9.1 Analyzing Data

SWBAT find the measures of central tendency and the standard deviation of a set of data.

Central Tendency: Central values or "middle" of a data set.

Mean: Average for a set of data.

Median: The middle value for a data set listed in order.

Mode: The most frequently occurring values in a set of data.

Range: The difference between the highest and lowest values in a set of data.

Outlier: The value that is extremely different from the rest of the data in a set.

Example 1: Find the mean, median, mode, and range. Identify any outliers:

a. 3.4, 4.5, 2.3, 5.9, 9.8, 3.3, 2.1, 3.0, 2.9

$\bar{x} = 4.13$ range = 7.7

med = 3.3 outlier = 9.8

mode = None

b. 17, 21, 19, 10, 15, 19, 14, 0, 11, 16

$\bar{x} = 14.2$ range = 21

med = 15.5 outlier = 0

mode = 19

Finding Central Tendency: HOW MANY CALLS?

Directions: Determine how many calls you have made within the past two days. Record the class data in the space below.

a) Find the range: _____

b) Find the mean: _____

c) Find the median: _____

d) Find the mode: _____

e) Outliers? _____

Example 3: You scored an 83%, 74%, 95%, and 76% on your last four math tests. If you want to earn an 85% in the class, what score must you get on your next math test?

$\frac{83+74+95+76+x}{5} = 85$ $328 + x = 425$ $x = 97\%$ 97%.

Example 4: You scored a 99%, 67%, 83%, and 86% on your last four science tests. If your next test counts twice, is it possible to average a 90%?

$\frac{99+67+83+86+2x}{6} = 90$ $335 + 2x = 540$ $2x = 205$ $x = 102\%$ Not possible.

Measure of Variation: Describes how the data in a data set are spread out.

Standard Deviation (s): A measure of how far the numbers in a data set varies from the mean.

Variance (s^2): A measure of how far each value in the data set is from the mean.

Sample Variance	Standard Deviation
$S^2 = \frac{\sum(x-\bar{x})^2}{n-1}$	$S_x = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$
The average of the squared differences is the variance.	The square root of the variance is the standard deviation.

Example 5: What are the mean, variance, and standard deviation of the following values: 2, 6, 7, 3, 4, 2

Data Value: x_i	$(x-\bar{x})$	$(x-\bar{x})^2$
2	2-4 = -2	$(-2)^2 = 4$
6	6-4 = 2	$(2)^2 = 4$
7	7-4 = 3	$(3)^2 = 9$
3	3-4 = -1	$(-1)^2 = 1$
4	4-4 = 0	$(0)^2 = 0$
2	2-4 = -2	$(-2)^2 = 4$
	Sum:	22

$\bar{x} = \frac{2+6+7+3+4+2}{6} = \frac{24}{6} = 4$

$S^2 = \frac{22}{6-1} = 4.4$ = variance

$S_x = \sqrt{\frac{22}{5}} = 2.098$ = standard deviation

Example 6: The table displays the number of U.S. hurricane strikes by decade from the years 1851 to 2000. What are the mean, standard deviation, and variance for this data set?

Decade	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Strikes	19	15	20	22	21	18	21	13	19	24	17	14	12	15	14

Source: National Hurricane Center

$\bar{x} = 17.6$ $S_x = 3.641$ $S^2 = 13.04$

Example 7: The table displays the number of hurricanes in the Atlantic Ocean from 1992 to 2006.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Number	4	4	3	11	10	3	10	8	8	9	4	7	9	14	5

Source: National Hurricane Center

a) What are the mean, standard deviation, and variance?

$\bar{x} = 7.267$ $S_x = 3.327$ $S^2 = 11.07$

b) Within how many standard deviations from the mean do all the values fall?

0.613 ← 3.94 ← 7.267 → 10.594 → 13.92 → 17.25

w/in 3 SD

You Try! Find the mean, standard deviation, and variance of the following data values. Within how many standard deviations of the mean do all the data values fall: 12, 17, 15, 13, 9, 10, 12, 10, 15, and 17?

$\bar{x} = 13$

$S_x = 2.91$

7.18 ← 10.09 ← 13 → 15.91 → 18.82

w/in 2 SD