Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 1: Exploring One-Variable Data	
Statistics is the science of data. We begin our study of statistics by mastering the art of examining data. Data is explored with a focus on displaying, finding, and interpreting quantitative measures. Data is also analyzed for general shape and patterns.	
Essential Questions	**Learning Targets/Objectives**
How do you organize data? How do you display and analyze categorical data? How do you display and analyze quantitative data? How do you measure center? How do you measure variability? How do you identify outliers? How do you compare multiple distributions?	Students will be able to: • Identify the individuals and variables in a set of data • Classify variables as categorical or quantitative • Classify variables as discrete or continuous • Make and interpret bar graphs for categorical data • Identify what makes some graphs of categorical data misleading • Calculate marginal and joint relative frequencies from a two-way table • Calculation conditional relative frequency from a two-way table • Use bar graphs to compare distributions of categorical data • Describe the nature of the association between two categorial variables • Make and interpret dotplots, stemplots, and histograms of quantitative data

	• Identify shape of a distribution from a graph • Describe the overall pattern (shape, center and variability) of a distribution and identify any major departures from the pattern (outliers) • Compare distributions of quantitative data using dotplots, stemplots, and histograms • Calculate measures of center (mean, median) for a distribution of quantitative data • Calculate and interpret measures of variability (range, standard deviation, IQR) for a distribution of quantitative data • Explain how outliers and skewness affect measures of center and variability • Identify outliers using 1.5 X IQR rule • Make and interpret boxplots of quantitative data. • Use boxplots and numerical summaries to compare distributions of quantitative data
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Bar graph, mean, median, range	Categorial, quantitative, discrete, continuous, relative frequencies, dotplot, stemplot, histogram, variability, standard deviation, IQR, skewness, outliers, boxplot

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets
2023 New Jersey Student Learning Standards for Mathematics

1. S-ID.B.5	1. 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.
2. S-ID.A.1	2. Represent data with plots on the real number line (dot plots, histograms, and box plots).
3. S-ID.A.2	3. 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.
4. S-ID.A.3	4. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
NJSLS	**Interdisciplinary Connections**
1. SL.PE.11–12.1	1. Initiate and participate effectively in a range of collaborative discussions (one on- one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
2. SL.II.11–12.2	2. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
3. SL.PI.11–12.4	3. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
4. SL.UM.11–12.5	4. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI.1	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
2. 9.4.12.IML.3	2. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.2	1. Describe the trade-offs in how and where data is organized and stored.
2. 8.1.12.DA.4	2. Explain the relationship between binary numbers and the storage and use of data in a computing device.

3. 8.1.12.DA.5	3. Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
4. 8.1.12.DA.6	4. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
5. 8.1.12.AP.2	5. Create generalized computational solutions using collections instead of repeatedly using simple variables.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions

- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
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Resources

Textbook

The Practice of Statistics (6th edition) by Starnes and Tabor

Online Resources

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- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 1.1 Analyzing Categorical Data	
Specific Learning Objective	**Practice & Apply Exercises**
• Identify the individuals and variables in a set of data • Classify variables as categorical or quantitative • Classify variables as discrete or continuous • Make and interpret bar graphs for categorical data • Identify what makes some graphs of categorical data misleading • Calculate marginal and joint relative frequencies from a two-way table • Calculation conditional relative frequency from a two-way table • Use bar graphs to compare distributions of categorical data	Exercises 1.1 on pages 24 – 30

• Describe the nature of the association between two categorial variables	

Section Number & Title: 1.2 Displaying Quantitative Data with Graphs	
Specific Learning Objective	**Practice & Apply Exercises**
• Make and interpret dotplots, stemplots, and histograms of quantitative data • Identify shape of a distribution from a graph • Describe the overall pattern (shape, center and variability) of a distribution and identify any major departures from the pattern (outliers) • Compare distributions of quantitative data using dotplots, stemplots, and histograms	Exercises 1.2 on pages 47 – 54

Section Number & Title: 1.3 Describing Quantitative Data with Numbers	
Specific Learning Objective	**Practice & Apply Exercises**
• Calculate measures of center (mean, median) for a distribution of quantitative data • Calculate and interpret measures of variability (range, standard deviation, IQR) for a distribution of quantitative data • Explain how outliers and skewness affect measures of center and variability • Identify outliers using 1.5 X IQR rule • Make and interpret boxplots of quantitative	Exercises 1.3 on pages 75 - 80

data. • Use boxplots and numerical summaries to compare distributions of quantitative data	

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. • Diagnostic Pre-Test • Chapter Tests • Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: • Teacher observations • Self-Assessments • Student record-keeping • Quizzes • Warm-ups • Exit Tickets • Participation in class discussions • Independent practice	The following assessments require students to utilize various strands of mathematics. • Projects • Performance Tasks • Homework • Classwork
List of Accommodations and Modifications • Special Education • 504 Students		

- At Risk Students
- MLL
- Gifted and Talented

State Mandates and Resources

- New Jersey Student Learning Standards
- Standards for Mathematical Practices

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Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 2 - Modeling Distributions of Quantitative Data

In this unit (Chapter 2), students develop an understanding of how to describe location in a distribution and how to analyze density curves, a mathematical model for distributions. Students learn the basic tenets of the normal distribution and the standard normal distribution. Students will identify percentiles and make/analyze cumulative relative frequency graphs. Students will find proportions or probabilities using standardized value, z score, and the standard normal table and the TI 84 calculator. They will also calculate the point having a stated proportion of all values below or above it. Finally, students will assess the normality of data using multiple graphical and quantitative methods.

Essential Questions	Learning Targets/Objectives
How do you describe an individual value's location in distribution using a percentile? How do you use a cumulative relative frequency graph to examine the location of a value? How do you recognize and interpret density curves? How do you find the proportion of values that fall between values using the empirical rule or the standard normal distribution? How do you use the standard normal distribution using Table A and on the calculator? How do you assess the normality of a distribution?	Students will be able to: • How do you describe an individual value's location in distribution using a percentile? • How do you use a cumulative relative frequency graph to examine the location of a value? • How do you recognize and interpret density curves? • How do you find the proportion of values that fall between values using the empirical rule or the standard normal distribution? • How do you use the standard normal distribution using Table A and on the calculator? • How do you assess the normality of a distribution?

Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Percent, proportion, probability	Percentile, ogive, density curve, empirical rule, standard normal distribution, normal distribution

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. S-ID.A.3 2. S-ID.A.4	1. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 2. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
NJSLS	**Interdisciplinary Connections**
1. SL.PE.11–12.1 2. SL.II.11–12.2 3. SL.PI.11–12.4	1. Initiate and participate effectively in a range of collaborative discussions (one on- one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. 2. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. 3. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization,

	development, and style are appropriate to task, purpose, and audience.
4. SL.UM.11–12.5	4. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
5. HS-LS4-3	5. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI. 1	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
2. 9.4.12.IML.2	2. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
4. 9.4.12.TL.1	4. Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task.
5. 9.4.12.TL.2	5. Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.4	2. Explain the relationship between binary numbers and the storage and use of data in a computing device.
3. 8.1.12.DA.5	3. Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
4. 8.1.12.DA.6	4. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

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Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 2.1 Describing Location in a Distribution	
Specific Learning Objective	**Practice & Apply Exercises**
• Find and analyze percentiles. • Make and analyze cumulative relative frequency graphs.	Exercises 2.1 (1, 2, 7, 10, 11. 14, 15, 19, 24, 26, 27, 29, 32, 36, 37, 39, 40)

Section Number & Title: 2.2 - Density Curves and Normal Distributions	
Specific Learning Objective	**Practice & Apply Exercises**
• Understand the characteristics of density curves. • Locate the median and mean for density curves. • Use the empirical rule to state what percent of the observations from a normal distribution fall between two points when both points lie at the mean or one, two, or three standard deviations one either side of the mean. • Recognize the shape of normal curves and be able to estimate both the mean and standard deviation from such a curve. • Find the z score of an observation. Interpret z scores and understand that any normal distribution becomes standard	Exercises 2.2 (43, 45, 46, 49, 51, 52, 55, 56, 59, 60, 61, 66, 68, 69, 72, 75, 77, 80, 85, 86, 87, 88, 91)

normal N(0,1) when standardized. • Understand the impact of transformations on data measures. • Use Table A and your calculator to calculate the proportion of values above a stated number, below a stated number, or between stated numbers. • Calculate the point having a stated proportion of all values above it or below it. • Determine graphically if a distribution is approximately normal. • Using an empirical rule process, determine if a distribution is approximately normal. • Construct and interpret normal probability plots.	

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IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

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• Diagnostic Pre-Test • Chapter Tests • Standardized Tests	• Warm-ups • Exit Tickets • Participation in class discussions • Independent practice	

List of Accommodations and Modifications

- Special Education
- 504 Students
- At Risk Students
- MLL
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State Mandates and Resources

- New Jersey Student Learning Standards
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PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 3: Exploring Two-Variable Data	
In Chapter 3, we study the relations between two quantitative variables. Scatterplots show the relationship, whether or not there is an explanatory-response distinction. Correlation describes the strength of the relationship, and least squares regression fits a line to data that have an explanatory-response relation. Using least squares regression lines, correlation, coefficient of determination, and residuals, a model fit can be assessed and future predictions can be made if the model is appropriate.	
Essential Questions	**Learning Targets/Objectives**
What is the difference between an explanatory and response variable? How do you make and describe a scatterplot? How do you calculate and interpret correlation? What is a regression line and how do you use it to make predictions? How do you calculate and interpret a LSRL? How do you know if a linear model is appropriate? How do you interpret computer regression output? How do you transform data to make it linear?	Students will be able to: • Distinguish between explanatory and response variables for quantitative data. • Make a scatterplot to display the relationship between two quantitative variables. • Describe the direction, form and strength of a relationship displayed in a scatterplot and identify unusual features. • Interpret the correlation. • Understand the basic properties of correlation, including how the correlation is influenced by unusual points. • Distinguish correlation from causation. • Make predictions using regression lines, keeping in mind the dangers of extrapolation.

	• Calculate and interpret a residual. • Interpret the slope and y intercept of a regression line. • Determine the equation of a least-squares regression line using technology or computer output. • Construct and interpret residual plots to assess whether a regression model is appropriate. • Interpret the standard deviation of the residuals and r-squared and use these values to assess how well a least-squares regression line models the relationship between two variables. • Describe how the least-squares regression line, standard deviation of the residuals and r-squared are influences by unusual points. • Find the slope and y intercept of the least-squares regression line from the means and standard deviations of x and y and their correlation. • Use transformations involving powers, roots, or logarithms to create a linear model that describes the relationship between two quantitative variables, and use the model to make predictions. • Detemine which of several models does a better job of describing the relationship between two quantitative variables.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Quantitative data, scatterplot, transformation	Correlation, causation, regression, regression line, residual, residual plot, coefficient of determination, unusual points

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets
2023 New Jersey Student Learning Standards for Mathematics

1. S-ID.B.6.a	1. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models. **Climate Change Example:** Students may use linear or exponential functions fitted to geoscience data to solve problems and analyze the results from global climate models to make an evidence-based forecast of the current rate of global climate change.
2. S-ID.B.6.b	2. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
3. S-ID.B.6.c	3. Fit a linear function for a scatter plot that suggests a linear association.
NJSLS	**Interdisciplinary Connections**
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2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI.1	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
2. 9.4.12.CT.3	2. Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
3. 9.4.12.IML.2	3. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

4. 9.4.12.IML.3	4. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
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Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

The Practice of Statistics (6th edition) by Starnes and Tabor

Online Resources

- Desmos Activities
- Pear Assessment
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- Quizizz
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- Canva
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- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 3.1 - Scatterplots and Correlation	
Specific Learning Objective	**Practice & Apply Exercises**
• Distinguish between explanatory and response variables for quantitative data. • Make a scatterplot to display the relationship between two quantitative variables. • Describe the direction, form and strength of a relationship displayed in a scatterplot and identify unusual features. • Interpret the correlation. • Understand the basic properties of correlation, including how the correlation is influenced by	Exercises 3.1 on pages 171 – 175

unusual points. • Distinguish correlation from causation.	

Section Number & Title: 3.2 - Least Squares Regression	
Specific Learning Objective	**Practice & Apply Exercises**
• Make predictions using regression lines, keeping in mind the dangers of extrapolation. • Calculate and interpret a residual. • Interpret the slope and y intercept of a regression line. • Determine the equation of a least-squares regression line using technology or computer output. • Construct and interpret residual plots to assess whether a regression model is appropriate. • Interpret the standard deviation of the residuals and r-squared and use these values to assess how well a least-squares regression line models the relationship between two variables. • Describe how the least-squares regression line, standard deviation of the residuals and r-squared are influences by unusual points. • Find the slope and y intercept of the least-squares regression line from the means and standard deviations of x and y and their correlation.	Exercises 3.2 on pages 204 – 212

Section Number & Title: 3.3 - Transforming to Achieve Linearity	
Specific Learning Objective	**Practice & Apply Exercises**
• Use transformations involving powers, roots, or logarithms to create a linear model that describes the relationship between two quantitative variables, and use the model to make predictions. • Detemine which of several models does a better job of describing the relationship between two quantitative variables.	Exercises 3.3 on pages 229 - 235

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. • Diagnostic Pre-Test	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: • Teacher observations • Self-Assessments • Student record-keeping • Quizzes • Warm-ups	The following assessments require students to utilize various strands of mathematics. • Projects • Performance Tasks • Homework • Classwork

• Chapter Tests • Standardized Tests	• Exit Tickets • Participation in class discussions • Independent practice	

List of Accommodations and Modifications

- Special Education
- 504 Students
- At Risk Students
- MLL
- Gifted and Talented

State Mandates and Resources

- New Jersey Student Learning Standards
- Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 5 Probability	
Chapter 5 presents the fundamental concepts of probability. Probability calculations are the basis for inference. The tools acquired in the chapter help the student to describe the behavior of statistics from random samples. Probability is used to describe the long term regularity that results from many repetitions of the same random phenomenon. Probability rules and visual methods to displays probabilities are introduced. More complex probabilities are calculated using multiple probability rules in the sample problem.	
Essential Questions	**Learning Targets/Objectives**
What is the idea of probability? What is a simulation? What is a probability model? What are the basic probability rules? What is the addition rule? What is a Venn Diagram? What is conditional probability? What is the multiplication rule?	Students will be able to: • Interpret probability as a long-run relative frequency. • Use simulation to model a random process. • Give a probability model for a random process with equally likely outcomes and use it to find the probability of an event. • Use basic probability rules, including the complement rule and the addition rule for mutually exclusive events. • Use a two-way table or Venn diagram to model a random process and calculate probabilities involving two events. • Apply the general addition rule to calculate probabilities.

	• Calculate and interpret conditional probabilities. • Determine if two events are independent. • Use the general multiplication rule to calculate probabilities. • Use a tree diagram to model a random process involving a sequence of outcomes and to calculate probabilities. • When appropriate, use the multiplication rule for independent events to calculate probabilities.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Probability, random, Venn diagram, tree diagram	Simulation, mutually exclusive, independent events, general addition rule, general multiplication rule

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. S-CP.A.1	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”).
2. S-CP.A.2	2. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
3. S-CP.A.3	3. Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.

4. S-CP.B.6	4. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.
5. S-CP.B.7	5. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.
6. S-CP.B.8	6. Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.
NJSLS	**Interdisciplinary Connections**
1. SL.PE.11–12.1	1. Initiate and participate effectively in a range of collaborative discussions (one on- one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
2. SL.II.11–12.2	2. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
3. SL.PI.11–12.4	3. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
4. SL.UM.11–12.5	4. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
5. HS-ESS1-4	5. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI.1	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
2. 9.4.12.IML.2	2. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

2. 8.1.12.DA.4 3. 8.1.12.DA.6	2. Explain the relationship between binary numbers and the storage and use of data in a computing device. 3. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships

- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources

- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
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Resources

Textbook

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- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 5.1 Randomness, Probability, and Simulation	
Specific Learning Objective	**Practice & Apply Exercises**
• Interpret probability as a long-run relative frequency. • Use simulation to model a random process. • Give a probability model for a random process with equally likely outcomes and use it to find the probability of an event.	Exercises 5.1 on pages 336 – 341

Section Number & Title: Section 5.2 Probability Rules	
Specific Learning Objective	**Practice & Apply Exercises**
• Use basic probability rules, including the complement rule and the addition rule for mutually exclusive events. • Use a two-way table or Venn diagram to	Exercises 5.2 on pages 354 – 358

model a random process and calculate probabilities involving two events. • Apply the general addition rule to calculate probabilities.	

Section Number & Title: Section 5.3 Conditional Probability and Independence	
Specific Learning Objective	**Practice & Apply Exercises**
• Calculate an interpret conditional probabilities. • Determine if two events are independent. • Use the general multiplication rule to calculate probabilities. • Use a tree diagram to model a random process involving a sequence of outcomes and to calculate probabilities. • When appropriate, use the multiplication rule for independent events to calculate probabilities.	Exercises 5.3 on pages 376 - 381

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments

Summative	Formative	Performance
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources

- New Jersey Student Learning Standards
- Standards for Mathematical Practices

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Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 6: Random Variables and Probability Distributions	
In this unit (Chapter 6) students learn how to find measures for discrete versus continuous random variables. First students are taught to distinguish between discrete versus continuous variables. Then the mean and variance of a random variable are calculated, and rules for the sum or difference of two random variables are developed. Also in this chapter, students will begin by understanding both a binomial and geometric setting and how they relate to the random variables defined in the beginning of this chapter. As we progress through this chapter, students will be able to calculate probabilities, means and standard deviations within a binomial and geometric setting. Finally, they will use all of these calculations to give a normal approximation to a binomial distribution.	
Essential Questions	**Learning Targets/Objectives**
How do you recognize a discrete versus continuous variable? How do you construct a probability distribution table and histogram for a discrete variable? How do you find probabilities of continuous variables for events as areas under density curves including the standard normal distribution? How do you find the mean and variance of a discrete variable? How do you approximate the mean of a distribution using simulation? How do you solve probability problems using the means and variances rules? What is a binomial and geometric setting? What are the properties of these distributions?	Students will be able to: • Recognize and define a discrete random variable, and construct a probability distribution table and a probability histogram for the random variable. • Recognize and define a continuous random variable, and determine probabilities of events as areas under density curves. • Given a normal random variable, use the standard normal table or a graphing calculator to find probabilities of events as areas under the standard normal distribution curve. • Calculate the mean and variance of a discrete random variable. • Find the expected payout in a raffle or similar game of chance.

How do you calculate a binomial and geometric probabilities? How do you find the mean and standard deviation of a binomial and geometric random variable? How do you perform a normal approximation to a binomial distribution?	• Use simulation methods and the law of large numbers to approximate the mean of a distribution. • Use rules for means and rules for variances to solve problems involving sums, differences, and linear combinations of random variables. • Recognize a binomial and geometric setting • Define a binomial and geometric distribution • Find binomial probabilities using technology and the binomial formula • Find geometric probabilities using technology • Calculate mean and standard deviation of a binomial and geometric random variable • Calculate a normal approximation to a binomial distribution
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Probability, normal, density curve, standard normal, mean, variance, simulation	Discrete random variable, probability distribution, continuous random variable, expected value, law of large numbers, binomial random variable, geometric random variable

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. S-MD.A.1	1. Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.
2. S-MD.A.2	2. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

3. S-MD.A.3	3. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value
4. S-MD.A.4	4. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.
5. S-MD.B.5.a	5. Find the expected payoff for a game of chance.
NJSLS	**Interdisciplinary Connections**
1. SL.PE.11–12.1	1. Initiate and participate effectively in a range of collaborative discussions (one on- one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
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5. HS-LS4-3	5. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI. 1	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
2. 9.4.12.IML.2	2. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
4. 9.4.12.TL.1	4. Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task.
5. 9.4.12.TL.2	5. Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.4	2. Explain the relationship between binary numbers and the storage and use of data in a computing device.
3. 8.1.12.DA.5	3. Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
4. 8.1.12.DA.6	4. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

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- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

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- Use Equations
- Use Expressions
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- Use Operations
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Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

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- Devices:
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Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 6.1 Discrete and Continuous Random Variables	
Specific Learning Objective	**Practice & Apply Exercises**
• Recognize and define a discrete random variable, and construct a probability distribution table and a probability histogram for the random variable. • Recognize and define a continuous random variable, and determine probabilities of events as areas under density curves. • Given a normal random variable, use the stand normal table or a graphing calculator to find probabilities of events as areas under the standard normal distribution curve. • Calculate the mean and variance of a discrete random variable.	Exercises 6.1 (2,3,9,12,17,25,26,29,32,34)

• Find the expected payout in a raffle or similar game of chance. • Use simulation methods and the law of large numbers to approximate the mean of a distribution.	

Section Number & Title: 6.2 Transforming and Combining Random Variables	
Specific Learning Objective	**Practice & Apply Exercises**
• Use rules for means and rules for variances to solve problems involving sums, differences, and linear combinations of random variables.	Exercises 6.2 (39, 40,41,47,49,51,54,60, 73, 74)

Section Number & Title: 6.3 Binomial and Geometric Random Variables	
Specific Learning Objective	**Practice & Apply Exercises**
• Recognize a binomial and geometric setting • Define a binomial and geometric distribution • Find binomial probabilities using technology and the binomial formula • Find geometric probabilities using technology • Calculate mean and standard deviation of a binomial and geometric random variable • Calculate a normal approximation to a binomial distribution	Exercises 6.3 (77-80,84,85,91,95,100,109,112,115-119)

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

<table>
<tr><th colspan="3">Assessments</th></tr>
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● Diagnostic Pre-Test
● Chapter Tests
● Standardized Tests</td>
<td>The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to:

● Teacher observations
● Self-Assessments
● Student record-keeping
● Quizzes
● Warm-ups
● Exit Tickets
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● Independent practice</td>
<td>The following assessments require students to utilize various strands of mathematics.

● Projects
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● Homework
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State Mandates and Resources
• New Jersey Student Learning Standards • Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 7: Sampling Distributions	
This unit serves as an essential foundation for the study of statistical inference by exploring the probability distributions of two common statistics: sample proportions and sample means. The chapter focuses on understanding how data collected from samples can be used to make generalizations about larger populations. By examining the behavior and distributions of these statistics, students will learn key concepts such as: Sample Proportions: Understanding the distribution of sample proportions, how they vary across different samples, and how to calculate probabilities associated with these proportions using the binomial distribution and normal approximation. Sample Means: Exploring the distribution of sample means and its relationship to the population mean. This includes learning about the Central Limit Theorem, which describes how sample means tend to follow a normal distribution as sample sizes increase, regardless of the population's distribution. Through this unit, students will gain a deeper understanding of how sample statistics behave, setting the stage for more advanced topics like hypothesis testing and confidence intervals in statistical inference. Key learning outcomes include recognizing the importance of sample size, understanding variability within sample statistics, and applying probability rules to draw conclusions from data.	
Essential Questions	**Learning Targets/Objectives**
1. What is a sampling distribution? 2. What is the difference between a statistic and a parameter? 3. How do you describe a sampling distribution? 4. What is the sampling distribution for a sample proportion? 5. What is the sampling distribution of a difference between two proportions? 6. What is the sampling distribution for a sample mean?	Students will be able to: • Distinguish between a parameter and a statistic. • Create a sampling distribution using all possible samples from a small population. • Use the sampling distribution of a statistic to evaluate a claim about a parameter. • Distinguish among the distribution of a population, the distribution of

7. What is the Central Limit Theorem? 8. What is the sampling distribution of a difference between two means?	a sample and the sampling distribution of a statistic. • Determine if a statistic is an unbiased estimator of a population parameter. • Describe the relationship between sample size and the variability of a statistic. • Calculate the mean and standard deviation of the sampling distribution of a sample proportion and interpret the standard deviation. • Determine if the sampling distribution of p-hat is approximately Normal. • Calculate the mean and standard deviation of the sampling distribution of a difference in two sample proportions, and interpret the standard deviation. • Determine if the sampling distribution of the difference of two proportions is approximately Normal. • If appropriate, use a Normal distribution to calculate probabilities involving p-hat or the difference between two p-hats. • Calculate the mean and standard deviation of the sampling distribution of a sample mean and interpret the standard deviation. • Explain how the shape of the sampling distribution of x-bar is affected by the shape of the population distribution and the sample size. • Calculate the mean and standard deviation of the sampling distribution of a difference in sample means and interpret the standard deviation. • Determine if the sampling distribution of two sample means is approximately Normal. • If appropriate, use a Normal distribution to calculate probabilities involve x-bar or the difference of two sample means.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Distribution, Normal Distribution, Z-scores, Sampling	Parameter, Statistic, Sampling Means, Sampling Proportions

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. S-MD.A.3 2. S-MD.A.4	1. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. 2. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.
NJSLS	**Interdisciplinary Connections**
1. SL.PE.11–12.1	1. Initiate and participate effectively in a range of collaborative discussions (one on- one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
2. SL.II.11–12.2	2. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
3. SL.PI.11–12.4	3. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
4. SL.UM.11–12.5	4. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
5. HS-LS2-6	5. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI.1 2. 9.4.12.IML.2	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas. 2. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of

	information, in media, data, or other resources.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
4. 9.4.12.TL.2	4. Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.4	2. Explain the relationship between binary numbers and the storage and use of data in a computing device.
3. 8.1.12.DA.5	3. Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
4. 8.1.12.DA.6	4. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan

- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics

- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods

- Maintain Oversight
- Evaluate Results

Resources

Textbook

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Online Resources

- Desmos Activities
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- New Jersey Climate Education Hub

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...

- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources
• Leveled Assessments • Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 7.1 What is a Sampling Distribution?	
Specific Learning Objective	**Practice & Apply Exercises**
• Distinguish between a parameter and a statistic. • Create a sampling distribution using all possible samples from a small population. • Use the sampling distribution of a statistic to evaluate a claim about a parameter. • Distinguish among the distribution of a population, the distribution of a sample and the sampling distribution of a statistic. • Determine if a statistic is an unbiased estimator of a population parameter. • Describe the relationship between sample size and the variability of a statistic.	Exercises 7.1 on pages 482 – 486

Section Number & Title: 7.2 Sample Proportions	
Specific Learning Objective	**Practice & Apply Exercises**
• Calculate the mean and standard deviation of the sampling distribution of a sample proportion and interpret the standard deviation. • Determine if the sampling distribution of p-hat is approximately Normal. • Calculate the mean and standard deviation of the sampling distribution of a difference in two sample proportions, and interpret the standard deviation. • Determine if the sampling distribution of the difference of two proportions is approximately Normal. • If appropriate, use a Normal distribution to calculate probabilities involving p-hat or the difference between two p-hats.	Exercises 7.2 on pages 498 – 501

Section Number & Title: 7.3 Sample Means	
Specific Learning Objective	**Practice & Apply Exercises**
• Calculate the mean and standard deviation of the sampling distribution of a sample mean and interpret the standard deviation. • Explain how the shape of the sampling distribution of x-bar is affected by the shape of the population distribution and the sample size. • Calculate the mean and standard deviation of the sampling distribution of a difference	Exercises 7.3 on pages 518 - 522

in sample means and interpret the standard deviation. • Determine if the sampling distribution of two sample means is approximately Normal. • If appropriate, use a Normal distribution to calculate probabilities involve x-bar or the difference of two sample means.	

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. • Diagnostic Pre-Test • Chapter Tests • Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: • Teacher observations • Self-Assessments • Student record-keeping • Quizzes • Warm-ups • Exit Tickets • Participation in class discussions • Independent practice	The following assessments require students to utilize various strands of mathematics. • Projects • Performance Tasks • Homework • Classwork
List of Accommodations and Modifications • Special Education • 504 Students • At Risk Students • MLL		

- Gifted and Talented

State Mandates and Resources

- New Jersey Student Learning Standards
- Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 8: Estimating Proportions with Confidence	
In this unit (Chapter 8) students begin by understanding the process of inference and how it is related to proportions. As we progress through the chapter, students will be able to calculate and interpret a confidence interval for a proportion or difference of two proportions. Finally, students will learn how to find minimum sample sizes for desired margin of errors in order to create confidence intervals for proportions with a specified confidence level.	
Essential Questions	**Learning Targets/Objectives**
1. How do you construct and interpret a one-sample confidence interval for a proportion? 2. How do you evaluate changes on sample size and confidence level on the width of a confidence interval? 3. How do you find the sample size for a desired margin of error? 4. How do you construct a confidence interval to compare two proportions?	Students will be able to: ● Understand the meaning of a good point estimator. ● Understand the meaning and interpretation of a confidence interval. ● Understand the meaning and interpretation of the margin of error and standard error. ● Understand what effects the margin of error. Be able to state the effect of changes to the sample size, standard deviation, and confidence level. ● Understand the concept of critical value. ● Understand conditions for inference about a proportion. ● Construct (by hand and by calculator) and interpret a one-sample confidence interval for a population proportion.

	● Understand how to work backward to find a point estimate or margin of error from a given confidence interval. ● Find the sample size for a desired margin of error. ● Construct (by hand and by calculator) and interpret a confidence interval for comparing two proportions.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Proportions, Sampling, Sample Size	Point Estimate, Confidence Intervals, Margin of Error, Standard Error

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. MA.S-IC.A.1 2. MA.S-IC.B.4 3. MA.S-IC.B.5	1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. 2. 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. 3. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
NJSLS	**Interdisciplinary Connections**
1. SL.PE.11–12.1 2. SL.II.11–12.2 3. SL.PI.11–12.4	1. Initiate and participate effectively in a range of collaborative discussions (one on- one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. 2. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. 3. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization,

	development, and style are appropriate to task, purpose, and audience.
4. SL.UM.11–12.5	4. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
5. HS-ESS1-4	5. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
6. HS-LS2-6	6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI. 1	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
2. 9.4.12.IML.2	2. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
4. 9.4.12.TL.2	4. Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.4	2. Explain the relationship between binary numbers and the storage and use of data in a computing device.
3. 8.1.12.DA.5	3. Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
4. 8.1.12.DA.6	4. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures

- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately

- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
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Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

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- Find General Methods
- Maintain Oversight
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Resources
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Online Resources
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Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 8.1 Confidence Intervals: The Basics	
Specific Learning Objective	**Practice & Apply Exercises**
• Understand the meaning of a good point estimator. • Understand the meaning and interpretation of a confidence interval. • Understand the meaning and interpretation of the margin of error and standard error. • Understand what effects the margin of error. Be able to state the effect of changes to the sample size, standard deviation, and confidence level. • Understand the concept of critical value.	Exercises 8.1 (1-4,5,7,9,10,17,19,21)

Section Number & Title: 8.2 Estimating a Population Proportion	
Specific Learning Objective	**Practice & Apply Exercises**
• Understand conditions for inference about a proportion. • Construct (by hand and by calculator) and interpret a one-sample confidence interval for a population proportion. • Understand how to work backward to find a point estimate or margin of error from a given confidence interval.	Exercises 8.2 (29-32,35,36,40,42,44,46,49,50,55)

• Find the sample size for a desired margin of error.	

Section Number & Title: 8.3 Estimating a Difference in Proportions	
Specific Learning Objective	**Practice & Apply Exercises**
• Construct (by hand and by calculator) and interpret a confidence interval for comparing two proportions.	Exercises 8.3 (63,65,69,71,73,75)

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. • Diagnostic Pre-Test • Chapter Tests • Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: • Teacher observations • Self-Assessments • Student record-keeping • Quizzes • Warm-ups • Exit Tickets • Participation in class discussions • Independent practice	The following assessments require students to utilize various strands of mathematics. • Projects • Performance Tasks • Homework • Classwork

List of Accommodations and Modifications

- Special Education
- 504 Students
- At Risk Students
- MLL
- Gifted and Talented

State Mandates and Resources

- New Jersey Student Learning Standards
- Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 9: Testing Claims About Proportions

In this unit, students build on their understanding of sampling distributions by focusing on the z-distribution for proportions and its application in hypothesis testing. The unit begins by examining the similarities and differences between the z-distribution and other sampling distributions covered in previous chapters. Students will explore how the z-distribution is used to model the behavior of sample proportions and assess how well sample data align with population parameters. As the unit progresses, students will delve into the process of hypothesis testing for proportions, learning to test claims about population proportions in two key scenarios: One-Sample Proportion Testing: Students will learn to formulate null and alternative hypotheses, calculate the test statistic, and make decisions about the population proportion based on sample data. Two-Sample Proportion Testing: This section expands on hypothesis testing by comparing two proportions from independent samples, teaching students to determine whether the observed difference is statistically significant. Throughout the unit, students will gain practical experience with hypothesis testing procedures, including calculating p-values, interpreting confidence intervals, and making informed conclusions about population proportions based on sample evidence. By the end of the unit, students will be able to confidently apply z-tests for proportions in both one-sample and two-sample scenarios.

Essential Questions	Learning Targets/Objectives
1. How do you state hypotheses? 2. How do you interpret a P-value? 3. How do you make a conclusion for a hypothesis test? 4. How do you describe Type I and Type II errors? 5. How do you perform a hypothesis test about p? 6. What is the one-sample z test for p? 7. What are two-sided tests?	Students will be able to: • 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 error and Type II error in context. Give a consequence of each error in a given setting.

8. What is the power of a test? 9. How do you perform a significance test for the difference between two proportions?	• 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.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Point estimator, Z-scores, sampling proportions	Hypothesis or Significance Testing, Condition checks, P-value, Type I and II errors, Power of a Test

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. S-MD.B.7 2. S-IC.A.1	1. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). 2. Understand statistics as a process for making inferences about population parameters based on a random

	sample from that population.
NJSLS	**Interdisciplinary Connections**
1. SL.II.11–12.2 2. SL.PI.11–12.4 3. SL.UM.11–12.5 4. HS-ESS3-1 5. HS-LS2-4	1. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. 2. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience. 3. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. 4. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity. 5. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI.1 2. 9.4.12.IML.2 3. 9.4.12.IML.3 4. 9.4.12.TL.2	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas. 2. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources. 3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions. 4. Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.4 2. 8.1.12.DA.5 3. 8.1.12.DA.6	1. Explain the relationship between binary numbers and the storage and use of data in a computing device. 2. Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 3. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

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- Explain the Meaning
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Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

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- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

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- Use Defi nitions
- Use Prior Results
- Make Conjectures

- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
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Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

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- Use a Graph
- Use a Formula
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Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

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Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

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- Specify Units

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PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 9.1 Significance Tests: The Basics	
Specific Learning Objective	**Practice & Apply Exercises**
• State appropriate hypotheses for a significance test about a population	Exercises 9.1 on pages 595 – 599

parameter. • Interpret a P-value in context. • Make an appropriate conclusion for a significance test.	

Section Number & Title: 9.2 Tests About a Population Proportion	
Specific Learning Objective	**Practice & Apply Exercises**
• 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. • Interpret a Type I error and Type II error in context. Give a consequence of each error in a given setting.	Exercises 9.2 on pages 619 – 624

Section Number & Title: 9.3 Tests About a Difference in Proportions	
Specific Learning Objective	**Practice & Apply Exercises**
• State appropriate hypotheses for a	Exercises 9.3 on pages 636 - 640

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.	

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. • Diagnostic Pre-Test • Chapter Tests • Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: • Teacher observations • Self-Assessments • Student record-keeping • Quizzes • Warm-ups • Exit Tickets • Participation in class discussions • Independent practice	The following assessments require students to utilize various strands of mathematics. • Projects • Performance Tasks • Homework • Classwork
List of Accommodations and Modifications • Special Education • 504 Students • At Risk Students • MLL		

- Gifted and Talented

State Mandates and Resources

- New Jersey Student Learning Standards
- Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Estimating Means with Confidence

In this unit, students will learn to construct and interpret confidence intervals for various types of mean data, building on their knowledge of statistical inference. The unit begins with identifying the conditions that must be satisfied to construct valid confidence intervals. Students will explore confidence intervals for three key scenarios: Confidence Intervals for a Single Mean and Confidence Intervals for the Difference of Two Means. Additionally, they will learn how to determine the desired sample size needed to achieve a particular margin of error or confidence level, given certain parameters. By the end of the unit, students will have mastered the ability to: Confirm that the necessary conditions are present for constructing confidence intervals. Construct and interpret confidence intervals for single means, differences of two means, and mean differences in paired data.

Essential Questions	Learning Targets/Objectives
1. How do you construct a one-sample t interval for a population mean? 2. How do you calculate a sample size to satisfy a desired confidence level and margin of error? 3. How do you construct a two-sample t interval? 4. How do you construct a confidence interval for paired data?	Students will be able to: • Evaluate whether the conditions exist to be able to contrast a confidence interval for means. • Determine the t critical value for calculating a confidence interval for a mean with a table. • Estimate with confidence the population mean when the population standard deviation is unknown by hand and by calculator. Interpret this interval. • Choose a correct sample size given a desired confidence level and margin of error.

	• Students will be able to determine the impacts to the width of a confidence interval when the sample size, confidence level, and standard deviation change. • Determine whether conditions are met for constructing a confidence interval between two means. • Construct and interpret a confidence interval for a difference between two means. • Analyze the distribution of differences in paired data using graphs and summary data. • Construct and interpret a confidence interval for a mean difference.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. S-IC.A.1 2. S-IC.B.4 3. S-IC.B.5	1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. 2. 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. 3. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
NJSLS	**Interdisciplinary Connections**
1. SL.PE.11–12.1	1. Initiate and participate effectively in a range of collaborative discussions (one on- one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own

	clearly and persuasively.
2. SL.II.11–12.2	2. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
3. SL.PI.11–12.4	3. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
4. SL.UM.11–12.5	4. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
5. HS-ESS1-4	5. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
6. HS-PS4-3	6. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI. 1	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
2. 9.4.12.IML.2	2. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
4. 9.4.12.TL.2	4. Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.4	2. Explain the relationship between binary numbers and the storage and use of data in a computing device.
3. 8.1.12.DA.5	3. Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
4. 8.1.12.DA.6	4. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions

- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions

- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources
Textbook
The Practice of Statistics (6th edition) by Starnes and Tabor
Online Resources

- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section Number & Title: 10.1 Estimating a Population Mean	
Specific Learning Objective	**Practice & Apply Exercises**
• Evaluate whether the conditions exist to be able to contrast a confidence interval for	Exercises 10.1 (1-24 odds)

means. • Determine the t critical value for calculating a confidence interval for a mean with a table. • Estimate with confidence the population mean when the population standard deviation is unknown by hand and by calculator. Interpret this interval. • Choose a correct sample size given a desired confidence level and margin of error. • Students will be able to determine the impacts to the width of a confidence interval when the sample size, confidence level, and standard deviation change.	

Section Number & Title: 10.2 Estimating a Difference in Means	
Specific Learning Objective	**Practice & Apply Exercises**
• Determine whether conditions are met for constructing a confidence interval between two means. • Construct and interpret a confidence interval for a difference between two means. • Analyze the distribution of differences in paired data using graphs and summary data. • Construct and interpret a confidence interval for a mean difference.	Exercises 10.2 (27-45 odds, 50, 52)

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR

UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Testing Claims About Means	
In Chapter 11, students begin with examining a t-distribution for means and its similarities and differences to the sampling distributions covered in Chapters 7 and 9. As we progress through the chapter, students will learn about hypothesis testing with means for one-sample and two-sample data	
Essential Questions	**Learning Targets/Objectives**
1. How do you carry out a significance test for a population mean? 2. What is the one-sample t Test for a population mean? 3. How do two-sided tests relate to confidence intervals? 4. How do you test about a difference in means? 5. What are significance tests for a mean difference? 6. How do you tell the difference between paired data and two sample tests?	Students will be able to: • 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 mean. • State appropriate hypotheses for a significance test about a difference between two 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. • Determine when it is appropriate to use paired t procedures versus two-sample t procedures.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Hypothesis testing, P-value, Confidence Intervals	T test, Student T distribution

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. S-MD.B.5a 2. S-MD.B.5b 3. S-MD.B.6 4. S-MD.B.7	1. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast food restaurant. 2. Evaluate and compare strategies on the basis of expected values. 3. Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). 4. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).
NJSLS	**Interdisciplinary Connections**
1. SL.II.11–12.2	1. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

2. SL.PI.11–12.4	2. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
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- Problem Solve

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- Use a Graph
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- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

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- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 11.1 – Tests about a Population Mean	
Specific Learning Objective	**Practice & Apply Exercises**
• 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 mean.	Exercises 11.1 on pages 714 – 718

Section 11.2 – Tests about a Difference in Means	
Specific Learning Objective	**Practice & Apply Exercises**
• State appropriate hypotheses for a significance test about a difference between two 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. • Determine when it is appropriate to use paired t procedures versus two-sample t procedures.	Exercises 11.2 on pages 735 - 743

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
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• Diagnostic Pre-Test • Chapter Tests • Standardized Tests	• Warm-ups • Exit Tickets • Participation in class discussions • Independent practice	

List of Accommodations and Modifications

- Special Education
- 504 Students
- At Risk Students
- MLL
- Gifted and Talented

State Mandates and Resources

- New Jersey Student Learning Standards
- Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Advanced Placement Statistics
Course Number: 034600

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Inference for Distributions and Relationships	
n this chapter, students will be introduced to the chi-square distribution. Students will use the chi-square distribution to perform inference analysis for goodness of fit and two-way table data (homogeneity and association). As the chapter progresses, students will revisit regression topics which were first introduced in Chapter 3. In this chapter, they will learn how to perform inference analysis (confidence intervals and hypothesis tests) for the true slope of the regression line.	
Essential Questions	**Learning Targets/Objectives**
1. What are the properties of a chi-square distribution? 2. How do you test the distribution of a population? 3. What is a two-way table? 4. How do you test for homogeneity of populations? 5. How do you test for independent variables? 6. What is a regression model? 7. How do you read computer output for regression inference? 8. What are the conditions for regression inference? 9. What is the standard error for the LSRL? 10. What are the degrees of freedom for paired data? 11. How do you construct a confidence interval for slope? 12. How do you perform a significance test for slope?	Students will be able to: • Understand the properties of the chi-square distribution • Understand and analyze two-way tables • Compute the expected counts, degrees of freedom, and chi-square test statistic for a Goodness of Fit, Homogeneity, and Association (or Independence) tests. • State and check conditions for chi-square tests. • Perform and interpret chi-square hypothesis tests using a calculator and table. • Choose the appropriate chi-square test in a given setting. • Identify and interpret the statistic values for y-intercept, slope, and standard error of the slope from computer output. Understand that these statistic values are the best estimates for the corresponding

	parameter values for a regression model. • Find the standard error about the LSRL • Understand degrees of freedom for paired data • Check the conditions for performing inference about the slope of a population of the true regression line. • Construct and interpret a confidence interval for the slope of the population regression line by hand and using a calculator. • Perform and interpret a significance test about the slope of the population regression line. • Interpret inference analysis with regards to causality.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Hypothesis Testing, P-value, Two-way tables, Correlation	Chi-square distribution, Goodness of Fit, Homogeneity, Association

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. S-ID.B.5	1. 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.
2. S-ID.B.6a	2. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.
3. S-ID.B.6b	3. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.

4. S-ID.B.6c	4. Fit a linear function for a scatter plot that suggests a linear association.
5. S-ID.C.7	5. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
6. S-ID.C.8	6. Compute (using technology) and interpret the correlation coefficient of a linear fit.
7. S-ID.C.9	7. Distinguish between correlation and causation.
8. S-IC.A.1	8. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
NJSLS	**Interdisciplinary Connections**
1. SL.II.11–12.2	1. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
2. SL.PI.11–12.4	2. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
3. SL.UM.11–12.5	3. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
4. HS-ESS3-1	4. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
5. HS-LS2-7	5. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
6. HS-LS2-8	6. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI.1	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
2. 9.4.12.IML.2	2. Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
4. 9.4.12.TL.2	4. Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.4	1. Explain the relationship between binary numbers and the storage and use of data in a computing device.
2. 8.1.12.DA.5	2. Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
3. 8.1.12.DA.6	3. Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

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- Consider Simpler Forms
- Problem Solve

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- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

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- Use Defi nitions
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- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

The Practice of Statistics (6th edition) by Starnes and Tabor

Online Resources

- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 4.1 Sampling and Surveys	
Specific Learning Objective	**Practice & Apply Exercises**
• Understand the properties of the chi-square distribution • Understand and analyze two-way tables • Compute the expected counts, degrees of freedom, and chi-square test statistic for a Goodness of Fit, Homogeneity, and Association (or Independence) tests. • State and check conditions for chi-square tests. • Perform and interpret chi-square hypothesis tests using a calculator and table.	Exercises 4.1 (1,2,5-10,13,15-21,24-27,33,35,39)

Section 4.2 Experiments	
Specific Learning Objective	**Practice & Apply Exercises**
• Choose the appropriate chi-square test in a given setting. • Identify and interpret the statistic values for y-intercept, slope, and standard error of the slope from computer output. Understand that these statistic values are the best estimates for the corresponding parameter values for a regression model. • Find the standard error about the LSRL • Understand degrees of freedom for paired data	Exercises 4.2 (43,45,47,49,51,55,59,60,63,68,70,72,76,81,83,85,86)

Section 4.3 Using Studies Wisely	
Specific Learning Objective	**Practice & Apply Exercises**
• Check the conditions for performing inference about the slope of a population of the true regression line. • Construct and interpret a confidence interval for the slope of the population regression line by hand and using a calculator. • Perform and interpret a significance test about the slope of the population regression line. • Interpret inference analysis with regards to causality.	Exercises 4.3 (93,98,100,103,107,116)

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices