Unit 7 - Bivariate Statistics
Algebra I

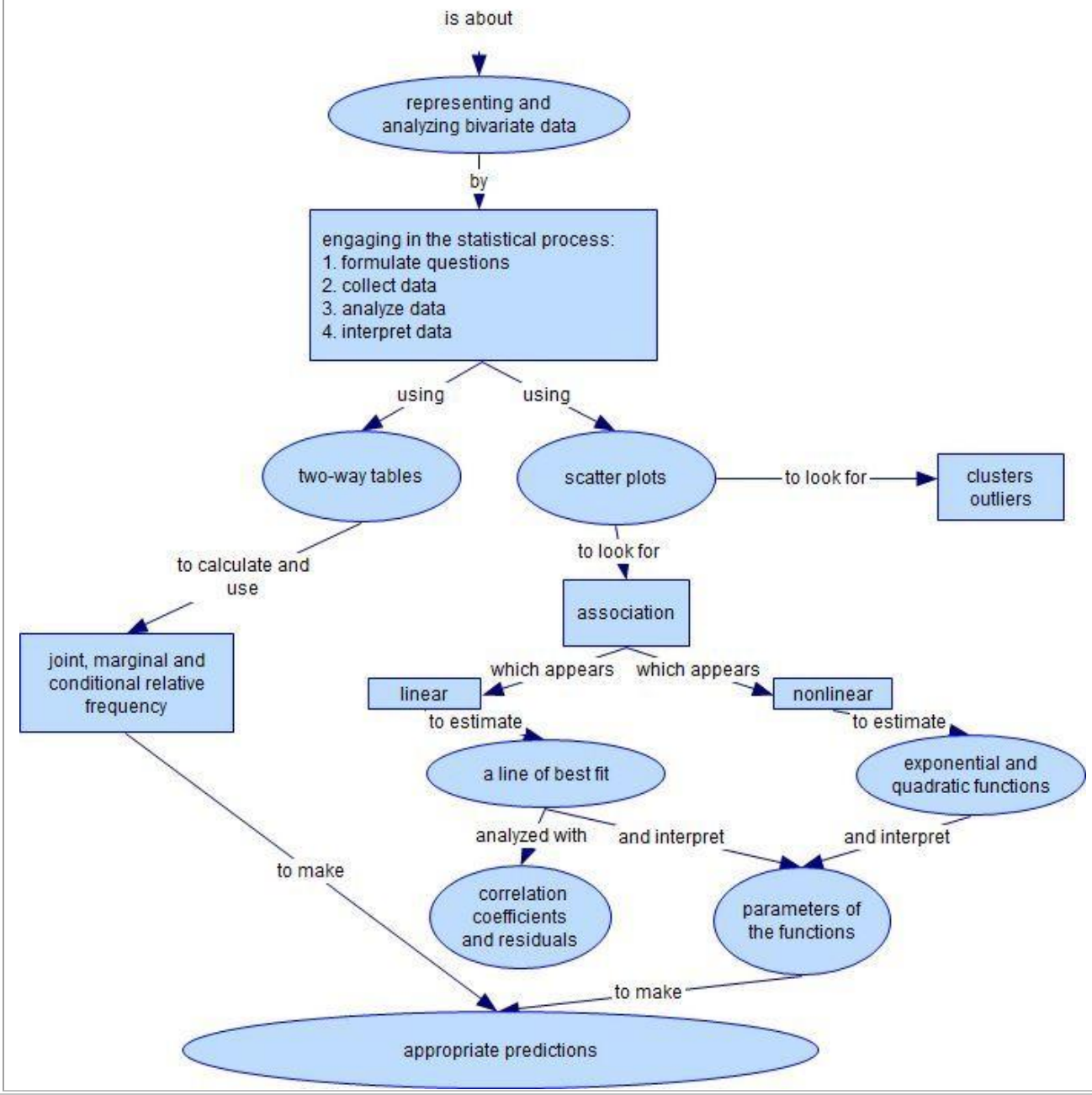
Friday, March 11, 2016, 11:23AM

Common Core Initiative

Overarching Questions and Enduring Understandings

In analyzing bivariate sets of data, how do scatter plots and two-way tables help make sense of the data and assist in making predictions?

Graphic Organizer



Unit Abstract

In this unit students will create and analyze data displays for both categorical and quantitative data. In eighth grade students constructed and interpreted two-way tables summarizing data on two categorical variables collected from the same subjects. They used relative frequencies calculated for rows or columns to describe possible association between the two variables. In this unit, students will deepen their knowledge of relative frequencies to find and use conditional, marginal and joint relative frequencies. In Algebra 2, students will use their understanding of two-way tables to analyze a sample space, decide if events are independent, and to approximate conditional probabilities.

In sixth, seventh and eighth grade students represented and analyzed both univariate and bivariate quantitative data. In eighth grade students constructed and interpreted scatter plots focusing on estimating lines of best fit and informally analyzing the closeness of the fit. They also described patterns including clustering, outliers, positive or negative association and linear or nonlinear association. In this unit students formalize their analysis of the line of best fit by using residuals to analyze the variance in a bivariate data set. This is an extension of 6th and 7th grade standards where students find the average distance from the mean to analyze the variance in an univariate data set. In addition, students will analyze the relation between the two variables in a linear model by using technology to compute and interpret the correlation coefficient. However, a cause and effect relationship is not necessarily related to the strength of the correlation, and students should recognize instances where causation is unrelated to this strength. Students will also use what they know about exponential and quadratic functions from previous units to fit a function to the data to solve problems in the context of the data. Solving problem might include describing patterns, like they did in eighth grade, or making predictions inside and outside of the data set.

Unit Overview (Word)

Unit Overview (PDF)

Content Expectations/Standards

High School: Statistics/Probability

Interpreting Categorical & Quantitative Data

HSS-ID.B. Summarize, represent, and interpret data on two categorical and quantitative variables

- HSS-ID.B.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal and conditional relative frequencies). Recognize possible associations and trends in the data.
- HSS-ID.B.6. Represent data on two quantitative variables on a scatter plot and describe how the variables are related.
  - HSS-ID.B.6a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
  - HSS-ID.B.6b. Informally assess the fit of a model function by plotting and analyzing residuals.
  - HSS-ID.B.6c. Fit a linear function for scatter plots that suggest a linear association.

HSS-ID.C. Interpret linear models

- HSS-ID.C.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the

Unit Level Standards

There are standards listed in this section for two reasons.

1. ***The standards have been modified to be appropriate for this unit. Text in gray font is part of the CCSS-M standard but does not apply to this unit. Text in brackets denotes a modification that has been made to the standard.***
2. ***The standards contain content that is developed and/or utilized across multiple units.***

Modified For this Unit

n/a

Developed and/or Utilized Across Multiple Units

Quantities

HSN-Q.A. Reason quantitatively and use units to solve problems.

- HSN-Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.
- HSN-Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

context of the data.

- HSS-ID.C.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
- HSS-ID.C.9. Distinguish between correlation and causation.

Essential/Focus Questions

1. When looking at both categorical and quantitative data how can the strength of the association between two variables be analyzed?
2. What impact can an outlier have on the correlation coefficient for a scatter plot?
3. What is the difference between correlation and causation?
4. How are the parameters from different functions modeling data interpreted in real- world contexts?
5. How are joint, marginal, and conditional relative frequencies similar? Different?

Key Concepts

causation
correlation (positive, negative, strong, weak, moderate, linear, nonlinear)
correlation coefficient
line of best fit
outlier
relative frequencies (joint, marginal, conditional)
residual
scatter plot
two-way table

Assessment Tasks

Assessment Overview
Student Handout
MPG City versus Highway

Intellectual Processes

Standards for Mathematical Practice

Students will have opportunities to:

- **model with mathematics** to fit a function to the data and solve problems in the context of the data;
- **use appropriate tools strategically** to create scatter plots, measuring and analyzing the strength of the correlation coefficient; and
- **reason abstractly and quantitatively** to create a coherent representation of the data presented in problems.

Lesson Sequence

Lesson Overview
Professional Learning Tasks-Teacher Reflection Video-Pre-Assessment

Resources

Unit Resources