

**Unit Topic:** Collecting Data      **Grade level:** AP Stats  
**Length of lesson:** 7 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 way we collect data influences what we can and cannot say about a population.
- Well-designed experiments can establish evidence of causal

**Essential Question(s):**

- What do our data tell us?
- Why might the data we collected not be valid for drawing conclusions about an entire population?

relationships.	
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**Student objectives (outcomes):**

Students will be able to:

- Identify the population and sample in a statistical study.
- Identify voluntary response sampling and convenience sampling and explain how these sampling methods can lead to bias.
- Describe how to select a simple random sample using slips of paper, technology, or a table of random digits.
- Describe how to select a sample using stratified random sampling, cluster sampling, and systematic random sampling, and explain whether a particular sampling method is appropriate in a given situation.
- Explain how undercoverage, nonresponse, question wording, and other aspects of a sample survey can lead to bias
- Explain the concept of confounding and how it limits the ability to make cause-and-effect conclusions.
- Distinguish between an observational study and an experiment, and identify the explanatory and response variables in each type of study.
- Identify the experimental units and treatments in an experiment.
- Describe the placebo effect and the purpose of blinding in an experiment.
- Describe how to randomly assign treatments in an experiment using slips of paper, technology, or a table of random digits.
- Explain the purpose of comparison, random assignment, control, and replication in an experiment.
- Describe a completely randomized design for an experiment.
- Describe a randomized block design and a matched pairs design for an experiment and explain the purpose of blocking in an experiment.
- Explain the concept of sampling variability when making an inference about a population and how sample size affects sampling variability.
- Explain the meaning of statistically significant in the context of an experiment and use simulation to determine if the results of an experiment are statistically significant.
- Identify when it is appropriate to make an inference about a population and when it is appropriate to make an inference about cause and effect.
- Evaluate if a statistical study has been carried out in an ethical manner.

**Stage 2 – Assessment Evidence**

<b>Performance Task(s):</b>	<b>Other Evidence:</b>
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**Stage 3 – Learning Plan**

**Learning Activities:**

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