Data and Statistics

**There are three measures of central tendency that you must know.
All of these should be somewhat familiar to you:**

Mean: Commonly called the average. It is the sum of a set of values divided by the number of values.

Median: The middle number. If there are an even number of values, it is the average of the two middle values.

Mode: Occurs the most.

Range: The difference between the least and greatest values in a set.

Example:
State the mean, median, mode, and range for the following set of numbers:

$$\{6, 3, 8, 2, 5, 6, 4, 6, 9, 4\}$$

Practice:
Find the mean, median, and mode for each set.
Roud to the tenth if necessary.

1. {15, 18, 34, 25, 10, 21, 16}
2. {120, 145, 210, 175, 165, 120, 145}
3. {15, 16, 37, 47, 2, 19, 22, 7, 5}

This should be easy with a calculator. Once you understand these concepts, you should be able to tackle some more difficult examples:

Example:
The mean (average) of Greg's first three test scores this quarter is 92. What is the minimum score will Greg need to score on his 4th test to bring his test average up to a 93?

Example:
The mean age in Lisa's class of 20 students is 11.5. The mean age of the 15 students in Kevin's class is 13.2. What is the mean age of all 35 students in Lisa and Kevin's class combined?

Example:
Four integers are added to the set {3, 4, 5, 5, 8}, increasing the mean, median, and mode all by 1. What is the largest integer in the new set?

Mean, Median and Mode

Find the mean, median, and mode for each set below.
Round to the tenth where necessary.

1. {5, 10, 15, 20, 25, 30, 35}

2. {2, 5, -3, 11, 15, 4, 1, 5}

mean_____ med._____ mode_____

mean_____ med._____ mode_____

3. {6, 11, 4, 13, 2, 1, 5, 5, 9}

4. {2, 19, 31, 44, 45, 61, 119, 121}

mean_____ med._____ mode_____

mean_____ med._____ mode_____

Solve each: THINK!

5. Penny has 12 dimes and 18 quarters. What is the average value of Penny's 30 coins?

5. _____

6. Jenny had a 91 test average before she took the 6th test of the semester. After the 6th test, her average had dropped to a 90. What did she score on the 6th test?

6. _____

7. Michael missed the first homework assignment of the quarter and got a 0 on it. How many homework assignments will he need to get a 100 on to bring his homework average back up to a 'B'? (Greater than 85).

7. _____

8. When you take a retake in Mr. Batterson's class, the retake is counted double. For example, if you had a 46 on the original test and you get a 100 on the retake, your new test grade would be the average of a 46 and two 100's:
   (46 + 100 + 100)/3 = 82.
   If you score a 46 on a test, what is the minimum retake score you will need to bring your grade to at least a 70?

8. _____

Mean, Median and Mode

Solve each:

9. What is the largest number that could possibly be a part of a set of five whole numbers that has a mean of 11 and a mode of 6?
For example, one possible set could be {5, 6, 6, 18, 20}, in which case 20 would be the largest number.

9. _____

10. What number could be included in the set below to increase the median by 1 without changing the mode or the range (the range is the difference between the smallest and largest numbers in a set)?

{4, 5, 7, 7, 9, 11, 11, 12}

10. _____

11. The average weight for a group of ten students is 135 pounds. If Alex and Jon are left out of the average, the average of the 8 remaining students is one pound less than the average of all 10. If Alex weighs two pounds more than Jon, how much does Jon weigh?

11. _____

12. Marissa takes three one-digit integers and squares them. The mean of the three perfect squares is 26 and the median is 25. What are the three original one-digit integers that Marissa squared?

12. _____ _____ _____

13. The mean of the first 49 natural numbers (1, 2, 3, 4, ... 49) is the same as the median, both are 25. What is the sum of the first 49 natural numbers?

13. _____

Data Representation: Frequency

There are many ways to organize and represent data. Here are a few you should know, each shows a frequency distribution.

Stem-And-Leaf Plots.
These show a distribution of data. In the table below, the stem is the tens place for a set of test scores, while the leaf represents the units digit.

Practice: Find the mean, median, mode, and range for the set of data below:

Test Scores: 7|5 represents a score of 75

Stem	Leaf
7	2, 5, 5, 8
8	0, 5, 5, 7, 8, 9
9	1, 4, 4, 7
10	0, 5

Mean: _____   Median: _____   Mode: _____   Range: _____

Practice: Create a stem-and-leaf plot to display the following set of 15 student heights in inches.
{52, 55, 56, 59, 60, 62, 64, 65, 65, 66, 66, 67, 67, 70, 71}

Line plots place all of the values on a number line, using an X or other symbol to represent each value:

50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
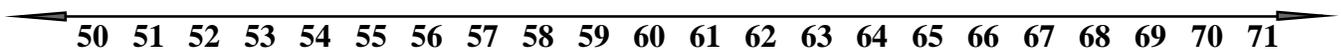
Histograms are similar but offer a little more flexibility. A histogram looks like a bar graph, but is used to show the number of times values in a given distribution occur. You can choose how to set-up the distributions.
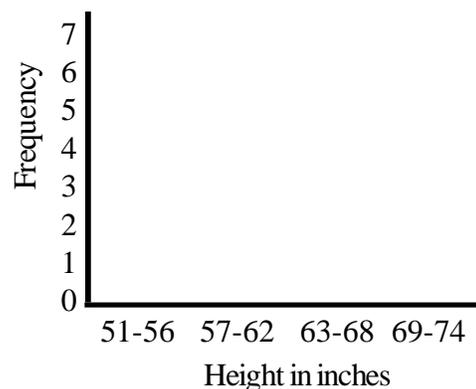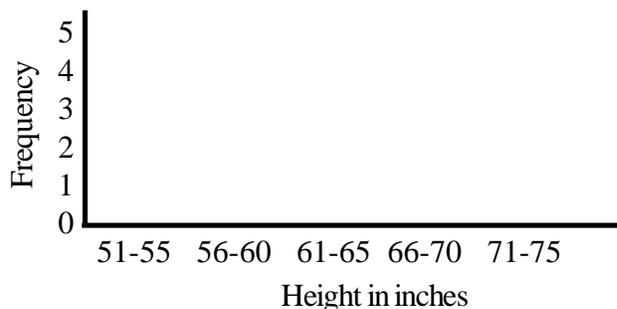
Data Frequency

For each of the sets of data below, construct a stem-and-leaf plot, line plot, and histogram to represent each set of data.

1. {11, 13, 13, 15, 19, 24, 24, 25, 29, 30, 31, 31, 34, 35, 35, 35, 36, 36, 37, 39, 41}

2. {4.1, 4.3, 4.3, 4.4, 4.8, 4.9, 5.0, 5.0, 5.6, 5.7, 5.7, 5.9, 6.4, 6.9, 7.1, 9.1}

Data Frequency

Math 8

Use the plots below to answer the questions that follow:

Points Scored: 7|5 represents 75 points

Stem	Leaf
0	**8, 9, 9, 9**
1	**0, 0, 1, 2, 2, 8**
2	**0, 3, 8**
3	**0, 1**

The stem-and-leaf plot above displays the number of points scored by Alonzo in each of the first 15 basketball games he played in this season. Round to the tenth where necessary.

3. What was the greatest number of points Alonzo scored this season? _____

4. What was the fewest? _____

5. What was the average number of points Alonzo scored in a game? _____

6. What was the median number of points he scored? _____

7. In his first five games, Alonzo averaged just 9 points per game. How many points did he average in his last 10 games? _____

8. If there are 5 games left in the season, how many points per game will Alonzo need to score if he wants to bring his average for all 20 games to 20 points per game? _____

9. Create two histograms below to display the data above. On the left, use 6-10, 11-15, 16-20, 21-25, 26-30, and 30-35 on the x-axis. On the right, use 5-9, 10-14, 15-19, 20-24, 25-29, and 30-34. Which one makes Alonzo look better?

Frequency

6
5
4
3
2
1
0

6-10   11-15   16-20   21-25   26-30   31-35

Points Scored

Frequency

6
5
4
3
2
1
0

5-9   10-14   15-19   20-24   25-29   30-34

Points Scored
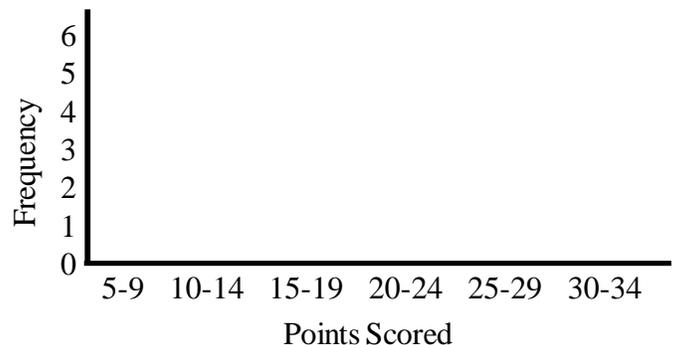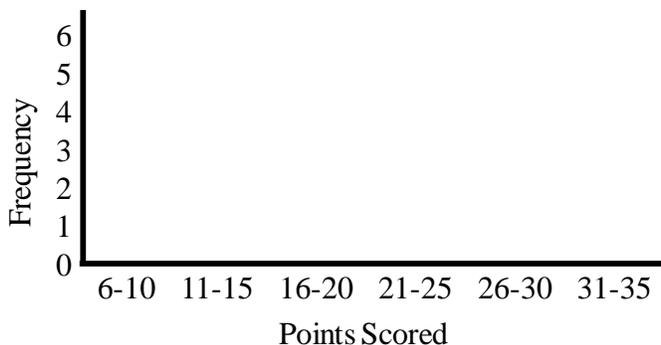
Misleading Graphs

Data can be used to mislead.
What is misleading about the graphs below?

Customer Satisfaction

# of Hurricanes '99-'05
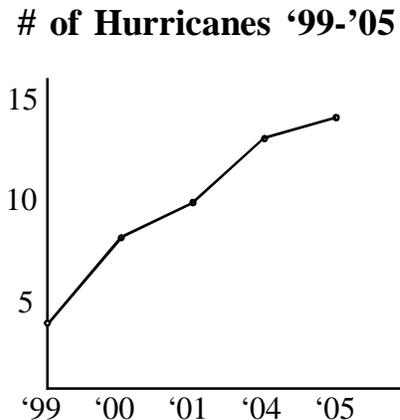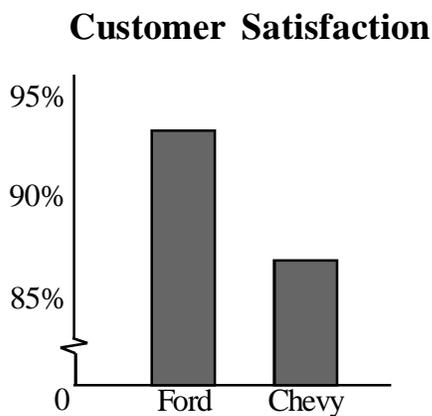
Using the **mean, median, or mode** for a data set can be misleading.
Try to achieve the following with a set of data.

1. Create a set of test scores in which the test average for eight students is a 69, but only one student gets below a 'C'.

2. Create a set of test scores in which the median for 9 students is an 86, the average score is a 65, and no one gets an 'A'

**3.** Create a set of six test scores in which the mean is misleadingly high.

4. Create a set of six test scores in which the median is misleadingly low.

Sample Sets can create misleading data as well.
Match each conclusions and sample set below:

1. School lunchrooms should offer more sweets according to 78%...
2. The school science curriculum needs to focus more on health and fitness according to 85%...
3. The driving age should be lowered to 15 according to 97%...
4. Smoking should be prohibited in all public places according to 92%...

a. ...of physicians surveyed.
b. ...of elementary school students surveyed.
c. ...of high school freshman.
d. ...of professional athletes.

Students at a high school were asked which they would prefer to eat at this year's graduation picnic. Results are shown below. Which graph more accurately displays the survey results?
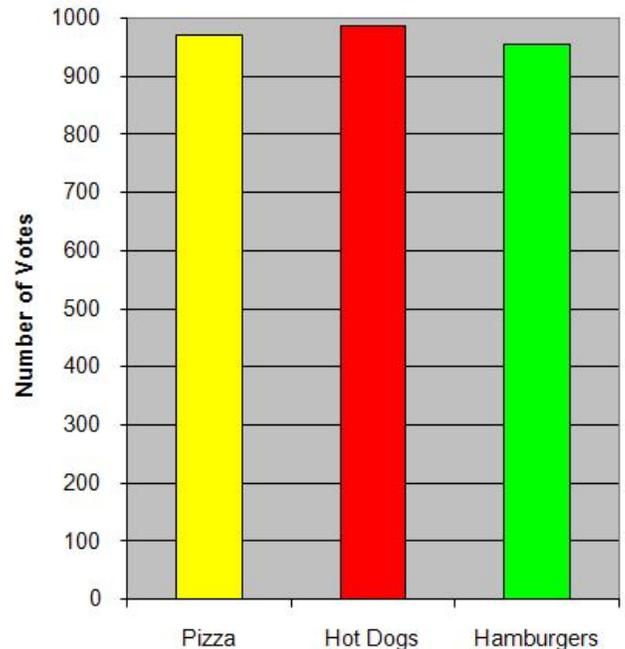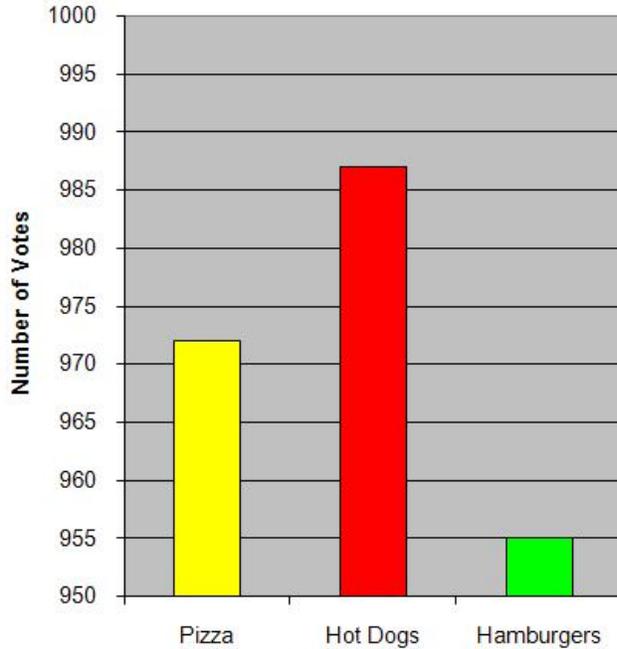
Create a histogram using the following 15 test scores that makes the student's grade appear higher than it really is. Then create one that makes the student's grade appear lower. Use three bars on each histogram.

{69, 70, 70, 70, 75, 77, 79, 85, 85, 85, 86, 87, 94, 95, 95}