Math Grade 6: Unit 7
Statistics

Parent Guide

"*I Can*" Help My Student…

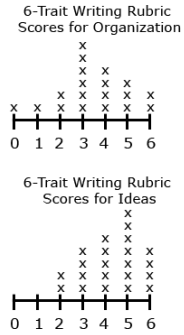
- Explain that there are three ways that the distribution of a set of data can be described: by its center, spread and overall shape.
- Organize and display data as a line plot, histogram, or box plot.
- Determine the upper and lower extremes, median, and upper and lower quartiles of a set of data and use this information to display the data in a box plot.
- Identify the similarities and differences of representing the same data in a line plot, a histogram, or box plot.
- Write a data collection summary that includes the number of observations, what is being investigated, how it is measured, and the units of measurement.
- Justify the use of a particular measure of center or measure of variability based on the shape of the data.

Vocabulary

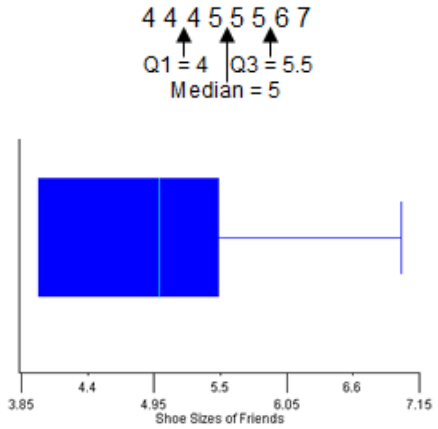
line plot - A method of visually displaying a distribution of data values where each data value is shown as a dot or mark above a number line. Also known as a dot plot.
mean - A measure of center in a set of numerical data, computed by adding the values in a list and then dividing by the number of values in the list. Example: For the data set {1, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the mean is 21.
median - A measure of center in a set of numerical data. The median of a list of values is the value appearing at the center of a sorted version of the list—or the mean of the two central values, if the list contains an even number of values. Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 90}, the median is 11.
mode – The number that occurs most frequently in a set of numbers. A data set can have no mode or multiple modes.
range - The difference between the largest and smallest values in a numerical data set.

Important Understandings and Concepts

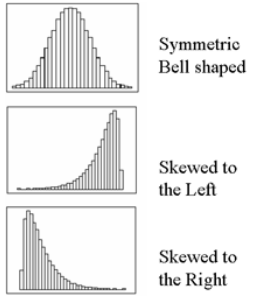
Showing two graphs vertically rather than side by side helps students make comparisons. For example, students would be able to see from the display of the two graphs that the ideas scores are generally higher than the organization scores. One observation students might make is that the scores for organization are clustered around a score of 3 whereas the scores for ideas are clustered around a score of 5.



Here is a ***box plot*** for the data to the right. The middle value in the ordered data set is the median. If there is an even number of values, the median is the mean of the middle two values. In this case, the median would be 5 because 5 is the average of the 4th and 5th values which are both 5. Students find quartile 1 (Q1) by examining the lower half of the data. Again there are 4 values which is an even number of values. Q1 would be the average of the 2nd and 3rd value in the data set or 4. Students find quartile 3 (Q3) by examining the upper half of the data. Q3 would be the average of the 6th and 7th value in the data set or 5.5. The mean of the data set was 5 and the median is also 5, showing that the values are probably clustered close to the mean. The interquartile range is 1.5 (5.5 – 4). The interquartile range is small, showing little variability in the data



When examining the shape of the data, students look for "tails" of data on either the left or right, or whether the data is basically symmetrical as shown in this example. This determines in which direction the data is ***skewed.*** Skewed data has ***outlier*** values that are far away from the majority of the data. These outliers cause the mean to be skewed up or skewed down. In these cases, the median may be the best measure of center for the data, not the mean.



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Sample Problems

1. Ms. Wheeler asked all the students in her class to write their age in months on a sticky note. The 28 students in the class brought their sticky note to the front of the room and posted them in order on the white board. The data set is listed below in order from least to greatest. Create a box plot for this data.

130	130	131	131	132	132	132	133	134	136
137	137	138	139	139	139	140	141	142	142
142	143	143	144	145	147	149	150		

Solution: Five number summary

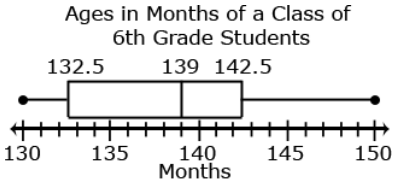
Minimum – 130 months

Quartile 1 (Q1) – (132 + 133) ÷ 2 = 132.5 months

Median (Q2) – 139 months

Quartile 3 (Q3) – (142 + 143) ÷ 2 = 142.5 months

Maximum – 150 months



2. Describe the quartiles in the above box plot for the ages in months data described above.

Solution:

This box plot shows that:

¼ of the students in the class are from 130 to 132.5 months old

¼ of the students in the class are from 142.5 months to 150 months old

½ of the class are from 132.5 to 142.5 months old

The median class age is 139 months.

Multiple problems, different solution paths, and teacher commentary for the 6th grade standards in this unit. http://www.illustrativemathematics.org/6.SP

How Can You Help Your Student?

Playing games is a wonderful way to practice skills at home in a fun environment. *Stack-n-Pack* books contain several math games covering math concepts from Kindergarten through High School. *Stack-n-Pack* card games may be checked out from your school (contact your school's Parent Liaison) or purchased online: Stack-n-Pack Mathematics Card Games for K-HS . The ***Fractions, Decimals, and Percents*** game from the *Stack-n-Pack 6-8* book is good practice for 6th graders.

- Talk about data wherever it occurs it occurs in real life. This could be data from newspapers, magazines, the internet, or from the TV. Ask challenging questions such as, "I wonder how many cars go through this McDonalds drive-thru every day? How would you measure that?"

- Following are links to different online video lessons from LearnZillion and Khan Academy that teach the Grade 6 Statistics content in this unit.
  - http://learnzillion.com/courses/44?collection_id=613
  - http://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-data-statistics -

- Here are online activities and games for students to create and analyze data with different data display types.
  - http://shodor.org/interactivate-java/activities/Histogram/ Interactive analysis
  - http://shodor.org/interactivate-java/activities/BoxPlot/ Interactive analysis of box plots
  - http://webtech.kennesaw.edu/jcheek4/statistics.htm - Games and lessons for the introduction to statistics
  - http://www.adaptedmind.com/gradelist.php?grade=6 Games that reinforce mean, median, and mode
  - http://gamequarium.com/data.html Games to support data analysis skills
  - http://nlvm.usu.edu/en/nav/frames_asid_200_g_3_t_5.html A tool to create box plots