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Measures of Central Tendency & Spread

The **MEASURES OF CENTRAL TENDENCY** are numbers that refer to the middle value in the data. Measures of central tendency are most useful when comparing sets of data that are similar.

The _____ is the average (the total of all values divided by the number of values). It is the most common way of finding the central number.

The _____ is the middle value in a list arranged in numerical order. It is used when two or more numbers are very different from the rest of the group. It emphasizes the position of the number rather than the value. If there is an even number of data, there are two middle numbers. In this case, average the two middle numbers to find the median.

The _____ is the value that occurs most often. It is used when it is important to know how often a number occurs rather than its value. When more than one number appears most often, there is more than one mode. If no number appears most often, there is no mode.

Example 1

David bowls for a youth league. Here are his scores for the past season: 135, 148, 120, 158, 162, 192, 162, 178, 162, 150, 138.

a. Calculate David's **mean** bowling score.

b. Find the **median** for David's bowling scores.

c. Identify the **mode** for David's bowling scores.

"Add the numbers, divide by how many numbers you've added and there you have it-the average amount of minutes you sleep in class each day."

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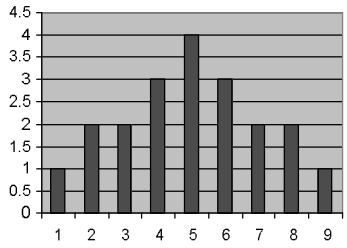
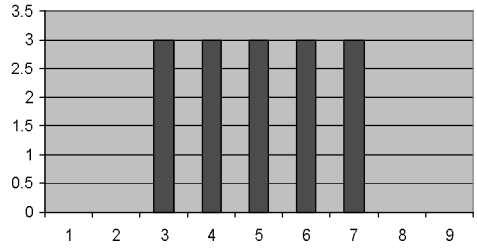
Sometimes measures of central tendency don't explain the differences in data sufficiently. For example, the following sets of data both have a mean of 8 and a median of 8.

Set A	**Set B**
0, 2, 2, 4, 4, 6, 6, 6, 8, 8, 8, 8, 10, 10, 10, 12, 12, 14, 14, 16	4, 4, 4, 6, 6, 6, 8, 8, 8, 10, 10, 10, 12, 12, 12
	

When considering the calculations of mean and mode, the two data sets appear very similar. When looking at the graphs, they are quite different; Set A has a _____ distribution while Set B is _____.

The **MEASURES OF SPREAD** show how far apart the data are. Measures of spread are used to help compare data sets that vary from each other.

The _____ is the difference between the highest and lowest values in a set of data. It can be misleading if there are extremely high or low values that don't follow the rest of the data.

The range can be useful to compare data sets which appear similar. Consider sets A and B above.

Range of Set A	**Range of Set B**

Set ___ is more consistent since it has a _____ range.

The _____ is the measure of dispersion of the data. It is the average of the squared differences from the mean.

The _____ _____ is the best measure of the spread of data and is represented with the symbol σ (sigma). It is calculated by finding the square root of the variance. The smaller the standard deviation, the closer it is to the mean of the data and better it represents the data.

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Example 2

Toby and Polly both work at a local pizza shop. Their manager has decided to give a raise to her best employee. She looks at the number of pizzas each made during their shifts.

Toby	54	152	180	12	72	126	104	132
Polly	132	104	102	120	86	12	180	96

The manager calculates the mean and range to help her make her decision.

	Toby	**Polly**
MEAN	$\frac{832}{8}=104$	$\frac{832}{8}=104$
RANGE	180 – 12 = 168	180 – 12 = 168

Unfortunately, these statistics leave both employees equal. The manager notices that Polly's data looks more consistent, but she needs proof to support her claim. Help the manager decide who is more deserving by calculating the standard deviation for each.

CALCULATING STANDARD DEVIATION BY HAND	**CALCULATING STANDARD DEVIATION USING THE TI-83+**
1. Find the difference between each value and the mean of the data. 2. Square each difference. 3. Add up all of your answers from Step 2. 4. Find the variance → the average of the differences squared. 5. Find the standard deviation → Find the square root of your answer in Step 4.	1. Press **STAT** and then **1.** 2. Enter the data into L_1 by pressing **ENTER** after each entry. 3. Press **STAT** and cursor right once for **CALC.** 4. Press **1** for 1-Var Stats. 5. Type L_1 by pressing **2nd 1 ENTER.** 6. **Sx =** the sample standard deviation (used when results are to be applied to an entire population, not just the data entered) **σx** = the population standard deviation (used when only data entered should be considered)