Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Mathematics	Course:	Statistics and Probability	Unit 5 Title:	Analyzing Univariate Data	Grade Level(s):	10-11
Assessed Trimester:	Trimester A	Pacing:	8-9 Days	Date Created:	1/29/2014	Last Revision Date:	1/29/2014

Course Understandings: *Student will understand that:*

D. Graphs and data displays allow them to see trends, center, and spread of large amounts of data as well as compare multiple sets of data to make real-world conclusions.
E. Outliers and lurking variables can have a significant impact on data and how we collect and analyze it.
H. Technology can be used to assist with calculations, simulations, and data analysis.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

Minnesota State/Local/Technology Standard(s) addressed (2007):

- **Standard (9.4.1.#):** Display and analyze data; use various measures associated with data to draw conclusions, identify trends and describe relationships.
  Benchmark:
  9.4.1.1 Describe a data set using data displays, including box-and-whisker plots; describe and compare data sets using summary statistics, including measures of center, location and spread. Measures of center and location include mean, median, quartile and percentile. Measures of spread include standard deviation, range and inter-quartile range. Know how to use calculators, spreadsheets or other technology to display data and calculate summary statistics.
  9.4.1.2 Analyze the effects on summary statistics of changes in data sets.

- **Standard (9.4.2.#):** Explain the uses of data and statistical thinking to draw inferences, make predictions and justify conclusions.
  Benchmark:
  9.4.2.1 Evaluate reports based on data published in the media by identifying the source of the data, the design of the study, and the way the data are analyzed and displayed. Show how graphs and data can be distorted to support different points of view. Know how to use spreadsheet tables and graphs or graphing technology to recognize and analyze distortions in data displays.
  9.4.2.2 Identify and explain misleading uses of data; recognize when arguments based on data confuse correlation and causation.

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

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Meaning

Unit Understanding(s):	Essential Question(s):
Students will understand that: • Describing a set of numerical data needs to involve analyzing shape of the distribution, center (mean, median, mode), spread (range, inner-quartile range, standard deviation), and potential outliers in the data (1.5XIQR Criterion). • In order to create an appropriate graph you need to consider what type of data you have (categorical, numerical) and how much you have (ie. a lot of numerical data you would want to create a histogram, change over time you would want to create a time plot, etc). • As a result of an outlier present in a set of data the descriptive statistics may be affected strongly.	**Students will keep considering:** • How do you interpret a graph you see in the newspaper or in an advertisement? • What situations would it be really important to use the outliers in your data? • Why don't newspapers use boxplots more often?

Acquisition

Knowledge - Students will:

- Understand frequency tables, bar graphs, pie charts, pictographs, time plots, histograms, boxplots, side-by-side boxplots, stemplots, and back-to-back stemplots
- Understand summary statistics including mean, median, mode, 1st quartile, 3rd quartile, standard deviation, IQR, range and percentile
- Know how to use calculators, spreadsheets or other technology to display data
- Understand shape of a distribution
- Know, define, identify describe:
  - Skewed left
  - Skewed right
  - Symmetric
  - Outlier
  - Mean
  - Median
  - Mode
  - IQR
  - Standard deviation
  - Range
- How to read various graphs
- Identify the source of data

Reasoning - Students will:

- Compare data sets using summary statistics
- Analyze/deduce/infer the effects of an outlier, removing a data point, or multiplying data points by a scalar on summary statistics
- Distinguish which graph is appropriate when
- Analyze distortions

Skills - Students will:

- Describe data sets using data displays including frequency tables, bar graphs, pie charts, pictographs, time plots, histograms, boxplots, side-by-side boxplots, stemplots, and back-to-back stemplots
- Describe data sets using summary statistics including mean, median, mode, 1st quartile, 3rd quartile,, standard deviation, IQR, range and percentile
- Use calculators, spreadsheets or other technology to display data and calculate summary statistics
- Use spreadsheets and graphing technology to make data displays
- Identify outliers

Common Misunderstandings

- Students incorrectly believe that degrees in a pie chart add up to 360 and percents add up to 100%.
- Students do not understand the difference between a bar graph and a histogram.
- Students incorrectly believe that methods of displaying data are interchangeable.
- Students do not remember that time plots are used when you want to display change over time.

Essential new vocabulary

- 1st Quartile
- 3rd Quartile
- 5 Number Summary
- 1.5*(IQR) Criterion for outliers
- Back-to-back stemplots
- Bin
- Boxplots
- Dot plots
- Frequency table
- Histograms
- IQR
- Outlier
- Pictographs
- Side-by-side boxplots
- Skewed left
- Skewed right
- Standard deviation
- Stemplots
- Symmetric
- Time plots