A statistician will describe a distribution by describing the shape, giving a measure of central tendency, and also giving a measure of variability.

We have discussed two ways to measure central tendency: the mean and the median. Recently we learned that if we choose to use the mean as a measure of central tendency, then we can measure variability using the average distance from the mean, ADM. Today we will focus on how to measure variation relative to the median.

1. Find the median for this set of data.

6 6 7 7 7 7 9 9 11 13 13 13 15 15 15 15 16 16 19 20 21 22 22 22

Statisticians measure spread relative to the median by marking the quartiles.
Quartiles divide the data in four groups, with 25% of the data in each group. The median is the second quartile.)

Mark the quartiles on the number line. Use the quartile marks to make a box. Then mark the lowest data value and the highest data value. Connect these to the box with a horizontal line.
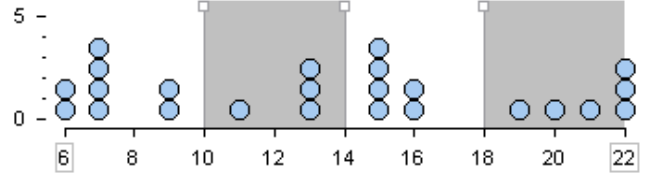
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 0    2    4    6    8   10   12   14   16   18   20   22
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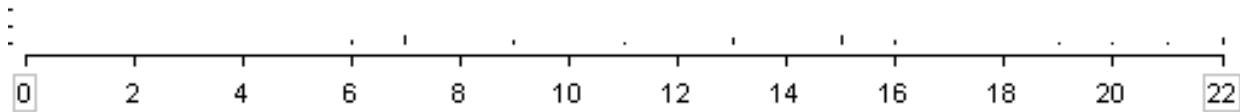
2. In Tinkerplots you can set dividers with "equal widths" or "equal counts".

   a. For Graph A are the dividers "equal widths" or "equal counts"?

   Which kind of dividers are used in Graph B?
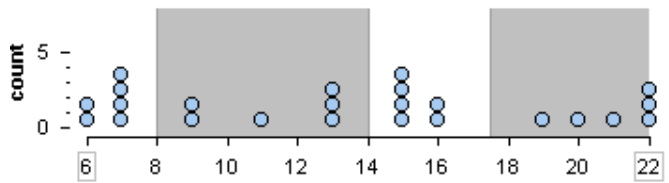
   b. Write percents representing the percent of data in each of the four shaded sections for both graphs
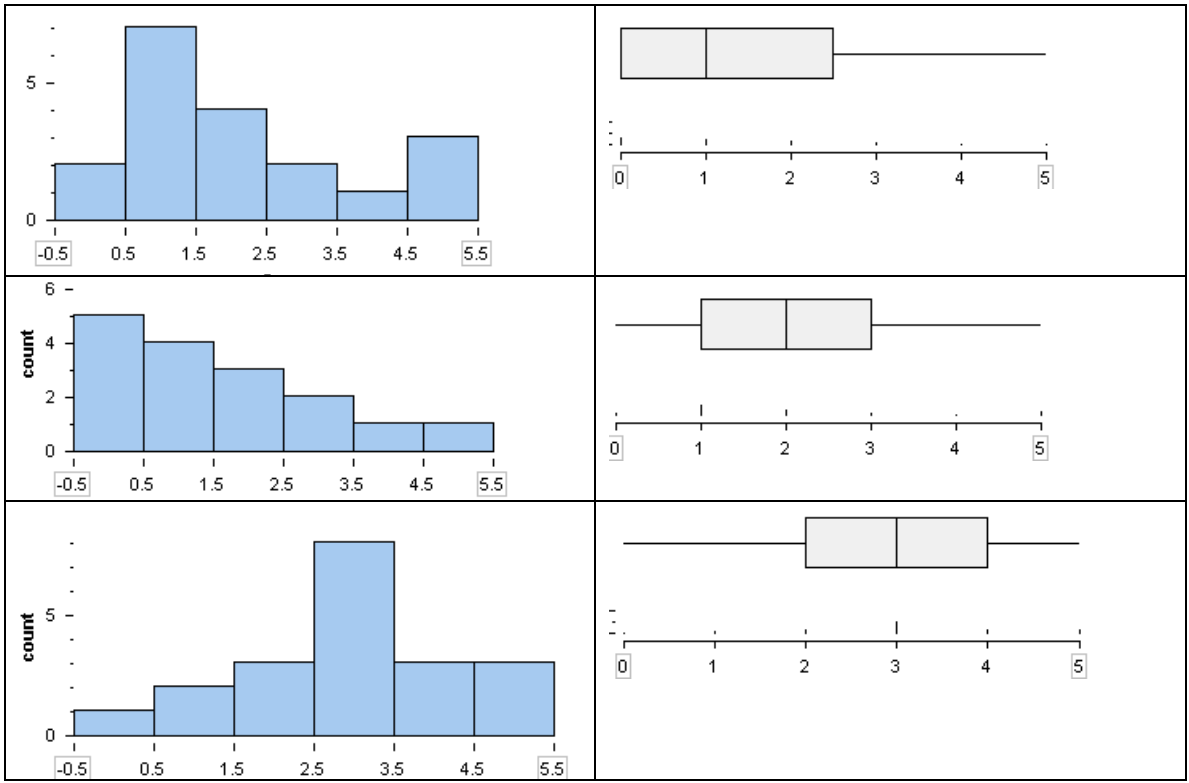
   c. Which kind of divider is related to a boxplot? Why does this make sense?

   Draw the boxplot for this data. Show the percentages above your boxplot.

   d. Which kind of divider is related to a histogram? Why does this make sense?

   Draw a histogram with four bars for this data. Show the percentages above your histogram.
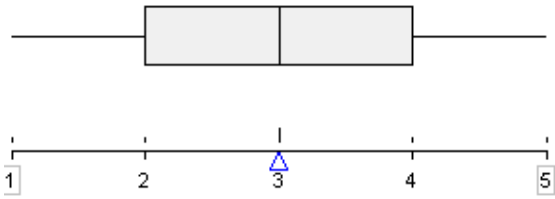
3. Match the histograms to the boxplots.

4. Make up a data set (n=11) that fits this pair of graphs. Then find a different data set that also fits these two graphs.
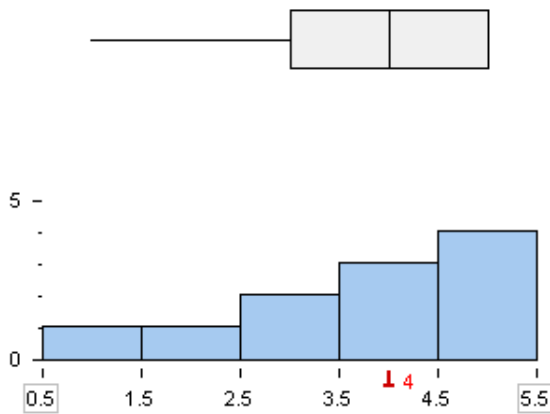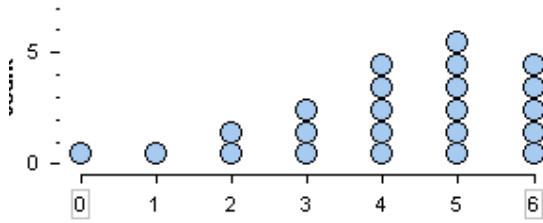
5. Make up a data set (n=10) with the largest ADM possible that fits this boxplot. Then make up a data set (n=10) with the smallest ADM possible that fits this boxplot.

6. Make up a data set with 10 numbers that matches this boxplot. Make a histogram of your data.
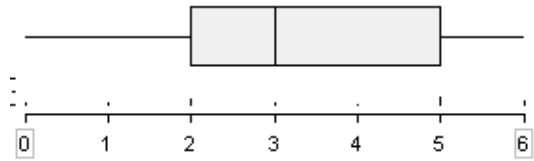
7. Draw a boxplot for the data shown in the dotplot.

8. The Food and Drug Administration is testing two new brands of aspirin. For each brand, twenty tablets are randomly drawn from a bottle and the amount of aspirin in each tablet is determined using chemical analysis. Each brand claims to have one gram of aspirin per tablet. Boxplots are drawn to show the distribution of the weight of aspirin in each tablet.

a. What is the median amount of aspirin in each brand? (give a reasonable estimate)

b. Approximately what percent of aspirin in each brand contain more than the declared one gram?

c. What is the shape of each distribution?
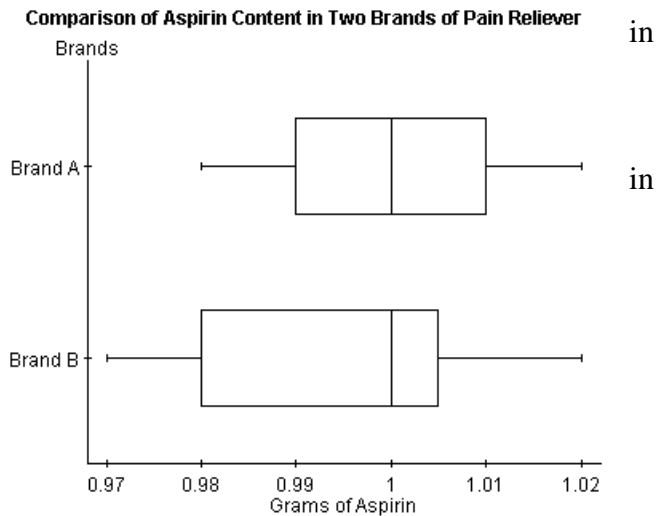
d. If government regulations specify tolerances within 10 milligrams (0.01 grams), approximately what percent of the aspirin in each brand exceed this tolerance?

e. Which is the better brand? Why? (State your position clearly, support your decision by referring to the shape and numerical summaries.)