Unit Topic: Inference for Quantitative Data: Means
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. • The t-distribution may be used to model variation. • An interval of values should be used to estimate parameters, in order to account for uncertainty. • Significance testing allows us to	**Essential Question(s):** • How do we know whether to use a t-test or a z-test for inference with means? • How can we make sure that samples are independent? • Why is it inappropriate to accept a hypothesis as true based on the results of statistical inference testing?

make decisions about hypotheses within a particular context.	

Student objectives (outcomes):

Students will be able to:

- Determine the critical value for calculating a C% confidence interval for a population mean using a table or technology.
- State and check the Random, 10%, and Normal/Large Sample conditions for constructing a confidence interval for a population mean.
- Construct and interpret a confidence interval for a population mean.
- Determine whether the conditions are met for constructing a confidence interval for a difference between two means.
- Construct and interpret a confidence interval for a difference between two means.
- Analyze the distribution of differences in a paired data set using graphs and summary statistics.
- Construct and interpret a confidence interval for a mean difference.
- State and check the Random, 10%, and Normal/Large Sample conditions for performing a significance test about a population mean.
- Calculate the standardized test statistic and P-value for a test about a population mean.
- Perform a significance test about a population mean.
- Use a confidence interval to make a conclusion for a two-sided test about a population parameter.
- State appropriate hypotheses for a significance test about a difference in means.
- Determine whether the conditions are met for performing a test about a difference between two means.
- Calculate the standardized test statistic and P-value for a test about a difference between two means.
- Perform a significance test about a difference between two means.
- Perform a significance test about a mean difference.
- Determine when it is appropriate to use paired t procedures versus two-sample t procedures.

Stage 2 – Assessment Evidence

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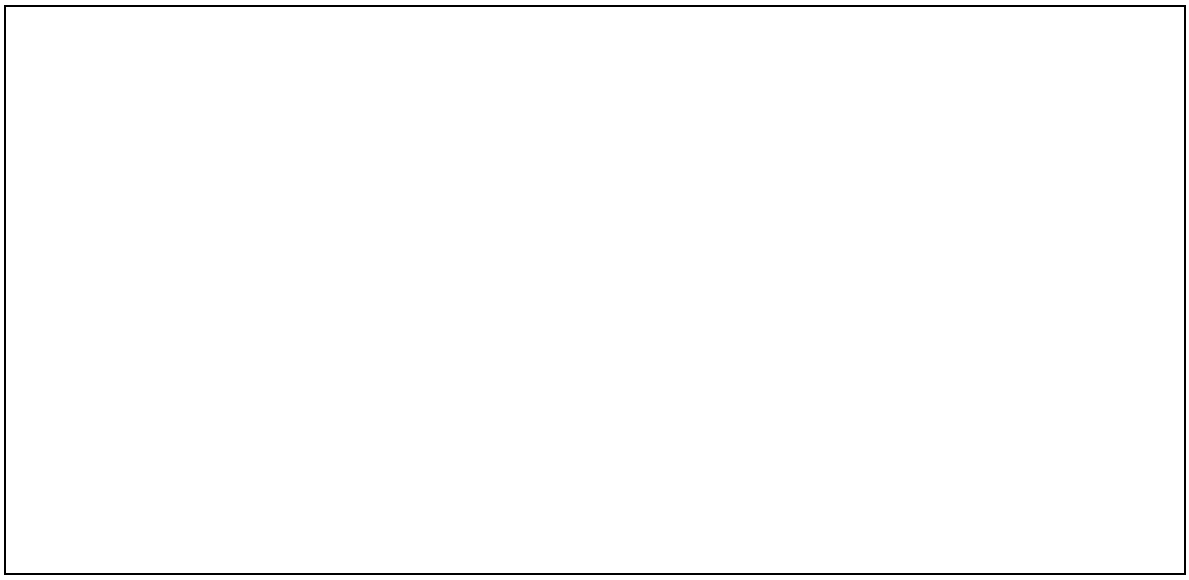
Stage 3 – Learning Plan

Learning Activities: