med} = 22$ and represents the center vertical line of the box which is the Median. The fifth screen displays $Q3 = 24$ and represents the right side of the box which is quartile 3. The last screen displays $\text{Max}X = 25$ which represents the right end of the whisker which is the maximum. There are no outliers on the right side.

Name _____ Class _____ Date _____

Activity 10: Worksheet

Stem-and-Leaf Plot and Box-and-Whisker Plot

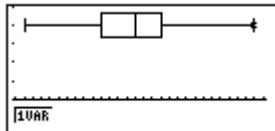
Construct a stem-and-leaf plot and a box-and-whisker plot for the following four sets of data.

- 1.) 42, 43, 46, 46, 47, 48, 49, 49, 50, 51, 51, 51, 51, 51, 52, 52, 54, 54, 54, 54, 55, 55, 55, 55, 56, 56, 56, 57, 57, 57, 57, 58, 60, 61, 61, 61, 62, 64, 64, 65, 68, 69.
- 2.) 36, 40, 41, 42, 42, 42, 44, 45, 45, 46, 48, 49, 49, 50, 50, 51, 51, 51, 52, 52, 52, 52, 53, 53, 53, 53, 53, 54, 55, 55, 55, 56, 56, 56, 56, 57, 57, 57, 57, 57, 59, 59, 59, 60, 60, 61, 62, 62, 64, 68, 70, 71.
- 3.) 24, 33, 4, 10, 10, 21, 33, 33, 34, 37, 36, 42, 43, 35, 24, 5, 21, 20, 27, 36, 48, 31, 23, 22, 28, 29, 27, 31, 39, 30, 32, 31, 26, 16, 26, 34, 37, 38, 23, 38, 45, 34, 16, 25, 28, 39, 33.
- 4.) 1, 3, 2, 5, 3, 4, 6, 5, 9, 4, 5, 5, 5, 6, 8, 2, 6, 9, 5, 9, 2, 4, 5, 7, 6, 5, 4, 3, 6, 6, 4, 5, 3, 8, 5, 8, 5, 9, 3, 4, 5, 5, 7, 8, 6, 7, 8, 9, 2, 1, 3, 4.

Solutions to Activity 10 Worksheet

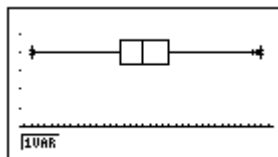
1.

STEM	LEAVES
4	2, 3, 6, 6, 7, 8, 9, 9
5	0, 1, 1, 1, 1, 1, 1, 2, 2, 4, 4, 4, 4, 5, 5, 5, 5, 6, 6, 6, 7, 7, 7, 7, 8
6	0, 1, 1, 1, 2, 4, 4, 5, 8, 9



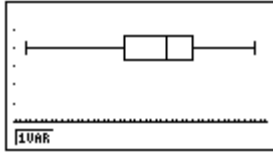
STEM	LEAVES
3	6
4	0, 1, 2, 2, 2, 4, 5, 5, 6, 8, 9, 9
5	0, 0, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 3, 3, 4, 5, 5, 5, 6, 6, 6, 6, 7, 7, 7, 7, 7, 9, 9, 9
6	0, 0, 1, 2, 2, 4, 8
7	0, 1

2.



3.

STEM	LEAVES
0	4, 5
1	0, 0, 6, 6
2	0, 1, 1, 2, 3, 3, 4, 4, 5, 6, 6, 7, 7, 8, 8, 9
3	0, 1, 1, 1, 2, 3, 3, 3, 3, 4, 4, 4, 5, 6, 6, 7, 7, 8, 8, 9, 9
4	2, 3, 5, 8



4. No stem-and-leaf plot because this data would have only one stem.

