ACC - Data Analysis

Content Area: **Mathematics**
Course(s): **Algebra, Math 8**
Time Period: **April**
Length: **7 Days**
Status: **Published**

Unit Summary

In this world of ever-increasing information, our students must learn to collect, analyze, and interpret data for practical application and problem solving. This lesson unit is designed to draw on prior knowledge of measures of central tendency (including mean, median, mode) and extends into the concepts of data dispersion and analyzing lines of best fit using residuals and correlation coefficients. Students will revisit various graphical representations of data (histograms, line plots, scatterplots, etc.) and build and interpret frequency tables. Graphing calculators are used to explore modeling data with linear functions and to develop and evaluate inferences and predictions that are based on the model. Extensions are included to connect to linear functions including analyzing, interpreting, graphing and modeling situations involving climate change.

Standards

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.K-12.2	Reason abstractly and quantitatively.
MA.S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
MA.S-ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.S-ID.B.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
MA.S-ID.B.6a	Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data.
MA.K-12.6	Attend to precision.
MA.S-ID.B.6c	Fit a linear function for a scatter plot that suggests a linear association.
MA.K-12.7	Look for and make use of structure.
MA.S-ID.C	Interpret linear models
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.S-ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
MA.8.F.B	Use functions to model relationships between quantities.
MA.S-CP.B	Use the rules of probability to compute probabilities of compound events in a uniform probability model

MA.8.F.B.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
MA.8.SP.A	Investigate patterns of association in bivariate data.
MA.8.SP.A.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
MA.8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g. line of best fit) by judging the closeness of the data points to the line.
MA.8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
MA.8.SP.A.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.

Student Learning Objectives

- Students will learn to analyze information based on data communicated through tables and graphs.
- Students will learn to recognize patterns from data including clustering, outliers, informal correlations and linear/non-linear associations.
- Students will learn to construct scatter plots and informally draw lines of "best fit".
- Students will learn to use the slope and intercept of the line of "best fit" to solve multi-step problems.
- Students will learn to read stem and leaf plots, box and whisker plots, bar graphs, lines graphs, pie charts, histogram/ frequency charts.
- Students will learn to find theoretical and experimental probabilities.
- Students will learn to find probabilities of mutually exclusive and overlapping events.
- Students will learn to find probabilities of independent and dependent events.
- Students will analyze various types of graphs to discover the effects of climate change.
- Student will analyze various types of graphs to look at the most effective ways to mitigate climate change.

Essential Questions

- In what situations can incorrectly-presented data be deceiving or even dangerous?
- How can collecting and analyzing data help you make decisions or predictions?
- What are the different ways that humans deal with chance?
- What is the difference between causation and association?

Enduring Understandings

- Students will understand that raw data leads to useful information after analysis and appropriate presentation.

Application

- Students will be able to independently use their learning to model real world scenarios with appropriate data displays.
- Students will be able to independently use their learning to make predictions based on current information.
- Students will be able to independently use their learning to determine a course of action to fight climate change.

Skills

Students will be skilled at:

- Identifying various data displays and their pros and cons.
- Reading various data displays.
- Making various data displays.
- Calculating probablity.