

# Human Box and Whiskers

*This activity was presented at the 1992 Woodrow Wilson Institute in Princeton, New Jersey by Jo Ann Schuette, who teaches at Curtis Middle School in Wichita, Kansas.*

**Materials needed:** yarn, magic marker, paper to record data, pencil, number line (use tape on the floor, chalk on concrete, or the seams on floor tiles), calculator, signs with each of the following labels: Lower Extreme, Upper Extreme, Median, Upper Quartile (UQ), Lower Quartile (LQ).

**Expected time needed:** 15 to 20 minutes for the formation of the physical box plot and another class period for discussion of data and doing some extensions.

Before you begin, appoint a recorder to help you.

1. Have each student write his or her height in inches to the nearest inch on a piece of paper. Have the entire class stand.
2. Direct the students to organize themselves in a line from the shortest height to the tallest height.
3. Discuss the special qualities of this line.
  - Say, "Presenting a special number at the left of the line, lower extreme. And now, at this end of the line, presenting another special number, upper extreme." While you are presenting these numbers, a "Vanna White" fanfare may accompany the introductions.
  - Now, find the median by having the two students at opposite ends of the line simultaneously hold up their hands. Then, have the next pair at opposite ends of the line hold up their hands. This continues until the last person or pair of people at the center of the line is found. The person (or

pair) who is the median holds up his or her hand(s), and everyone else drops theirs.

- Find the median of the upper half. This number is called the upper quartile, indicated by UQ.
- Find the median of the lower half. This number is called the lower quartile, indicated by LQ.

As special points are designated, have the students who represent them step forward and raise their hand, holding up their labels.

4. Have the special numbers step forward onto the number line.
5. Discuss and figure out whether or not there is an "outlier." Data that are more than 1.5 times the interquartile range from the upper or lower quartiles are called outliers. If you have outliers, you will need to have people designated to represent the end of the normal range.
6. Locate the special numbers on a number line. Then string yarn from the lower quartile number to the upper quartile number.
7. String yarn from the lower quartile value to the end of the normal range making a whisker. Extend the yarn from the upper quartile value to the end of the normal range to make the other whisker.
8. Follow up with written work or small group discussions:
  - What part of the data are enclosed by the "box" in the box-and-whiskers plot?
  - Which data are connected to the box by the "whiskers" in the box-and-whiskers plot?
  - What five pieces of information can you learn from the box-and-whiskers plot?

- How do you know if a value is an "outlier?"
- What kind of data would be best organized and reported with a box-and-whiskers plot?
- Name a set of data with ten numbers whose box-and-whiskers plot would have only one "whisker."
- What drawbacks does a box-and-whiskers plot have, if any?

## 9. Extensions:

- Use centimeters instead of inches. Have students estimate their heights in centimeters before they actually measure. This estimating technique would also work with inches; however, most people already know their height in inches, but they usually don't know their height in centimeters.
- Make a stem and leaf plot and compare the outcome of the data.