ALGEBRA I ACTIVITY 12:
BOX PLOTS AND HISTOGRAMS
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ACTIVITY OVERVIEW:
In this activity we will
- Create a box plot representing distances traveled on 30 weekends
- Compare the box plot to a histogram of the same data to better understand the shape of the box plot

Press [STAT][ENTER]. Press [▲] to the top of **L1** and then right arrow to the top of the seventh list which has no heading. The calculator will be in Alpha Mode, so type the heading **WKND**.

June collected the distances she drove each weekend for 30 weekends. The distances are listed (ten entries per row) in the three rows below. Enter all 30 distances in the **WKND** list.
31, 8, 93, 69, 75, 2, 33, 194, 83, 17,
2, 207, 99, 32, 8, 2, 75, 126, 30, 9,
211, 93, 8, 75, 198, 25, 32, 71, 9, 98

Press [2nd][Y=] for the **Stat Plots** menu. Press [ENTER] to select **Plot 1**. Press [ENTER] to turn the plot on. Select the box plot icon. Arrow down to **Xlist**.

To select **WKND** as the list, press [2nd][STAT] to access the lists. Down arrow to the **WKND** list and press [ENTER].

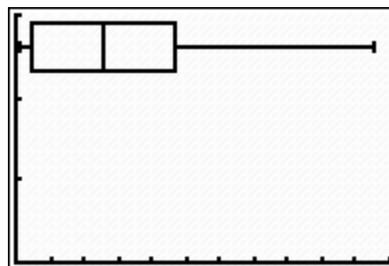This will paste **WKND** in as the **Xlist**.

Press WINDOW. An appropriate window would include *x*'s that range from 0 to 220. The box plot is not affected by the *y* settings because it is not paired with a second set of numbers.
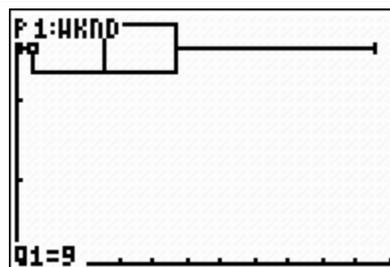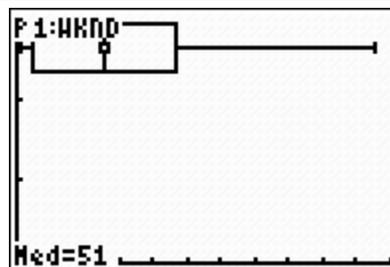
Press GRAPH.

Press TRACE to observe the minimum, Q1 and other values. Why is the first whisker so short? What does it mean for the other whisker to be so long?

The median value is 51. What does this value say about the distances traveled? Since this point is the "middle" point in the data, why isn't the box plot balanced at this point?

To better understand the shape of the box plot, compare it to a histogram of the same data. Press 2nd Y= for the **Stat Plots** menu. Press 2 to select **Plot 2**. Press ENTER to turn the plot on. Select the histogram icon. Arrow down to **Xlist** and change it to **WKND**.

Press WINDOW. An appropriate window will still include *x*'s that range from 0 to 220. The histogram will chunk the data into intervals of 20, as indicated by the **Xscl**. It will show frequency on the vertical axis. The **Ymax** can be adjusted later if needed. The **Ymin** has been set slightly below 0 to allow room at the bottom of the graph to read the trace information (which, for a histogram, takes up a bit of room).

```
WINDOW
 Xmin=0
 Xmax=220
 Xscl=20
 Ymin=-4
 Ymax=14
 Yscl=2
 Xres=1
```

Press GRAPH. What do you notice about the shape of the histogram? How does it compare to the shape of the box plot?
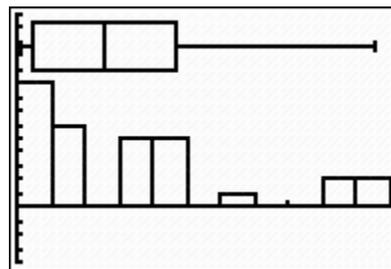
Press TRACE and up arrow to make sure you are tracing on Plot 2. The readout shows that for the interval containing 0 and numbers less than 20 there are nine entries. Does the fact that the first bar is so tall relate to why is the first whisker so short? What do you see now about why the other whisker is so long?

```
P 2:WKND
min=0
max<20          n=9
```
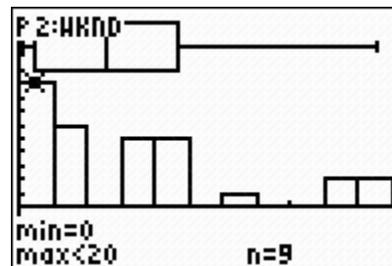
Right arrow to the spot on the histogram that should contain the median. The interval from 40 to 60 should contain the median of 51, but it shows zero entries. How is that possible?

```
P 2:WKND
min=40
max<60          n=0
```