

WAUCONDA SCHOOL DISTRICT 118

UNIT PLANNING ORGANIZER

Subject: AP Statistics

Chapter 4: Collecting Data

Pacing: 14 days

STAGE 1 – DESIRED RESULTS

Essential Questions:

- How can a random sample be obtained?
- What is the difference between a random sample and a simple random sample?
- What are the other types of sampling techniques?
- Discuss the advantages and disadvantages of each type.
- What types of bias can be encountered and why is it important to reduce bias?
- Discuss the different types of random sampling designs and when it is appropriate to use each design.
- Describe the difference between an observational study and an experiment?
- Discuss the value of a control group.
- What is the correct procedure for designing an experiment?

Big Ideas:

- Overview of methods of data collection
- Planning and conducting surveys
- Planning and conducting experiments
- Generalizability of results and types of conclusions that can be drawn from observational studies, experiments, and surveys
- Probability
- Sampling distributions

CCSS (Priority Standards):

Appendix B (starts on p.41): <http://media.collegeboard.com/digitalServices/pdf/research/RR2011-8.pdf>

STAGE 2 – EVIDENCE

Concepts (What students need to know)	Performance Tasks (What students will be able to do)	21st Century Skills
<ul style="list-style-type: none"> • Section 4.1: Sampling and Surveys • Section 4.2: Experiments • Section 4.3: Using Studies Wisely 	<ul style="list-style-type: none"> • Identify the population and sample in a statistical study. (4.1) • Identify voluntary response sampling and convenience sampling and explain how these sampling methods can lead to bias. (4.1) • Describe how to select a simple random sample using slips of paper, technology, or a table of random digits. (4.1) • 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. (4.1) • 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. (4.1) • Explain how undercoverage, nonresponse, question wording, and other aspects of a sample survey can lead to bias. (4.1) • Explain the concept of confounding and how it limits the ability to make cause-and-effect conclusions. (4.2) • Distinguish between an observational study and an experiment, and identify the explanatory and response variables in each type of study. (4.2) • Identify the experimental units and treatments in an experiment. (4.2) • Describe the placebo effect and the purpose of blinding in an experiment. (4.2) • Describe how to randomly assign treatments in an experiment using slips of paper, technology, or a table of random digits. (4.2) • Explain the purpose of comparison, random assignment, control, and replication in an experiment. (4.2) • Describe a completely randomized design for an experiment. (4.2) • Describe a randomized block design and a matched pairs design for an experiment and explain the purpose of blocking in an experiment. (4.2) • Explain the concept of sampling variability when making an inference about a population and how sample size 	

	<p>affects sampling variability. (4.3)</p> <ul style="list-style-type: none"> ● 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. (4.3) ● 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. (4.3) ● Evaluate if a statistical study has been carried out in an ethical manner. (4.3) 	
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Common Formative/Summative Assessments:

- Quiz (4.1), Quiz (4.2), Quiz (4.3) and Chapter 4 Test

Interim Assessments (Informal Progress Monitoring checks):

- Lesson 4.1 Classwork: “Does Beyonce Write Her Own Lyrics?” & Lesson 4.1 Check for Understanding (Day 1)
- Lesson 4.1 Classwork: “How Much Do Fans Love Justin Timberlake?” & Lesson 4.1 Check for Understanding (Day 2)
- Lesson 4.1 Classwork: “How Much Do Fans Love Justin Timberlake? Day 2” & Lesson 4.1 Check for Understanding (Day 3)
- Lesson 4.1 Classwork: “What is Wrong with These Surveys?” & Lesson 4.1 Check for Understanding (Day 4)
- Lesson 4.2 Classwork: “Does SAT Prep Produce Higher Scores?” & Lesson 4.2 Check for Understanding (Day 1)
- Lesson 4.2 Classwork: “Would You Fall for That?” & Lesson 4.2 Check for Understanding (Day 2)
- Lesson 4.2 Classwork: “Does the Type of SAT Prep Matter?” & Lesson 4.2 Check for Understanding (Day 3)
- Lesson 4.3 Classwork: “Does Caffeine Increase Pulse Rate?” & Lesson 4.3 Check for Understanding (Day 1)
- Lesson 4.3 Classwork: “Does Listening to Music Improve GPA?” & Lesson 4.3 Check for Understanding (Day 2)

Modified Common Assessments:

Modified Interim Assessments:

STAGE 3 – LEARNING PLAN (INSTRUCTIONAL PLANNING)

Suggested Resources/Materials/Informational Texts

Suggested Research-based Effective Instructional Strategies

Identifying Similarities and Differences - The ability to break a concept into its similar and dissimilar characteristics allows students to understand (and often solve) complex problems by analyzing them in a more simple way. Teachers can either directly present similarities and differences, accompanied by deep discussion and inquiry, or simply ask students to identify similarities and differences on their own. While teacher-directed activities focus on identifying specific items, student-directed activities encourage variation and broaden understanding, research shows.

Summarizing and Note Taking - These skills promote greater comprehension by asking students to analyze a subject to expose what's essential and then put it in their own words. According to research, this requires substituting, deleting, and keeping some things and having an awareness of the basic structure of the information presented.

Cues, Questions, and Advance Organizers Cues - Questions, and advance organizers help students use what they already know about a topic to enhance further learning. Research shows that these tools should be highly analytical, should focus on what is important, and are most effective when presented before a learning experience

Cooperative Learning - Research shows that organizing students into cooperative groups yields a positive effect on overall learning. When applying cooperative learning strategies, keep groups small and don't overuse this strategy-be systematic and consistent in your approach.

Reinforcing Effort and Providing Recognition - Effort and recognition speak to the attitudes and beliefs of students, and teachers must show the connection between effort and achievement. Research shows that although not all students realize the importance of effort, they can learn to change their beliefs to emphasize effort.

Taken from: Marzano's Nine Instructional Strategies for Effective Teaching and Learning

Academic Vocabulary/ Word Wall	Enrichment/Extensions/ Modifications
Population	
Census	
Sample	
Sample Survey	

Convenience Sampling	
Bias	
Voluntary Response Sampling	
Random Sampling	
Simple Random Sample (SRS)	
Sampling Without Replacement	
Stratified Random Sampling	
Strata	
Cluster Sampling	
Systematic Random Sampling	
Undercoverage	
Nonresponse	
Response Bias	
Explanatory Variable	
Response Variable	
Observational Studies	
Experiments	
Treatments	
Experimental units (Subjects)	
Levels (Factors)	
Placebo	
Control Group	
Placebo Effect	
Double-blind	
Single-blind	
Random Assignment	
Replication	

Completely Randomized Design	
Randomized Block Design	
Blocks	
Matched Pairs Design	
Sampling Variability	
Statistically Significant	
Inference About a Population	
Inference About Cause-and-Effect	
Institutional Review Board	
Informed Consent	
Confidential	