Math Practice 2: Statistical Measures—Teacher Instructions

Teacher Introduction

Scientists use a variety of statistical tools in order to interpret and compare data. These tools include the three measures of central tendency, the mean, median, and mode and box -and-whiskers plots.

In this activity, students will compare the duration of missions for four different U.S. space shuttles over a seven year period. The students will learn that various statistical tools show different characteristics about a set of data.

Vocabulary

box-and-whiskers plot—a method of displaying data that helps in interpreting how data is distributed on an interval scale. A box-and-whiskers plot shows the shape of the distribution, its central value, and the variability. It especially helps show whether a distribution is skewed or whether there are unusual observations in the data set (outliers).

central tendency—how much the values of a distribution cluster, usually measured by mean, median, or mode.

lower quartile—the median of the lower part of the data.

mean—the arithmetic average; the sum of all the scores divided by the number of the scores.

median—the middle of a set of data. Half the scores are above the median; half are below. To find the median:

- If the number of data is odd, the median is in the center.
- If the number of data is even, the median is the average of the two center scores.

mode—the number or score that appears most often in a set of data.

quartile—a division or group of data that separates the data into equal parts.

upper quartile—the median of the upper part of data.

Math Standards:

Grades 6-8: Data Analysis and Probability Standard

Select and use appropriate statistical methods to analyze data.

- Find, use, and interpret measures of center and spread, including mean and interquartile range.
- Discuss and understand the correspondence between data sets and their graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatterplots.
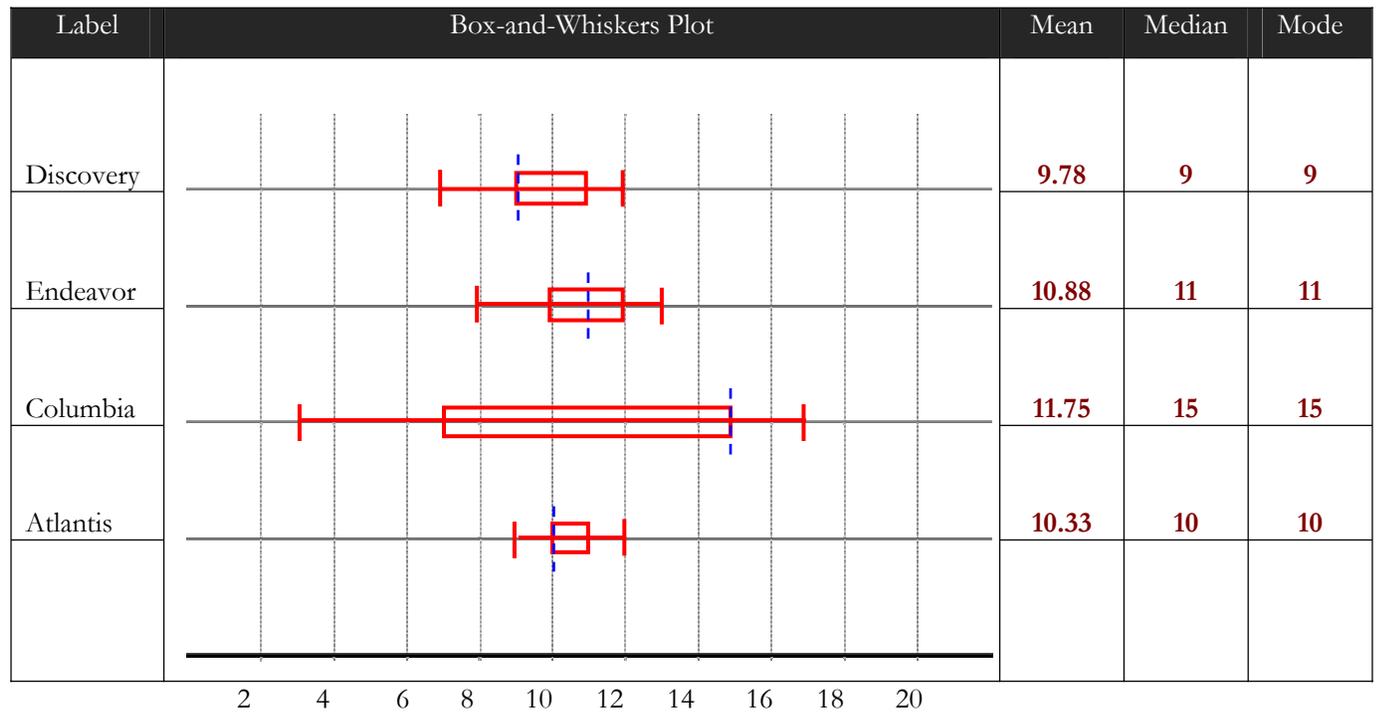
Materials

- Copies of Math Practice 2
- Pencil
- Ruler

Procedure:

1. Preview the activity with the students. Read the student version of the Introduction and the Vocabulary section aloud in class. Allow time for questions and discussion.

2. Direct your students to work through the Procedure, Analysis Activity, and Example sections of Math Practice 2.

3. Students should complete the Data Analysis Worksheet and answer the Analysis Questions.

4. Review the answers to the questions as a class using the answer key as your guide.

5. Make sure that your students understand the relevance of this activity to their mission work. During the F.S.I.: Tranquility Base live simulation, students will use box-and-whiskers plots to make important decisions.

Answer Key

Data Analysis Worksheet

Label	Box-and-Whiskers Plot	Mean	Median	Mode
Discovery		9.78	9	9
Endeavor		10.88	11	11
Columbia		11.75	15	15
Atlantis		10.33	10	10

2   4   6   8   10   12   14   16   18   20

Analysis Questions

Use your box-and-whiskers plots to answer the following questions:

1. Which shuttle flew the longest mission?

   The shuttle Columbia with a mission of 17 days

2. Which shuttle flew the shortest mission?

   The shuttle Columbia with a mission that lasted three days

3. Which shuttle's duration had the smallest range? Explain.

   The shuttle Atlantis with a range of 3
   (The length of whiskers shows the range of the numbers.)

4. Which shuttle had a median of 11 days?

   The shuttle Endeavor