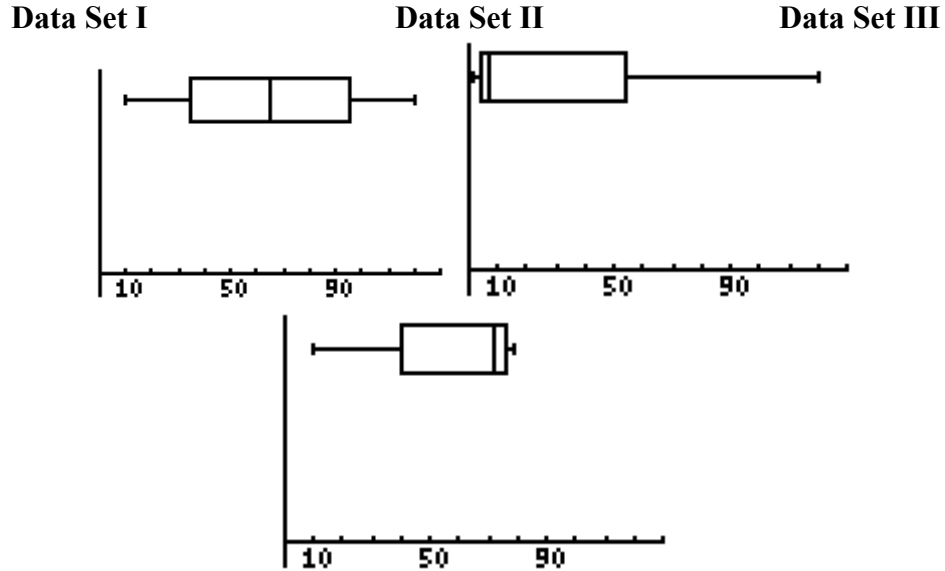


## Box and Whisker Plots and Measures of Central Tendency

The box and whisker plots for three data sets are shown below.



1. Compare the shapes of the box and whisker plots.
2. What do these shapes tell you about the variation in the data sets.
3. The data sets for these box and whisker plots are given below.

Data Set I:
10    20    30    40    50    60    70    80    90    100    110    120

Data Set II:
1    2    3    4    5    6    7    8    9    100    110    120

Data Set III:
10    10    11    70    71    72    73    74    75    76    78    79

- a. Calculate the mean of each data set.
  - b. Locate the mean of each data set on its box and whisker plot by drawing a vertical line that passes through the mean.
  - c. How do the mean and median of each data set compare?
4. What does the shape of a box and whisker plot tell you about the relationship between the mean and the median of its data set?

## **Box and Whisker Plots and Measures of Central Tendency**

### **Answer Key**

Notes: When students are making judgements about which measure of central tendency to use, they need to understand how variability in the data affects the values of the measures of central tendency. Generally, if you are looking for the best representative value when there is a skewed set of data, it is better to use the median rather than the mean. This is because the mean can be influenced by outliers and therefore give a false idea of the truth.

1 - 2. Students should mention that Data Set I is symmetrical. They can see that the box and whisker plot is symmetrical whereas the other two plots are not. Data Set II has half the data that is 10 or less and the other half between 10 and 120, while Data Set III has half the data falling between 70 and 80 with the other half falling between 10 and 70. Students should have a solid understanding of median and how it is represented in a box and whisker plot.

3. a – b.

	<b>Mean</b>	<b>Median</b>
<b>Data Set I</b>	65	65
<b>Data Set II</b>	31.25	6.5
<b>Data Set III</b>	58.25	72.5

c. If the data are symmetrical, then the mean and the median are equal. However, when the data are skewed to the right as in Data Set II, the mean is greater than the median. When the data are skewed to the left as is the case with Data Set III, the mean is less than the median. In other words, the mean is pulled in the direction of the skewedness or outliers while the median is not effected.

4. If the box and whisker plot is symmetrical, the mean and the median will be the same. If the data are skewed to the right (you can tell this by a long whisker on the right side), then the mean will be greater than the median. If the data are skewed to the left (shown by a long whisker to the left side), then the mean will be less than the median.