Unit Topic: Inference for Categorical Data: Proportions
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 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. • An interval of values should be used to estimate parameters, in order to account for uncertainty • The normal distribution may be used to model variation • Significance testing allows us to	**Essential Question(s):** • When can we use a normal distribution to perform inference calculations involving population proportions? • How can we narrow the width of a confidence interval? • If the proportion of subjects who experience serious side effects when taking a new drug is smaller than the proportion of subjects who

make decisions about hypotheses within a particular context. • Probabilities of Type I and Type II errors influence inference.	experience serious side effects when taking a placebo, how can we determine if the difference is statistically significant?

Student objectives (outcomes):

Students will be able to:

- Identify an appropriate point estimator and calculate the value of a point estimate.
- Interpret a confidence interval in context.
- Determine the point estimate and margin of error from a confidence interval.
- Use a confidence interval to make a decision about the value of a parameter.
- Interpret a confidence level in context.
- Describe how the sample size and confidence level affect the margin of error.
- Explain how practical issues like nonresponse, undercoverage, and response bias can affect the interpretation of a confidence interval.
- State and check the Random, 10%, and Large Counts conditions for constructing a confidence interval for a population proportion.
- Determine the critical value for calculating a C% confidence interval for a population proportion using a table or technology.
- Construct and interpret a confidence interval for a population proportion.
- Determine the sample size required to obtain a C% confidence interval for a population proportion with a specified margin of error.
- Determine whether the conditions are met for constructing a confidence interval about a difference between two proportions.
- Construct and interpret a confidence interval for a difference between two proportions.
- State appropriate hypotheses for a significance test about a population parameter.
- Interpret a P-value in context.
- Make an appropriate conclusion for a significance test.
- Interpret a Type I and a Type II error in context. Give a consequence of each error in a given setting.
- State and check the Random, 10%, and Large Counts conditions for performing a significance test about a population proportion.
- Calculate the standardized test statistic and P-value for a test about a population proportion.
- Perform a significance test about a population proportion
- Interpret the power of a significance test and describe what factors affect the power of a test
- State appropriate hypotheses for a significance test about a difference between two proportions.
- Determine whether the conditions are met for performing a test about a difference between two proportions.

- Calculate the standardized test statistic and P-value for a test about a difference between two proportions.
- Perform a significance test about a difference between two proportions.

Stage 2 – Assessment Evidence	
Performance Task(s):	**Other Evidence:** •

Stage 3 – Learning Plan
Learning Activities: