

# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/Data analysis</p>	<p><b>Unit Summary:</b> 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.</p>
<p><b>Grade Level(s): 11 - 12</b></p>	
<p><b>Essential Question(s):</b></p> <p>How do you organize data?</p> <p>How do you display and analyze categorical data?</p> <p>How do you display and analyze quantitative data?</p> <p>How do you measure center?</p> <p>How do you measure variability?</p> <p>How do you identify outliers?</p> <p>How do you compare multiple distributions?</p>	<p><b>Enduring Understanding(s):</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>- Identify the individuals and variables in a set of data</li> <li>- Classify variables as categorical or quantitative</li> <li>- Classify variables as discrete or continuous</li> <li>- Make and interpret bar graphs for categorical data</li> <li>- Identify what makes some graphs of categorical data misleading</li> <li>- Calculate marginal and joint relative frequencies from a two-way table</li> <li>- Calculate conditional relative frequency from a two-way table</li> <li>- Use bar graphs to compare distributions of categorical data</li> <li>- Describe the nature of the association between two categorical variables</li> <li>- Make and interpret dotplots, stemplots, and histograms of quantitative data</li> <li>- Identify shape of a distribution from a graph</li> <li>- Describe the overall pattern (shape, center and variability) of a distribution and identify any major departures from the pattern (outliers)</li> <li>- Compare distributions of quantitative data using dotplots, stemplots, and histograms</li> <li>- Calculate measures of center (mean, median) for a distribution of quantitative data</li> <li>- Calculate and interpret measures of variability (range, standard deviation, IQR) for a distribution of quantitative data</li> <li>- Explain how outliers and skewness affect measures of center and variability</li> <li>- Identify outliers using 1.5 X IQR rule</li> <li>- Make and interpret boxplots of quantitative data.</li> <li>- Use boxplots and numerical summaries to compare distributions of quantitative data</li> </ul>

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b>Learning Target</b></p> <ol style="list-style-type: none"> <li>1. Analyze categorical data</li> <li>2. Display quantitative data with graphs</li> <li>3. Describe quantitative data with numbers</li> </ol>	<p><b>NJSLS:</b></p> <ol style="list-style-type: none"> <li>1. MA.S-ID.B.5</li> <li>2. MA.S-ID.A.1</li> <li>3. MA.S-ID.A.2-3</li> </ol>
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### Cross-Curricular Standards:

<p><b>Real world problem-solving examples</b></p> <ol style="list-style-type: none"> <li>1. Comparing the household size in U.K. versus South Africa p.36</li> <li>2. Make and interpret stemplots of football player head sizes for developing helmets p.38</li> <li>3. Using boxplots to decide which company makes better tablets p.71</li> </ol>	<p><b>Learning Target</b></p> <ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data and evaluate evidence to determine measures of central tendencies, casual/correlational relationships and anomalous data.</li> <li>2. Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including design constraints.</li> <li>3. Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics and culture.</li> </ol>	<p><b>NJSLS:</b></p> <ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. CS&amp;DT.8.2.12.ITH.1</li> <li>3. CS&amp;DT.8.2.12.ITH.3</li> </ol>
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**The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:**

<p><b>21<sup>st</sup> Century skills:</b></p> <ul style="list-style-type: none"> <li>● Critical thinking</li> <li>● Creativity</li> <li>● Collaboration</li> <li>● Communication</li> <li>● Information literacy</li> <li>● Technology literacy</li> <li>● Media literacy</li> <li>● Flexibility</li> <li>● Leadership</li> <li>● Initiative</li> <li>● Productivity</li> <li>● Social skills</li> </ul>	<p><b>Mathematical Practices:</b></p> <ul style="list-style-type: none"> <li>● Make sense of problems and persevere in solving them</li> <li>● Reason abstractly and quantitatively</li> <li>● Construct viable arguments and critique the reasoning of others</li> <li>● Model with mathematics</li> <li>● Use appropriate tools strategically</li> <li>● Attend to precision</li> <li>● Look for and make use of structure</li> <li>● Look for and express regularity in repeated reasoning</li> </ul>
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**Students will engage with the following:**

**Text:**

- The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor

**Online resources incorporated through the year, including but not limited to:**

- AP Central
- Sapling
- Albert IO

**Calculators:**

TI-84 Plus graphing calculator

**Students will write:**

Students will write a narrative on describing a data set by using shape, center, spread and outliers.  
Students will write a narrative on comparing two distributions using shape, center, spread and outliers.  
Students will justify whether or not a data set has outliers.

## PART III: TRANSFER OF KNOWLEDGE AND SKILLS

### DESCRIBE THE LEARNING EXPERIENCE.

#### How will students uncover content and build skills?

##### Section 1.1 – Analyzing Categorical Data

- **Activities:** Hiring discrimination – it just won't fly! Pg. 6
- **Instructional strategies:** Use provided online instructional presentations, review "Learning Targets" specified in each section at beginning of lesson, use intermittent "Check your Understanding" through each section, and use exit tickets to test "Learning Targets." Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 1.1 on pages 24 – 30

##### Section 1.2 – Displaying Quantitative Data with Graphs

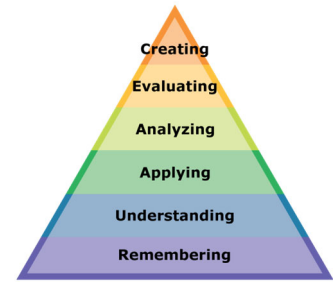
- **Instructional Strategies:** Use provided online instructional presentations, review "Learning Targets" specified in each section at beginning of lesson, use intermittent "Check your Understanding" through each section, and use exit tickets to test "Learning Targets." Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 1.2 on pages 47 – 54

##### Section 1.3 – Describing Quantitative Data with Numbers

- **Activities:** Mean as a "balance point" Pg. 56  
Team challenge: Did Mr. Starnes stack his class? Pg. 72
- **Instructional Strategies:** Use provided online instructional presentations, review "Learning Targets" specified in each section at beginning of lesson, use intermittent "Check your Understanding" through each section, and use exit tickets to test "Learning Targets." Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 1.3 on pages 75 - 80

## PART IV: EVIDENCE OF LEARNING

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



### Formative Assessments:

Quizzes, tests, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Benchmarks & final assessments

### Accommodations/Modifications:

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### Performance Assessments:

Projects, presentations, final writing projects

### Accommodations/Modifications:

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**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/Modeling Distributions of Quantitative Data</p>	<p><b>Unit Summary:</b> 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.</p>
<p><b>Grade Level(s): 11 - 12</b></p>	
<p><b>Essential Question(s):</b></p> <p><b>How do you describe an individual value's location in distribution using a percentile?</b></p> <p><b>How do you use a cumulative relative frequency graph to examine the location of a value?</b></p> <p><b>How do you recognize and interpret density curves?</b></p> <p><b>How do you find the proportion of values that fall between values using the empirical rule or the standard normal distribution?</b></p> <p><b>How do you use the standard normal distribution using Table A and on the calculator?</b></p> <p><b>How do you assess the normality of a distribution?</b></p>	<p><b>Enduring Understanding(s):</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>● Find and analyze percentiles.</li> <li>● Make and analyze cumulative relative frequency graphs.</li> <li>● Understand the characteristics of density curves.</li> <li>● Locate the median and mean for density curves.</li> <li>● 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.</li> <li>● Recognize the shape of normal curves and be able to estimate both the mean and standard deviation from such a curve.</li> <li>● Find the z score of an observation. Interpret z scores and understand that any normal distribution becomes standard normal <math>N(0,1)</math> when standardized.</li> <li>● Understand the impact of transformations on data measures.</li> <li>● Use Table A and your calculator to calculate the proportion of values above a stated number, below a stated number, or between stated numbers.</li> <li>● Calculate the point having a stated proportion of all values above it or below it.</li> <li>● Determine graphically if a distribution is approximately normal.</li> <li>● Using an empirical rule process, determine if a distribution is approximately normal.</li> <li>● Construct and interpret normal probability plots.</li> </ul>

**PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES**

**DESCRIBE THE LEARNING TARGETS.**

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).</li> <li>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.</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. MA.S-ID.A.3</li> <li>2. MA.S-ID.A.4</li> </ol>
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**Cross-Curricular Standards:**

<p><b><u>Real world problem-solving examples</u></b></p> <ol style="list-style-type: none"> <li>1. Analyze how far away human guesses are from reality p. 100</li> <li>2. Determine the new mean and standard deviation given transformations for temperature p. 101</li> <li>3. Determine the rarity of the stopping distance of cars p. 122</li> </ol>	<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships and anomalous data.</li> <li>2. 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.</li> <li>3. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. SCI. HS-LS2-6</li> <li>3. SCI. HS-LS2-7</li> </ol>
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**The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:**

<b>21<sup>st</sup> Century skills:</b> <ul style="list-style-type: none"><li>● Critical thinking</li><li>● Creativity</li><li>● Collaboration</li><li>● Communication</li><li>● Information literacy</li><li>● Technology literacy</li><li>● Media literacy</li><li>● Flexibility</li><li>● Leadership</li><li>● Initiative</li><li>● Productivity</li><li>● Social skills</li></ul>	<b>Mathematical Practices:</b> <ul style="list-style-type: none"><li>● Make sense of problems and persevere in solving them</li><li>● Reason abstractly and quantitatively</li><li>● Construct viable arguments and critique the reasoning of others</li><li>● Model with mathematics</li><li>● Use appropriate tools strategically</li><li>● Attend to precision</li><li>● Look for and make use of structure</li><li>● Look for and express regularity in repeated reasoning</li></ul>
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**Students will engage with the following:**

<b>Text:</b> <ul style="list-style-type: none"><li>● <b>The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor</b></li></ul> <b>Online resources incorporated through the year, including but not limited to:</b> <ul style="list-style-type: none"><li>● AP Central</li><li>● Sapling</li><li>● Albert IO</li></ul> <b>Calculators:</b> <b>TI-84 Plus graphing calculator</b>
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**Students will write:**

<ul style="list-style-type: none"><li>● <b>Students will write a narrative explaining why two groups or individuals are different in severity based on their standardized z score.</b></li><li>● <b>Students will explain why a distribution is or is not normal. Students will justify whether or not a data set has outliers.</b></li><li>● <b>Students will explain why a data point is rare based on percentiles and the z score.</b></li></ul>
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## PART III: TRANSFER OF KNOWLEDGE AND SKILLS

### DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

#### Section 2.1 Describing Location in a Distribution:

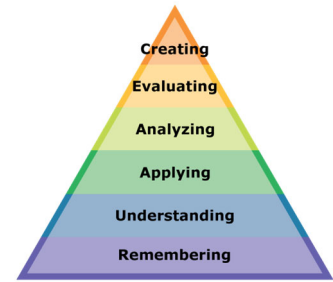
- **Activities:** Where do I stand? Pg. 90
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 2.1 (1, 2, 7, 10, 11, 14, 15, 19, 24, 26, 27, 29, 32, 36, 37, 39, 40)

#### Section 2.2 Density Curves and Normal Distributions:

- **Activities:** Team Challenge: The Vending Machine Problem Pg. 130
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** 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)

## PART IV: EVIDENCE OF LEARNING

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



### Formative Assessments:

Quizzes, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Tests, Final Assessments

### Accommodations/Modifications:

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**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> <b>AP Statistics/Exploring two-variable quantitative data</b></p>	<p><b>Unit Summary:</b></p> <p>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.</p>
<p><b>Grade Level(s): 11 - 12</b></p>	
<p><b>Essential Question(s):</b></p> <p>What is the difference between an explanatory and response variable?</p> <p>How do you make and describe a scatterplot?</p> <p>How do you calculate and interpret correlation?</p> <p>What is a regression line and how do you use it to make predictions?</p> <p>How do you calculate and interpret a LSRL?</p> <p>How do you know if a linear model is appropriate?</p> <p>How do you interpret computer regression output?</p> <p>How do you transform data to make it linear?</p>	<p><b>Enduring Understanding(s):</b></p> <p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>- Distinguish between explanatory and response variables for quantitative data.</li> <li>- Make a scatterplot to display the relationship between two quantitative variables.</li> <li>- Describe the direction, form and strength of a relationship displayed in a scatterplot and identify unusual features.</li> <li>- Interpret the correlation.</li> <li>- Understand the basic properties of correlation, including how the correlation is influenced by unusual points.</li> <li>- Distinguish correlation from causation.</li> <li>- Make predictions using regression lines, keeping in mind the dangers of extrapolation.</li> <li>- Calculate and interpret a residual.</li> <li>- Interpret the slope and y intercept of a regression line.</li> <li>- Determine the equation of a least-squares regression line using technology or computer output.</li> <li>- Construct and interpret residual plots to assess whether a regression model is appropriate.</li> <li>- 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.</li> <li>- Describe how the least-squares regression line, standard deviation of the residuals and r-squared are influenced by unusual points.</li> <li>- 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.</li> </ul>

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|  | <ul style="list-style-type: none"><li>- 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.</li><li>- Determine which of several models does a better job of describing the relationship between two quantitative variables.</li></ul> |
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## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b>Learning Target</b></p> <ol style="list-style-type: none"> <li>1. Analyze scatterplots and correlation.</li> <li>2. Analyze least-squares regression</li> <li>3. Transform to achieve linearity</li> </ol>	<p><b>NJSLS:</b></p> <ol style="list-style-type: none"> <li>1. MA.S-ID.B.6</li> <li>2. MA.S-ID.B.6</li> <li>3. MA.S-ID.B.6</li> </ol>
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### Cross-Curricular Standards:

<p><b>Realworld problem-solving examples</b></p> <ol style="list-style-type: none"> <li>1. Buying wins – Do baseball teams who spend more money have more wins? Pg. 155</li> <li>2. An analysis of the duration of a eruption of Old Faithful and how long until the next eruption.</li> </ol>	<p><b>Learning Target</b></p> <ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data and evaluate evidence to determine measures of central tendencies, casual/correlational relationships and anomalous data.</li> <li>2. Mathematical tools and technology are used to gather, analyze and communicate results.</li> </ol>	<p><b>NJSLS:</b></p> <ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. SCI.9-12.5.1.12.B.1</li> </ol>
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**Students will engage with the following:**

**Text:**

- The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor

**Online resources incorporated through the year, including but not limited to:**

- AP Central
- Sapling
- Albert IO

**Calculators:**

TI-84 Plus graphing calculator

**Students will write:**

- Explain why a LSRL is an acceptable fit for the given scatterplot
- Explain how the residual plot indicates an acceptable or unacceptable fit.
- Interpret the meaning of coefficient of variation in the context of the problem.

## PART III: TRANSFER OF KNOWLEDGE AND SKILLS

### DESCRIBE THE LEARNING EXPERIENCE.

#### How will students uncover content and build skills?

##### Section 3.1 – Scatterplots and Correlation

- **Activities:** Candy grab p. 152, Guess the correlation p. 161, Correlation and Regression applet p.163
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 3.1 on pages 171 – 175

##### Section 3.2 – Least-Squares Regression

- **Activities:** Investigating properties of the least-squares regression line p. 198
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 3.2 on pages 204 – 212

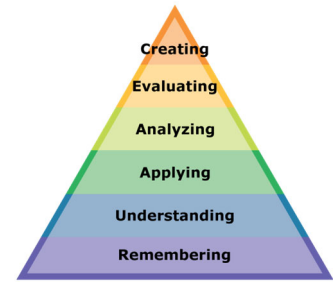
##### Section 3.3 – Transforming to Achieve Linearity

- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 3.3 on pages 229 - 235



## PART IV: EVIDENCE OF LEARNING

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IDENTIFY BLOOM'S LEVELS.



### Formative Assessments:

Quizzes, tests, homework, class discussion, individual conferences

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**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/Collecting Data</p>	<p><b>Unit Summary:</b> This unit (Chapter 5) demonstrates good techniques for producing data and also explains why poor techniques often produce worthless data. Different methods for creating samples are introduced; some simple, some complex. Observational studies and experiments are compared. Completely randomized experimental design is defined and modelled. Finally, simulations are introduced as a method to imitate real life scenarios.</p>
<p><b>Grade Level(s): 11 - 12</b></p>	
<p><b>Essential Question(s):</b> How do you design an unbiased study?  How do you distinguish between an observational study and an experiment?  How can you design a sample using various techniques – SRS, comparative, block, stratified, clustered, systematic?  How can you design a sound completely randomized experiment?  What are the principles of experimental design?  How can you randomly choose and assign subjects?  How can you simulate an experiment?</p>	<p><b>Enduring Understanding(s):</b>  Students will be able to:</p> <ul style="list-style-type: none"> <li>● Identify the population in a sampling situation.</li> <li>● Recognize bias due to voluntary response samples and other inferior sampling methods.</li> <li>● Recognize the presence of under-coverage and nonresponse as sources of error in a sample survey.</li> <li>● Recognize the effect of wording of questions on the response.</li> <li>● Use random digits to select a stratified random sample from a population when the strata are identified.</li> <li>● Understand whether a sample is stratified versus clustered.</li> <li>● Recognize whether a study is an observational study or an experiment.</li> <li>● Recognize bias due to confounding of explanatory variables with lurking variables in either an observational study or an experiment.</li> <li>● Identify the factors (explanatory variables), treatments, response variables, and experimental units or subjects in an experiment.</li> <li>● Understand the principles of experimental design.</li> <li>● Use a random number generator to carry out the random assignment of subjects to groups in a completely randomized experiment.</li> <li>● Recognize a block design and when it would be appropriate.</li> <li>● Recognize the placebo effect and the use of blind techniques.</li> <li>● Know when a completely randomized, blocked design, and matched pair design would be appropriate and how to design each.</li> <li>● Outline the design of a sound experiment using a diagram with sizes of groups, specific treatments, and response variables.</li> <li>● Explain why a randomized comparative experiment can give good evidence for cause-and-effect relationships.</li> <li>● Use a simulation to comment on the significance of a cause effect relationship.</li> </ul>

**PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES**

**DESCRIBE THE LEARNING TARGETS.**

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Understand statistics as a process for making inferences about population parameters based</li> <li>2. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.</li> <li>3. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. MA.S-IC.A.1</li> <li>2. MA.S-IC.B.3</li> <li>3. MA.S-IC.B.5</li> </ol>
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**Cross-Curricular Standards:**

<p><b><u>Real world problem-solving examples</u></b></p> <ol style="list-style-type: none"> <li>1. Design sampling given a school assembly p. 259</li> <li>2. Identify treatments and experimental units for a malaria study p. 274</li> <li>3. Explain how a health experiment conforms to the sound tenets of experimental design p 282</li> </ol>	<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.</li> <li>2. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</li> <li>3. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. SCI. HS-LS2-7</li> <li>3. SCI. HS-LS2-8</li> </ol>
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**The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:**

<b>21<sup>st</sup> Century skills:</b> <ul style="list-style-type: none"><li>● Critical thinking</li><li>● Creativity</li><li>● Collaboration</li><li>● Communication</li><li>● Information literacy</li><li>● Technology literacy</li><li>● Media literacy</li><li>● Flexibility</li><li>● Leadership</li><li>● Initiative</li><li>● Productivity</li><li>● Social skills</li></ul>	<b>Mathematical Practices:</b> <ul style="list-style-type: none"><li>● Make sense of problems and persevere in solving them</li><li>● Reason abstractly and quantitatively</li><li>● Construct viable arguments and critique the reasoning of others</li><li>● Model with mathematics</li><li>● Use appropriate tools strategically</li><li>● Attend to precision</li><li>● Look for and make use of structure</li><li>● Look for and express regularity in repeated reasoning</li></ul>
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**Students will engage with the following:**

<b>Text:</b> <ul style="list-style-type: none"><li>● <b>The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor</b></li></ul> <b>Online resources incorporated through the year, including but not limited to:</b> <ul style="list-style-type: none"><li>● AP Central</li><li>● Sapling</li><li>● Albert IO</li></ul> <b>Calculators:</b> <b>TI-84 Plus graphing calculator</b>
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**Students will write:**

<ul style="list-style-type: none"><li>● <b>Students will describe why one sample method is better than another for a specific situation.</b></li><li>● <b>Students will describe a complete sound experiment or observational study.</b></li><li>● <b>Students will explain how to design a simulation to replicate the results of a real-world scenario.</b></li></ul>
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## 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:

- **Activities:** Who Wrote the Federalist Papers – Pg 250
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 4.1 (1,2,5-10,13,15-21,24-27,33,35,39)

##### Section 4.2 Experiments:

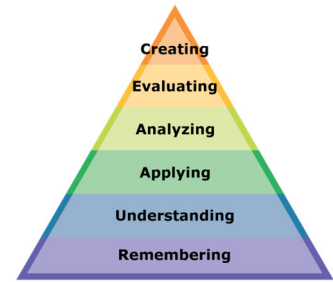
- **Activities:** Use at the end of the section. Group students. Have each group design a different sound experiment (on large white sheet – in words or flowchart format). Have each group report out to the class explaining their experiments. Have a whole class discussion to discuss the validity of each experiment.
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** 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:

- **Activities:** Analyzing the Caffeine Experiment - Pg 301
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** 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.  
IDENTIFY BLOOM'S LEVELS.



### Formative Assessments:

Quizzes, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Tests, Final Assessments

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Performance Assessments:

Projects, presentations, final writing projects

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<b>Course/Unit Title:</b> <b>AP Statistics</b>	<b>Unit Summary:</b> 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.
<b>Grade Level(s): 11 - 12</b>	
<b>Essential Question(s):</b>  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?	<b>Enduring Understanding(s):</b>  <b>Students will be able to:</b> <ul style="list-style-type: none"> <li>- Interpret probability as a long-run relative frequency.</li> <li>- Use simulation to model a random process.</li> <li>- Give a probability model for a random process with equally likely outcomes and use it to find the probability of an event.</li> <li>- Use basic probability rules, including the complement rule and the addition rule for mutually exclusive events.</li> <li>- Use a two-way table or Venn diagram to model a random process and calculate probabilities involving two events.</li> <li>- Apply the general addition rule to calculate probabilities.</li> <li>- Calculate an interpret conditional probabilities.</li> <li>- Determine if two events are independent.</li> <li>- Use the general multiplication rule to calculate probabilities.</li> <li>- Use a tree diagram to model a random process involving a sequence of outcomes and to calculate probabilities.</li> <li>- When appropriate, use the multiplication rule for independent events to calculate probabilities.</li> </ul>

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b>Learning Target</b></p> <ol style="list-style-type: none"> <li>1. Randomness, Probability and Simulation.</li> <li>2. Probability Rules</li> <li>3. Conditional Probability and Independence</li> </ol>	<p><b>NJSLS:</b></p> <ol style="list-style-type: none"> <li>1. M.S-CP.A</li> <li>2. M.S-CP.A-B</li> <li>3. M.S-CP.A-B</li> </ol>
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### Cross-Curricular Standards:

<p><b>Realworld problem-solving examples</b></p> <ol style="list-style-type: none"> <li>1. Facebook versus Instagram – using general addition rules Pg. 349</li> <li>2. Teens and social media – the general multiplication rule</li> </ol>	<p><b>Learning Target</b></p> <ol style="list-style-type: none"> <li>1. Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society’s economy, politics and culture.</li> <li>2. Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society’s economy, politics and culture.</li> </ol>	<p><b>NJSLS:</b></p> <ol style="list-style-type: none"> <li>1. CS&amp;DT.8.2.12.ITH.3</li> <li>2. CS&amp;DT.8.2.12.ITH.3</li> </ol>
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**The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:**

<p><b>21<sup>st</sup> Century skills:</b></p> <ul style="list-style-type: none"> <li>● Critical thinking</li> <li>● Creativity</li> <li>● Collaboration</li> <li>● Communication</li> <li>● Information literacy</li> <li>● Technology literacy</li> <li>● Media literacy</li> <li>● Flexibility</li> <li>● Leadership</li> <li>● Initiative</li> <li>● Productivity</li> <li>● Social skills</li> </ul>	<p><b>Mathematical Practices:</b></p> <ul style="list-style-type: none"> <li>● Make sense of problems and persevere in solving them</li> <li>● Reason abstractly and quantitatively</li> <li>● Construct viable arguments and critique the reasoning of others</li> <li>● Model with mathematics</li> <li>● Use appropriate tools strategically</li> <li>● Attend to precision</li> <li>● Look for and make use of structure</li> <li>● Look for and express regularity in repeated reasoning</li> </ul>
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**Students will engage with the following:**

**Text:**

- The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor

**Online resources incorporated through the year, including but not limited to:**

- AP Central
- Sapling
- Albert IO

**Calculators:**

TI-84 Plus graphing calculator

**Students will write:**

- An explanation as to why two events are independent.
- A description of the probability found using conditional probability or  $P(A|B)$  versus  $P(B|A)$ .
- A lessons-learned summary after finding the probabilities using a tree-diagram in a multi-stage problem.

## PART III: TRANSFER OF KNOWLEDGE AND SKILLS

### DESCRIBE THE LEARNING EXPERIENCE.

#### How will students uncover content and build skills?

##### Section 5.1 – Randomness, Probability and Simulation

- **Activities:** The “1 in 6 wins” game on p.326, Investigating randomness on p.330
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 5.1 on pages 336 – 341

##### Section 5.2 – Probability Rules

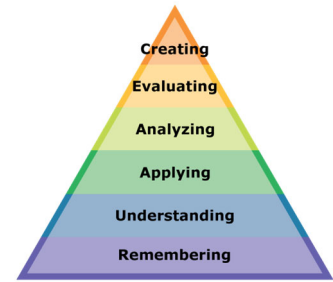
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 5.2 on pages 354 – 358

##### Section 5.3 – Conditional Probability and Independence

- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** 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.  
IDENTIFY BLOOM'S LEVELS.



### Formative Assessments:

Quizzes, tests, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Benchmarks & final assessments

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Performance Assessments:

Projects, presentations, final writing projects

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
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# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/ Random Variables and Probability Distributions</p> <p><b>Grade Level(s): 11 - 12</b></p>	<p><b>Unit Summary:</b> 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.</p>
<p><b>Essential Question(s):</b> How do you recognize a discrete versus continuous variable?</p> <p>How do you construct a probability distribution table and histogram for a discrete variable?</p> <p>How do you find probabilities of continuous variables for events as areas under density curves including the standard normal distribution?</p> <p>How do you find the mean and variance of a discrete variable?</p> <p>How do you approximate the mean of a distribution using simulation?</p> <p>How do you solve probability problems using the means and variances rules?</p> <p>What is a binomial and geometric setting? What are the properties of these distributions?</p> <p>How do you calculate a binomial and geometric probabilities?</p>	<p><b>Enduring Understanding(s):</b> Students will be able to:</p> <ul style="list-style-type: none"> <li>● Recognize and define a discrete random variable, and construct a probability distribution table and a probability histogram for the random variable.</li> <li>● Recognize and define a continuous random variable, and determine probabilities of events as areas under density curves.</li> <li>● 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.</li> <li>● Calculate the mean and variance of a discrete random variable.</li> <li>● Find the expected payout in a raffle or similar game of chance.</li> <li>● Use simulation methods and the law of large numbers to approximate the mean of a distribution.</li> <li>● Use rules for means and rules for variances to solve problems involving sums, differences, and linear combinations of random variables.</li> <li>● Recognize a binomial and geometric setting</li> <li>● Define a binomial and geometric distribution</li> <li>● Find binomial probabilities using technology and the binomial formula</li> <li>● Find geometric probabilities using technology</li> <li>● Calculate mean and standard deviation of a binomial and geometric random variable</li> <li>● Calculate a normal approximation to a binomial distribution</li> </ul>

**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?**

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.</li> <li>2. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.</li> <li>3. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.</li> <li>4. Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. MA.S-MD.A.2</li> <li>2. MA.S-MD.A.3</li> <li>3. MA.S-MD.A.4</li> <li>4. MA.S-MD.B.5</li> </ol>
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### Cross-Curricular Standards:

<p><b><u>Real world problem-solving examples</u></b></p> <ol style="list-style-type: none"> <li>1. Find probabilities of Apgar scores for babies p. 391</li> <li>2. Analyze unit transformations for the temperature of water p. 415</li> <li>3. Calculating the probability of a particular blood type p. 437</li> </ol>	<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships and anomalous data.</li> <li>2. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</li> <li>3. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. SCI. HS-LS2-7</li> <li>3. SCI. HS-LS2-8</li> </ol>
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**The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:**

<b>21<sup>st</sup> Century skills:</b> <ul style="list-style-type: none"><li>● Critical thinking</li><li>● Creativity</li><li>● Collaboration</li><li>● Communication</li><li>● Information literacy</li><li>● Technology literacy</li><li>● Media literacy</li><li>● Flexibility</li><li>● Leadership</li><li>● Initiative</li><li>● Productivity</li><li>● Social skills</li></ul>	<b>Mathematical Practices:</b> <ul style="list-style-type: none"><li>● Make sense of problems and persevere in solving them</li><li>● Reason abstractly and quantitatively</li><li>● Construct viable arguments and critique the reasoning of others</li><li>● Model with mathematics</li><li>● Use appropriate tools strategically</li><li>● Attend to precision</li><li>● Look for and make use of structure</li><li>● Look for and express regularity in repeated reasoning</li></ul>
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**Students will engage with the following:**

<b>Text:</b> <ul style="list-style-type: none"><li>● <b>The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor</b></li></ul> <b>Online resources incorporated through the year, including but not limited to:</b> <ul style="list-style-type: none"><li>● AP Central</li><li>● Sapling</li><li>● Albert IO</li></ul> <b>Calculators:</b> TI-84 Plus graphing calculator
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**Students will write:**

<ul style="list-style-type: none"><li>● <b>Students will explain why a variable is Binomially distributed.</b></li><li>● <b>Students will describe the shape of a probability distribution.</b></li><li>● <b>Students will interpret the standard deviation of the difference between independent random variables.</b></li></ul>
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## **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

### **DESCRIBE THE LEARNING EXPERIENCE.**

#### **How will students uncover content and build skills?**

##### **Section 6.1 Discrete and Continuous Random Variables:**

- **Activities: Bottled Water Versus Tap Water – Pg 388**
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments: Exercises 6.1 (2,3,9,12,17,25,26,29,32,34)**

##### **Section 6.2 Transforming and Combining Random Variables:**

- **Activities: Have a Roulette Game Day in the classroom prior to 6.2 (see Roulette simulators online) (without betting). Have the students calculate select probabilities on a sheet as they play. Use this activity within this section to discuss the combined expected value of winning a game multiple times.**
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments: Exercises 6.2 (39, 40,41,47,49,51,54,60, 73, 74)**

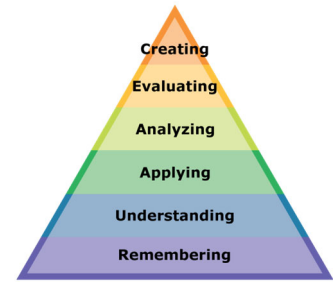
##### **Section 6.3 Binomial and Geometric Random Variables:**

- **Activities: Pop Quiz! Pg 431**
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments: 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.  
IDENTIFY BLOOM'S LEVELS.



### Formative Assessments:

Quizzes, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Tests, Final Assessments

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
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Projects, presentations, final writing projects

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# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/Sampling Distributions</p>	<p><b>Unit Summary:</b> The purpose of this chapter is to prepare for the study of statistical inference by looking at the probability distributions of some very common statistics:</p>
<p><b>Grade Level(s):</b> 11 - 12</p>	<p>sample proportions and sample means.</p>
<p><b>Essential Question(s):</b></p> <p><b>What is a sampling distribution?</b></p> <p><b>What is the difference between a statistic and a parameter?</b></p> <p><b>How do you describe a sampling distribution?</b></p> <p><b>What is the sampling distribution for a sample proportion?</b></p> <p><b>What is the sampling distribution of a difference between two proportions?</b></p> <p><b>What is the sampling distribution for a sample mean?</b></p> <p><b>What is the Central Limit Theorem?</b></p> <p><b>What is the sampling distribution of a difference between two means?</b></p>	<p><b>Enduring Understanding(s):</b></p> <p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>- Distinguish between a parameter and a statistic.</li> <li>- Create a sampling distribution using all possible samples from a small population.</li> <li>- Use the sampling distribution of a statistic to evaluate a claim about a parameter.</li> <li>- Distinguish among the distribution of a population, the distribution of a sample and the sampling distribution of a statistic.</li> <li>- Determine if a statistic is an unbiased estimator of a population parameter.</li> <li>- Describe the relationship between sample size and the variability of a statistic.</li> <li>- Calculate the mean and standard deviation of the sampling distribution of a sample proportion and interpret the standard deviation.</li> <li>- Determine if the sampling distribution of <math>\hat{p}</math> is approximately Normal.</li> <li>- Calculate the mean and standard deviation of the sampling distribution of a difference in two sample proportions, and interpret the standard deviation.</li> <li>- Determine if the sampling distribution of the difference of two proportions is approximately Normal.</li> <li>- If appropriate, use a Normal distribution to calculate probabilities involving <math>\hat{p}</math> or the difference between two <math>\hat{p}</math>'s.</li> <li>- Calculate the mean and standard deviation of the sampling distribution of a sample mean and interpret the standard deviation.</li> <li>- Explain how the shape of the sampling distribution of <math>\bar{x}</math> is affected by the shape of the population distribution and the sample size.</li> <li>- Calculate the mean and standard deviation of the sampling distribution of a difference in sample means and interpret the standard deviation.</li> </ul>

- |  |  |
|--|--|
|  | <ul style="list-style-type: none"><li>- Determine if the sampling distribution of two sample means is approximately Normal.</li><li>- If appropriate, use a Normal distribution to calculate probabilities involve <math>\bar{x}</math> or the difference of two sample means.</li></ul> |
|--|--|

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b>Learning Target</b></p> <ol style="list-style-type: none"> <li>1. What is a sampling distribution?</li> <li>2. Sample proportions</li> <li>3. Sample means</li> </ol>	<p><b>NJSLS:</b></p> <ol style="list-style-type: none"> <li>1. MA.S-MD.A</li> <li>2. MA.S-MD.A</li> <li>3. MA.S-MD.A</li> </ol>
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### Cross-Curricular Standards:

<p><b>Realworld problem-solving examples</b></p> <ol style="list-style-type: none"> <li>1. Reaching for chips – using a sampling distribution to evaluate a claim. Pg. 473</li> <li>2. Going to college – normal calculations involving sample proportions</li> </ol>	<p><b>Learning Target</b></p> <ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data and evaluate evidence to determine measures of central tendencies, casual/correlational relationships and anomalous data.</li> <li>2. Design investigations, collect evidence, analyze data and evaluate evidence to determine measures of central tendencies, casual/correlational relationships and anomalous data.</li> </ol>	<p><b>NJSLS:</b></p> <ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. SCI.9-12.5.1.12.B.1</li> </ol>
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The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

<p><b>21<sup>st</sup> Century skills:</b></p> <ul style="list-style-type: none"> <li>● Critical thinking</li> <li>● Creativity</li> <li>● Collaboration</li> <li>● Communication</li> <li>● Information literacy</li> <li>● Technology literacy</li> <li>● Media literacy</li> <li>● Flexibility</li> <li>● Leadership</li> <li>● Initiative</li> <li>● Productivity</li> <li>● Social skills</li> </ul>	<p><b>Mathematical Practices:</b></p> <ul style="list-style-type: none"> <li>● Make sense of problems and persevere in solving them</li> <li>● Reason abstractly and quantitatively</li> <li>● Construct viable arguments and critique the reasoning of others</li> <li>● Model with mathematics</li> <li>● Use appropriate tools strategically</li> <li>● Attend to precision</li> <li>● Look for and make use of structure</li> <li>● Look for and express regularity in repeated reasoning</li> </ul>
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**Students will engage with the following:**

**Text:**

- The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor

**Online resources incorporated through the year, including but not limited to:**

- AP Central
- Sapling
- Albert IO

**Calculators:**

TI-84 Plus graphing calculator

**Students will write:**

- Students will write the appropriate notation for a sampling distribution of means and proportions.
- Student will explain how answers for a problem related to a sampling distribution of means would be affected if they were told that the distribution was non-normal.

## PART III: TRANSFER OF KNOWLEDGE AND SKILLS

### DESCRIBE THE LEARNING EXPERIENCE.

#### How will students uncover content and build skills?

##### Section 7.1 – What is a sampling distribution?

- **Activities:** A penny for your thoughts? on p.468, The craft stick problem on p.475
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 7.1 on pages 482 – 486

##### Section 7.2 – Sample Proportions

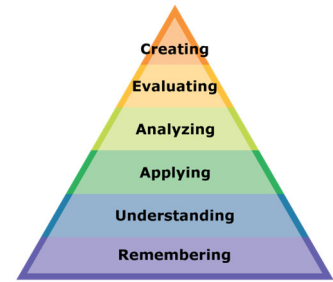
- **Activities:** The candy machine on p.487
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 7.2 on pages 498 – 501

##### Section 7.3 – Sample Means

- **Activities:** Exploring the sampling distribution of  $\bar{x}$  for a Normal population on p.505, Exploring the sampling distribution of  $\bar{x}$  for non-Normal populations on p.509
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 7.3 on pages 518 - 522

## PART IV: EVIDENCE OF LEARNING

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



### Formative Assessments:

Quizzes, tests, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Benchmarks & final assessments

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Performance Assessments:

Projects, presentations, final writing projects

### Accommodations/Modifications:

As stated in IEP or 504

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# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<b>Course/Unit Title:</b> <b>AP Statistics/Estimating Proportions with Confidence</b>	<b>Unit Summary:</b> 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.
<b>Grade Level(s): 11 - 12</b>	
<b>Essential Question(s):</b> <b>How do you construct and interpret a one-sample confidence interval for a proportion?</b>  <b>How do you evaluate changes on sample size and confidence level on the width of a confidence interval?</b>  <b>How do you find the sample size for a desired margin of error?</b>  <b>How do you construct a confidence interval to compare two proportions?</b>	<b>Enduring Understanding(s):</b>  Students will be able to: <ul style="list-style-type: none"> <li>● Understand the meaning of a good point estimator.</li> <li>● Understand the meaning and interpretation of a confidence interval.</li> <li>● Understand the meaning and interpretation of the margin of error and standard error.</li> <li>● Understand what effects the margin of error. Be able to state the effect of changes to the sample size, standard deviation, and confidence level.</li> <li>● Understand the concept of critical value.</li> <li>● Understand conditions for inference about a proportion.</li> <li>● Construct (by hand and by calculator) and interpret a one-sample confidence interval for a population proportion.</li> <li>● Understand how to work backward to find a point estimate or margin of error from a given confidence interval.</li> <li>● Find the sample size for a desired margin of error.</li> <li>● Construct (by hand and by calculator) and interpret a confidence interval for comparing two proportions.</li> </ul>



**PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES**

**DESCRIBE THE LEARNING TARGETS.**

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.</li> <li>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.</li> <li>3. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. MA.S-IC.A.1</li> <li>2. MA.S-IC.B.4</li> <li>3. MA.S-IC.B.5</li> </ol>
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**Cross-Curricular Standards:**

<p><b><u>Real world problem-solving examples</u></b></p> <ol style="list-style-type: none"> <li>1. Construct a confidence interval for body pain p. 571</li> <li>2. Evaluate the conditions for confidence interval to be created for the survival of cockroaches p. 574</li> <li>3. Calculate and interpret a confidence interval for the proportion of distracted walking by humans p. 559</li> </ol>	<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.</li> <li>2. 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.</li> <li>3. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. SCI.HS-LS2-6</li> <li>3. SCI.HS-LS2-8</li> </ol>
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**The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:**

<b>21<sup>st</sup> Century skills:</b> <ul style="list-style-type: none"><li>● Critical thinking</li><li>● Creativity</li><li>● Collaboration</li><li>● Communication</li><li>● Information literacy</li><li>● Technology literacy</li><li>● Media literacy</li><li>● Flexibility</li><li>● Leadership</li><li>● Initiative</li><li>● Productivity</li><li>● Social skills</li></ul>	<b>Mathematical Practices:</b> <ul style="list-style-type: none"><li>● Make sense of problems and persevere in solving them</li><li>● Reason abstractly and quantitatively</li><li>● Construct viable arguments and critique the reasoning of others</li><li>● Model with mathematics</li><li>● Use appropriate tools strategically</li><li>● Attend to precision</li><li>● Look for and make use of structure</li><li>● Look for and express regularity in repeated reasoning</li></ul>
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**Students will engage with the following:**

<b>Text:</b> <ul style="list-style-type: none"><li>● <b>The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor</b></li></ul> <b>Online resources incorporated through the year, including but not limited to:</b> <ul style="list-style-type: none"><li>● AP Central</li><li>● Sapling</li><li>● Albert IO</li></ul> <b>Calculators:</b> <b>TI-84 Plus graphing calculator</b>
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**Students will write:**

<ul style="list-style-type: none"><li>● <b>Students will explain why the appropriate conditions exists to construct a confidence interval for proportions</b></li><li>● <b>Students will interpret the meaning of a confidence interval for proportions</b></li><li>● <b>Students will explain whether there is convincing evidence to make a decision given a confidence interval for proportions.</b></li></ul>
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## **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

### **DESCRIBE THE LEARNING EXPERIENCE.**

#### **How will students uncover content and build skills?**

##### **Section 8.1 Confidence Intervals: The Basics:**

- **Activities:** The Beads Pg 536
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 8.1 (1-4,5,7,9,10,17,19,21)

##### **Section 8.2 Estimating a Population Proportion:**

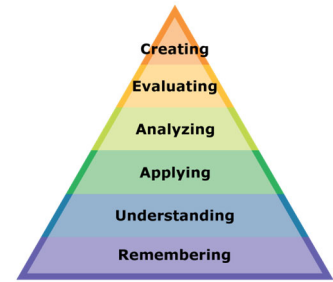
- **Activities:** The Confidence Intervals for Proportions applet Pg 542, Show students other applications online that will simulate point estimators and find confidence intervals. As a group, discuss the randomized process being used.
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 8.2 (29-32,35,36,40,42,44,46,49,50,55)

##### **Section 8.3 Estimating a Difference in Proportions:**

- **Activities:** After teaching this section, collect class data on the proportion of students that plan on attending their upcoming prom – specify grade level when answering. Have the students pair up to find the point estimator and confidence intervals for the difference in the proportion of students who do plan on attending their upcoming prom – Juniors vs Seniors. Discuss as a group the meaning of this interval.
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** 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.  
IDENTIFY BLOOM'S LEVELS.



### Formative Assessments:

Quizzes, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Tests, Final Assessments

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Performance Assessments:

Projects, presentations, final writing projects

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
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# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/Inference for Categorical Data: Proportions</p>	<p><b>Unit Summary:</b> In Chapter 9, students begin with examining a z-distribution for proportions and its similarities and differences to the sampling distributions covered in Chapter 7. As we progress through the chapter, students will learn about hypothesis testing with proportions for one-sample and two-sample data.</p>
<p><b>Grade Level(s):</b> 11 - 12</p>	
<p><b>Essential Question(s):</b></p> <p>How do you state hypotheses?</p> <p>How do you interpret a P-value?</p> <p>How do you make a conclusion for a hypothesis test?</p> <p>How do you describe Type I and Type II errors?</p> <p>How do you perform a hypothesis test about <math>p</math>?</p> <p>What is the one-sample z test for <math>p</math>?</p> <p>What are two-sided tests?</p> <p>What is the power of a test?</p> <p>How do you perform a significance test for the difference between two proportions?</p>	<p><b>Enduring Understanding(s):</b></p> <p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>- State appropriate hypotheses for a significance test about a population parameter.</li> <li>- Interpret a P-value in context.</li> <li>- Make an appropriate conclusion for a significance test.</li> <li>- Interpret a Type I error and Type II error in context. Give a consequence of each error in a given setting.</li> <li>- State and check the Random, 10%, and Large Counts conditions for performing a significance test about a population proportion.</li> <li>- Calculate the standardized test statistic and P-value for a test about a population proportion.</li> <li>- Perform a significance test about a population proportion.</li> <li>- Interpret the power of a significance test and describe what factors affect the power of a test.</li> <li>- State appropriate hypotheses for a significance test about a difference between two proportions.</li> <li>- Determine whether the conditions are met for performing a test about a difference between two proportions.</li> <li>- Calculate the standardized test statistic and P-value for a test about a difference between two proportions.</li> <li>- Perform a significance test about a difference between two proportions.</li> </ul>

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><u>Learning Target</u></p> <ol style="list-style-type: none"> <li>1. Significance Tests: The Basics</li> <li>2. Tests about a Population Proportion</li> <li>3. Tests about a Difference in Proportions</li> </ol>	<p><u>NJSLS:</u></p> <ol style="list-style-type: none"> <li>1. M.S-MD.B</li> <li>2. M.S-MD.B</li> <li>3. M.S-MD.B</li> </ol>
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### Cross-Curricular Standards:

<p><u>Realworld problem-solving examples</u></p> <ol style="list-style-type: none"> <li>1. Perfect potatoes – Type I and Type II errors. Pg. 593</li> <li>2. One potato, two potato – Significance test for a proportion. Pg. 606</li> <li>3. Cholesterol and heart attacks – Performing a significance test about two proportions. Pg. 632</li> </ol>	<p><u>Learning Target</u></p> <ol style="list-style-type: none"> <li>1. Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including design constraints.</li> <li>2. Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including design constraints.</li> <li>3. Design investigations, collect evidence, analyze data and evaluate evidence to determine measures of central tendencies, casual/correlational relationships and anomalous data.</li> </ol>	<p><u>NJSLS:</u></p> <ol style="list-style-type: none"> <li>1. CS&amp;DT.8.2.12.ITH.1</li> <li>2. CS&amp;DT.8.2.12.ITH.1</li> <li>3. SCI.9-12.5.1.12.B.1</li> </ol>
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The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

<p><b>21<sup>st</sup> Century skills:</b></p> <ul style="list-style-type: none"> <li>● Critical thinking</li> <li>● Creativity</li> <li>● Collaboration</li> <li>● Communication</li> <li>● Information literacy</li> <li>● Technology literacy</li> <li>● Media literacy</li> <li>● Flexibility</li> <li>● Leadership</li> <li>● Initiative</li> <li>● Productivity</li> <li>● Social skills</li> </ul>	<p><b>Mathematical Practices:</b></p> <ul style="list-style-type: none"> <li>● Make sense of problems and persevere in solving them</li> <li>● Reason abstractly and quantitatively</li> <li>● Construct viable arguments and critique the reasoning of others</li> <li>● Model with mathematics</li> <li>● Use appropriate tools strategically</li> <li>● Attend to precision</li> <li>● Look for and make use of structure</li> <li>● Look for and express regularity in repeated reasoning</li> </ul>
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**Students will engage with the following:**

**Text:**

- **The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor**

**Online resources incorporated through the year, including but not limited to:**

- **AP Central**
- **Sapling**
- **Albert IO**

**Calculators:**

**TI-84 Plus graphing calculator**

**Students will write:**

- **Students will interpret Type I and Type II errors in context of the problem.**
- **Students will be able to interpret the decision of hypothesis tests in context of the problem.**

## PART III: TRANSFER OF KNOWLEDGE AND SKILLS

### DESCRIBE THE LEARNING EXPERIENCE.

#### How will students uncover content and build skills?

##### Section 9.1 – Significance Tests: The Basics

- **Activities:** I'm a great free-throw shooter! on pg. 584
- **Instructional strategies:** Use provided online instructional presentations, review "Learning Targets" specified in each section at beginning of lesson, use intermittent "Check your Understanding" through each section, and use exit tickets to test "Learning Targets." Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 9.1 on pages 595 – 599

##### Section 9.2 – Tests about a Population Proportion

- **Activities:** A great free-throw shooter? on p. 614
- **Instructional strategies:** Use provided online instructional presentations, review "Learning Targets" specified in each section at beginning of lesson, use intermittent "Check your Understanding" through each section, and use exit tickets to test "Learning Targets." Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 9.2 on pages 619 – 624

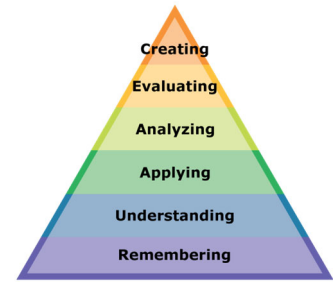
##### Section 9.3 – Tests about a Difference in Proportions

- **Activities:** Who likes tattoos? on p. 625
- **Instructional strategies:** Use provided online instructional presentations, review "Learning Targets" specified in each section at beginning of lesson, use intermittent "Check your Understanding" through each section, and use exit tickets to test "Learning Targets." Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 9.3 on pages 636 - 640



## PART IV: EVIDENCE OF LEARNING

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



### Formative Assessments:

Quizzes, tests, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

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- [504 Students](#)
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- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Benchmarks & final assessments

### Accommodations/Modifications:

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### Performance Assessments:

Projects, presentations, final writing projects

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# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/Estimating Means with Confidence</p>	<p><b>Unit Summary:</b> In this chapter, students will confirm conditions are present for the construction of a confidence intervals for the mean, the difference of two means, and the mean difference for paired data. They will be able to construct and interpret a confidence interval for each of these cases by hand and by calculator. They will be able to calculate a desired sample size given set desired parameters.</p>
<p><b>Grade Level(s): 11 - 12</b></p>	
<p><b>Essential Question(s):</b></p> <p><b>How do you construct a one-sample t interval for a population mean?</b></p> <p><b>How do you calculate a sample size to satisfy a desired confidence level and margin of error?</b></p> <p><b>How do you construct a two-sample t interval?</b></p> <p><b>How do you construct a confidence interval for paired data?</b></p>	<p><b>Enduring Understanding(s):</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>● Evaluate whether the conditions exist to be able to contrast a confidence interval for means.</li> <li>● Determine the t critical value for calculating a confidence interval for a mean with a table.</li> <li>● Estimate with confidence the population mean when the population standard deviation is unknown by hand and by calculator. Interpret this interval.</li> <li>● Choose a correct sample size given a desired confidence level and margin of error.</li> <li>● 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.</li> <li>● Determine whether conditions are met for constructing a confidence interval between two means.</li> <li>● Construct and interpret a confidence interval for a difference between two means.</li> <li>● Analyze the distribution of differences in paired data using graphs and summary data.</li> <li>● Construct and interpret a confidence interval for a mean difference.</li> </ul>

**PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES**

**DESCRIBE THE LEARNING TARGETS.**

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.</li> <li>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.</li> <li>3. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. MA.S-IC.A.1</li> <li>2. MA.S-IC.B.4</li> <li>3. MA.S-IC.B.5</li> </ol>
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**Cross-Curricular Standards:**

<p><b><u>Real world problem-solving examples</u></b></p> <ol style="list-style-type: none"> <li>1. Construct a confidence interval for the difference between math scores when humans listen to music or not p. 677</li> <li>2. Construct confidence intervals for screen tension on video terminals p. 660</li> <li>3. Construct confidence intervals for the difference in the sizes of varying pine trees p. 672</li> </ol>	<p><b><u>Learning Target</u></b></p> <ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data and evaluate evidence to determine measures of central tendencies, causal/correlational relationships and anomalous data.</li> <li>2. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.</li> <li>3. 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.</li> </ol>	<p><b><u>NJSLS:</u></b></p> <ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. SCI.HS-PS4-5</li> <li>3. SCI. HS-LS2-6</li> </ol>
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**The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:**

<b>21<sup>st</sup> Century skills:</b> <ul style="list-style-type: none"><li>● Critical thinking</li><li>● Creativity</li><li>● Collaboration</li><li>● Communication</li><li>● Information literacy</li><li>● Technology literacy</li><li>● Media literacy</li><li>● Flexibility</li><li>● Leadership</li><li>● Initiative</li><li>● Productivity</li><li>● Social skills</li></ul>	<b>Mathematical Practices:</b> <ul style="list-style-type: none"><li>● Make sense of problems and persevere in solving them</li><li>● Reason abstractly and quantitatively</li><li>● Construct viable arguments and critique the reasoning of others</li><li>● Model with mathematics</li><li>● Use appropriate tools strategically</li><li>● Attend to precision</li><li>● Look for and make use of structure</li><li>● Look for and express regularity in repeated reasoning</li></ul>
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**Students will engage with the following:**

<b>Text:</b> <ul style="list-style-type: none"><li>● The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor</li></ul> <b>Online resources incorporated through the year, including but not limited to:</b> <ul style="list-style-type: none"><li>● AP Central</li><li>● Sapling</li><li>● Albert IO</li></ul> <b>Calculators:</b> TI-84 Plus graphing calculator
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**Students will write:**

<ul style="list-style-type: none"><li>● Students will interpret a confidence interval in context of the problem.</li><li>● Students will explain why conditions are met to construct confidence intervals.</li><li>● Students will describe what a graph reveals about the distribution of the differences for paired data.</li></ul>
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## **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

### **DESCRIBE THE LEARNING EXPERIENCE.**

**How will students uncover content and build skills?**

#### **Section 10.1 Estimating a Population Mean:**

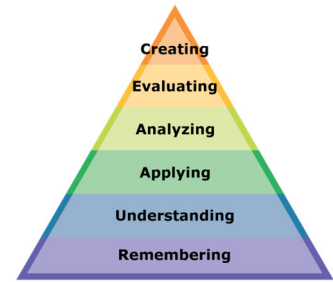
- **Activities:** Confidence Interval BINGO! P. 649
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 10.1 (1-24 odds)

#### **Section 10.2 Estimating a Difference in Means:**

- **Activities:**
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** 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.  
IDENTIFY BLOOM'S LEVELS.



### Formative Assessments:

Quizzes, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Tests, Final Assessments

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Performance Assessments:

Projects, presentations, final writing projects

### Accommodations/Modifications:

As stated in IEP or 504

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# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/Testing Claims about Means</p>	<p><b>Unit Summary:</b></p> <p>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</p>
<p><b>Grade Level(s):</b> 11 - 12</p>	
<p><b>Essential Question(s):</b></p> <p>How do you carry out a significance test for a population mean?</p> <p>What is the one-sample t Test for a population mean?</p> <p>How do two-sided tests relate to confidence intervals?</p> <p>How do you test about a difference in means?</p> <p>What are significance tests for a mean difference?</p> <p>How do you tell the difference between paired data and two sample tests?</p>	<p><b>Enduring Understanding(s):</b></p> <p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>- State and check the Random, 10% and Normal/Large Sample conditions for performing a significance test about a population mean.</li> <li>- Calculate the standardized test statistic and P-value for a test about a population mean.</li> <li>- Perform a significance test about a population mean.</li> <li>- Use a confidence interval to make a conclusion for a two-sided test about a population mean.</li> <li>- State appropriate hypotheses for a significance test about a difference between two means.</li> <li>- Determine whether the conditions are met for performing a test about a difference between two means.</li> <li>- Calculate the standardized test statistic and P-value for a test about a difference between two means.</li> <li>- Perform a significance test about a difference between two means.</li> <li>- Determine when it is appropriate to use paired t procedures versus two-sample t procedures.</li> </ul>

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

<p><u>Learning Target</u></p> <ol style="list-style-type: none"> <li>1. Tests about a Population Mean</li> <li>2. Tests about a Difference in Means</li> </ol>	<p><u>NJSLS:</u></p> <ol style="list-style-type: none"> <li>1. M.S-MD.B</li> <li>2. M.S-MD.B</li> </ol>
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### Cross-Curricular Standards:

<p><u>Realworld problem-solving examples</u></p> <ol style="list-style-type: none"> <li>1. Healthy streams – performing a significance test about a population mean. Pg. 706</li> <li>2. Calcium and blood pressure – significance test for a difference between two means. Pg. 723</li> </ol>	<p><u>Learning Target</u></p> <ol style="list-style-type: none"> <li>1. Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including design constraints.</li> <li>2. Design investigations, collect evidence, analyze data and evaluate evidence to determine measures of central tendencies, casual/correlational relationships and anomalous data</li> </ol>	<p><u>NJSLS:</u></p> <ol style="list-style-type: none"> <li>1. CS&amp;DT.8.2.12.ITH.1</li> <li>2. SCI.9-12.5.1.12.B.1</li> </ol>
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The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

<p><b>21<sup>st</sup> Century skills:</b></p> <ul style="list-style-type: none"> <li>● Critical thinking</li> <li>● Creativity</li> <li>● Collaboration</li> <li>● Communication</li> <li>● Information literacy</li> <li>● Technology literacy</li> <li>● Media literacy</li> <li>● Flexibility</li> <li>● Leadership</li> <li>● Initiative</li> <li>● Productivity</li> <li>● Social skills</li> </ul>	<p><b>Mathematical Practices:</b></p> <ul style="list-style-type: none"> <li>● Make sense of problems and persevere in solving them</li> <li>● Reason abstractly and quantitatively</li> <li>● Construct viable arguments and critique the reasoning of others</li> <li>● Model with mathematics</li> <li>● Use appropriate tools strategically</li> <li>● Attend to precision</li> <li>● Look for and make use of structure</li> <li>● Look for and express regularity in repeated reasoning</li> </ul>
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**Students will engage with the following:**

**Text:**

- The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor

**Online resources incorporated through the year, including but not limited to:**

- AP Central
- Sapling
- Albert IO

**Calculators:**

TI-84 Plus graphing calculator

**Students will write:**

- Students will be able to interpret the decision of hypothesis tests in context of the problem.
- Students will be able to explain the difference between paired data and two-sample data.

## 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

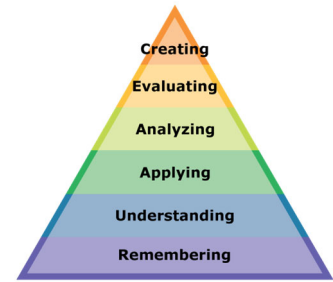
- **Activities:** Does polyester decay? on p. 696
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 11.1 on pages 714 – 718

##### Section 11.2 – Tests about a Difference in Means

- **Activities:** Get your heart beating! on p. 732
- **Instructional strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check your Understanding” through each section, and use exit tickets to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** 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.  
IDENTIFY BLOOM'S LEVELS.



### Formative Assessments:

Quizzes, tests, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Benchmarks & final assessments

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Performance Assessments:

Projects, presentations, final writing projects

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
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# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

**Course Name: AP Statistics**

**Course Number: 034600**

## PART I: UNIT RATIONALE

### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Statistics/Inference for Distributions and Relationships</p>	<p><b>Unit Summary:</b> In 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.</p>
<p><b>Grade Level(s): 11 - 12</b></p>	
<p><b>Essential Question(s):</b> What are the properties of a chi-square distribution?  How do you test the distribution of a population?  What is a two-way table?  How do you test for homogeneity of populations?  How do you test for independent variables?  What is a regression model?  How do you read computer output for regression inference?  What are the conditions for regression inference?  What is the standard error for the LSRL?  What are the degrees of freedom for paired data?  How do you construct a confidence interval for slope?  How do you perform a significance test for slope?</p>	<p><b>Enduring Understanding(s):</b>  Students will be able to:</p> <ul style="list-style-type: none"> <li>● Understand the properties of the chi-square distribution</li> <li>● Understand and analyze two-way tables</li> <li>● Compute the expected counts, degrees of freedom, and chi-square test statistic for a Goodness of Fit, Homogeneity, and Association (or Independence) tests.</li> <li>● State and check conditions for chi-square tests.</li> <li>● Perform and interpret chi-square hypothesis tests using a calculator and table.</li> <li>● Choose the appropriate chi-square test in a given setting.</li> <li>● 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.</li> <li>● Find the standard error about the LSRL</li> <li>● Understand degrees of freedom for paired data</li> <li>● Check the conditions for performing inference about the slope of a population of the true regression line.</li> <li>● Construct and interpret a confidence interval for the slope of the population regression line by hand and using a calculator.</li> <li>● Perform and interpret a significance test about the slope of the population regression line.</li> <li>● Interpret inference analysis with regards to causality.</li> </ul>

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

<u>Learning Target</u>	<u>NJSLS:</u>
<ol style="list-style-type: none"> <li>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.</li> <li>2. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.</li> <li>3. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.</li> <li>4. Compute (using technology) and interpret the correlation coefficient of a linear fit.</li> <li>5. Distinguish between correlation and causation.</li> <li>6. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.</li> </ol>	<ol style="list-style-type: none"> <li>1. MA.S-ID.B.5</li> <li>2. MA.S-ID.B.6</li> <li>3. MA.S-ID.B.7</li> <li>4. MA.S-ID.B.8</li> <li>5. MA.S-ID.B.9</li> <li>6. MA.S-IC.A.1</li> </ol>

### Cross-Curricular Standards:

<u>Real world problem-solving examples</u>	<u>Learning Target</u>	<u>NJSLS:</u>
<ol style="list-style-type: none"> <li>1. Evaluate the relationship between crying frequency and IQ p. 827</li> <li>2. Evaluate whether environmentally conscious people use snowmobiles in Yellowstone National Park p. 796</li> <li>3. Determine if there is an association between fear and gender p. 799</li> </ol>	<ol style="list-style-type: none"> <li>1. Design investigations, collect evidence, analyze data and evaluate evidence to determine measures of central tendencies, causal/correlational relationships and anomalous data.</li> <li>2. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</li> <li>3. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.</li> </ol>	<ol style="list-style-type: none"> <li>1. SCI.9-12.5.1.12.B.1</li> <li>2. SCI.HS-LS2-7</li> <li>3. SCI.HS-LS2-8</li> </ol>

**The following 21<sup>st</sup> century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:**

<b>21<sup>st</sup> Century skills:</b> <ul style="list-style-type: none"><li>● Critical thinking</li><li>● Creativity</li><li>● Collaboration</li><li>● Communication</li><li>● Information literacy</li><li>● Technology literacy</li><li>● Media literacy</li><li>● Flexibility</li><li>● Leadership</li><li>● Initiative</li><li>● Productivity</li><li>● Social skills</li></ul>	<b>Mathematical Practices:</b> <ul style="list-style-type: none"><li>● Make sense of problems and persevere in solving them</li><li>● Reason abstractly and quantitatively</li><li>● Construct viable arguments and critique the reasoning of others</li><li>● Model with mathematics</li><li>● Use appropriate tools strategically</li><li>● Attend to precision</li><li>● Look for and make use of structure</li><li>● Look for and express regularity in repeated reasoning</li></ul>
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**Students will engage with the following:**

<b>Text:</b> <ul style="list-style-type: none"><li>● The Practice of Statistics (6<sup>th</sup> edition) by Starnes and Tabor</li></ul> <b>Online resources incorporated through the year, including but not limited to:</b> <ul style="list-style-type: none"><li>● AP Central</li><li>● Sapling</li><li>● Albert IO</li></ul> <b>Calculators:</b> TI-84 Plus graphing calculator
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**Students will write:**

<ul style="list-style-type: none"><li>● Students will interpret the value of the correlation in context of the problem.</li><li>● Students will interpret the coefficient of determination in context of the problem.</li><li>● Students will interpret the y-intercept and the slope in context of the problem.</li><li>● Students will interpret a confidence interval for slope.</li><li>● Students will interpret the decision of a hypothesis test for slope.</li></ul>
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## PART III: TRANSFER OF KNOWLEDGE AND SKILLS

### DESCRIBE THE LEARNING EXPERIENCE.

#### How will students uncover content and build skills?

##### Section 12.1 Chi-Square Tests for Goodness of Fit:

- **Activities:** The Candy Man Can p. 760
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 12.1 (1-18 even)

##### Section 12.2 Inference for Two-Way Tables:

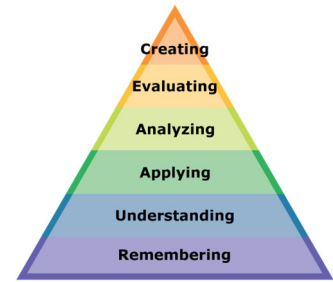
- **Activities:** Begin the section by doing two-way activities at [Census.gov](http://Census.gov).
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 12.2 (27-53 odd,56,57)

##### Section 12.3 Inference for Slope:

- **Activities:** Sampling from Old Faithful p. 812
- **Instructional Strategies:** Use provided online instructional presentations, review “Learning Targets” specified in each section at beginning of lesson, use intermittent “Check Your Understanding” through each section, and use exit ticket to test “Learning Targets.” Use Technology Corner instruction as needed. Use FRAPPY problems for AP open ended practice.
- **Assignments:** Exercises 12.3 (69-85 odd,87-92)

## PART IV: EVIDENCE OF LEARNING

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



### Formative Assessments:

Quizzes, homework, class discussion, individual conferences

### Accommodations/Modifications:

As stated in IEP or 504

- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

### Summative Assessments:

Tests, Final Assessments

### Accommodations/Modifications:

As stated in IEP or 504

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### Performance Assessments:

Projects, presentations, final writing projects

### Accommodations/Modifications:

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