

Kenilworth Public Schools

Curriculum Guide

Content Area: Statistics
Grade: 11-12
BOE Approved: 8/11/2014

Revision Date: March 2020
Submitted by: Anthony Rossetti
BOE Revision Approved: N/A

Statistics - 11th & 12th Grade - Scope and Sequence

Unit 1- Categorical and Quantitative Data	Unit 2- Distributions, the Normal Model and Standard Deviation	Unit 3- Exploring Relationships Between Variables	Unit 4- Gathering Data	Unit 5- Randomness & Probability	Unit 6- Additional Topics
Weeks 1-6	Weeks 7-13	Weeks 13-20	Weeks 21-28	Weeks 29-36	Weeks 37-40
<p><i>Unit Description:</i></p> <p>Introduction to statistical thinking and both categorical and quantitative data.</p>	<p><i>Unit Description:</i></p> <p>Work with distributions, focusing on the normal distributions.</p>	<p><i>Unit Description:</i></p> <p>Investigate association and correlation between variables and linear regressions.</p>	<p><i>Unit Description:</i></p> <p>Statistically sound ways to gather data.</p>	<p><i>Unit Description:</i></p> <p>Investigate theories of probability and apply to solve problems.</p>	<p><i>Unit Description:</i></p> <p>Reach conclusions that extend beyond the immediate data alone.</p>
<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • What is data? What data is not. • Statistics vocabulary • Enter data into Ti-84 calculator • The area principle • Frequency tables • Bar charts • Contingency tables • Conditional tables • Conditional distributions • Bar charts 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Compare groups of data using boxplots and histograms • Create boxplots on Ti-84 • Time-plots • Calculate and use standard deviation to compare and analyze sets of data • Z-scores • Z-scores in reverse • Empirical rule (68-95-99.7 rule) 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Scatterplots • Scatterplots on Ti-84 • Correlation • Conditions for using correlation • Manually calculate correlation • Correlation on Ti-84 • Correlation vs. causation • Linear regressions • Manually calculate linear regression • Residuals 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Intro to randomness and the importance of randomness on data collection • Generate numbers (table, Ti-84) • Generate random numbers with Ti-84 calculator • Random number tables • Sampling • Sample surveys • Types of bias 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Randomness • Trials • Sample spaces • Law of large numbers • Probability • Conditional probability • Probability rules • Dependent vs. independent • Venn diagrams • Replacement • Tree diagrams 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Teacher chosen topic. Ex: statistics in code breaking, criminal justice, business • Teacher chosen topic. Ex: media math (Nielsen Ratings) • Inference • Confidence intervals • Hypothesis testing • Critical values • Sample size • Field work and analysis

<ul style="list-style-type: none"> • Pie charts • (Use Font: Times, Size 11, Not Italicized) Copy from unit learning targets on the unit of study doc. 	<ul style="list-style-type: none"> • Percentiles • Normal PDF on Ti-84 (areas under the normal curve) 	<ul style="list-style-type: none"> • Least square “best fit” line • Writing the linear regression equation $\hat{y}=a+bx$ • Calculate r • Calculate r squared • Lurking variables 	<ul style="list-style-type: none"> • Randomization • Sample size • Populations and parameters • Simple random samples • Sampling methods (stratified, cluster, multistage, systematic) • Bad sampling designs and bias • Experiments and observational studies • Experimental design • Control treatments 	<ul style="list-style-type: none"> • Bayes’s rule • Probability models • Expected Value: center, spread • Bernoulli Trials 	
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Statistics- Categorical and Quantitative Data- Unit 1

Unit Title: Categorical and Quantitative Data	
Unit summary: Introduction to statistical thinking and both categorical and quantitative data	
Primary interdisciplinary connections: Social Studies, Science, Business	
21st Century Themes: Global Awareness, Financial, Economic, Business and Entrepreneurial Literacy, Civic and Health Literacy	
Learning Targets	
NJSLS Standards: 9-12.S.ID.A.1, 9-12.S.ID.A.2, 9-12.S.ID.A.3, 9-12.S.ID.B.5, 9-12.S.ID.6	
Technology Standards: 8.1.12.A.3, 8.1.12.C.1	
Content Statements:	
1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets
3	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.
4	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
Big Idea: Understand what data is and how it is represented.	
Unit Essential Questions:	Unit Enduring Understandings:
<ul style="list-style-type: none"> • How do we represent data? • What are the key elements that are important in summarizing data? 	<ul style="list-style-type: none"> • We use pie charts, bar graphs, histograms, stem-and-leaf, dot plots, etc...to represent data. • When representing data we need to obey the area principle.
Unit Learning Targets	
<i>Students will...</i>	
<ul style="list-style-type: none"> • Represent data with plots on the real number line (dot plots, histograms, and box plots). Use proper statistics vocabulary. • Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets Understand and use the area principle. • 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. Create and interpret bar charts. 	

Evidence of Learning

Summative Assessment:

- Quizzes
- Tests

Formative Assessments:

- Homework
- Classwork
- Other activities

Lesson Plans

<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • The three rules of data analysis <ul style="list-style-type: none"> ○ Make a picture ○ Make a picture ○ Make a picture 	5 minutes
<ul style="list-style-type: none"> • What is the “area principle?” <ul style="list-style-type: none"> ○ Review examples of real-life statistical representations ○ Discuss meanings, misconceptions and improvements 	5 minutes
<ul style="list-style-type: none"> • Investigate and create tables and charts <ul style="list-style-type: none"> ○ Frequency tables <ul style="list-style-type: none"> ▪ Proportions ▪ Percentages ▪ Relative frequencies ▪ Distributions 	25 minutes
<ul style="list-style-type: none"> • Gathering real student data for exploration <ul style="list-style-type: none"> ○ Height, weight, BMI ○ Class section, average time studying, grade 	10 minutes
<ul style="list-style-type: none"> • Investigate and create bar charts <ul style="list-style-type: none"> ○ Relative frequency ○ Create bar charts 	55 minutes
<ul style="list-style-type: none"> • Investigate and create pie charts <ul style="list-style-type: none"> ○ What is a pie chart? ○ When is it best used? ○ Review circle geometry for creating accurate pie 	10 minutes

<ul style="list-style-type: none"> charts • Create pie charts using compass and ruler • Contingency tables <ul style="list-style-type: none"> ○ Review terminology such as cells, rows, and columns ○ Discuss the Titanic disaster <ul style="list-style-type: none"> ▪ The movie ▪ Time period ▪ Causes ▪ Casualties ○ Work on actual Titanic data in chapter two of textbook <ul style="list-style-type: none"> ▪ Build and analyze tables using actual casualty counts from the Titanic disaster • Experiment with MS Excel to create the same tables and calculations <ul style="list-style-type: none"> ○ Use Google Docs to create similar ○ Visit computer lab or use iPads • Produce and present data, tables and graphs 	<p>25 minutes</p> <p>5 minutes</p> <p>10 minutes</p> <p>25 minutes</p> <p>Full 1-2 day lab</p>
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<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Ti-84 calculator • Whiteboard, SmartBoard, Projector or Blackboard • Statistics textbook • Annenberg Learner “Against All Odds” Statistics resources online • Stats Medic website 	<p>Can do by hand or with calculator. Teachers can sometimes find new improved interactive resources online.</p>

**Differentiating Instruction:
Students with Disabilities, English Language Learners,
and Gifted & Talented Students**

Examples of Strategies and Practices that Support Students with Disabilities:

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting

- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Statistics - Distributions and the Normal Model - Unit 2

Unit Title: Distributions, the Normal Model, and Standard Deviation	
Unit summary: Work with distributions, focusing on the normal distributions	
Primary interdisciplinary connections: Social Studies, Science, Business	
21st Century Themes: Global Awareness, Financial, Economic, Business and Entrepreneurial Literacy, Civic and Health Literacy	
Learning Targets	
NJSLS Standards: 9-12.S.ID.A.2, 9-12.S.ID.A.3, 9-12.S.ID.A.4	
Technology Standards: 8.1.12.A.3, 8.1.12.C.1	
Content Statements:	
1	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
2	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
3	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.
Big Idea: We can use the Normal Model in many situations to explain the position of an observation within a set of observations. For example, if I score a 1200 on the SAT, how good of a score is that? We use the Normal Distribution and z-scores to explain where a score sits among all of the scores.	
Unit Essential Questions: <ul style="list-style-type: none"> • How do we look at the distribution of data points? • What is a percentile? • Why are distributions important in real life? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Many distributions have standard shapes such as the normal distribution. • The normal distribution is applicable in many situations. • Standard deviations help to put meaning to distributions and their spread. • In real life, percentiles are frequently used to compare individuals to a group.
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. • Interpret differences in shape, center, and spread in the context of the data sets, accounting for 	

possible effects of extreme data points (outliers).

- 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.

Evidence of Learning

Summative Assessment:

- Quizzes
- Tests

Formative Assessments:

- Homework
- Classwork
- Other activities

Lesson Plans

<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • Create boxplots for NFL football quarterbacks <ul style="list-style-type: none"> ○ Gather data from a reputable source online ○ Compare performance of the group in one year versus another • Alternate topic for students that don't like football <ul style="list-style-type: none"> ○ Gather data for two classes to compare to each other ○ May use test grades or any other quantitative variable ○ Create boxplot, present and explain • Create Normal model poster for SAT scores <ul style="list-style-type: none"> ○ Gather data (without names) for SAT scores for DBHS students ○ Students calculate their percentile 	<p style="text-align: center;">At least one full class (40 minutes)</p> <p style="text-align: center;">At least one full class (40 minutes)</p> <p>Requires additional time if students manipulate the data in Excel, with Ti-84 or other technology</p>
<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Ti-84 calculator • Whiteboard, SmartBoard, Projector or Blackboard • Statistics textbook • Annenberg Learner "Against All Odds" Statistics 	<p>Can do by hand or with calculator. Teachers can sometimes find new improved interactive resources online.</p>

resources online

- Stats Medic website

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Examples of Strategies and Practices that Support Students with Disabilities:

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Statistics- Relationships Between Variables - Unit 3

Unit Title: Exploring Relationships Between Variables	
Unit summary: Investigate association and correlation between variables and linear regressions	
Primary interdisciplinary connections: Social Studies, Science, Business	
21st Century Themes: Global Awareness, Financial, Economic, Business and Entrepreneurial Literacy, Civic and Health Literacy	
Learning Targets	
NJSLS Standards: 9-12.S.ID.B.6.c, 9-12.S.ID.C.7, 9-12.S.ID.C.8, 9-12.S.ID.C.9,	
Technology Standards: 8.1.12.A.3, 8.1.12.C.1	
Content Statements: (copy/paste from NJSLS)	
1	Fit a linear function for a scatter plot that suggests a linear association.
2	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
3	Compute (using technology) and interpret the correlation coefficient of a linear fit.
4	Distinguish between correlation and causation.
Big Idea: We can investigate the relationship between variables to improve our understanding and ability to make better decisions.	
Unit Essential Questions: <ul style="list-style-type: none"> • How can we use scatter plots to investigate data? • What is correlation and causation? • How can we use existing data and statistical methods to gain understanding and make better decisions? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • We can graph two variables using various methods including scatter plots. • When representing data, we need to obey the area principle.
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Fit a linear function for a scatter plot that suggests a linear association. • Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. • Compute (using technology) and interpret the correlation coefficient of a linear fit. • Distinguish between correlation and causation. 	
Evidence of Learning	
Summative Assessment:	

Formative Assessments:

- Homework
- Classwork
- Other activities

Lesson Plans	
<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • Use Ti-84 to build scatterplots with data <ul style="list-style-type: none"> ◦ Discuss correlation and applications. Create scenario where students want to know the relationship between linear distances and commute time ◦ Use Google Maps to find linear distances of students' homes and school ◦ Use Google Docs or MS Excel to input data • Use scatterplots to plot and calculate correlation <ul style="list-style-type: none"> ◦ Input values for explanatory and response variables ◦ Determine the association between two variables ◦ Calculate the correlation coefficient <p>Note: Teacher and students may choose other variables to investigate. Consider allowing small group projects.</p>	<p style="text-align: center;">5 minutes</p> <p style="text-align: center;">30-35 minutes</p> <p style="text-align: center;">40 minutes Computer Lab</p>
<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Ti-84 calculator • Whiteboard, SmartBoard, Projector or Blackboard • Statistics textbook • Annenberg Learner "Against All Odds" Statistics resources online • Stats Medic website • Google Apps for Education 	<p>Can do by hand or with calculator. Teachers can sometimes find new improved interactive resources online.</p>

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students
<p>Examples of Strategies and Practices that Support Students with Disabilities:</p> <ul style="list-style-type: none"> • Use of visual and multisensory formats • Use of assisted technology

- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Statistics - Gathering Data - Unit 4

Unit Title: Gathering Data	
Unit summary: Statistically sound ways to gather data	
Primary interdisciplinary connections: Social Studies, Science, Business	
21st Century Themes: Global Awareness, Financial, Economic, Business and Entrepreneurial Literacy, Civic and Health Literacy	
Learning Targets	
NJSLS Standards: 9-12.S.IC.A.1, 9-12.S.IC.A.2, 9-12.S.IC.B.3, 9-12.S.IC.6	
Technology Standards: 8.1.12.A.3, 8.1.12.C.1	
Content Statements:	
1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?
3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
4	Evaluate reports based on data.
Big Idea: We can investigate the relationship between variables to improve our understanding and ability to make better decisions.	
Unit Essential Questions: <ul style="list-style-type: none"> • How do we represent data? • What are the key elements that are important in summarizing data? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • We use pie charts, bar graphs, histograms, stem-and-leaf, dot plots, etc...to represent data. • When representing data, we need to obey the area principle.
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Understand statistics as a process for making inferences about population parameters based on a random sample from that population. • Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model? • Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. • Evaluate reports based on data. 	

Evidence of Learning

Summative Assessment: Quizzes, tests

Formative Assessments:

- Homework
- Classwork
- Other activities

Lesson Plans

Activities/Interdisciplinary Connections

Timeframe

- Current news analysis
 - Students will find current news stories that reference or based in statistical sampling and surveying
 - Teachers may allow class time in the library to research
 - Identify the sampling method
 - Discuss the sample survey
 - Specify types of bias or lack of bias in the study
 - Evaluate the “randomness” of the sample
 - Investigate the design of the sampling design
 - Differentiate experiments from observational studies
 - Determine the control treatments if applicable
- Student generated survey
 - Students work with teacher to develop a specific topic for research
 - Students may work in small groups
 - Build plans for sampling, data collection, and then analysis of the data
 - Use iPads or PCs and standard applications for the analysis
 - All teams will present their results including the process and findings
- After this unit is complete or near complete, the teacher should have students work to choose a topic for exploration

Allow two homework days for article selection

Total project should be limited to three days until submission

This project will take a couple of weeks to be completed

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<i>Teacher Resources</i>	<i>Teacher Note</i>
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Examples of Strategies and Practices that Support Gifted & Talented Students:

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Examples of Strategies and Practices that Support English Language Learners:

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- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Statistics - Randomness & Probability - Unit 5

Unit Title: Randomness & Probability	
Unit summary: Investigate probabilities and their importance in statistical analysis	
Primary interdisciplinary connections: Social Studies, Science, Business	
21st Century Themes: Global Awareness, Financial, Economic, Business and Entrepreneurial Literacy, Civic and Health Literacy	
Learning Targets	
NJSLS Standards: 9-12.S.CP.A.1, 9-12.S.CP.A.2, 9-12.S.CP.A.3, 9-12.S.CP.A.5, 9-12.S.CP.B.7, 9-12.S.CP.B.8, 9-12.S.CP.B.9	
Technology Standards: 8.1.12.A.3, 8.1.12.C.1	
Content Statements:	
1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).
2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
3	Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
4	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.
5	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.
6	Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model.
7	Use permutations and combinations to compute probabilities of compound events and solve problems.
Big Idea: There are several important rules that affect our understanding of probability and its implications.	
Unit Essential Questions: <ul style="list-style-type: none"> • What is the Law of Large Numbers? • What are some of the fallacies linked to probability? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Probabilities will approach their theoretical probability over time. • Many real-world business applications rely on the rules of probability.

<ul style="list-style-type: none"> • What are the basic probability rules? • How can we use tree diagrams and Venn diagrams to investigate probability? 	<ul style="list-style-type: none"> • By understanding rules of probability, we can avoid the misconceptions associated such as “I’m due”.
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<p>Unit Learning Targets</p> <p>Students will...</p> <ul style="list-style-type: none"> • Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). • Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. • Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. • Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer. • Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model. • Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model. • Use permutations and combinations to compute probabilities of compound events and solve problems.
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Evidence of Learning

<p>Summative Assessment:</p> <ul style="list-style-type: none"> • Quizzes • Tests
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<p>Formative Assessments:</p> <ul style="list-style-type: none"> • Homework • Classwork • Other activities
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Lesson Plans

<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • Investigate games of chance 	2-3 days per game

<ul style="list-style-type: none"> ○ Break down games of chance to understand why the house always wins in the long run <ul style="list-style-type: none"> ▪ Blackjack ▪ Craps ▪ Poker ○ Students typically enjoy the opportunity to learn and play new games ○ Teacher may also give students the option to create their own game based on probabilities ● Research how probabilities affect decisions made in professional sports <ul style="list-style-type: none"> ○ Students investigate the use of probabilities in a particular sport or activity <ul style="list-style-type: none"> ▪ Football ▪ Baseball/Softball ▪ Soccer 	<p>May be extended to get a deeper understanding of methodology</p> <p style="text-align: center;">2-3 days</p>
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<p><i>Teacher Resources</i></p>	<p><i>Teacher Note</i></p>
<ul style="list-style-type: none"> ● Ti-84 calculator ● Whiteboard, SmartBoard, Projector or Blackboard ● Statistics textbook ● Annenberg Learner “Against All Odds” Statistics resources online ● Stats Medic website 	<p>Can do by hand or with calculator. Teachers can sometimes find new improved interactive resources online.</p>

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and Gifted & Talented Students**

- Examples of Strategies and Practices that Support Students with Disabilities:
- Use of visual and multisensory formats
 - Use of assisted technology
 - Use of prompts
 - Modification of content and student products
 - Testing accommodations
 - Authentic assessments
- Examples of Strategies and Practices that Support Gifted & Talented Students:
- Adjusting the pace of lessons
 - Curriculum compacting
 - Inquiry-based instruction
 - Independent study
 - Higher-order thinking skills
 - Interest-based content
 - Student-driven instruction

- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Statistics - Additional Topics in Statistics - Unit 6

Unit Title: Additional Topics in Statistics	
Unit summary: The majority of this course is focused on descriptive statistics. Unit 6 is designed to cover additional topics of particular interest to high school students and also the basics of inferential statistics to prepare students for college statistics. Teachers choose topics of particular interest and teach these statistics related topics in Unit 6. This unit should include some hands-on projects for students.	
Primary interdisciplinary connections: Social Studies, Science, Business	
21st Century Themes: Global Awareness, Financial, Economic, Business and Entrepreneurial Literacy, Civic and Health Literacy	
Learning Targets	
NJSLS Standards: 9-12.S.IC.B.3, 9-12.S.IC.4, 9-12.S.MD.B.6, 9-12.MD.B.7	
Technology Standards: 8.1.12.A.3, 8.1.12.C.1	
Content Statements:	
1	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
2	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
3	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
4	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).
Big Idea: We can make even better decisions if we can make predictions with a quantifiable amount of confidence. Confidence intervals and hypothesis testing help to quantify our predictions.	
Unit Essential Questions: <ul style="list-style-type: none"> • Can we always use a Normal Model? • What are confidence intervals? • What kind of errors might we encounter? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • The Normal Model becomes a better representation as the sample size increases. • We need to be aware of sample sizes. • Sample sizes need to be big enough, but also small enough.
Unit Learning Targets Students will... <ul style="list-style-type: none"> • Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. 	

- 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.
- Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
- Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

Evidence of Learning

Summative Assessment:

- Quizzes
- Tests

Formative Assessments:

- Homework
- Classwork
- Other activities

Lesson Plans

<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • Statistics in criminal justice project <ul style="list-style-type: none"> ○ Fingerprints ○ Watch NUMB3ERS episode “Identity Crisis” <ul style="list-style-type: none"> ▪ Students research the history of fingerprinting as a crime fighting tool ▪ Discuss and present on the basis of fingerprinting as a tool ○ Alternate assignment: Students may choose an area of their choice in which statistics is used <ul style="list-style-type: none"> ▪ Statistics in nursing ▪ Statistics in sports ▪ Statistics in business 	<p>2 days for video and 4 days for research and creating presentations</p>
<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Ti-84 calculator • Whiteboard, SmartBoard, Projector or Blackboard • Statistics textbook • Annenberg Learner “Against All Odds” Statistics 	<p>Can do by hand or with calculator. Teachers can sometimes find new improved interactive resources online.</p>

resources online

- Stats Medic website

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Examples of Strategies and Practices that Support Students with Disabilities:

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups