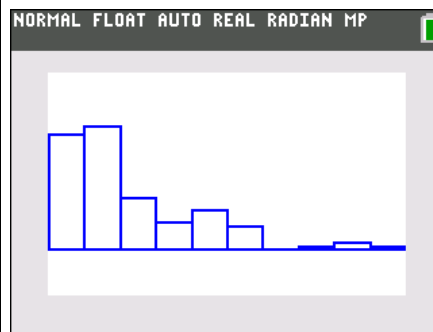# Statistical Plots

Activity Overview

This activity gives students an opportunity to select and create the most appropriate graph to represent a given data set.

Topic: Statistics and Data Analysis

- Select and use appropriate statistical methods to analyze data
- Discuss and understand the correspondence between data sets and their graphical representations, especially histograms, , box plots, and scatterplots.

Teacher Preparation and Notes

- The lists provided with this activity need to be loaded on all calculators.
- **To download the data lists and student worksheet, go to education.ti.com/exchange/sp**

This activity utilizes MathPrint™ functionality and includes screen captures taken from the TI-84 Plus C Silver Edition. It is also appropriate for use with the TI-83 Plus, TI-84 Plus, and TI-84 Plus Silver Edition but slight variances may be found within the directions.

Compatible Devices:
- TI-84 Plus Family
- TI-84 Plus C Silver Edition

Associated Materials:
- Statistical_Plots_Student.pdf
- Statistical_Plots_Student.doc
- HomerunL1.8XI
- HomerunL2.8XI
- HomerunL3.8XI
- HomerunL4.8XI
- HomerunL5.8XI

Tech Tips:
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials
- Any required calculator files can be distributed to students via handheld-to-handheld transfer.

Part 1 – Creating a Scatter Plot

Before you begin the activity, send the five lists to the students. If you send the lists to one student, that student can then send them to another student and so on..

A description of each list is as follows:

L1 (years from 1980 – 2004)

L2 (most home runs hit by a single player for the years given in L1)

L3 (total number of career home runs hit by the top 100 home run hitters)

L4 (number of home runs hit in 2004 by top 25 home run hitters for the American League)

L5 (number of home runs hit in 2004 by top 25 home run hitters for the National League)

This information should be shared and discussed with the students so that they can label their graphs appropriately and make better sense of the plots.

Questions 1–3

Students are asked to set up a scatter plot in Part 1. If students have prior experience with setting up stat plots, little supervision may be needed.
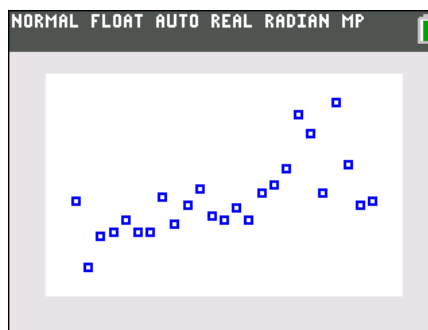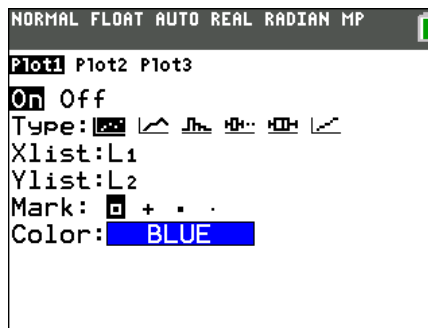
To access the stat plot, press [2nd] [Y=] and press [ENTER] at **Plot1**. If you need to change the list names, move to **Xlist** and press [2nd] [LIST] and select the correct name from the list. Repeat for **Ylist**.

Once the stat plot is set up, students can press [ZOOM] and select **ZoomStat** to have the calculator select a viewing window. It is also good practice to have students look at the data and select appropriate minimums and maximums.

Students should press [WINDOW] to view the scale so that they can add it to their drawing. They can also adjust he settings since **ZoomStat** doesn't always provide 'nice' numbers.

Discuss with students how they can use the scatter plot to describe the data (to see the general trend of the data). It may help to discuss the specifics of the data. They should see that the number of homeruns generally increases over the years.
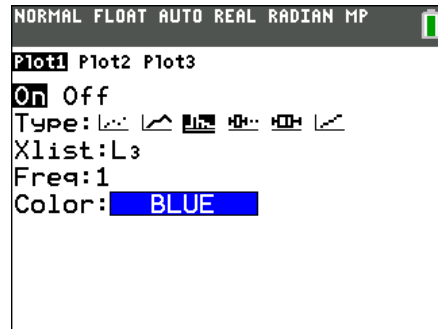
Also, if students have not used the **StatPlot** set up screen much, you may want to give them time to explore the different types of graphs and the data needed for each.
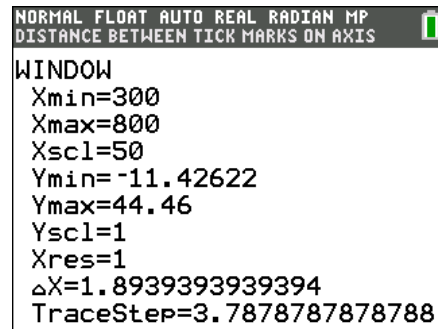
Part 2 – Creating a Histogram

Question 4

After discussing the scatter plot, have students move to the histogram. Again, access the Stat Plot menu and change the set up of **Plot1** to a histogram using L3.
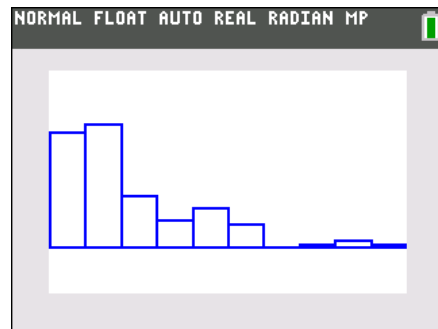
In this case, have students set up the window (WINDOW) with an **Xmin** of 300, **Xmax** of 800 and **Xscl** of 50.

If they just press GRAPH at this point they won't see the entire graph, They will need to adjust the Y settings.

If they press **ZoomStat,** then they will need to readjust the X settings.
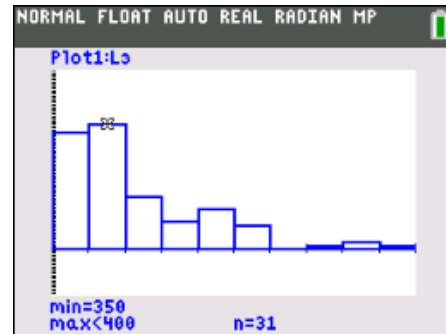
Questions 5–8

Students should press the [TRACE] key and explore the graph by using the [◄] and [►] arrow keys. Ask questions about the different bars, including the bar that is empty.

Have them interpret the numbers displayed. In the graph shown at the right, 31 of the top 100 players had between 350 and 400 career homeruns. 350 is included but not 400.

Discuss with students how they can use the histogram to describe the data. It describes the frequency of a category. (A circle graph also does this.) They should see that many players have a few home runs and that fewer players have many home runs.

Have students adjust the **Xscl** of the window (i.e. the width of the bars of the histogram) to see what happens. In pairs or small groups, they can discuss how you can change the look of the graph even though the data hasn't changed. They should see that the height of the bars and the number of bars change.

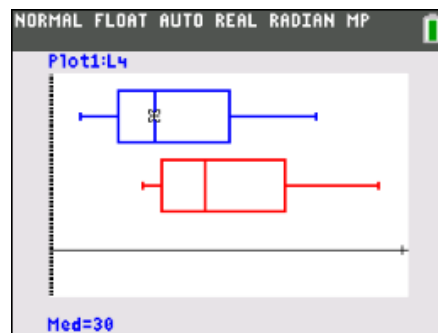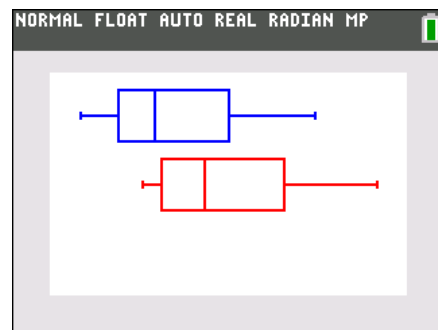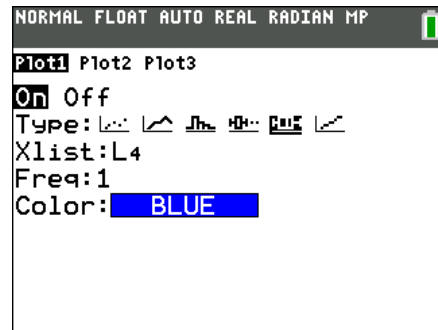**Part 3 – Creating Box Plots**

Questions 9–11

Students explore a box-and-whisker plot. In this example, they will use both **Plot1** (L4) and **Plot2** (L5).

Again, to select the list name, press 2nd [LIST] and move down to the needed list and press ENTER. This will enter the list name in the **Xlist** field.

Press ZOOM and select **ZoomStat** to display the graph.

The TRACE key will allow students to explore the various parts of the graph. Use the ◄ and ► arrow keys and interpret the data shown. The graph at the right shows that the median number of homeruns hit but the top 25 homerun hitters in the AL in 2004 was 30. To move from Plot 1 (L4) to Plot 2 (L5), students need to use the up and down (▲ ▼) arrows. The graph they are tracing will be displayed in the upper left corner.

Ask students questions to compare the two sets of data. Are the minimums of both sets of data close together? The maximums? Help students see that box plots are a great way to compare the statistics of two different sets of data.
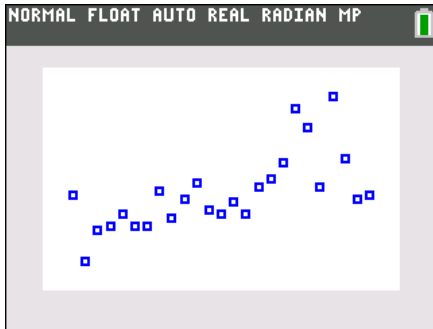
Solutions – student worksheet

Part 1 – Creating a Scatter Plot

1. Set up a Scatter Plot with **L1** as the Xlist and **L2** as the Ylist. **Answer: Check students' work.**

2. Press ZOOM and choose **ZoomStat** to display the graph. Sketch the graph at the right. Show the scale and label the axes.

    Answer:

    NORMAL FLOAT AUTO REAL RADIAN MP

3. What information can you gather from the graph?

    Answer: Students should see that you can determine trends over time. In this case, there appears to be more homeruns hit as time passes.

Part 2 – Creating a Histogram

4. Change Plot1 to a Histogram using **L3**. Set **Xmin** to 300, **Xmax** to 800, and **Xscl** to 50.

    Answer: Check students' work.
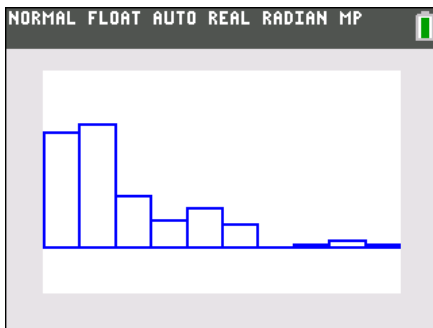
5. How is the set up of this graph different from the scatter plot above?

    Answer: This graph only uses one list. I had to select a scale for the width of each bar in the graph.

6. Sketch the graph at the right. Show the scale and label the axes.

    Answer:

    NORMAL FLOAT AUTO REAL RADIAN MP

7. What is easier to see with this type of graph?

    Answer: It is easier to compare the different sections to each other. The height of the bar makes it easier to see which group has the most and which has the least.

8. What happens to the graph if you adjust the **Xscl** to be larger? smaller?
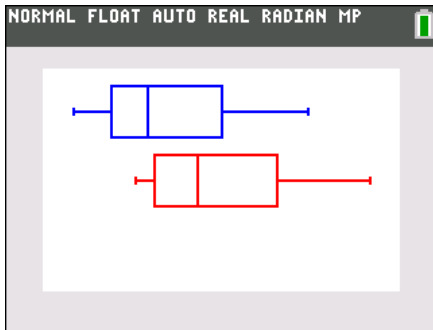
    Answer: If I make the Xscl 100, there are fewer bars because it has combined that data into the same bar and the bar heights in general increase. The bars become wider. If you make the Xscl 25, there are more bars and the bar heights in general decrease. The bars become narrower.

Part 3 – Creating Box Plots

9. Change Plot1 to a Box Plot using **L4**. Set up Plot2 to a Box Plot using **L5**. Press ZOOM and choose **ZoomStat** to display the graph. **Answer: Check students' work.**

10. Sketch the graph at the right. Show the scale and label the axes.

    Answer:

11. Press TRACE and use the arrows to explore the parts of the graph. What does this graph allow you to do?

    Answer: This graph allows me to compare two sets of data.

12. What can you gather from the graph?

    Answer: The American League has less homeruns overall than the National League.