

**Introduction to Statistics**  
**STATS ABOUT OUR CLASS!**

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**South Carolina State Standards For Data Analysis:**

- I. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
  - A. Design investigations to address a question and consider how data collection methods affect the nature of a data set.
    1. Compare data sets collected in different ways to address a given question and then determine how the methods of collection affected the data sets.
  - B. Collect data using observations, surveys, and experiments.
  - C. Represent data using tables and graphs such as line plots, bar graphs, and line graphs.
    1. Determine the appropriate horizontal and vertical scales for data sets and then how to represent zero on a graph.
    2. Construct and interpret tables and line graphs for data sets from applied situations.
    3. Explain what type of graph may be appropriate for a given data set.
  - D. Recognize the differences in representing categorical and numerical data.
    1. Compare the types of graphs that may be used for categorical data with types that may be used for numerical data.

**Concepts:**

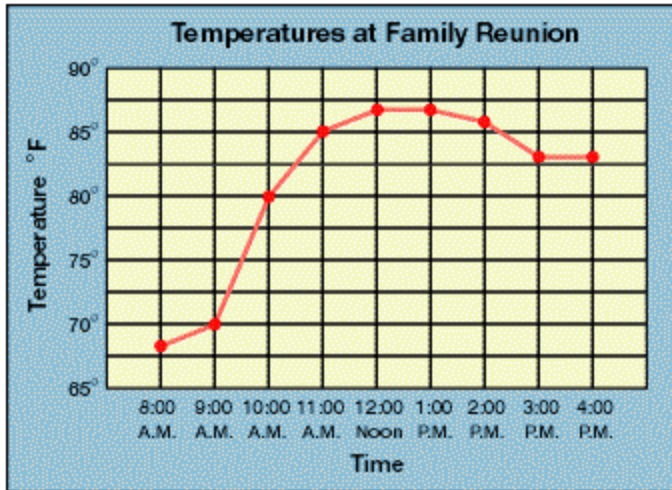
Graphing, Collecting Data, Interpreting Graphs and Tables, Constructing Graphs and Tables, Determining What Type of Graph is Appropriate for a Given Set of Data

**Background Information:**

- Line Graphs- Line graphs are used to show change over time. Broken lines show increases or decreases in data and the slope of the line tells whether the change is gradual or rapid. Horizontal line segments show periods of no change. The

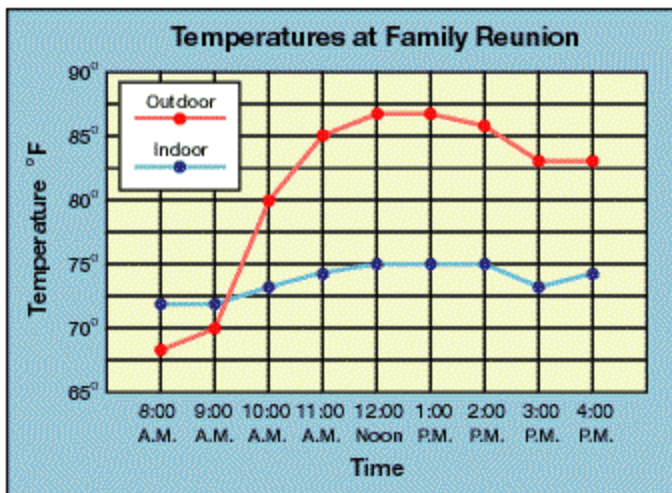
following is an example of a line graph displaying temperatures over an eight-hour period at a family reunion.

### Line Graph



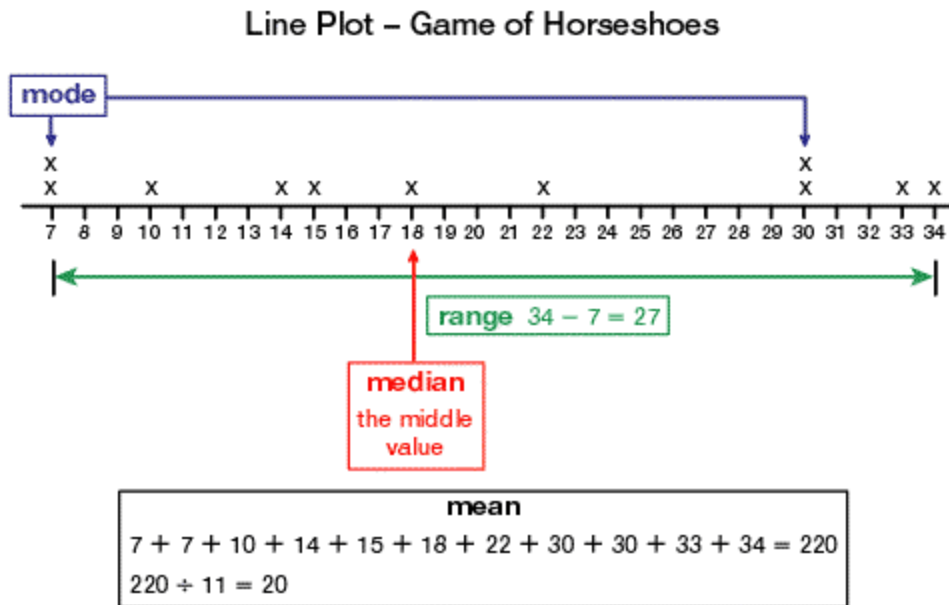
- Double Line Graphs- Double line graphs allow students to compare two sets of data over time. They often use two colors and a code to show the sets of data. Here is a double line graph showing temperatures in indoor and outdoor areas at the family reunion.

### Double Line Graph

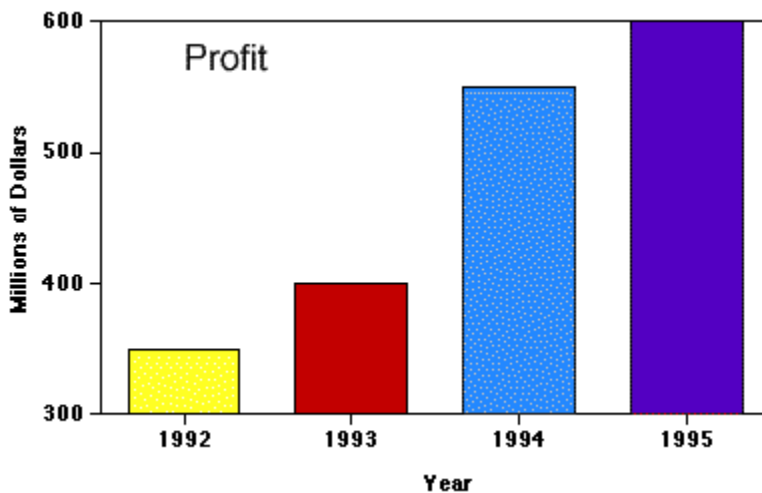


- Line Plots- Line plots are a type of graph that makes it easy to see the mean, median, mode and range of a set of data. Line plots use a number line and Xs to represents each number. It gives you a quick picture of the range of data (how far

the data is spread out). This line plot shows these scores from the game of horseshoes at the family reunion: 18, 14, 22, 33, 7, 7, 30, 34, 30, 10, 15.

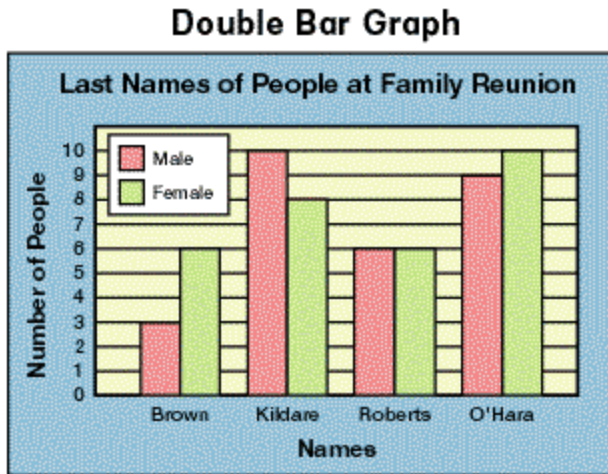


- Bar Graphs- Bar graphs use bars to compare frequencies of possible data values. Bar graphs show data for a single category or number. Below is an example of a bar graph showing the amount of profit made in millions of dollars during 1992, 1993, 1994, and 1995.

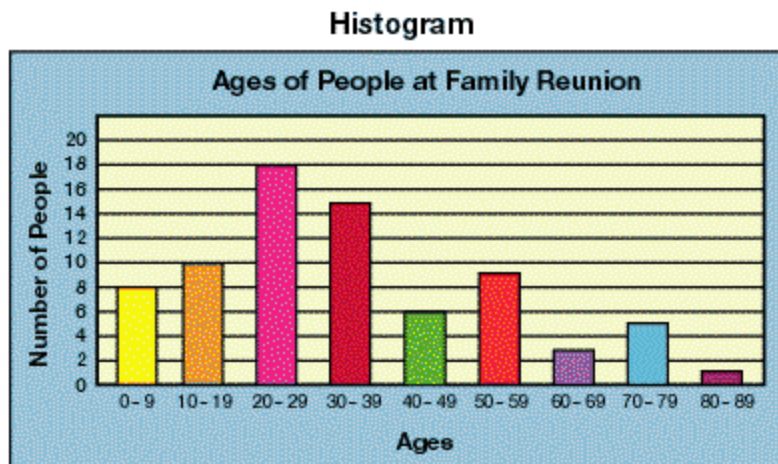


- Double Bar Graphs- Double bar graphs use two sets of bars to compare frequencies of data values between two levels of data (e.g. boys and girls). Males

and females of each family name could be shown in a double bar graph such as this one.



- Histograms- Histograms are very similar to bar graphs except that they show interval data, that is data grouped within a range of numbers such as 1-5, 6-10, 11-15, 16-20, and so on. Below is an example of a histogram.



**Materials Needed:**

Overhead transparencies

Math Notebooks- Journals

Chart Paper

Collecting and Recording Data Sheet (Sample Attached)

## **Engage**

Provide students with a survey sheet including all of their names in order to record data. (See sample) Ask the students the research question about our class: “What is your favorite sport?” The students will be responsible for gathering the data about this question from each one of their classmates. After the students have collected their data, meet back together as a class in order to discuss the data that was collected. Ask the students what types of graphs they could use to display this data. We want students to receive practice creating histograms, line plots, bar graphs and frequency tables with the data collected. Review each type of graph listed above.

Model how to record the data that the students found in a frequency table by using the overhead projector. Have students create the frequency table in their math journals. Model and have the students participate in creating a histogram from the data in their frequency tables. This is a good place to review the major concepts of frequency tables and histograms. Students should also practice making bar graphs and line plots from the data so that they can see the difference between these graphing methods.

After the students have graphed the data from their research question in a variety of ways, talk about which graph is the most appropriate one to use with the type of data collected. Talk as a class about why you would not use a line graph to display this data.

After the class discussion has taken place the students will be asked questions about the data. The students will record their answers, as well as, the graph they used to find their answers. This activity will help them support or refute their decisions about which graph helps them the most. The class can then talk about each type of graphing and the strengths and weaknesses of each one.

## **Exploration**

The students will work in their groups to come up with some other questions that can be addressed with data. Some examples of questions they may ask are:

- How many brothers do you have?
- How many sisters do you have?

- What is your favorite subject?
- What color are your eyes?
- How many pencils do you have in your desk?

The students will then have to set up a design on how they are going to collect their information in order to collect data. After they have explained their survey question and design for their investigation and gotten it approved by the teacher, they may begin collecting their data.

After the students have collected their data they will be required to organize the information in the following ways:

- Frequency Table
- Histogram
- Bar graph
- Line plot

Students will be expected to create these graphs and tables on chart paper. The group will then discuss among themselves which way of organizing their information works best for their data. They will have to be able to explain their answer during their presentation.

### **Explanation**

1. Have each group present their survey question and the data they found to the class. Students should be able to explain each type of graph or table they used in order to organize their data thoroughly.
2. The group should discuss what type of graph was the most appropriate for them to use in order to organize their data.
3. The following are some questions the teacher may ask in order to help the students during their presentation:
  - Why did you choose your survey question?
  - What were some other questions you could have used?
  - Why was one graph more appropriate for your data than another graph?
  - What would you do differently if you could do this survey/experiment over again?

### **Elaboration**

1. After each group presents allow the students to ask them any questions they need to in order to receive clarity about their survey question and experimental design.
2. Hold a class discussion about the difficulties of this project.
3. Discuss the different types of graphs. Encourage students to use the new mathematical vocabulary they have developed through this lesson.

**Evaluation**

1. Have the students explain in their math notebooks in words and diagrams what they learned about each type of graph. Also have them explain what they learned about how to survey and collect data from their classmates.
2. Give students more questions to answer about graphing. They will be assessed on their knowledge about the different types of graphing, methods of surveying and data collection, and the actual graphing itself.

- Sample Journal Questions:

**There are 25 students in Ms. Herron’s math class. Five students have green eyes, seven have blue eyes, three have black eyes, one has hazel eyes, eight have dark blue eyes, and one student has light blue eyes.**

1. For the information above make a frequency table.
2. For the information above make a histogram.
3. For the information above make a line plot.
4. What was the most frequent response?
5. How many more students have blue eyes than black?
6. Which table or graph did you find easier to read to find the answers to questions 4 and 5? Explain your answer.

**Make a bar graph for the following information and explain why you would use a bar graph for this information and not some other type of graph.**

**Video Rentals in 1991**

Movie	Number rented in millions
Beauty and the Beast	40

<b>Adams Family</b>	<b>58</b>
<b>Home Alone</b>	<b>60</b>
<b>Hook</b>	<b>40</b>
<b>City Slickers</b>	<b>60</b>