Mean and Standard Deviation

After students have mastered constructing and interpreting the shape, outliers, center, and spread of a distribution, they are ready to add numeric summaries to their exploratory data analysis. We can use 1.69 oz bags of m&m's to introduce/reinforce the concepts of mean and standard deviation.

Materials Needed:

- Ten 1.69 oz bags of m&m's.
- Scale - check with your Science department.
- Data Collection and Calculation Table - one per student.

Activity:

Review data displays and interpretations of center and spread. If a bag advertises 1.69 oz, does that mean we are guaranteed 1.69 oz of m&m's? What is a typical actual weight? How can we calculate the typical weight found in a bag? What if the weights differ between bags? Discuss variability. How can we describe the variability from bag to bag? Introduce the concepts of mean and standard deviation.

Carefully weigh the contents of ten bags of m&m's. Record each bag's weight in the table on an overhead. Display the weights on a dotplot on the board and calculate the average weight. Note this on the dotplot and discuss its relative location

Discuss the variability of the recorded weights and note the distances/deviations from the mean weight on the dotplot. How can we calculate a 'standard' measure of this distance? Using the Standard Deviation Calculation Table, illustrate the computation of the standard deviation. Discuss 'deviation', 'squared deviation', their sums, etc. as you calculate the measure.

Extension:

How else could we describe center and spread? Discuss and illustrate median, quartiles, range, and interquartile range. Determine min, Q1, Q2, Q3, and max and display data with a boxplot. Note how each measure of the 5-number summary is shown on this display.

Am I Getting What I Paid For?

Mean and Standard Deviation of m&m Bags Labeled 1.69 oz.

Do m&m bags labeled 1.69 oz. actually contain that weight? If not, what is a typical weight and how much variability is there from bag to bag? To answer those questions, we will collect data on ten bags of m&m's. Your teacher or a volunteer will weigh each bag and report the weights. Your task is to use the tables below to calculate and interpret the mean and standard deviation for the weights of bags labeled 1.69 oz.

As the data is collected, construct a dotplot and fill in the table below.

1.5   1.55   1.6   1.65   1.7   1.75   1.8
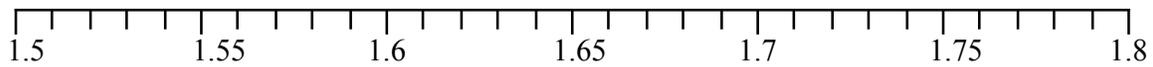
Weights of "1.69 oz" Bags of m&m's

Bag #	x	$(x - \bar{x})$	$(x - \bar{x})^2$
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
n=10	$\sum x =$ _____	$\sum (x - \bar{x})$	$\sum (x - \bar{x})^2$
	$\bar{x} =$ _____	$=$ _____	$=$ _____

Standard Deviation s= $\sqrt{\dfrac{\sum (x - \bar{x})^2}{n-1}}$ s=_____.