

*Unit Lesson Plans-Data Analysis-*  
*Greg Gearey and Jennifer Froemming*

## **Lesson 1-Organizing Data**

### Activity 1-Finding facts from data

Half of the students will be given (face down) a paragraph of information containing data and the other half will be given a table of the same data (Exploring Statistics, Elementary Quantitative Literacy Project, Book One, K-6, Dale Seymour).

They will all flip over the sheet simultaneously and try to answer teacher questions. The goal being to show how much easier it is to use data in an organized way like a table.

How else can we organize data?

### Activity 2-M&M's

What kind of data could be collected about M&M's?

How many are in a bag? How many colors? How many of each color?

Students will be asked to make guesses. Record guesses on the board.

Students will be asked to sort a small bag of M&M's by color and record how many of each color and the total.

Combine class data on the board in a table by letting kids put tallies. Total categories up. How close were you?

How can we represent this data?

In groups, have students make a graph (of their choice). Hopefully you will have at least one group make a bar graph. Have them put it on the board and explain their work. Have a group, or as a class, develop a double bar graph with actual and predicted.

Also have a group put their circle graph on the board (if no one makes a circle graph, ask groups to work on making one). As a class discuss building a circle graph? (Student Worksheet, 1998 Texas Instruments Incorporated, Activity 11)

### Activity 3-Raisin Fun

If students need more work in this area, you can collect data on the amount of raisins in a box, organize, and represent it graphically. You could use two different brands and compare. You could also use the data for making other types of graphs later in the unit.

(1991 AIMS Education Foundation, September Newsletter)

## **Lesson 2-Histograms**

### Activity 1-Class Heights

Discuss as a class how we might go about gathering data on the height of our class. Locate materials, set up groups, and commence gathering that data. Then ask each group to organize their data as a line plot. From there develop a histogram by putting bars/boxes around X's and create a vertical axis for frequency. Discuss the differences between line plot, histogram, and bar graph.

### Activity 2-How long does a baseball game take?

Create a fairly long list of times for baseball games and have the students work as a class to make a histogram. It will take some work to develop the concepts of "scale" and "ranges" on the horizontal axis since the times are so varied and a line plot is not feasible. (8<sup>th</sup> Grade CMP, p.18-19, Question 5)

### Activity 3-Drop Off

In this activity students will be dealing with the analysis of a histogram of the maximum drop of fifty-five roller coasters in the United States.

(See "Drop Off" in Navigating through Data Analysis in grades 6-8, NCTM, p.29)

### Activity 4-Too much TV?

Students will build a histogram and analyze using data on hours of TV watching.

(See "TV Watching" in Navigating through Data Analysis 6-8, p. 23)

## **Lesson 3-Stem & Leaf Plots**

### Activity 1-Class Heights

Using previously collected data on class heights, build and discuss features of a stem & leaf plot.

### Activity 2-Class Heights Continued

Now extend to a back-to-back stem & leaf plot by using data from another class and work on analyzing each graph and comparing classes.

### Activity 3-Which battery would you choose?

In this activity kids will use data on two battery brands which were tested, and use that data to make a back-to-back stem & leaf as well as two histograms, then compare and analyze them as well as summary statistics to make a decision about the better brand.

(see “Batteries” in Navigating through Data Analysis 6-8, p. 39)

## **Lesson 4-Box & Whisker Plots**

### Activity 1-Class Heights

Use the class height data to teach the construction of a box plot by ordering the list of heights, finding median, quartiles, extremes, and setting it up on top of a number line. Discuss “How is a box plot similar and different from histograms and stem & leaf plots?”

Discuss what outliers are and how to find them. Do we have any? If not, how tall or how short would someone have to be to be an outlier.

### Activity 2-Batteries

Use the battery activity, but now create two box plots on top of the same horizontal axis for comparison and analysis. Would you still choose the same battery? (see “Batteries” in Navigating through Data Analysis 6-8, p. 39)

### Activity 3-Comparing Planes

Using data on p. 17 of CMP 8<sup>th</sup> grade, have students, in groups, write three questions that could be answered by investigating the data. As a class record the different questions and discuss what a “good question” is. Then assign certain groups to investigate certain questions using graphs and summary statistics. Each group will then report to the class their findings.

### Activity 4-Flick the Nick

Students will be put into three or four groups to collect data on how far they can “flick” a nickel. Rules must be discussed as a class as to how to flick and how to measure to insure reasonable data.

Record each group’s data on the board.

Armed with the class data, each group must compute summary statistics, construct graphs, and write an explanation as to why their group is the “best”.

They must then present their case to the class.

(Blackline Master 7, EQL investigation 8, “Flick the Nick”, Dale Seymour)

## **Lesson 5-Further Analysis**

### Activity 1-Sugar in Cereal

How much sugar is in cereal? Have students bring in cereal boxes before the day of this activity. Use these boxes, each group chooses ten different kinds from the pile, create box plots on board to compare/discuss/analyze together.

### Activity 2-Where’s the sugar in cereal?

Using the data sheets on cereals and their sugar content sorted by shelf placement, the students are to construct graphs and compute measures of center and variability to answer the question: Are companies placing the unhealthy cereals on the center shelf at the eye level of young children

(Statistics: Middles, Means, and in-betweens, Dale Seymour Publications, Student sheets 7-9)

### Activity 3-Peanut Butter Comparisons

Students analyze and compare types of peanut butter bases on many attributes.

(see Investigations 1 and 2 from CMP 8, pp. 5-14)

### Activity 4-Arrowheads

Students investigate four different groups of arrowheads found during 2 different time periods, and then take two new groups of arrowheads with time periods unknown and try to classify them based on summary stats and graphical attributes.

(see Investigation 4 from CMP 8, pp. 49-52, 55)

### **Other Possible Activities**

Comparing basketball teams, pp. 56-57, CMP 8.

Finding and comparing pulse rates.

How high can you jump?

Balancing Data.

### **Materials List**

- Lesson 1:** Small bags of M&M's, one for each student  
Protractors  
Compass (optional)  
Small boxes of raisins-2 brands (optional activity)
- Lesson 2:** Yardsticks, or measuring device for height of student  
Post-It notes
- Lesson 3:** Class Heights from previous lesson for all classes
- Lesson 4:** Class Heights from previous lesson for all classes  
Box & Whisker reference sheet from STEM 8  
Nickels  
Tape  
Measuring Devices
- Lesson 5:** Cereal Boxes (empty)

## PERFORMANCE PACKAGE TASK 1

(Title of Package)

**Content Standard:** Data Analysis, Statistics and Probability  
**Level:** 8<sup>th</sup>(State Middle Level 6-8)

### ***Specific Statement(s) from the Standard:***

Find, use and interpret measures of center and spread along with the construction and analysis of histograms, circle graphs, stem-and-leaf plots, and box-and-whisker plots to draw conclusions and identify trends.

### ***Product(s):***

A report summarizing their findings concerning a posed question.

### ***Task Description:***

- Students will:
1. Select or be assigned sets of data related to a topic approved by the instructor.
  2. Form a question that can be answered using the data sets and have it approved by instructor.
  3. Compute mean, median, mode, quartiles, range, interquartile range, and outliers for each set of data.
  4. Construct histograms, circle graphs, stem-and-leaf plots and box-and-whisker plots for each data set.
  5. Compare the data sets and summarize analysis in written form.
  6. Answer the posed question.
  7. Compile written report with all of the above included.

### ***Special Notes:***

Students will be given time to search for data in books, publications, and on the internet. If they are not successful in finding useful data to answer their question, they will be given data by instructor to form a question from, which must be approved by instructor.

PERFORMANCE PACKAGE TASK 1  
(Title of Package)

**FEEDBACK CHECKLIST FOR TASK 1**

The purpose of the checklist is to provide feedback to the student about his/her work relative to the content standard. Have the standard available for reference.

Y=Yes

N=Needs Improvement

<u>Student</u>		<u>Teacher</u>
_____	Select a topic of interest and form possible questions.	_____
_____	Find an appropriate set of data.	_____
_____	Choose and/or modify question.	_____
_____	Accurately computes mean, median, mode, quartiles, range, interquartile range, and outliers.	_____
_____	Construct at least two appropriate graphical displays.	_____
_____	Analyze data, summarize, and answer the posed question.	_____

Overall Comments (information about student progress, quality of the work, next steps for teacher and student, needed adjustments in the teaching and learning processes, and problems to be addressed):