Unit 3, Lesson 9

Technological Graphing

Let's use technology to represent data.

9.1 It Begins with Data

Open a spreadsheet window and enter the data so that each value is in its own cell in column A.

1. How many values are in the spreadsheet? Explain your reasoning.

2. If you entered the data in the order that the values are listed, the number 7 is in the cell at position A1 and the number 5 is in cell A5. List all of the cells that contain the number 13.

3. In cell C1 type the word "Sum," in C2 type "Mean," and in C3 type "Median." You may wish to double-click or drag the vertical line between columns C and D to allow the entire words to be seen.

	A
1	7
2	8
3	4
4	13
5	5
6	15
7	14
8	8
9	12
10	2

	A
11	8
12	13
13	12
14	13
15	6
16	1
17	9
18	4
19	9
20	15

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9.2 Finding Spreadsheet Statistics

Using the data from the *Warm-up*, we can calculate a few **statistics** and look at the data.

- Next to the word Sum, in cell D1, type =Sum(A1:A20)
- Next to the word Mean, in cell D2, type =Mean(A1:A20)
- Next to the word Median, in cell D3, type =Median(A1:A20)

1. What are the values for each of the statistics?

2. Change the value in A1 to 8. How does that change the statistics?

3. What value can be put into A1 to change the mean to 10.05 and the median to 9?

We can also use Geogebra to create data displays.

- Click on the letter A for the first column so that the entire column is highlighted.
- Click on the button that looks like a histogram to get a new window labeled One Variable Analysis.
- Click Analyze to see a histogram of the data.

1. Click the button Σx to see many of the statistics.
   a. What does the value for n represent?

   b. What does the value for Σx represent?

   c. What other statistics do you recognize?

2. Adjust the slider next to the word Histogram. What changes?

3. Click on the button to the right of the slider to bring in another window with more options. Then, click the box next to Set Classes Manually and set the Width to 5. What does this do to the histogram?

4. Click the word Histogram, and look at a box plot and dot plot of the data. When looking at the box plot, notice there is an x on the right side of the box plot. This represents a data point that is considered an outlier. Click on the button to the right of the slider, and uncheck the box labeled Show Outliers to include this point in the box plot. What changes? Why might you want to show outliers? Why might you want to include or exclude outliers?

9.3 Making Digital Displays

Use the data that you collected from the numerical, statistical question from a previous lesson. Use technology to create a dot plot, boxplot, and histogram for your data. Then find the mean, median, and interquartile range for the data.

Are you ready for more?

A stem and leaf plot is a table in which each data point is indicated by writing the first digit(s) on the left (the stem) and the last digit(s) on the right (the leaves). Each stem is written only once and shared by all data points with the same first digit(s). For example, the values 31, 32, and 45 might be represented like:

3	1 2
4	5

Key: 3 | 1 means 31

A class took an exam and earned the scores:

86 73 85 86 72 94 88 98

87 86 85 93 75 64 82 95

99 76 84 68

1. Use technology to create a stem and leaf plot for this data set.

2. How can we see the shape of the distribution from this plot?

3. What information can we see from a stem and leaf plot that we cannot see from a histogram?

4. What do we have more control of in a histogram than in a stem and leaf plot?

Lesson 9 Summary

Data displays (like histograms or box plots) are very useful for quickly understanding a large amount of information, but often take a long time to construct accurately using pencil and paper. Technology can help create these displays as well as calculate useful *statistics* much faster than doing the same tasks by hand. Especially with very large data sets (in some experiments, millions of pieces of data are collected), technology is essential for putting the information into forms that are more easily understood.

A **statistic** is a quantity that is calculated from sample data as a measure of a distribution. *Mean* and *median* are examples of statistics that are measures of center. *Mean absolute deviation (MAD)* and *interquartile range (IQR)* are examples of statistics that are measures of variability. Although the interpretation must still be done by people, using the tools available can improve the accuracy and speed of doing computations and creating graphs.