



Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:

Meeting the needs of all students with a proud tradition of academic excellence.

Curriculum Documents

School: Ocean Township High School

Course: Probability and Statistics

Department: Math

Supervisor: Nichole Wynes

Board Approval	Supervisor	Notes
September 2012	Janet Bluefield	Update Standards
December 2017	Nichole Wynes	Update Standards

Home of the Spartans!
#spartanlegacy



Week	Marking Period 1	Week	Marking Period 3
1	Collecting & Organizing Data	19	Probability & Inferences
2	Collecting & Organizing Data	20	Hypothesis Testing for 2 Samples
3	Collecting & Organizing Data	21	Hypothesis Testing for 2 Samples
4	Projects Utilizing Statistic Skills	22	Hypothesis Testing for 2 Samples
5	Projects Utilizing Statistic Skills	23	Hypothesis Testing for 2 Samples
6	Projects Utilizing Statistic Skills	24	Constructing & Interpreting Confidence Intervals
7	Projects Utilizing Statistic Skills	25	Constructing & Interpreting Confidence Intervals
8	Misuses & Abuses of Statistics	26	Constructing & Interpreting Confidence Intervals
9	Misuses & Abuses of Statistics	27	Constructing & Interpreting Confidence Intervals
Week	Marking Period 2	Week	Marking Period 4
10	Misuses & Abuses of Statistics	28	Constructing & Interpreting Confidence Intervals
11	Data Displays & Analysis	29	Hypothesis Testing
12	Data Displays & Analysis	30	Hypothesis Testing
13	Data Displays & Analysis	31	Hypothesis Testing
14	Data Displays & Analysis	32	Hypothesis Testing
15	Data Displays & Analysis	33	Bivariate Hypothesis Tests
16	Probability & Inferences	34	Bivariate Hypothesis Tests
17	Probability & Inferences	35	Bivariate Hypothesis Tests
18	Probability & Inferences	36	Bivariate Hypothesis Tests

Time Frame**Standard - 3 Weeks Block – 1 Week****Topic****Collecting and Organizing Data****Essential Questions**

How can we describe data ?

To what extent can statistics help us make predictions and inferences about our world ?

How can we determine the validity of our interpretation of the statistics ?

Enduring Understandings

Data collection can be utilized to make summative statements or inferences about a population.

Observational studies can be used to demonstrate correlation or association.

Designed experiments can be used to prove causation.

Data can be organized in a variety of useful ways.

Alignment to NJSL**Mathematical Practice:**

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 8. Look for and express regularity in repeated reasoning.

HS: Stats/ Prob, Interpreting Categorical & Quantitative Data

- S-ID Summarize, represent and interpret data on a single count or measurement variable
- S-ID.1. Represent data with plots on the real number line (dot plots, histograms and box plots).
- S-ID.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.
- S-ID.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Key Concepts and Skills

Identify types of statistics and data.

Establish a process for planning and conducting a study

Calculate relative frequency.

Construct bar graphs and dotplots.

Distinguish between an experiment and an observational study.

Determine the processes of sampling.

Create a procedure for conducting a designed experiment using proper terminology.

Identify key concepts of a designed experiment and when to block an experiment.

Understand the need to blind or double blind an experiment.

Learning Activities

United Stats of America – series on DVD

Cooperative Group Activity – pg 42 # 1

Assessments

Quizzes, Common Assessment, Homework, Project

21 Century Skills

Creativity	Critical Thinking	Communication	Collaboration
Life & Career Skills	Information Literacy	Media Literacy	

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Internet Project from www.aw.com/triola

Statistical websites

Kahn academy lessons

Time Frame **Standard- 4 Weeks Block – 1 Week**

Topic

Projects Utilizing Our Statistics Skills

Essential Questions

How do you go about proving or disproving a claim ?

What are the most effective and accurate techniques for collecting data that meet my goal ?

What is the best statistical test to analyze and interpret my collected data ?

What conclusions can be drawn from my data and hypothesis tests ?

Enduring Understandings

Almost all data can be tested for significance

Data must be collected properly for test results to be valid

The internet is a valuable resource but not the only source of data

Learning can be more useful when applied to one’s personal interests

Alignment to NJSLs

HS: Prob, Interpreting Categorical & Quantitative Data

S-ID Summarize, represent and interpret data on a single count or measurement variable

- S-ID.1. Represent data with plots on the real number line (dot plots, histograms and box plots).
- S-ID.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.
- S-ID.3. Interpret differences in shape, center and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- S-ID.4. 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.

S-ID Summarize, represent and interpret data on two categorical and quantitative variables

- S-ID.5. 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.
- S-ID.6. Represent data on two quantitative variables on a scatter plot and describe how the variables are related.
 - S-ID.6a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic and exponential models.
 - S-ID.6b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
 - S-ID.6c. Fit a linear function for scatter plots that suggest a linear association.

S-ID Interpret linear models

- S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the context of the data.
- S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
- S-ID.9. Distinguish between correlation and causation.

Key Concepts and Skills

Brainstorm project topics.

Collect data conforming to rules of randomization.

Organize data using appropriate method.

Create a data display that best represents the data.

Perform appropriate hypothesis test for data.

Analyze and interpret results to draw conclusions about original hypothesis.

Write up results for formal presentation or create power point.

Learning Activities

Parking Lot Survey

Creating Surveys to distribute

End of the year project

Internet Project from www.aw.com/triola

Assessments

Quizzes, Common Assessment, Homework, Project

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
	Life & Career Skills		Information Literacy		Media Literacy		

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Computer Lab – using Excel

TI – 83

Internet Project from www.aw.com/triola

Statistical websites

Kahn academy lessons

Time Frame	Standard – 3 Weeks Block – 1 Week
Topic	
Misuses and Abuses of Statistics	
Essential Questions	
<p>Can surveys be trusted?</p> <p>What are some red flags when reading a study or experiment that may indicate biased results ?</p> <p>What should you look for to ensure a graph is not misleading in its construction ?</p> <p>What information should be presented with a study to ease suspicion and lessen scrutiny ?</p>	
Enduring Understandings	
<p>There are many ways to misuse or mislead with statistics.</p> <p>It is important to question results that are given and not accept them outright.</p> <p>Graphs can be misleading.</p> <p>It is possible to get desired results by selectively collecting data.</p>	
Alignment to NJSL	
HS: Stats/Prob, Making Inferences & Justifying Conclusions	
<p>S-IC Understand and evaluate random processes underlying statistical experiments</p> <ul style="list-style-type: none"> • S-IC.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. • S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g. using simulation. <p>S-IC Make inferences and justify conclusions from sample surveys, experiments and observational studies.</p> <ul style="list-style-type: none"> • S-IC.3. Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each. • S-IC.4. 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. • S-IC.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.. • S-IC.6. Evaluate reports based on data. 	
Key Concepts and Skills	
<p>Create misleading graphs using improper proportions or not starting at 0.</p> <p>Use non-random sampling to collect data.</p> <p>Construct misleading survey questionnaires.</p> <p>Design a study to achieve a certain predetermined outcome.</p> <p>Debate two opposing views using the same data set.</p>	
Learning Activities	
<p>Internet Project from www.aw.com/triola</p> <p>Kahn Academy Lessons</p> <p>From Data to Decision pg 80</p> <p>United Stats of America DVD</p>	

Assessments			
Quizzes, Common Assessment, Homework, Project			
21st Century Skills			
Creativity	Critical Thinking	Communication	Collaboration
Life & Career Skills	Information Literacy	Media Literacy	
Interdisciplinary Connections			
Technology Integration			
<p>8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.</p> <p>Internet Project from www.aw.com/triola</p> <p>Statistical websites</p> <p>Kahn academy lessons</p>			

Time Frame	Standard – 5 Weeks Block – 2 Weeks
Topic	
Data Displays and Analysis	
Essential Questions	
<p>What method of displaying data would best represent my purpose?</p> <p>Why can technology support but not replace our mathematics skills and understanding?</p> <p>What conclusions can be made and supported and what can not be supported? When is data reliable to use?</p>	
Enduring Understandings	
<p>Data can be organized and displayed in a variety of ways.</p> <p>Understanding the distribution of data is important to determine how to analyze the data.</p> <p>Describing the variation of data is as important as defining the center of a data set. Standard deviation is essential to every.</p>	
Alignment to NJSL	
HS: Stats/ Prob, Interpreting Categorical & Quantitative Data	
<p>S-ID Summarize, represent and interpret data on a single count or measurement variable</p> <ul style="list-style-type: none"> • S-ID.1. Represent data with plots on the real number line (dot plots, histograms and box plots). • S-ID.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. • S-ID.3. Interpret differences in shape, center and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). • S-ID.4. 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. <p>S-ID Summarize, represent and interpret data on two categorical and quantitative variables</p>	

Department: Mathematics Course: Probability and Statistics

- S-ID.5. 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.
- S-ID.6. Represent data on two quantitative variables on a scatter plot and describe how the variables are related.

Key Concepts and Skills

Use comparative bar graphs and pie graphs to display data.
 Construct and analyze stem and leaf plots for tendencies and distribution.
 Create frequency, relative frequency and cumulative frequency histograms.
 Identify distribution of data based on histograms.
 Display bivariate data using scatter plots.
 Calculate the mean, median, mode, midrange, range and standard deviation of data.
 Create and interpret boxplots.
 Understand and use the Empirical Rule.

Learning Activities

United Stats of America DVD
 From Data To Decision pg 80
 Search newspapers and magazines to find graphs that are misleading

Assessments

Quizzes, Common Assessment, Homework, Project

21st Century Skills

Creativity	Critical Thinking	Communication	Collaboration
Life & Career Skills	Information Literacy	Media Literacy	

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
 Internet Project from www.aw.com/triola
 Statistical websites
 Kahn academy lessons

Time Frame	Standard – 4 Weeks Block – 2 Weeks
Topic	
Probability and Inference	
Essential Questions	
Can probability be an accurate tool for making predictions? What are differences between games of chance and skill and can probability be used for each? When is simulation a useful tool in calculating probability? When data is considered normally distributed and when can z-scores be used?	
Enduring Understandings	
Relative frequency of occurrence is probability.	

The Law of Large Numbers allows for accurate estimations when sample size is large enough.
Tree diagrams are an excellent method of displaying sample space and calculating probability.
Probability distribution of a discrete variable becomes more normal as sample size increase.

Alignment to NJSL

HS: Stats/Prob, Conditional Probability & the Rules of Probability

S-CP Understand independence and conditional probability and use them to interpret data

- S-CP.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”).
- S-CP.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.
- S-CP.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.
- S-CP.4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.
- S-CP.5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

S-CP Use the rules of probability to compute probabilities of compound events in a uniform probability model.

- S-CP.6. Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model.
- S-CP.7. 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.
- S-CP.8. (+) 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.
- S-CP.9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

HS: Stats/Prob, Using Probability to Make Decisions

S-MD Calculate expected values and use them to solve problems

- S-MD.1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.
- S-MD.2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
- S-MD.3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.
- S-MD.4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

S-MD Use probability to evaluate outcomes of decisions

Department: Mathematics Course: Probability and Statistics

- S-MD.5. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
- S-MD.5a. Find the expected payoff for a game of chance.
- S-MD.5b. Evaluate and compare strategies on the basis of expected values.
- S-MD.6. (+) Use probabilities to make fair decisions
- S-MD.7. (+) Analyze decisions and strategies using probability concepts.

Key Concepts and Skills

Create sample space of a chance experiment.
 Use Venn Diagrams to represent outcomes.
 Identify mutually exclusive events.
 Distinguish between experimental and theoretical probabilities.
 Calculate probabilities for compound events and conditional events.
 Establish rules for Independence of events.
 Calculate means of discrete random variables.
 Identify properties of a z-curve
 Use z-scores to find probabilities and percentiles.

Learning Activities

Simulating the probability of a head with a fair coin
 United Stats of America DVD
 “Monty Hall problem” pg 183

Assessments

Quizzes, Common Assessment, Homework, Project

21st Century Skills

	Creativity		Critical Thinking		Communication		Collaboration
	Life & Career Skills		Information Literacy		Media Literacy		

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
 Internet Project from www.aw.com/triola
 Statistical websites
 Khan academy lessons

Time Frame	Standard – 4 Weeks Block – 2 Weeks
Topic	
Hypothesis Testing for Two Samples	
Essential Questions	
How can hypothesis Testing be used to find out if a difference between two samples is greater than	

a given value ?

What are differences between pooled and non-pooled and does it matter which is used to test data ?

When is it appropriate to use a matched pair t-test instead of a two sample t-test ?

Can the probability value be utilized to determine the strength of the test ?

Enduring Understandings

Hypothesis testing for two samples involves the difference between the means or proportions.

Identifying and labeling each population allows for more accurate and less confusing conclusions.

Procedures vary for samples that are dependent as opposed to independent.

Matched pair tests are an important analysis tool when analyzing results of an experiment.

Alignment to NJSL

HS: Stats/Prob, Interpreting Categorical & Quantitative Data

S-ID Summarize, represent and interpret data on a single count or measurement variable

- S-ID.1. Represent data with plots on the real number line (dot plots, histograms and box plots).
- S-ID.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.
- S-ID.3. Interpret differences in shape, center and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- S-ID.4. 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.

S-ID Summarize, represent and interpret data on two categorical and quantitative variables

- S-ID.5. 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.
- S-ID.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
- S-ID.6a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic and exponential models.
- S-ID.6b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
- S-ID.6c. Fit a linear function for scatter plots that suggest a linear association.

S-ID Interpret linear models

- S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the context of the data.
- S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
- S-ID.9. Distinguish between correlation and causation.

Key Concepts and Skills

Identify and label two groups to be tested.

Create appropriate null and alternate hypotheses.

Department: Mathematics Course: Probability and Statistics

Conduct two sample t-test for pooled or non-pooled data.
 Distinguish between independent and dependent samples.
 Perform matching pair t-test and interpret results.
 Construct confidence interval for matched pair results.
 Understand the cautions and limitations of hypothesis testing.
 Use paragraph method of conducting hypothesis tests.

Learning Activities

Comparing Populations – Internet Project pg 511
 From Data to Decision pg. 512 – Do Academy Awards involve age discrimination?

Assessments

Quizzes, Common Assessment, Homework, Project

21st Century Skills

Creativity	Critical Thinking	Communication	Collaboration
Life & Career Skills	Information Literacy	Media Literacy	

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
 Internet Project from www.aw.com/triola
 Statistical websites
 Kahn academy lessons

Time Frame	Standard – 5 Weeks Block – 2 Weeks
Topic	
Constructing and Interpreting Confidence Intervals	
Essential Questions	
<p>How can a confidence interval be interpreted in context of the problem ? How is the width of the interval affected by changes in sample size or confidence level ? How can a sample size be determined for a study that would place your results within a specified error ? Can confidence intervals be used to draw conclusions about a claim ?</p>	
Enduring Understandings	
<p>A point estimate is used to establish a value for a population parameter A confidence interval is a range of plausible values for a characteristic of a population Confidence intervals are always two tailed and the confidence level relates to the area under the curve between the interval Standard error is the estimated standard deviation of the statistic</p>	
Alignment to NJSL	
HS: Stats/Prob, Making Inferences & Justifying Conclusions	
S-IC Understand and evaluate random processes underlying statistical experiments	

- S-IC.1. Understand that statistics as a process for making inferences about population parameters based on a random sample from that population.
- S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g. using simulation.

S-IC Make inferences and justify conclusions from sample surveys, experiments and observational studies

- S-IC.3. Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.
- S-IC.4. 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.
- S-IC.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
- S-IC.6. Evaluate reports based on data.

Key Concepts and Skills

Calculate a point estimate from a sample.

Use formula to create a confidence interval for a sample mean.

Understand the relationship between the interval and a normal curve.

Interpret the interval in words in context of the problem.

Find confidence interval for one sample proportion.

Understand the relationship between sample size and width of confidence interval.

Work backwards to find sample size needed for a given study.

Calculate and interpret intervals for the difference of two sample means or proportions.

Learning Activities

From Data to Decision pg 386 – “Do Not Call” registry

Pg 387 - # 5 – Confidence Interval – Correct age of the President

Assessments

Quizzes, Common Assessment, Homework, Project

21st Century Skills

Creativity	Critical Thinking	Communication	Collaboration
Life & Career Skills	Information Literacy	Media Literacy	

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Internet Project from www.aw.com/triola

Statistical websites

Kahn academy lessons

Time Frame	Standard – 4 Weeks Block – 2 Weeks
Topic	
Introduction to Hypothesis Testing	

Essential Questions

- Which hypothesis test is appropriate for a particular data set ?
- What makes results “statistically significant” and how are they determined so ?
- When is interpreting results inconclusive and potentially dangerous ?
- How can one data set be used to draw opposing conclusions ?

Enduring Understandings

- Hypothesis testing uses sample data to decide between two competing claims about a population characteristic
- There is a possibility of making a Type I or Type II error when conducting a hypothesis test Tests can be performed using the critical value approach of the p-value approach
- The level of significance is the total area in the rejection region

Alignment to NJSLS

HS: Stats/ Prob, Interpreting Categorical & Quantitative Data

S-ID Summarize, represent and interpret data on a single count or measurement variable

- S-ID.1. Represent data with plots on the real number line (dot plots, histograms and box plots).
- S-ID.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.
- S-ID.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- S-ID.4. 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.

S-ID Summarize, represent and interpret data on two categorical and quantitative variables

- S-ID.5. 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.
- S-ID.6. Represent data on two quantitative variables on a scatter plot and describe how the variables are related.
- S-ID.6a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic and exponential models.
- S-ID.6b. Informally assess the fit of a function and analyzing residuals, including with the use of technology.
- S-ID.6c. Fit a linear function for scatter plots that suggest a linear association.

S-ID Interpret linear models

- S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the context of the data.
- S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
- S-ID.9. Distinguish between correlation and causation.

Key Concepts and Skills

Determine the null and alternate hypotheses for a given scenario.

Understand difference between one tailed and two tailed test and draw curve.
 Identify and interpret Type I and Type II errors in context of problem.
 Follow procedure and conduct hypothesis test on one sample mean.
 Understand and use p-value approach as well as critical value approach.
 Analyze results of test in context of the problem.
 Perform hypothesis tests on one sample proportion
 Establish and interpret the power of the test

Learning Activities

Applet Project – Hypothesis Test for a Proportion – pg 456

Assessments

Quizzes, Common Assessment, Homework, Project

21st Century Skills

Creativity	Critical Thinking	Communication	Collaboration
Life & Career Skills	Information Literacy	Media Literacy	

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Internet Project from www.aw.com/triola

Statistical websites

Kahn academy lessons

Time Frame	Standard – 4 Weeks Block – 2 Weeks
Topic	
Bivariate Hypothesis Tests	
Essential Questions	
How can qualitative data be tested to draw inferential conclusions that are supported numerically? What are differences between correlation and association when drawing conclusions about data? When is data usable for linear regression hypothesis testing? What assumptions must be met in order to use chi square testing and what if the assumptions are not met?	
Enduring Understandings	
Bivariate quantitative data can be tested using linear regression hypothesis testing procedures Bivariate qualitative data can be tested for association or independence using Chi Square tests A contingency table is a way of organizing bivariate qualitative data Chi Square curve is a right skewed non-normal curve	
Alignment to NJSLs	

HS: Stats/Prob, Interpreting Categorical & Quantitative Data

S-ID Summarize, represent and interpret data on two categorical and quantitative variables

- S-ID.5. 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.
- S-ID.6. Represent data on two quantitative variables on a scatter plot and describe how the variables are related.
- S-ID.6a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic and exponential models.
- S-ID.6b. Informally assess the fit of a model function by plotting and analyzing residuals, including with the use of technology.
- S-ID.6c. Fit a linear function for scatter plots that suggest a linear association.

S-ID Interpret linear models.

- S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the context of the data.
- S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
- S-ID.9. Distinguish between correlation and causation.

Key Concepts and Skills

Calculate expected values for a multiple proportion study.

Perform a Chi Square Goodness of Fit test and interpret results.

Create contingency table from data collected.

Calculate expected for each cell and the Chi Square test statistic.

Perform the Chi Square test for Association or Independence.

Calculate residuals for linear data.

Find and interpret the correlation coefficient and coefficient of determination.

Conduct a linear regression hypothesis test on the slope of a regression line and interpret results in context.

Learning Activities

Internet Project pg 456 – Hypothesis Testing

Assessments

Quizzes, Common Assessment, Homework, Project

21st Century Skills

Creativity	Critical Thinking	Communication	Collaboration
Life & Career Skills	Information Literacy	Media Literacy	

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Internet Project from www.aw.com/triola

Statistical websites

Kahn academy lessons

Department: Mathematics Course: Probability and Statistics