Exploring Quantitative Data (Part 2)

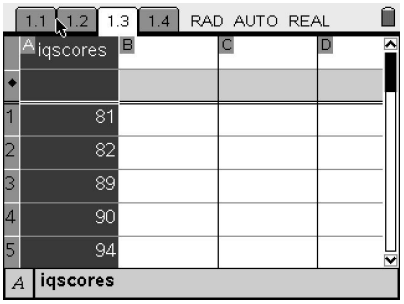
Describing a graphical display of quantitative data involves acknowledgement of three main things: **Center, Shape,** and **Spread**. **Shape** can be referred to as symmetric (unimodal – one peak, bi-modal – two peaks) or skewed (left – the majority of the data is in the higher values with a few unusually low values, or right – the majority of the data is in the lower values with a few unusually high values). **Center** can be described by the *mean* (average of all data values) or the *median* (the middle or average of the middle two data points). **Spread** can be explained by stating how far spread out the data is. Looking at the highest value – lowest value determines range which is a measure of spread. We can also use *standard deviation* which tells us the average distance the data are from the mean. **However**, sometimes in the presence of *outliers*, values that fall outside the overall pattern of the data, the values of the range, standard deviation, and mean can be misleading so deciding which measure of **center** and **spread** must be done carefully.

1. From the main menu (on), select *My Documents*, open the AP Statistics folder and highlight the document **IQScores** (See previous activity: Exploring Quantitative Data Part I)

2. Using ctrl ▶ to scroll through the pages of the document, pull up the histogram.

Describe this graph using center, shape, and spread.

To describe the three attributes above, you can use the data in your list.

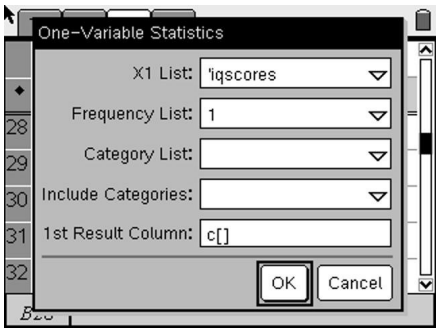


1. Go to the Lists & Spreadsheet page.

2. In the **iqscores** column, arrow up until the whole column becomes highlighted.

3. You can sort it by pressing ctrl menu and selecting *Sort*.

4. In the List & Spreadsheet, we want to calculate the One-Variable Statistics on **iqscores**. Press menu and *Statistics*, *Stat Calculations*, and then *One-Variable Statistics*. Press enter to choose just one list and the following screen will pop up. Fill in the rows with what is shown in the screen shot and tab to OK and press enter.



5. The One-Variable statistics for **iqscores** should now be listed in Column C. State the following values.

$\bar{x}$:=
sx :=
n:=
MinX:=
Q_1X:=
MedianX:=
Q_3X:=
MaxX:=

What do you notice about $\bar{x}$ and MedianX ? Does this agree with your statement about shape? Why or why not?

State the five-number summary below and describe what each number means in your own words.

Boxplots are graphical displays using the five-number summary. The "edges" of the "box" consist of Q_1 and Q_3. The Median is displayed as a line within the box. The Max and Min are used to create the whiskers.

Using the five-number summary, draw a boxplot of the IQ scores in the space provided. Remember to properly label the horizontal axis.

6. On the same Data & Statistics page access (doc▾) and go to *Page Layout*, *Select Layout*, and *Layout 3*.

7. In this new section, add a Data & Statistics page and recreate the histogram. Bin Width: 10, Alignment: 75, XMin: 72.5, XMax: 157.5, YMax: 17.

8. In the top screen, use (ctrl) (tab) to move between the split screen. You will notice a darker edge around the active screen.

9. In the top screen go to the Plot Type menu and select *BoxPlot*. Once the boxplot is generated, change the window settings to XMin: 63.5 and XMax: 157.5.

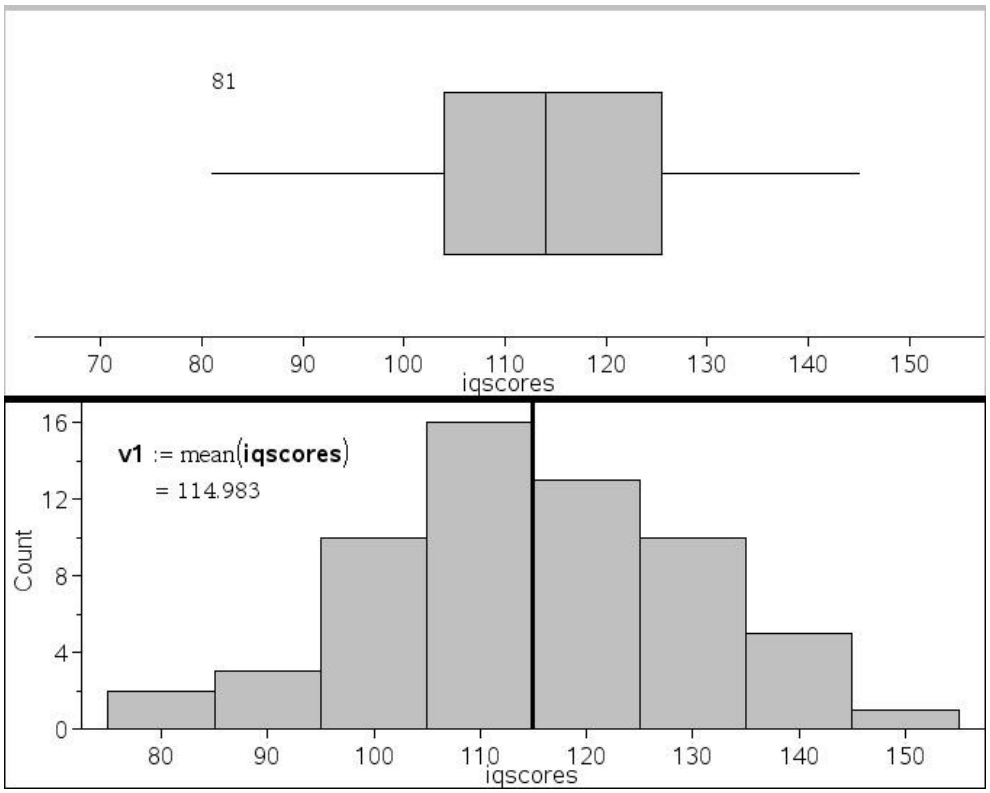
Compare the histogram and boxplot using a few sentences.

10. Using the Analyze option from the (menu) let's plot the mean. To do this select *Analyze* from the Menu. Then *Plot Value*. A **v1:=** should appear. Type **mean(iqscores)**, press (enter) and a line should appear on your histogram.

Compare this line that represents the mean with the median. If the distribution was skewed, how would this affect the relationship between the mean and median?

Save this document by pressing (doc▾) and selecting *File*, *Save*.

Here are the additional screen shots Part 2.

	A iqscores	B	C	D	E	F	G	H
◆								
1	81		Title	One-Vari...				
2	82		$\bar{x}$	114.983				
3	89		Σx	6899.				
4	90		Σx^2	806195.				
5	94		$sx := s_{n-1}$...	14.8009				
6	96		$\sigma x := \sigma_n x$...	14.6771				
7	97		n	60.				
8	100		MinX	81.				
9	101		Q_1X	104.				
10	101		MedianX	114.				
11	101		Q_3X	125.5				
12	102		MaxX	145.				
13	102		SSX := Σ(...	12925.				
14	102							
15	103							
16	105							
17	106							

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