

Rumson-Fair Haven Regional High School

Course: *Advanced Placement Statistics*

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Section I: Course Description

Advanced Placement Statistics is not your typical algebraic math course, as it primarily focuses on the critical thinking applications of concepts and written analysis framework. Students will be introduced to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. The textbook provides an outline for the class and is the major source of problems for homework. Students are expected to read and outline the chapters in the textbook on their own to use in class discussions. Strong reading and writing skills are recommended as this course relies on interpreting texts and information in various formats. This allows additional time for activities to introduce and/or reinforce concepts, hands-on labs, investigations, and demonstrations that model practical data collection and analysis. Out-of-class preparation is important in this course along with the ability to apply critical thinking skills. Students will be exposed to four main conceptual themes throughout this course including exploring data, sampling and experimentation, anticipating patterns through probability, and statistical inference. Technology (TI-89 Titanium graphing calculators) will be implemented as a tool for data analysis as well as the simulation approach to probability. The main goal of this course will be to prepare a student to take *The College Board's Advanced Placement Examination in Statistics*. Please note that *AP Statistics* is NOT considered a core math course for college.

Section II: NJSLs: New Jersey Student Learning Standards/Learning Objectives:

1. **2023 New Jersey Student Learning Standards – Mathematics:**
 - “A New Jersey education in Mathematics builds quantitatively and analytically literate citizens prepared to meet the demands of college and career, and to engage productively in an information-driven society; ...[A] high-quality mathematics education [] fosters a population that...leverages data in decision-making and as a lens for discussing, analyzing, and responding to practical questions, persists to make sense of and model problems arising in everyday life, society, and the workplace, thinks critically and strategically to assess quantitative relationships and to solutions to complex problems, employs precise reasoning and constructs viable arguments to deduce conclusions, recognize false statements and assess peers’ reasoning, interprets, evaluates and critiques the mathematics embedded in social, scientific and commercial systems, as well as the claims made in the private and public sectors, communicates precisely when conveying, representing, and justifying both qualitative and quantitative perspectives.”
2. **2023 New Jersey Student Learning Standards English Language Arts:**
 - A New Jersey education in English Language Arts builds readers, writers, and communicators prepared to meet the demands of college and career and to engage as productive American citizens with global responsibilities. ...Students will [d]evelop the necessary skills in reading, writing, speaking, and listening that are the foundations for creative and purposeful expression in language[; r]ead rich, challenging texts that build their knowledge of the world, grow their confidence and identities as readers, and develop critical thinking skills and vocabulary necessary for long-term success[; e]ngage in regular, meaningful, writing authentic tasks, exploring valued topics, writing for impact and expression, and sharing their work with others (including authentic audiences)[; l]everage complex texts and digital media to develop comprehension, active listening, and discussion skills[; g]round daily writing and discussion in evidence, fostering an ability to read critically, build arguments, cite evidence, and communicate ideas to contribute meaningfully as productive citizens[; e]valuate the reliability, credibility, and perspective of authors and speakers across all forms of media[; e]xpress ideas and knowledge through a variety of modalities and media, and serve as effective communicators who purposefully read, write, and speak across multiple disciplines [and l]earn to persist in reading complex texts, establishing lifelong habits to read voluntarily for pleasure, for further education, for information on public policy, and for advancement in the workplace.
3. **2020 New Jersey Student Learning Standards: Comprehensive Health and Physical Education:**
 - “Successful preparation of students for the opportunities, rigors, and advances of the 21st Century cannot be accomplished without a strong and sustained emphasis on the health and wellness of all students. Today’s students are continually bombarded with physical, mental, and social influences that affect not only learning in school, but also the lifelong health of the citizens that schools are preparing for graduation. To that end, the New Jersey Student Learning Standards - Comprehensive Health and Physical Education (NJSLs-CHPE) were revised to address the need for students to gain knowledge and skills in caring for themselves, interact effectively with others, and analyze the impact of choices and consequences.
4. **2020 New Jersey Student Learning Standards: Science:**
 - “Scientific and technological advances have proliferated and now permeate most aspects of life in the 21st century. It is increasingly important that all members of our society develop an understanding of scientific and engineering concepts and processes. Learning how to construct scientific explanations and how to

design evidence-based solutions provides students with tools to think critically about personal and societal issues and needs. Students can then contribute meaningfully to decision-making processes, such as discussions about climate change, new approaches to health care, and innovative solutions to local and global problems.”

5. **Standard 8.1 (Computer Science) and 8.2 (Design Thinking) of the 2020 NJSL:**
 - o “The ‘Intent and Spirit of the Computer Science and Design Thinking Standards’ is to focus on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers.”
6. **Standard 9.4 (Life Literacies and Key Skills) of the 2020 NJSL:**
 - o “This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy.”
 - ***Climate Change:** The state of New Jersey has mandated instruction in, “Climate Change across all content areas, leveraging the passion students have shown for this critical issue and providing them opportunities to develop a deep understanding of the science behind the changes and to explore the solutions our world desperately needs.”
7. ***Amistad Law: N.J.S.A. 18A 52:16A-88:**
 - o The inclusion of lessons and resources/texts dealing with the African slave trade, slavery in America, the vestiges of slavery in this country and the contributions of African-Americans to our society will be implemented in English and Social Studies courses in accorAP Statistics with state law: “Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.”
8. ***Holocaust Law: N.J.S.A. 18A 35-28:**
 - o The inclusion of lessons and resources/texts that enable pupils to identify and analyze applicable theories concerning human nature and behavior; to understand that genocide is a consequence of prejudice and discrimination; and to understand that issues of moral dilemma and conscience have a profound impact on life will be implemented in English and Social Studies courses in accorAP Statistics with state law: “Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.”
9. ***LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35:**
 - o A transformative approach to the inclusion of lessons and resources/texts on the contributions and issues concerning the LGBTQ+ population and people with disabilities will be implemented across all core subjects in accorAP Statistics with state law: “A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district’s implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36). A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.”
10. ***Asian American and Pacific Islanders Legislation: N.J.S.A 4021/A6100:**
 - o The inclusion of lessons and resources/texts on the history and contributions of Asian Americans and Pacific Islanders, will enable New Jersey’s schools to provide a curriculum that reflects the diversity of our state. In accordance with state law: “A board of education shall include instruction on the history and contributions of Asian Americans and Pacific Islanders in an appropriate place in the curriculum of students in grades kindergarten through as part of the school district’s implementation of the New Jersey Student Learning Standards in Social Studies.”
11. Acquisition/development/refinement of the higher-order critical thinking skills aligned with the *Revised Bloom’s Taxonomy of Cognitive Objectives*

Section III: Curriculum Modifications

The *AP Statistics* curriculum is subject to case-by-case modifications to support/advance the needs of all students, including special education students, English language learners, gifted students, and those at risk of school failure. These modifications are based on Individualized Learning Programs (IEPs), recommendations made by the district’s English Language Learners (ELL) coordinator, feedback from members of the Intervention & Referral Services Team (*I&RS*) for at-risk students, and 504 Plans.

Coursework and assessments will be modified on an individual basis for students when necessary. Modifications may include but are not limited to those outlined on the [Modifications/Accommodations for Mathematics Courses chart](#).

Section IV: Preparation for Standardized Testing

Instruction in *AP Statistics* is aligned with the requirements of state and national standardized assessments, including the *NJGPA*, *NJSLA*, the *ACT*, the *PSAT*, and the *SAT*.

Section V: Curriculum Pacing Guide

Curriculum Pacing Guide	
Course Title: <i>AP Statistics</i>	Grade Level: 11th and 12th
Unit I: Sampling and Experimentation: Planning and Conducting a Study	Weeks 1-4
Unit II: Exploring Data: Describing Patterns and Departures from Patterns	Weeks 5-10
Unit III: Anticipating Patterns: Exploring Random Phenomena Using Probability and Simulation	Weeks 11-16
Unit IV: Statistical Inference: Estimating Population Parameters and Testing Hypotheses	Weeks 17-29
Unit V: AP Statistics Exam Review	Weeks 30-34
Unit VI: Cumulative Project	Weeks 35-40

Section VI: Primary Texts and Year-Long Instructional Resources

The following texts and instructional resources are employed for all students in *AP Statistics*:

- Google Classroom
- *Common Sense Education* (www.commonsense.org)
- AP Classroom - College Board
- Stats Medic (www.statsmedic.com)
- Starnes & Tabor. *The Practice of Statistics for the AP Course: 7th Edition*. Publisher: Bedford, Freeman & Worth, 2024.
- Texas Instruments TI-89 Titanium Graphing Calculator

Section VII: Grading Formula and Assessment Modes

Marking period grades in *AP Statistics* are determined via a percentage weighting model. The specific grading categories and weightings of each will be determined before the start of each academic year and will be published in the posted/distributed course syllabi.

Assessments in *AP Statistics* vary greatly in format, scope/content/skills assessed, and alternative assessments, differentiation in assessments and choice will be incorporated as appropriate. Preliminary assessments of each format will be used as benchmarks and summative assessments will be created/revised collaboratively each year and planned by members of the *AP Statistics* instructional team to inform future learning and to measure student growth.

Section VIII: Unit Templates

The following unit templates have been established for the *AP Statistics* curriculum by the *AP Statistics* instructional team:

Unit I: Sampling and Experimentation: Planning and Conducting a Study		
Unit Summary		
<p>In this unit, students will learn that depending on how data are collected, we may or may not be able to generalize findings or establish evidence of causal relationships. For example, if random selection is not used to obtain a sample from a population, bias may result and statistics from the sample cannot be assumed to generalize to the population. For data collected using well-designed experiments, statistically significant differences between or among experimental treatment groups are evidence that the treatments caused the effect. Students learn important principles of sampling and experimental design in this unit.</p>		
Standards/Core Ideas/Performance Expectations/Progress Indicators		
<p>The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in <i>AP Statistics</i>:</p> <ul style="list-style-type: none"> ● <i>2023 New Jersey Student Learning Standards Mathematics</i> <ul style="list-style-type: none"> ○ S.ID.C.9, S.IC.A.1 & 2, S.IC.B.4, S.IC.B.6 ● <i>2023 New Jersey Student Learning Standards English Language Arts</i> <ul style="list-style-type: none"> ○ RL.CT.11–12.8. ○ RI.MF.11-12.6. ● <i>2020 New Jersey Student Learning Standards Science</i> <ul style="list-style-type: none"> ○ HS-LS3-3, HS-ETS1-3 ● <i>2020 New Jersey Student Learning Standards for Comprehensive Health & Physical Education</i> <ul style="list-style-type: none"> ○ 2.3.12.HCDM.5 ● <i>2020 New Jersey Student Learning Standards: Computer Science and Design Thinking</i> <ul style="list-style-type: none"> ○ 8.1.8.IC.2, 8.1.8.DA.4, 8.1.8.DA.4 ● <i>2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills</i> <ul style="list-style-type: none"> ○ 9.4.12.CI.1, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.DC.4, 9.4.12.IML.2, 9.4.12.IML.8 		
Unit Essential Questions	Unit Enduring Understandings	
<ul style="list-style-type: none"> ● What does our data tell us? ● Why might the data we collected not be valid for drawing conclusions about an entire population? ● Why is it important to carefully run an experiment? 	<ul style="list-style-type: none"> ● The data allows us to make inferences using statistical calculations and results to assess the meaning of a claim. ● When observational units, or experimental units, in a sample, are not randomly selected from a population, it is appropriate to make generalizations only about a population of individuals that are similar to those used in the study. ● Well-designed experiments can establish evidence of causal relationships. 	
Evidence of Learning		
Formative & Alternative Assessments: <ul style="list-style-type: none"> ● Parkinson’s Activity Lab ● Collaborative Designing Studies FRAPPY ● Individual Student Check-ins with Teacher 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> ● Summer Assignment (Benchmark) ● Sampling and Surveys Quiz (Benchmark) ● Experiments Quiz ● Designing Studies Chapter Test (Benchmark) 	Resources Needed: <ul style="list-style-type: none"> ● Starnes & Tabor. <u>The Practice of Statistics for the AP Course: 7th Edition</u>. Publisher: Bedford, Freeman & Worth, 2024. ● AP Statistics Stats Medic: https://www.statsmedic.com/ced-ap-stats ● AP Classroom ● TI-89 Titanium

Unit II: Exploring Data: Describing Patterns and Departures from Patterns

Unit Summary

In this unit, students are introduced to data and the vocabulary of statistics. Students also learn to talk about data in real-world contexts. Students will define and represent categorical and quantitative variables, describe and compare distributions of one-variable data, and interpret statistical calculations to assess claims about individual data points or samples. Students will also begin to apply the normal distribution model as an introduction to how theoretical models for populations can be used to describe some distributions of sample data. Students will explore relationships in two-variable categorical or quantitative data sets. They will use graphical and numerical methods to investigate an association between two categorical variables. They will assess correlation and, if appropriate, use a linear model to predict values of the response variable from values of the explanatory variable. Students will interpret the least-squares regression line in context, analyze prediction errors (residuals), and explore departures from a linear pattern.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *AP Statistics*:

- *2023 New Jersey Student Learning Standards Mathematics*
 - S.ID.A.1-4, S.ID.B.5 7 6, S.ID.C.7 7 8, S.IC.B.6, S.CP.A.4
- *2023 New Jersey Student Learning Standards English Language Arts*
 - RL.CT.11–12.8.
 - RI.MF.11-12.6.
- *2020 New Jersey Student Learning Standards Science*
 - HS-ETS1-3
- *2020 New Jersey Student Learning Standards for Comprehensive Health & Physical Education*
 - 2.3.12.HCDM.5
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
 - 8.1.8.DA.4, 8.1.8.DA.4
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
 - 9.4.12.CI.1, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2

Unit Essential Questions

- How certain are we that what seems to be a pattern is not just a coincidence?
- How can graphs and statistics be used?
- What is a normal distribution?
- Why do we use a regression model?

Unit Enduring Understandings

- Analysis of data allows us to make inferences using statistical calculations/results to assess the significance of a claim.
- Graphical representations and statistics allow us to identify and represent key features of data.
- The normal distribution can be used to represent population distributions that are continuous, unimodal, bell-shaped, and symmetric.
- Regression models may allow us to predict responses to changes in an explanatory variable.

Evidence of Learning

Formative & Alternative Assessments:

- Exploring Data Collaborative Assessment
- Exploring Data FRAPPY
- Modeling Distributions of Data FRAPPY
- Describing Relationships Introduction Activity
- Describing Relationships FRAPPY
- Describing Relationships Alternative Assessment
- Individual Student Check-ins with Teacher

Benchmark & Summative Assessments:

- Exploring Data and Designing Studies Summative
- Modeling Distributions of Data Test
- Describing Relationships Project
- Describing Relationships Assessment

Resources Needed:

- Starnes & Tabor, [The Practice of Statistics for the AP Course; 7th Edition](#). Publisher: Bedford, Freeman & Worth, 2024.
- AP Statistics Stats Medic: <https://www.statsmedic.com/ced-ap-stats>
- AP Classroom
- TI-89 Titanium

Unit III: Anticipating Patterns: Exploring Random Phenomena Using Probability and Simulation

Unit Summary

In this unit, students will build on understandings of simulated or empirical data distributions and fundamental principles of probability to represent, interpret, and calculate parameters for theoretical probability distributions for discrete random variables. Interpretations of probabilities and parameters associated with a probability distribution should use appropriate units and relate to the context of the situation. This unit applies probabilistic reasoning to sampling, introducing students to sampling distributions of statistics they will use when performing inference. Students should understand that sample statistics can be used to estimate corresponding population parameters and that measures of center (mean) and variability (standard deviation) for these sampling distributions can be determined directly from the population parameters when certain sampling criteria are met. For large enough samples from any population, these sampling distributions can be approximated by a normal distribution. Simulating sampling distributions helps students to understand how the values of statistics vary in repeated random sampling from populations with known parameters.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *AP Statistics*:

- 2023 New Jersey Student Learning Standards Mathematics
 - S.ID.B.5, S.IC.B.4-6, S.CP.A.1-5, S.CP.B.6-9, S.MD.A.1-4, S.MD.B.5-7
- 2023 New Jersey Student Learning Standards English Language Arts
 - RL.CT.11–12.8.
 - RI.MF.11-12.6.
- 2020 New Jersey Student Learning Standards Science
 - HS-LS3-3, HS-ETS1-3
- 2020 New Jersey Student Learning Standards for Comprehensive Health & Physical Education
 - 2.3.12.HCDM.5
- 2020 New Jersey Student Learning Standards: Computer Science and Design Thinking
 - 8.1.8.DA.4, 8.1.8.DA.4
- 2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills
 - 9.4.12.CI.1, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2

Unit Essential Questions

- How can an event be both random and predictable?
- Why do we use simulation?
- How can we display variation in populations?
- How can we anticipate patterns in the values of a statistic from one sample to another? How likely is it to get a value this large just by chance?
- What is the normal distribution model?

Unit Enduring Understandings

- If the distribution of a random variable is approximately normal, the probability that the random variable takes on values within a particular interval of the random variable is determined by the area under the normal curve within that interval
- Simulation allows us to anticipate and predict patterns in data.
- Statistical summaries and graphs can be calculated to visualize patterns and/or variations in populations.
- Probability distributions may be used to model variation in populations. If the statistic is significant, then it's likely the value occurred by chance.
- The normal distribution can be used to represent population distributions that are continuous, unimodal, bell-shaped, and symmetric.

Evidence of Learning

Formative & Alternative Assessments:

- Randomness, Probability, and Simulation and Probability Rules Alternate Assessment
- Conditional Probability and Independence Alternate Assessment
- Probability FRAPPY
- Discrete and Continuous Random Variables and Transforming and Combining Random Variables Alternate Assessment
- Binomial and Geometric Random Variables Alternate Assessment
- Random Variables FRAPPY

Benchmark & Summative Assessments:

- Probability Test
- Random Variables Test
- Mid-Year AP Classroom Review Packet
- Sampling Distributions Assessment
- Describing Relationships, Probability, Random Variables, and Sampling Distributions Summative

Resources Needed:

- Starnes & Tabor. [The Practice of Statistics for the AP Course: 7th Edition](#). Publisher: Bedford, Freeman & Worth, 2024.
- AP Statistics Stats Medic: <https://www.statsmedic.com/c-ed-ap-stats>
- AP Classroom
- TI-89 Titanium

<ul style="list-style-type: none"> • 12 Days of Stats Activity • Casino Lab • German Tanks Introduction Activity (Sampling Distributions) • Sampling Distributions Alternate Assessment • Sampling Distributions FRAPPY • Individual Student Check-ins with Teacher 		
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Unit IV: Statistical Inference: Estimating Population Parameters and Testing Hypotheses

Unit Summary

In this unit, students will be introduced to statistical inference. Students will analyze categorical data to make inferences about binomial population proportions and will use statistical inference to construct and interpret confidence intervals to estimate population proportions and perform significance tests to evaluate claims about population proportions. They will also interpret the two types of errors that can be made in a significance test, their probabilities, and possible consequences in context. Students will analyze quantitative data to make inferences about population means. Students should understand how and why conditions for inference with proportions and means are similar and different. Students are introduced to chi-square tests and will discern when each type is appropriate.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *AP Statistics*:

- *2023 New Jersey Student Learning Standards Mathematics*
 - S.IC.B.5 & 6, S.MD.B.6 & 7
- *2023 New Jersey Student Learning Standards English Language Arts*
 - RL.CT.11–12.8.
 - RI.MF.11-12.6.
- *2020 New Jersey Student Learning Standards Science*
 - HS-LS3-3, HS-ETS1-3
- *2020 New Jersey Student Learning Standards for Comprehensive Health & Physical Education*
 - 2.3.12.HCDM.5, HS-LS2-8
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
 - 8.1.8.DA.4, 8.1.8.DA.4
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
 - 9.4.12.CI.1, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.TL.2

Unit Essential Questions

- When can we use a normal distribution to perform inference calculations involving population proportions?
- How can we narrow the width of a confidence interval?
- How can we determine if the difference is statistically significant?
- How do we know whether to use a t-test or a z-test for inference with means?
- Why is it inappropriate to accept a hypothesis as true based on the results of the significance test?

Unit Enduring Understandings

- When there are at least 10 observed failures and 10 observed successes, we can use a normal distribution model.
- Increasing the sample size will narrow the width of a confidence interval.
- Comparing the p-value to the significance level determines if the difference is statistically significant.
- A z-test is for proportion while a t-test is for means.
- It is traditional to reject the null hypothesis and find evidence in favor of the alternate hypothesis.

Evidence of Learning

Formative & Alternative Assessments: <ul style="list-style-type: none"> • Confidence Intervals and Estimating a Population Proportion Alternate Assessment • Estimating a Population Mean Alternate Assessment 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> • Estimating with Confidence Test • Testing a Claim Test • Comparing Two Populations or Groups Test 	Resources Needed: <ul style="list-style-type: none"> • Starnes & Tabor. <u>The Practice of Statistics for the AP Course: 7th Edition</u>. Publisher: Bedford, Freeman & Worth, 2024.
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<ul style="list-style-type: none"> Estimating with Confidence FRAPPY Significance Tests Activity Significance Tests Alternate Assessment Tests About a Population Proportion Alternate Assessment Tests About a Population Mean Alternate Assessment Testing a Claim FRAPPY Comparing Two Populations or Groups FRAPPY Chi-Square Tests for Goodness of Fit Activity Inference for Two-Way Tables Activity Inference for Distributions of Categorical Data FRAPPY Individual Student Check-ins with Teacher 	<ul style="list-style-type: none"> Inference for Distributions of Categorical Data Test 	<ul style="list-style-type: none"> AP Statistics Stats Medic: https://www.statsmedic.com/ed-ap-stats AP Classroom TI-89 Titanium
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Unit V: AP Statistics Exam Review

Unit Summary

In this unit, students will review main idea topics from the year, including but not limited to exploring one variable data, exploring two-variable data, collecting data, probability, random variables, and probability distributions, sampling distributions, inference for categorical data: proportions, inference for quantitative data: means, inference for categorical data: chi-square.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *AP Statistics*:

- 2023 New Jersey Student Learning Standards Mathematics
 - S.ID.A.1-4, S.ID.B.5 & 6, S.ID.C.7-9, S.IC.A.1, S.ID.A.2, S.IC.B.3-6, S.CP.A.1-5, S.CP.B.6-9, S.MD.A.1-4, S.MD.B.5-7
- 2023 New Jersey Student Learning Standards English Language Arts
 - RL.CT.11–12.8.
 - RI.MF.11-12.6.
- 2020 New Jersey Student Learning Standards Science
 - HS-LS3-3, HS-ETS1-3
- 2020 New Jersey Student Learning Standards for Comprehensive Health & Physical Education
 - 2.3.12.HCDM.5, HS-LS2-8
- 2020 New Jersey Student Learning Standards: Computer Science and Design Thinking
 - 8.1.8.DA.4, 8.1.8.DA.4
- 2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills
 - 9.4.12.CI.1, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2

Unit Essential Questions

- How do we run an experiment and assess the findings?
- How do we describe data?
- How can we represent, interpret, and calculate parameters for theoretical probability distributions?
- What statistical inferences can we draw from the data?
- Why do we use statistical tests?

Unit Enduring Understandings

- There are appropriate methods for gathering and representing data, ways to make an appropriate claim or draw an appropriate conclusion, and a methodical way to interpret statistical calculations and findings to assign meaning or assess a claim.
- Data can be displayed in a number of ways: numerical or graphical representations of distributions, summary statistics, relative positions of points within a distribution, correlation and predicted response, compare distributions or relative positions of points within a distribution, present relative frequencies, proportions, or probabilities using simulation or calculations.
- Students can determine parameters for probability distributions and describe probability distributions.

	<ul style="list-style-type: none"> Using data, we can identify an appropriate inference method for confidence intervals, verify that inference procedures apply in a given situation, construct a confidence interval, provided conditions for inference are met, justify a claim based on a confidence interval, and identify null and alternative hypotheses. Using data, we can calculate a test statistic and find a p-value, provided conditions for inference are met, identify an appropriate inference method for significance tests, and justify a claim using a decision based on significance tests.
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Evidence of Learning

Formative & Alternative Assessments: <ul style="list-style-type: none"> Collaborative Review Packet Symbols Kahoot Notation Kahoot Individual Student Check-ins with Teacher 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> Summative #3 Practice AP Exam 	Resources Needed: <ul style="list-style-type: none"> Starnes & Tabor. <u>The Practice of Statistics for the AP Course, 7th Edition</u>. Publisher: Bedford, Freeman & Worth, 2024. AP Statistics Stats Medic: https://www.statsmedic.com/ced-ap-stats AP Classroom TI-89 Titanium
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Unit VI: Cumulative Project

Unit Summary

In this unit, students will use main idea topics from the year, including but not limited to exploring one-variable data, exploring two-variable data, collecting data, probability, random variables, and probability distributions, sampling distributions, inference for categorical data: proportions, inference for quantitative data: means, inference for categorical data: chi-square in a collaborative work environment to create and analyze a real-world experiment.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *AP Statistics*:

- 2023 New Jersey Student Learning Standards Mathematics*
 - S.ID.C.9, S.IC.A.1 & 2, S.IC.B.4-6, S.MD.B.6-7
- 2023 New Jersey Student Learning Standards English Language Arts*
 - RL.CT.11–12.8.
 - RI.MF.11-12.6
- 2020 New Jersey Student Learning Standards Science*
 - HS-LS2-7, HS.ETS1-2, HS-ETS1-3
- 2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
 - 8.1.8.DA.4, 8.1.8.DA.4
- 2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
 - 9.4.12.CT.3, 9.4.12.IML.7

Unit Essential Questions

- How do we run an experiment and assess the findings?
- How do we describe data?
- How can we represent, interpret, and calculate parameters for theoretical probability distributions?
- What statistical inferences can we draw from the data?
- Why do we use statistical tests?

Unit Enduring Understandings

- There are appropriate methods for gathering and representing data, ways to make an appropriate claim or draw an appropriate conclusion, and a methodical way to interpret statistical calculations and findings to assign meaning or assess a claim.
- Data can be displayed in a number of ways: numerical or graphical representations of distributions, summary statistics, relative positions of points within a distribution, correlation, and predicted response, compare distributions or relative positions of points within a distribution, present relative frequencies, proportions, or probabilities using simulation or calculations.
- Students can determine parameters for probability distributions and describe probability distributions.
- Using data, we can identify an appropriate inference method for confidence intervals, verify that inference procedures apply in a given situation, construct a confidence interval, provided conditions for inference are met, Justify a claim based on a confidence interval, and identify null and alternative hypotheses.

		<ul style="list-style-type: none"> Using data, we can calculate a test statistic and find a p-value, provided conditions for inference are met, identify an appropriate inference method for significance tests, and justify a claim using a decision based on significance tests.
Evidence of Learning		
Formative & Alternative Assessments: <ul style="list-style-type: none"> Climate Change Data Discussion* Collaboration Check-Ins 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> AP Stats EOY Project 	Resources Needed: <ul style="list-style-type: none"> Starnes & Tabor. <u>The Practice of Statistics for the AP Course; 7th Edition</u>. Publisher: Bedford, Freeman & Worth, 2024. TI-89 Titanium Google Suites

Section IX: Unit Reflection

The *AP Statistics* instructional team must confer upon the completion of each instructional unit in the *AP Statistics* curriculum and rate the degrees to which the instructional units meet performance criteria established by the New Jersey Department of Education using the Unit Reflection Form. Completed unit reflection forms must be submitted to the Department Supervisor for approval upon completion of curriculum implementation with a complementing list of suggested modifications to the *AP Statistics* curriculum.

Unit Reflection Form: <i>AP Statistics</i>			
Lesson Activities:	Strongly	Moderately	Weakly
Foster student use of technology as a tool to develop critical thinking, creativity, and innovation skills;			
Are challenging and require higher-order thinking and problem-solving skills;			
Allow for student choice;			
Provide scaffolding for acquiring targeted knowledge/skills;			
Integrate modern, global perspectives, especially those regarding diversity, genocide, global issues, and historical ones regarding racial relations;			
Integrate 21 st century skills;			
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills;			
Are varied to address different student learning styles and preferences;			
Are differentiated based on student needs;			
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process;			
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives;			
Provide opportunities for student reflection and self-assessment;			

Provide data to inform and adjust instruction to better meet the varying needs of learners.			
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Appendix

Writing Instruction and the RFH Community

Writing instruction should happen across the RFH Community. Writing across the curriculum is a philosophy that advances the belief that writing is a method of learning. Since all departments are committed to helping students learn, writing must be used as a methodology to advance student learning.

Each academic discipline has its own unique conventions, formats and structures. It is the responsibility of each department to agree upon domain-specific writing praxes, model them for students, and require them to utilize them on a consistent basis. Students must understand that acceptable writing in one domain may not be acceptable writing in another area. The development of domain-specific writing skills supports the overall development of the student writer because all writing is grounded in the writing situation: audience, context, purpose, subject, and writer. Representatives from the academic disciplines must share their domain-specific writing praxes with each other, identify intersections, and determine how to address perceived gaps that limit student learning.

Students must experience writing situations that help them learn how to think creatively and critically and communicate effectively in the academic disciplines. Writing instruction, regardless of the academic discipline, must always reinforce student understanding of the writing situation. When students experience writing situations, they must study examples of domain-specific writing in order to understand how writers communicate in discipline-related contexts. This does not mean information embedded in textbooks. Domain-specific writing is writing that is used to inform and influence readers as it draws them into an established circle of discourse. Students must use these non-fiction texts to develop the close reading skills that will shape their own writing. Focused engagement with domain-specific writing should not be limited to basic reading comprehension and topical understanding. It must also include the analysis of the writing situation that is represented in the text: audience, context, purpose, subject, and writer. The close reading of well-written texts—regardless of the domain—will show students the importance of writing mechanics, diction, and syntax. The development of close reading skills will also help the students grow in terms of their ability to construct and advance independent and original claims that are well-supported by evidence. Domain-specific writing is grounded in positioning of claims and the effective use of evidence.

The final written product is important; nevertheless, the learning that results in this production must not be devalued. The writing process is not limited to the basic steps of planning, drafting, revising, and editing/proofreading. It is a complex sequence of critical and creative thinking and writing that leads to the production of a text that provides evidence of learning and understanding. Students must ultimately develop the ability to self-assess the effectiveness of their writing as a representation of the writing situation. Without the use of models that evidence learning and understanding, students will not develop the ability to self-assess their own work—the true outcome of the writing process.

What types of writing situations should RFH students engage in?

RFH students should engage in writing situations across the curriculum that require them to:

- write to improve mechanical proficiency, diction usage, and syntactical sophistication
- write to narrate, describe, and reflect
- write to summarize and report
- write to classify and define
- write to explain how process leads to an outcome
- write to compare, contrast and evaluate
- write to speculate on cause and effect
- write to propose solutions and solve problems
- write to analyze

These writing situations should be positioned in a coordinated, developmental sequence that extends across the academic disciplines.

Upon Completion of Grade 12, RFH students must be ready to transition to the following writing situations:

- write to analyze
- write to persuade (argument)

The core focuses of first-year college writing courses are analysis and argument. These courses orient the students to the demands and expectations of writing for the academic culture of college. At colleges/universities with carefully coordinated writing programs, students must demonstrate proficiency in analysis and argument before they transition to upper level courses that require them to engage in the following writing situation:

- write to investigate (research)