

Unit Topic: Exploring One-Variable Data **Grade level:** AP Stats
Length of lesson: 11 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 twoway 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.
- The normal distribution can be used to represent some population

Essential Question(s):

- Is my cat old, compared to other cats?
- How certain are we that what seems to be a pattern is not just a coincidence?

distributions.

Student objectives (outcomes):

Students will be able to:

- Identify the individuals and variables in a set of data.
- Classify variables as categorical or quantitative.
- Make and interpret bar graphs for categorical data.
- Identify what makes some graphs of categorical data misleading.
- Calculate marginal and joint relative frequencies from a two-way table.
- Calculate conditional relative frequencies from a two-way table.
- Use bar graphs to compare distributions of categorical data.
- Describe the nature of the association between two categorical variables
- Make and interpret dotplots, stemplots, and histograms of quantitative data.
- Identify the shape of a distribution from a graph.
- Describe the overall pattern (shape, center, and variability) of a distribution and identify any major departures from the pattern (outliers).
- Compare distributions of quantitative data using dotplots, stemplots, and histograms.
- Calculate measures of center (mean, median) for a distribution of quantitative data.
- Calculate and interpret measures of variability (range, standard deviation, IQR) for a distribution of quantitative data.
- Explain how outliers and skewness affect measures of center and variability.
- Identify outliers using the $1.5 \times \text{IQR}$ rule.
- Make and interpret boxplots of quantitative data.
- Use boxplots and numerical summaries to compare distributions of quantitative data.
- Find and interpret the percentile of an individual value within a distribution of data.
- Estimate percentiles and individual values using a cumulative relative frequency graph.
- Find and interpret the standardized score (zscore) of an individual value within a distribution of data.
- Describe the effect of adding, subtracting, multiplying by, or dividing by a constant on the shape, center, and variability of a distribution of data
- Use a density curve to model distributions of quantitative data.
- Identify the relative locations of the mean and median of a distribution from a density curve.
- Use the empirical rule to estimate (i) the proportion of values in a specified interval, or (ii) the value that corresponds to a given percentile in a Normal distribution
- Find the proportion of values in a specified interval in a Normal distribution using Table A or technology.
- Find the value that corresponds to a given percentile in a Normal distribution using Table A or technology.

- Determine whether a distribution of data is approximately Normal from graphical and numerical evidence.

Stage 2 – Assessment Evidence

Performance Task(s):

Other Evidence:

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Stage 3 – Learning Plan

Learning Activities: