Analyzing and Interpreting Statistics

Reporting Category	Statistics
Topic	Analyzing and Interpreting Descriptive Statistics
Primary SOL	A.9 The student, given a set of data, will interpret variation in real-world contexts and calculate and interpret mean absolute deviation, standard deviation, and z-scores.
Related SOL	

Materials

- Graphing Calculator
- Handouts

Vocabulary

mean

dispersion, mean absolute deviation, standard deviation, summation notation, variance, z-score (A.9)

Student/Teacher Actions – What should students be doing? What should teachers be doing to facilitate learning?

1. Review key vocabulary and ideas associated with the vocabulary as necessary.
2. Have students complete the handout in small groups.
3. As students are working, monitor their conversations making note of good discussions or ideas to bring forth in the whole group summary.
4. Bring the class together for a whole group summary. Discuss the items on the Analyzing and Interpreting Descriptive Statistics handouts. As you discuss solutions, be sure to have students explain their strategies and reasoning. Also, be sure to highlight any good discussions or debates you observed as groups were working on the questions.

Assessment

- **Questions**
  - On which measure of dispersion do outliers have a greater affect?
  - How can you determine how many elements fall within one standard deviation of the mean given the mean and standard deviation, as well as a set of data or histogram?
  - How does the shape of the graph of data relate to the value of the standard deviation and/or the mean absolute deviation?

- **Journal/writing prompts**
    - Given two sets of data or graphical representations with the same mean, describe how could you tell which would have the greater standard deviation or absolute mean deviation.
    - Describe a real life situation where knowing the standard deviation or absolute mean deviation would be beneficial. Why would it be beneficial in this situation?
- **Other**
    - Using the data from Mrs. Smith's 1st block class test scores, ask students to determine how many values fall one standard deviation below the mean. Note: Students should realize that one standard deviation below the mean falls inside the interval and there is no way to tell how many in that interval are below one standard deviation from the mean. Ask students what they would need in order to figure this out (different graphical representation like a line plot, or the actual data set).

Extensions and Connections (for all students)

- Have students create their own graphs and descriptive statistics based on their personal interests, topics in history, or topics in science. Then have them design questions that they would be able to answer based on the data. Have students exchange with one another.

Strategies for Differentiation

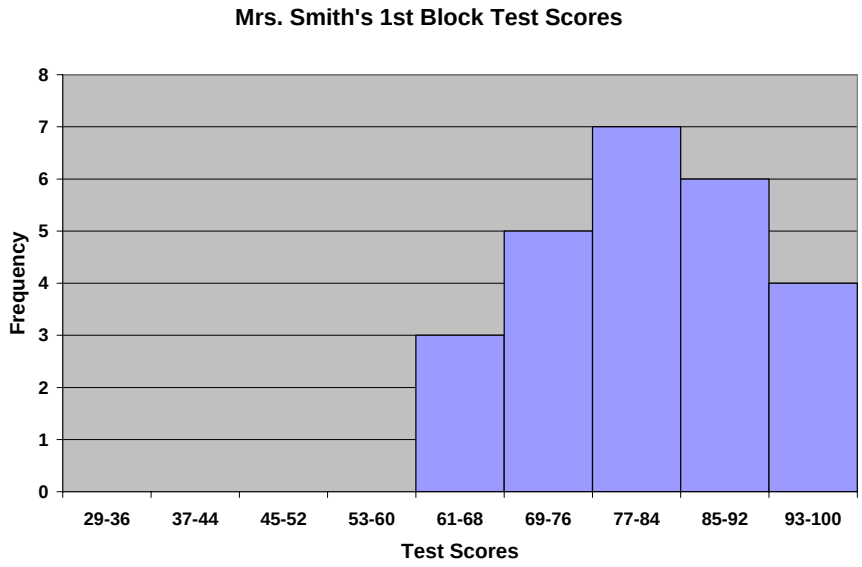
- Encourage students to refer to their graphic organizer (created in the previous lesson) for specific terms and formulas.
- Depending on students' level the Analyzing and Interpreting Statistics may be done as a whole class guided activity.

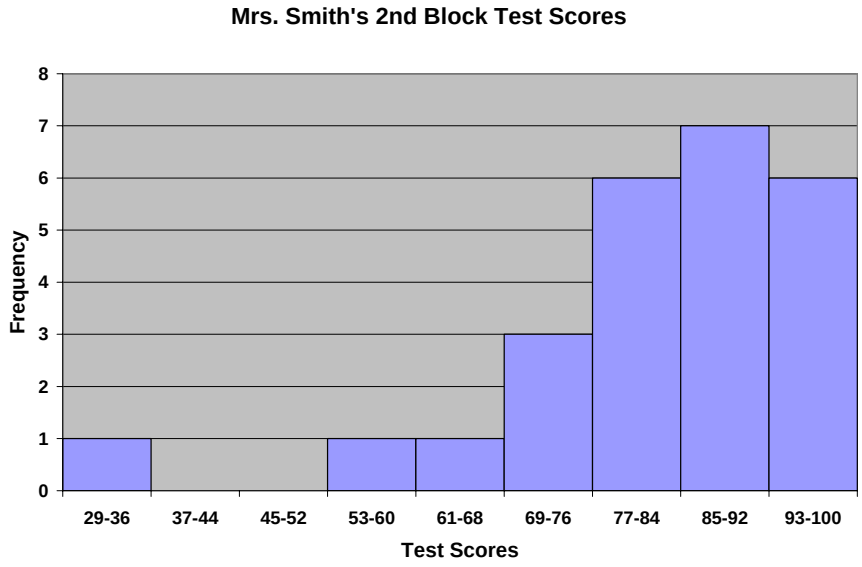
Analyzing and Interpreting Descriptive Statistics

1. You are given the following descriptive statistics for two data sets:

Data Set A	**Data Set B**
Mean = 83	Mean = 83
Absolute Mean Deviation = 7.68	Absolute Mean Deviation = 10.24
Variance = 94.96	Variance = 219.04
Standard Deviation = 9.74	Standard Deviation = 14.8

Which histogram below matches Data Set A's descriptive statistics and which matches Data Set B's descriptive statistics? How do you know?





2. Which of the two histograms contains an outlier(s)? How do you know?

3. Examine the absolute mean deviation and the standard deviation of both sets of data. Which measure of dispersion was least affected by the outlier(s)? How do you know?

4. Using Data Set A, how many elements fall one standard deviation above the mean? Why?

5. Find the z-score for the element 91 in data set B.

6. Find the z-score for the element 91 in data set A.

7. Given the following sets of data, which would you expect to have a greater standard of deviation? Why?

Data Set 1	Data Set 2
0, 5, 10, 15, 20, 25, 30	10, 10, 15, 15, 15, 20, 20

In a set of test scores, an 89 has a z-score of 1.5 and a 93 has a z-score of 2. What is the mean test score and the standard deviation?

At the Steakhouse Grill, steaks are cut into 12 oz. portions when they are ordered by a customer. For the past month the manager of Steakhouse Grill has been trying to determine the best cook to portion out the meat. The manager collected the standard deviation of sample meat portions each week for each of his cooks.

	Week 1	Week 2	Week 3	Week 4
Joe	0.2	0.2	0.2	0.15
Sarah	0.15	0.2	0.22	0.25
Holli	0.2	0.18	0.15	0.1
Jason	0.15	0.1	0.13	0.11
Ben	0.3	0.1	0.2	0.1

8. Compare and contrast the standard deviations for each cook. The manager needs to choose 3 cooks to cut portions of meat throughout the week. Which three should he choose? Why?

9. Which cook should the manager schedule for Friday and Saturday nights, when the restaurant is the busiest? Why?