### MEAN, MEDIAN, MODE AND RANGE

- **Mean** - the average. Add all values and divide by # of data
- **Median** - MIDDLE # when numbers are in order. (When set is even take avg of two middle numbers)
- **Mode** - # that happens the MOST (There can be more than one mode or NO mode)
- **Range** - difference between highest and lowest #

#### BACK OF CARD #13

Find the mean, median, mode and range of this set of data:

23, 12, 17, 9, 20, 9

Mean: __________

Median: __________

Mode: __________

Range: __________
CHOOSING MOST APPROPRIATE MEASURE

MEASURE | Most appropriate when...
--- | ---
Mean | the data does not contain an outlier (extreme value)
Median | the data contains an outlier, there are no big gaps in the middle of the data set
Mode | non-numeric data such as favorite color, data has many repeated numbers
Range | you are only concerned with the spread of numbers

The **mean absolute deviation (MAD)** is a measure of variation which tells you the average distance your scores are from the mean.

To calculate, simply:
- find the mean of the original data set
- find the distance each value in data set is from the mean
  - subtract value from mean, take positive answer
- find the mean of your distances

A **SMALL MAD** means your values are pretty close together

A **LARGE MAD** means your values are pretty spread out. They vary greatly.

BACK OF CARD #15

Students sold boxes of popcorn for a Relay for Life Fundraiser. The list below shows the # of boxes that each student sold:

7, 10, 10, 12, 16, 20, 100

Mean: 
Median: 
Mode: 
Range: 

Which measure of central tendency best represents the # of boxes of popcorn sold by each student?

BACK OF CARD #16

Find the mean absolute deviation, to the nearest hundredth, for each genre of movie in the table. Write a few sentences comparing their variation.

<table>
<thead>
<tr>
<th>TIME</th>
<th>MEAN</th>
<th>ABSOLUTE DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>[score - mean]</td>
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</table>

Mean absolute deviation: 
Mean absolute deviation: 

### BOX AND WHISKER PLOT

- Your data set must be in order.
- Cut the data set into 4 equal sections by finding the second Quartile (median, Q), first quartile (median of lower half, Q₁), and second quartile (median of upper half, Q₃).
- Plot the extremes (minimum and maximum), and the quartiles on a number line.
- Make lines through quartiles and box them.
- Connect extremes to box, whiskers!
- Notice that longer sections still hold 25% of the data, but the numbers are just very spread out!

### BACK OF CARD #17

Got It? Do these problems to find out.

1. What score represents the median? _____
2. What score represents the lower quartile? _____
3. What percent of the data is between 4 and 14? _____
4. If 24 data values are in the set, how many data values are between 4 and 10? _____
5. Does the longer section between 4 and 8 mean there are more values there than between 8 and 10? Explain.

### BACK OF CARD #18

The ages of candidates in an election are 23, 48, 49, 55, 57, 63, and 72.

Name any outliers in the data.

A whisker much longer than another section indicates a very large spread which may be caused by an OUTLIER. A value is allowed to be only a certain number away from the quartile box.

The length of the box is called the INTERQUARTILE RANGE (IQR). It's the distance between Q₁ and Q₃. [Q₃ - Q₁] 150

The limit is found by doing (IQR)(1.5). 150(1.5) = 225

A value cannot be farther away from Q₁ or Q₃.

If it is, put an asterisk in it's spot and extend whisker to next point. 600 was an outlier because it is more than 225 away from 250.
**Collection Of Data**

- **Survey** - a question or set of questions used to gather data, or pieces of information
- **Population** - group being surveyed
- **Sample** - smaller group from the population
- **Random Sample** - each individual in the population has an equal chance of being part of the sample
- **Biased Sample** - some individuals have a greater chance of being selected than others. Sample does not adequately represent the situation or you can guess their response. Results not VALID

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**Misleading Graphs**

- Graphs let readers analyze data easily, but are sometimes made to influence conclusions by misrepresenting the data.
- Graphs that use different intervals on their scales to misrepresent trends are misleading.

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**Back of Card #19**

Determine which samples are good samples. Justify your response.

Bonus: If the sample is not good, how could you improve it?

**Example 1:**
- Mina wants to know which music artist is the favorite of the 7th grade. Mina surveys 7th grade study hall.

**Example 2:**
- The school cafeteria wants to know what students prefer for lunch. They survey people at the movies.

**Example 3:**
- Higgins wants to know which subject is most loved at school. He surveys the math advanced classes.

**Example 4:**
- Inder wants to know what students prefer doing on the weekends. He surveys students in the gym after school on Friday.

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**Back of Card #20**

**Example:**
The line graphs show the sales for the Crumby Cookie Bakery. Which graph makes it appear that the sales declined only slightly? Is this a valid conclusion? Explain.

**Example 6:**
The graph shows the height of a plant after 9 weeks of growth. Why is the graph misleading?