

## Core Content

<b>Cluster Title: Summarize and describe distributions.</b>
<b>Standard:</b> 4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
<b>MASTERY Patterns of Reasoning:</b>
<p><b>Conceptual:</b></p> <ul style="list-style-type: none"> <li>Understand that data can be organized in graphs in order to analyze the data.</li> <li>Understand the decisions that must be made in order to create a useable data display (e.g., how much data is there, what comparisons need to be made)</li> <li>Know when data is best represented on number lines, dot plots, histograms or box plots.</li> </ul> <p><b>Procedural:</b></p> <ul style="list-style-type: none"> <li>Students will create dot plots (line plot), histogram, and box plots (box-and-whisker) including labeling and scaling axes appropriately.</li> </ul> <p><b>Representational:</b></p> <ul style="list-style-type: none"> <li>Represent a set of numerical data accurately on a number line, dot plots, histograms and box plots.</li> </ul>

## Supports for Teachers

<b>Critical Background Knowledge</b>
<p><b>Conceptual:</b></p> <ul style="list-style-type: none"> <li>Experience with the use of horizontal and vertical axes.</li> </ul> <p><b>Procedural:</b></p> <ul style="list-style-type: none"> <li>Choose appropriate and consistent scale for a given data set.</li> <li>Choose appropriate interval for a given data set.</li> </ul> <p><b>Representational:</b></p> <ul style="list-style-type: none"> <li>Set up an accurate and useable number line with correct labels.</li> </ul>
<b>Academic Vocabulary and Notation</b>
1 <sup>st</sup> Quartile (Q <sub>1</sub> ), 2 <sup>nd</sup> Quartile (Q <sub>2</sub> ), 3 <sup>rd</sup> Quartile (Q <sub>3</sub> ), 4 <sup>th</sup> Quartile (Q <sub>4</sub> ), Box plot (box-and-whisker), Distribution, Dot plot (line plot), Histogram, Interquartile range, Upper quartile, Lower quartile, Median, Upper endpoint (upper extreme), Lower endpoint (lower extreme)

Instructional Strategies Used		Resources Used					
Gather scores from the last quiz, and then create plots with the given data.		<a href="http://www.deltastate.edu/docs/math/Mitchell3.pdf">http://www.deltastate.edu/docs/math/Mitchell3.pdf</a>  Box Plot: <a href="http://www.shodor.org/interactivate/activities/BoxPlot/">http://www.shodor.org/interactivate/activities/BoxPlot/</a>  6.SP.4 reaction time activity (see below)					
Assessment Tasks Used							
<p><b>Skill-based Task</b></p> <p>Given a data set, create the following:</p> <table border="1" data-bbox="193 672 764 1169"> <tr> <td data-bbox="193 672 462 928">Data Set:</td> <td data-bbox="462 672 764 928">Dot Plot:</td> </tr> <tr> <td data-bbox="193 928 462 1169">Histogram:</td> <td data-bbox="462 928 764 1169">Box Plot:</td> </tr> </table>		Data Set:	Dot Plot:	Histogram:	Box Plot:	<p><b>Problem Task</b></p> <p>Have students count the number of steps they take to get to school. If they ride in a car or a bus they would count the steps they take to get to the vehicle and then into the school. Graph the data using all graphs in this standard.</p>	
Data Set:	Dot Plot:						
Histogram:	Box Plot:						

## Reaction Time Activity

Equipment Needed:        Meter stick or rulers  
                                 Graph paper

## Essential Questions:

1. What is reaction time and why does it vary from person to person? Why would people want to know what the expected variance of a population would be?
2. How can statistics be used to predict reaction times for an entire population?

## Statement of the Problem:

A reaction time is a measure of how long it takes you to do something (*such as step on the brakes*) upon receiving a certain signal (*such as see a child start across the street in front of you.*) Reaction times vary from one person to the next. Reaction times, from one measurement to the next, also vary for the same person.

In this experiment you will measure reaction times for a “specific event” of catching a dropped ruler or meter stick. Then based on the data for your partnership and your class, you will calculate measure of measure of center and variation, explain what these measures mean, and then graph the data in a box plot.

## Procedure:

- a. The reaction time to be measured in this experiment is how long it takes you to stop a stick that starts falling between your finger and thumb. The class will be broken into partnerships. One partner will hold the ruler or meter stick just above the finger and thumb of the other partner in order to test his/her reaction time. The ruler or meter stick should have the 0 at the bottom with the numbers going up. The person holding the ruler or meter stick will let it go allowing it to drop between the finger and thumb of their partner. The other person, looking only at the bottom of the stick, catches the stick as quickly as possible by pressing thumb and forefinger together.
- b. The length of the meter stick from the 0 centimeter end to the “catch” position is related to the elapsed time from moment of “drop” to moment of “catch”. Thus, you can use this length as a “measure” of the reaction time. Be sure to read the number visible just above the finger or thumb each time.

- c. Have each member of the partnership catch three “drops”. Record the meter stick readings on a sheet of data paper.
- d. Each person will calculate their own mean (average) measure and record this value on the board. These readings become the data set for the class.

- Adapted from the Laboratory Activities in *Unit 19 Working With Statistics* CORD Applied Mathematics 1989; pp. 21-33.

Calculations:

- a. Record your findings in the chart below

Student	Trial #1	Trial #2	Trial #3
#1			
#2			

- b. Determine the mode, median and mean of the reaction times for the group.

Mode \_\_\_\_\_

Median \_\_\_\_\_

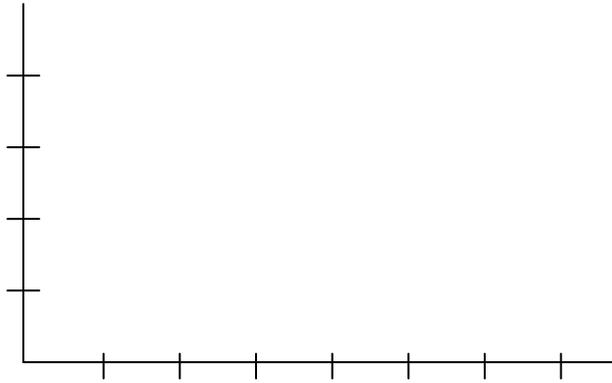
Mean \_\_\_\_\_

- c. Divide the reaction times into approximately 5 intervals. Make a histogram of the reaction times for your group.

What intervals did you choose?

Why did you choose these intervals? (Use a complete sentence.)

Complete the histogram below.



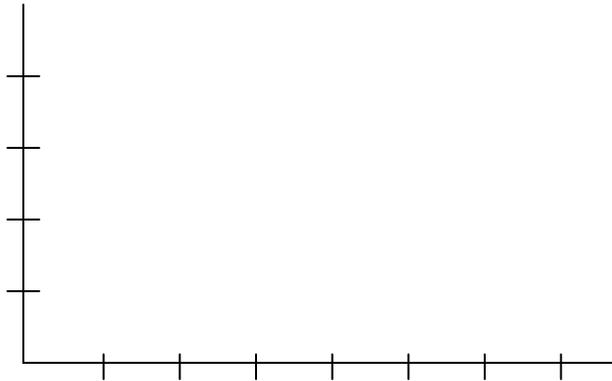
d. Determine the mode, median and mean of the reaction times for the entire class.

Mode \_\_\_\_\_

Median \_\_\_\_\_

Mean \_\_\_\_\_

- e. Divide the reaction times into approximately 5 intervals. Make a histogram of the reaction times for your class.



- f. How do the mean and standard deviation for your group compare with those for the class?

Mean:

Standard Deviation:

- g. How does the histogram for your group compare to the class histogram?

- h. Does the data shown in the histograms “fit” a normal curve?

What is the reason for your conclusion?

- i. Create a box plot of the class data.

\* Adapted from the Laboratory Activities in *Unit 19 Working With Statistics* CORD Applied Mathematics 1989; pp. 21-33.