

Lesson 9: Standard Deviation

Daily Data Collection

Each student will record the following information on the board:

Gender & Number of text messages sent so far today.

Distribution Part 3: Spread [you learned Range and IQR earlier]

The Standard Deviation - The average distance away from the mean the data values fall.

- Standard deviation is the measure of spread most commonly used in statistical practice when the mean is used to calculate central tendency. Thus, it measures spread around the mean.
- Standard deviation is influenced by outliers and skewness.
- The standard deviation is never negative.
- The units of the standard deviation are the same as the data.
- The square of standard deviation is called the Variance

A smaller standard deviation means:

- The data have a narrower spread of measurements around the mean
- The data usually have comparatively fewer high or low values.
- An item selected at random has a better chance of being close to the mean than an item from a data set whose standard deviation is higher.

To find the standard deviation by hand:

1. Find the mean.
2. Subtract the mean from each observation (data value) and write them down.
3. Square all the differences you wrote down in step 2 and write them down.
4. Add all the squares you wrote down in step 3 and write down the sum.
5. Divide the sum by the appropriate number
 - a. If the data represent a population, then divide by n (the population size).
 - b. If the data represent a sample, then divide by n-1 (the sample size minus 1).
6. The current answer is variance. To find standard deviation, square root the answer from step 5.

	Population	Sample
Description	Every possible element is represented in the data.	A smaller group selected from within the larger population.
Example	US Census	A Poll done for an upcoming election.
Variance	$\sigma^2 = \frac{1}{n} \sum (x_i - \bar{x})^2$	$s^2 = \frac{1}{n-1} \sum (x_i - \bar{x})^2$
Standard Deviation	$\sigma = \sqrt{\frac{1}{n} \sum (x_i - \bar{x})^2}$	$s = \sqrt{\frac{1}{n-1} \sum (x_i - \bar{x})^2}$

Class Data:

Find the mean and standard deviation for the texts of boys.

Find the mean and standard deviation for the texts of girls.

Compare the means.

Compare the Standard Deviations.

Guided Practice:

Who Texts More—Males or Females?



Pulling it all together

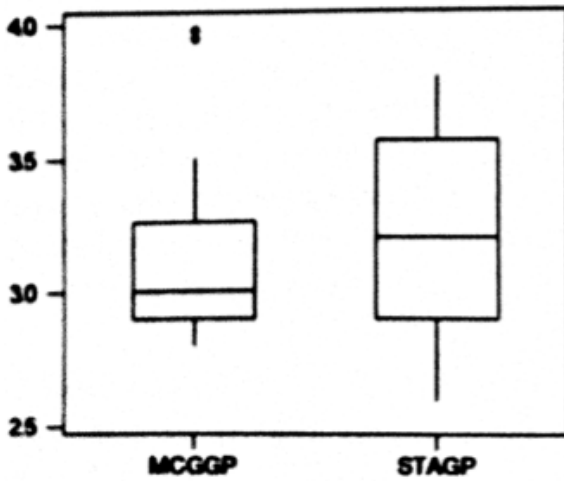
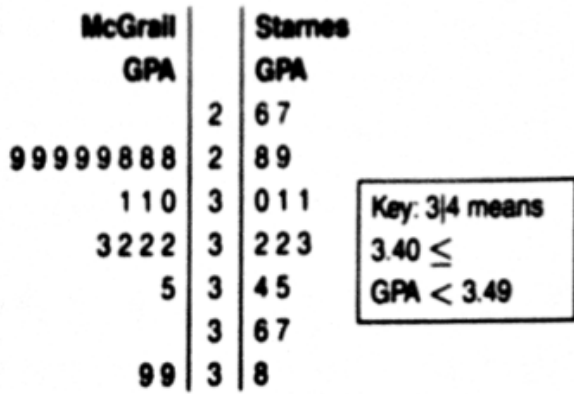
For their final project, a group of AP Statistics students investigated their belief that females text more than males. They asked a random sample of students from their school to record the number of text messages sent and received over a two-day period. Here are their data:

Males:	127	44	28	83	0	6	78	6	5	213	73	20	214	28	11	
Females:	112	203	102	54	379	305	179	24	127	65	41	27	298	6	130	0

Find the distribution of males and females (use mean and standard deviation).

What conclusions can you make about the texting habits of males and females?

The following two-sided stemplot and box plots show the GPAs of the students of two different teachers. Describe the distribution and describe any differences (Use median and IQR/Range)



The following histogram shows the frequency of SAT Math scores for students from MCG High School. Describe the distribution and describe the performance.

