

Unit Topic: Exploring Two-Variable Data **Grade level:** AP Stats
Length of lesson: 6 days

Stage 1 – Desired Results

Content Standard(s):

- HSS.ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).
- HSS.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.
- HSS.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).
- 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.IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
- HSS.IC.A.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?
- HSS.IC.B.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
- HSS.IC.B.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
- HSS.IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
- HSS.IC.B.6 Evaluate reports based on data.
- HSS.CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").

Understanding (s)/goals

Students will understand:

- Given that variation may be random or not, conclusions are uncertain.
- Graphical representations and statistics allow us to identify and represent key features of data.
- Regression models may allow us to predict responses to changes in an

Essential Question(s):

- Does the fact that the number of shark attacks increases with ice cream sales necessarily mean that ice cream sales cause shark attacks?
- How might you represent incomes of individuals with and without a college degree to help describe similarities and/or differences

explanatory variable.	between the two groups? <ul style="list-style-type: none"> • How can you determine the effectiveness of a linear model that uses the number of cricket chirps per minute to predict temperature?
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Student objectives (outcomes):

Students will be able to:

- Distinguish between explanatory and response variables for quantitative data.
- Make a scatterplot to display the relationship between two quantitative variables.
- Describe the direction, form, and strength of a relationship displayed in a scatterplot and identify unusual features.
- Interpret the correlation.
- Understand the basic properties of correlation, including how the correlation is influenced by unusual points.
- Distinguish correlation from causation.
- Make predictions using regression lines, keeping in mind the dangers of extrapolation.
- Calculate and interpret a residual.
- Interpret the slope and y intercept of a least-squares regression line.
- Determine the equation of a least-squares regression line using technology or computer output.
- Construct and interpret residual plots to assess whether a regression model is appropriate.
- Interpret the standard deviation of the residuals and use these values to assess how well a least-squares regression line models the relationship between two variables.
- Describe how the least-squares regression line, standard deviation of the residuals, and are influenced by unusual points.
- Find the slope and y intercept of the least squares regression line from the means and standard deviations of x and y and their correlation
- Use transformations involving powers, roots, or logarithms to create a linear model that describes the relationship between two quantitative variables, and use the model to make predictions.
- Determine which of several models does a better job of describing the relationship between two quantitative variables.

Stage 2 – Assessment Evidence

Performance Task(s):	Other Evidence: •
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Stage 3 – Learning Plan

Learning Activities:

