

Barry Bonds Hits it All

by – Diane Broberg

Activity overview

This activity will investigate the relationship between a histogram and a boxplot. It will also look at outliers and the effect they have on both graphs.

Concepts

Histograms

Boxplots

Outliers

Teacher preparation

Students should be able to create a histogram and a boxplot.

Classroom management tips

This activity can be used as a demonstration in which the concepts are investigated, an individual homework assignment, or as an assessment tool.

TI-Nspire Applications

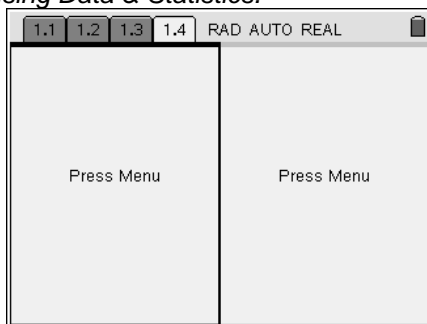
BondsHitsItAll.tns

Step-by-step directions

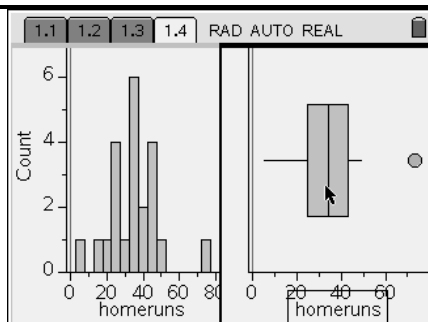
The directions given are for using the activity as a demonstration in which the concepts are investigated.

Give each student a copy of the handheld file.

*Students should create a new page with a split screen layout as shown below. Each screen will be a graph using **Data & Statistics**.*

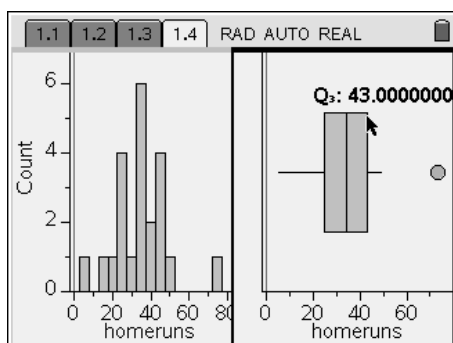


Create a histogram using the homerun data on the left side and a boxplot using the same data on the right side. The finished page is shown below. Note: the handheld automatically creates appropriate windows for each. Adjustments to the window can be made by dragging the graphs.

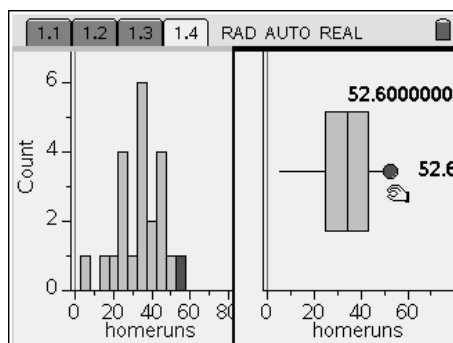


Discussion can now follow as to the relationship between the histogram and the boxplot. Questions that might be asked:

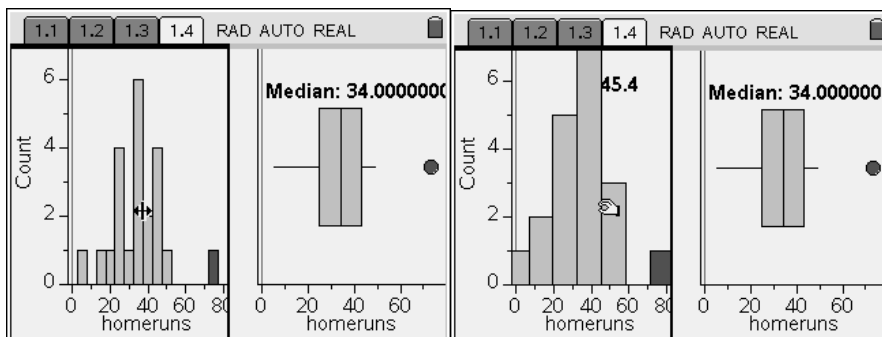
1. An outlier is defined as a data point that is $1.5 \times IQR$ above $Q3$ or below $Q1$. What is the IQR? The values for $Q1$ and $Q3$ can be found by hovering over the boxplot. Have students calculate the IQR and determine values that would make a data point an outlier.



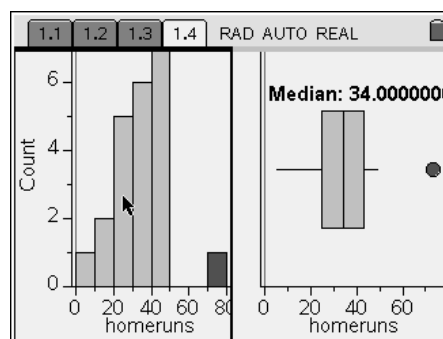
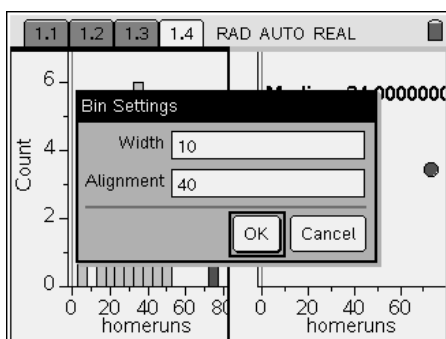
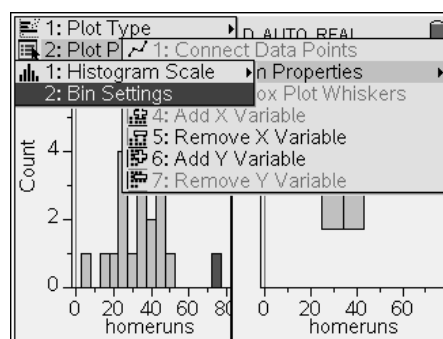
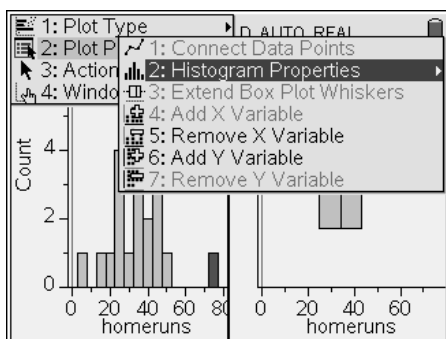
2. How is the outlier seen on the histogram?
3. What effect does an outlier have on the boxplot? To investigate this have students click on the outlier and drag the point to the left and right. Students will notice that as they drag the point, the boxplot and the histogram will change shapes. Ctrl Z will return the boxplot to the original one after students are done investigating.



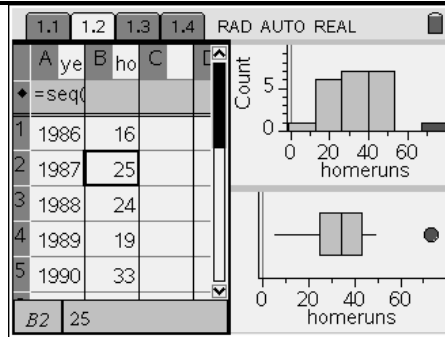
4. What affect does the width of the bars on a histogram have on the shape of the histogram and the shape of the boxplot? Students often think that different widths of bars on the histogram will change the shape of the boxplot. There are two ways to investigate this. The first is by dragging a bar on the histogram.



The second is done by manually changing the setting. To do this, choose plot properties under the menu. Then choose histogram properties and bin settings. The alignment allows you to change where the left of a bar sits. This can be any bar. The following is an example of a change in width.



5. What affect does changing one value in a data set have on the shape of the histogram and the boxplot. To do this, create a new page that has the spreadsheet and two graphs on one page. Click in any cell in column B on the spreadsheet and change the value. As one does this, the histogram and boxplot will change. An investigation like this allows students to see how an extreme value can greatly affect both graphs. Ctrl Z pressed several times will return the spreadsheet and graphs to their original values.



Assessment and evaluation

- *Continued practice looking at data sets is valuable. Choose sets that have outliers and do not have outliers.*

Activity extensions

- *Have students investigate the years that Bonds had good and bad years.*
- *Choose a data set with extreme low and high values. Also look at data sets that are symmetric and others that are skewed.*