

Measure of Center and Spread
(13.2 and 13.3)

Together, measures of **center** (like **mean, median, or mode**) give a sense of the "**representative middle**" of a data set.

Measures of **spread** (like the **range, mean absolute deviation, or standard deviation**) give a sense of how "**variable**" a data set is.



Present Today: #3, 13, 36

9:55: Chelsea Sc., Molly, Amy, Jared, Briana, Rachel We.

11:00: Abbey Se., Kelly, Jeffrey, Kayla, Kelly, Calli Vi.

HW: Sec. 13.2 #3, 9, 11, 19-24, 25-27, 51; and Sec. 13.3 #3*, 7*

* Find the (a) mean absolute deviation and (b) the standard deviation

Present Monday: 13.2 #24, 27 and 13.3 #3*

9:55 Jena Wei., Rebekah, Luke, Arie, Kelly, Leigha Bla.

11:00 Molly Wag., Tyson, Colin, Janessa, Mykki, Brittany Ene.

Warm-up / Measures of Center:

1. Create a data set that has a mean of 8 and a median of 8.5.

$$\underline{3}, \underline{4}, 5, 8, 9, \underline{10}, \underline{12}$$

$$\text{need sum to} = 8 \times n \text{ (so } \frac{\text{sum}}{n} = 8)$$

2. Create a data set that has:

Mode = 4, and 3 (two modes)

Mean = 8, and

Median = 9.

$$4, 4, 9, \underline{10}, \underline{13}$$

$$3, 3, 4, 4, (9), 10, 12, 13, 14$$

$$\text{sum } 72 \checkmark$$

$$2, 4, 4, (9), 10, 13, 14$$

$$\text{sum } 56? \checkmark$$

Statistics and Probability

6.SP

2. Understand that a [redacted] collected to answer a statistical question has a distribution which [redacted]
3. Recognize that [redacted] for a numerical data set [redacted] while [redacted]
5. Summarize numerical data sets in relation to their context, such as by:
 - c. [redacted] and [redacted] as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Ruler drop:

In groups of 3 or 4, collect data as follows:

1. Select a **dropper**, a **catcher**, and a **recorder / judge**.
2. The dropper releases the yardstick and the catcher pinches her fingers together to catch it with her dominant hand. Record the total drop as a measure of reaction time. Repeat until you have a good sample.
3. Repeat step 2 with the catcher's left hand. Compare the two datasets.

Compare clusters with your results. Is there a visual difference supporting your use.

Statistics and Probability

7.SP

3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities. [redacted]
[redacted] For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.

(Express the difference in means in terms of the variability of the data set)

Several Possible Measures of Spread:

Range = max - min

$$\text{Mean Absolute Deviation} = d = \frac{\sum_{i=1}^n |x_i - \bar{x}|}{n}$$

Median Absolute Deviation = m = median(|x_i - M|)

$$\text{Standard Deviation} = s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

Interquartile Range -- The range of the middle 50% of the ranked data set. (More on this when we examine box plots)

Calculating Mean Absolute Deviation by Hand...

Data Point, x (inches)	Deviation: x - \bar{x}	Square of deviation: (x - \bar{x}) ²
3		
7		
8		
10		

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

Calculating Mean Absolute Deviation by Hand...

Data Point, x (inches)	Deviation: x - \bar{x}	Absolute deviation: x - \bar{x}
3		
7		
8		
10		

$$d = \frac{\sum_{i=1}^n |x_i - \bar{x}|}{n}$$