OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT

Content Area: Mathematics

Course Title: Discrete Mathematics / Probability & Statistics	**Grade Level: 11, 12**

Unit Plan 1 **Algebra Review**	**Pacing Guide** **6-10 days**
Unit Plan 2 **Logarithms**	**Pacing Guide** **17-20 days**
Unit Plan 3 **Trigonometry**	**Pacing Guide** **17-20 days**
Unit Plan 4 **Descriptive Statistics**	**Pacing Guide** **11-16 days**
Unit Plan 5 **Modeling**	**Pacing Guide** **14-16 days**
Unit Plan 6 **Counting and Probability**	**Pacing Guide** **14-16 days**

Unit Plan 7 **Probability Distributions**	**Pacing Guide** **30-35 days**
Unit Plan8 **Hypothesis Testing**	**Pacing Guide** **10-15 days**
Unit Plan 9 **Matrices & Sequences/Series**	**Pacing Guide** **5-10 days**
Unit Plan10 **Voting, Apportionment & Fair Division**	**Pacing Guide** **5-10 days**
Unit Plan 11 **Graph Theory**	**Pacing Guide** **10-15 days**
Unit Plan 12 **Codes & Cryptography**	**Pacing Guide** **10-15 days**

Date Created: **February 2012**

Board Approved on: **March 14, 2012**

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Algebra Review

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary

This unit reviews essential algebra skills learned in Algebra I and Algebra II. These skills include using the rules of exponents, simplifying radical expressions, converting between exponential and radical form, factoring and solving multi-step linear equations.

Primary interdisciplinary connections:

Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:

The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:

For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

Extend the properties of exponents to rational exponents.

N-RN.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

N-RN.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents

Perform arithmetic operations on polynomials.

APR.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials

Interpret the structure of expressions.

A-SSE.2. Use the structure of an expression to identify ways to rewrite it.

Solve equations and inequalities in one variable.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

A-REI.4. Solve quadratic equations in one variable.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• Are the necessary background skills in place in order to be successful in Discrete/Probability & Statistics?	*Students will understand that…* • Certain prerequisite skills are required for Discrete/Probability & Statistics.
Unit Objectives *Students will know…* • How to apply the properties of exponents. • How to simplify and perform operations on radical expressions. • How to convert expressions between exponential and radical notation. • How to solve multi-step linear equations. • How to factor polynomial expressions. • How to solve polynomial equations by factoring.	**Unit Objectives** *Students will be able to…* • Apply the properties of exponents. • Simplify and perform operations on radical expressions. • Convert expressions between exponential and radical notation. • Solve multi-step linear equations. • Factor polynomial expressions. • Solve polynomial equations by factoring.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments
For additional ideas please refer to Resources page for the Common Core State Standards: http://www.corestandards.org/resources

- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects and Demonstrations
- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Native language texts and native language to English dictionary
- Follow all IEP modifications/504 plan

Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
- Graphing Calculator and/or Scientific Calculator
- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

Adjust the emphasis of topics based on the skills of the class.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Logarithms

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary
This unit covers the definition of a logarithm, how to convert between logarithmic and exponential expressions and equations, and applying the properties of logarithms to equation solving.

Primary interdisciplinary connections:
Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:
The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:
For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

Construct and compare linear, quadratic, and exponential models and solve problems.
F-LE.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
F-LE.4. For exponential models, express as a logarithm the solution to *ab^(ct) = d* where *a*, *c*, and *d* are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

Write expressions in equivalent forms to solve problems.
A-SSE.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

Build new functions from existing functions.
F-BF.5. Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• What are logarithms and how can they be used to solve mathematical and real world problems?	*Students will understand that…* • Logarithms are another way to express exponential expressions and equations. • Logarithms are a necessary mathematical tool to solve certain types of mathematical and real world problems.
Unit Objectives *Students will know…* • How to convert between exponential and logarithmic expressions and equations. • How to evaluate logarithmic expressions with and without a calculator. • How to apply the properties of logarithms to solve exponential and logarithmic equations.	**Unit Objectives** *Students will be able to…* • Convert between exponential and logarithmic expressions and equations • Evaluate logarithmic expressions with and without a calculator. • Apply the properties of logarithms to solve exponential and logarithmic equations.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments
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- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)

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- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Native language texts and native language to English dictionary
- Follow all IEP modifications/504 plan

Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
- Graphing Calculator and/or Scientific Calculator
- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

Graphing logarithms will be covered in unit 5.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Trigonometry

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary
This unit defines the three basic trigonometric ratios: sine, cosine and tangent. The three ratios are used to solve for missing measures in right triangles. The Law of Sines and the Law of Cosines are defined and used for finding missing measures of non-right triangles. Perimeter, area, and real world problems are solved using trigonometry.

Primary interdisciplinary connections:
Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:
The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:
For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

Define trigonometric ratios and solve problems involving right triangles.
G-SRT.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
G-SRT.7. Explain and use the relationship between the sine and cosine of complementary angles.
G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Apply trigonometry to general triangles
G-SRT.10. Prove the Laws of Sines and Cosines and use them to solve problems.
G-SRT.11. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• What are the three main trigonometric ratios and how can they be used to solve geometry based problems? • What are the Law of Sines and the Law of Cosines and how can they be applied?	*Students will understand that…* • Geometry based trigonometry can be applied to a wide variety of practical problem solving situations.
Unit Objectives *Students will know…* • How to identify the sine, cosine, and tangent ratios of an acute angle in a right triangle. • How to use trig ratios to solve for missing measures of a right triangle. • How to use Law of Sines and Law of Cosines to solve for missing measures of non-right triangles. • How to use trig to solve perimeter and area problems. • How to apply trig to real world problems such as angle of elevation and angle of depression.	**Unit Objectives** *Students will be able to…* • Identify the sine, cosine, and tangent ratios of an acute angle in a right triangle. • Use trig ratios to solve for missing measures of a right triangle. • Use Law of Sines and Law of Cosines to solve for missing measures of non-right triangles. • Use trig to solve perimeter and area problems. • Apply trig to real world problems such as angle of elevation and angle of depression.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments
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- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects and Demonstrations
- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Native language texts and native language to English dictionary
- Follow all IEP modifications/504 plan

Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
- Graphing Calculator and/or Scientific Calculator
- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

When using Law of Sines and the Law of Cosines the possibilities of no solutions and two solutions are mentioned but not emphasized.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Descriptive Statistics

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary
Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis should be placed on interpreting information from graphical and numerical displays and summarizing it in a clear, concise manner. Topics that will be cover include, but not limited to: measures of center, standard deviations, outliers, box plots, histograms and stem & leaf plots.

Primary interdisciplinary connections:
Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:
The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:
For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

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).

Understand and evaluate random processes underlying statistical experiments
S-IC.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

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.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• What is the appropriate graphical display for a set of data? • How are the measures of center, spread and position used to interpret graphical displays? • What does the shape of a distribution tell about the data? • What assumptions can be made from data? • How can graphical displays be manipulated to present misleading information? • How can data analysis be used in the areas of science to predict future happenings?	*Students will understand that…* • There are appropriate graphical displays for a set of data. • The measures of center, spread and position used to interpret graphical displays. • Assumptions can be made from data. • Graphical displays can be manipulated to present misleading information. • Data analysis can be used in the areas of science to predict future happenings?
Unit Objectives *Students will know…* • How to determine the appropriate graphical display for a set of data. • How the measures of center, spread and position area used to interpret graphical displays. • What the shape of a distribution tells about the data. • How to make assumptions from data. • That graphical displays can be manipulated to present misleading information. • That data analysis can be used in the areas of science to predict future happenings.	**Unit Objectives** *Students will be able to…* • Determine the appropriate graphical display for a set of data. • Use and interpret graphical displays involving measures of center, spread and position. • Determine what the shape of a distribution tells about the data. • Make assumptions from data. • Determine that graphical displays can be manipulated to present misleading information. • Understand that data analysis can be used in the areas of science to predict future happenings.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments
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- Chapter/Unit Test
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- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)

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- Modified assignments
- Differentiated instruction
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Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
- Graphing Calculator and/or Scientific Calculator
- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Modeling

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary
Data is gathered in order to reflect on past happenings and predict future ones. Students will be able to differentiate useful data from meaningless data and see how the skills learned in this course are used in the areas of science research, marketing, the financial world, etc. Topics of this unit will include: Regression lines, Correlation Coefficient, Coefficient of Determination, Residuals, Graphs of residuals, Standard error, Logarithmic Curves, Exponential Curves and Power Curves.

Primary interdisciplinary connections:
Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:
The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:
For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

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.
a. Fit a function to the data; 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.
b. Informally assess the fit of a function by plotting and analyzing residuals.
c. Fit a linear function for a scatter plot that suggests a linear association.

Interpret linear models
S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model 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.

Construct and compare linear, quadratic, and exponential models and solve problems.

F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.

F-LE.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F-LE.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

F-LE.4. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

Interpret expressions for functions in terms of the situation they model.

F-LE.5. Interpret the parameters in a linear or exponential function in terms of a context.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• How are regression models fit to graphs of real-life data used to predict future happenings? • How reliable are my predictions from my regression models? • Is the data I collected significant?	*Students will understand that…* • They can use regression models fit to graphs of real-life data and are used to predict future happenings. • Regression lines can be created that will fit data. • Reliable predictions can be made from regression models. • Not all data they collected is significant.
Unit Objectives *Students will know…* • How regression models fit to graphs of real-life data and are used to predict future happenings. • How to create regression lines that fit data. • How reliable predictions are from regression models. • Whether or not the data they collected is significant.	**Unit Objectives** *Students will be able to…* • Use regression models fit to graphs of real-life data and are used to predict future happenings. • Create regression lines that fit data. • Make reliable predictions are from regression models. • Determine whether or not the data they collected is significant**.**

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments
For additional ideas please refer to Resources page for the Common Core State Standards: http://www.corestandards.org/resources

- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects and Demonstrations
- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Native language texts and native language to English dictionary
- Follow all IEP modifications/504 plan

Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
- Graphing Calculator and/or Scientific Calculator
- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Counting & Probability

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary
Students will conduct and draw conclusions from independent and dependent probability experiments. They will use concepts from simple probability and Fundamental Counting Principal and apply them to compound probability, permutations and combinations.

Primary interdisciplinary connections:
Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:
The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:
For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

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 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.5. 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.

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 or B) = P(A) + P(B) – P(A 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 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.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/	
Unit Essential Questions • How is probability related to real world events? • How do independent and dependent events differ and what is their impact on compound probability calculations? • What is the likelihood of something occurring?	**Unit Enduring Understandings** *Students will understand that…* • The understanding of the manipulations of data displays and calculations can assist in making informed real world decisions. • Probability can be determined using either real data from an experiment or theoretical calculations. • Determining if order plays a part is significant in calculating the probability of an event.
Unit Objectives *Students will know…* • Calculate experimental probability given trial data. • Calculate theoretical probability. • Calculate probability of independent events using union and intersection. • Combinations and permutations.	**Unit Objectives** *Students will be able to…* • Make real life decisions based upon analysis of information. • Critically read and interpret data representations. • Use data to make predictions and support conclusions. • Calculate the theoretical and experimental probability provided events are independent or dependent. Also, utilizing complementary events. • Determine the impact of order in an experiment and utilize calculations for permutations and combinations.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments
For additional ideas please refer to Resources page for the Common Core State Standards: http://www.corestandards.org/resources

- Chapter/Unit Test
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Modifications (ELLs, Special Education, Gifted and Talented)

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Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

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Teacher Notes:

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Probability Distributions

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary

Many events can be predicted through probability distributions. It is important for students to understand that data can stray from these distributions and their predictions. It enforces the notion that we can try to predict what will happen, but we cannot control the random chaos in life. Topics of this unit will include: Binomial Distributions, Poisson Distributions, Geometric Distributions, Hypergeometric Distributions, Normal Distributions, Imperical Rule and Z-Scores.

Primary interdisciplinary connections:

Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:

The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:

For further clarification refer to Common Core State Standards at:
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Learning Targets

Content Standards

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. For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.

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. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/	
Unit Essential Questions • How do the outcomes of the probability distributions compare to simulations? • How can probability distributions be used to predict real-life events? • How is the normal curve related to calculus?	**Unit Enduring Understandings** *Students will understand that…* • Outcomes of the probability distributions compare to simulations. • Probability distributions can be used to predict real-life events. • The normal curve is related to calculus.
Unit Objectives *Students will know…* • How to use the binomial distribution to find probability. • How to use the Poisson distribution to find probability. • How to use the geometric distribution to find probability. • How to use the hypergeometric distribution to find probability. • How to use the normal distribution to find probability. • How to find the area under the normal curve. • How to calculate Z-Scores.	**Unit Objectives** *Students will be able to…* • Use the binomial distribution to find probability. • Use the Poisson distribution to find probability. • Use the geometric distribution to find probability. • Use the hypergeometric distribution to find probability. • Use the normal distribution to find probability. • Find the area under the normal curve. • Calculate Z-Scores.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments

For additional ideas please refer to Resources page for the Common Core State Standards: http://www.corestandards.org/resources

- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects and Demonstrations
- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Native language texts and native language to English dictionary
- Follow all IEP modifications/504 plan

Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
- Graphing Calculator and/or Scientific Calculator
- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Hypothesis Testing

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary

Students will decide whether to reject or fail to reject a claim by using hypothesis testing.

Students will determine whether the data fits a mean or a proportion, and then utilize appropriate testing methods.

Primary interdisciplinary connections:

Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:

The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:

For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

Understand and evaluate random processes underlying statistical experiments

S-IC.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

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

S-IC.6. Evaluate reports based on data.

Use probability to evaluate outcomes of decisions

S-MD.7. Analyze decisions and strategies using probability concepts.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• What is hypothesis testing? • What is the value in using hypothesis testing when trying to validate a claim?	*Students will understand that…* • Claims must be rigorously tested against quantitative sets of standards.
Unit Objectives *Students will know…* • What hypothesis testing is and the applicable terms associated with it. • How to perform a hypothesis test.	**Unit Objectives** *Students will be able to…* • Define hypothesis testing and all applicable terms. • Apply hypothesis testing for dependent samples. • Use the Z-test the graphing calculator.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments

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- Chapter/Unit Test
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Modifications (ELLs, Special Education, Gifted and Talented)

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Teacher Notes:

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Matrices & Sequences / Series

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary

In this unit students will understand how to identify and perform operations on Matrices. They will be able to use solve algebraic and real world problems using matrices. Students will also be able to understand and identify sequence and series. They will be able to determine the n^{th} term and write express them both explicitly and recursively.

Primary interdisciplinary connections:

Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:

The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:

For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

Perform operations on matrices and use matrices in applications.

N-VM.6. Use matrices to represent and manipulate data

N-VM.7. Multiply matrices by scalars to produce new matrices

N-VM.8. Add, subtract, and multiply matrices of appropriate dimensions.

N-VM.9. Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.

Build a function that models a relationship between two quantities.

F-BF.1. Write a function that describes a relationship between two quantities.

Determine an explicit expression, a recursive process, or steps for calculation from a context.

F-BF.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• How can algorithmic thinking be used to solve problems? • How are patterns of change related to the behavior of functions?	*Students will understand that…* • Optimization is finding the best solution within given constraints. • Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally.
Unit Objectives *Students will know…* • How to perform all operations on matrices. • That matrices can be used to solve many real world problems. • How to use matrices to organize data and then conquer everyday problems. • The characteristics of patterns and be able to write rules for those patterns. • How to use their understanding of patterns to solve real-world problems. • How to analyze and interpret patterns as it pertains to real-life situations.	**Unit Objectives** *Students will be able to…* • Understand how to perform all operations on matrices. • Understand that matrices can be used to solve many real world problems. • Understand how to use matrices to organize data and then conquer everyday problems. • Understand the characteristics of patterns and be able to write rules for those patterns. • Use their understanding of patterns to solve real-world problems. • Understand how to analyze and interpret patterns as it pertains to real-life situations.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments

For additional ideas please refer to Resources page for the Common Core State Standards: http://www.corestandards.org/resources

- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects and Demonstrations
- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)

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- Peer tutoring
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- Modified assignments
- Differentiated instruction
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Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
- Graphing Calculator and/or Scientific Calculator
- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Voting, Apportionment, & Fair Division

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary
This unit addresses the mathematics behind voting, apportionment, and fair division. Topics to be covered include determining a winner from a preference schedule, approval voting, weighted voting, Hamilton, Jefferson, Webster, & Hill Methods of apportionment, estate division, cut and choose, and the last diminisher methods.

Primary interdisciplinary connections:
Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:
The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:
For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

Create equations that describe numbers or relationships.
A-CED.1. Create equations and inequalities in one variable and use them to solve problems.

Build a function that models a relationship between two quantities.
F-BF.1. Write a function that describes a relationship between two quantities

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• What are the different ways to a determine winner in given voting scenarios? • What is fair division and how can it be applied in different real world situations?	*Students will understand that…* • In a voting situation the winner can vary depending on the method being used. • Every voting and apportionment method has its pros and cons. • In a weighted voting scenario, what may appear to be a significant difference in the number of votes may not translate into a significant amount of true voting power. • The concept of fair division can be applied to many real world situations.
Unit Objectives *Students will know…* • How to determine a winner from a preference schedule by the following methods: Majority, Plurality, Run-Off, Sequential Run-Off, Condorcet, and Borda Methods. • How to determine a winner by using the Approval Method. • How to determine the voting power of a coalition in a weighted voting situation. • How to apportion votes based on population using the Hamilton, Jefferson, Webster, & Hill Methods. • How to fairly divide an estate by using the sealed bids method. • How to use the cut- and-choose method and the last diminisher method for fair division.	**Unit Objectives** *Students will be able to…* • Given a preference schedule determine a winner by the following methods: Majority, Plurality, Run-Off, Sequential Run-Off, Condorcet, and Borda Methods. • Determine a winner by using the Approval Method of voting. • Determine the voting power of a coalition in a weighted voting situation • Apportion votes based on population using the Hamilton, Jefferson, Webster, & Hill Methods. • Fairly divide an estate by using the sealed bids method. • Understand and apply the cut- and-choose method and the last diminisher method for fair division.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments
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- Chapter/Unit Test
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- Quizzes
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- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Native language texts and native language to English dictionary
- Follow all IEP modifications/504 plan

Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
- Graphing Calculator and/or Scientific Calculator
- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

Time may not permit addressing all topics in this unit. Teachers should choose which to address based on available time.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Graph Theory

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary

This unit provides for visual models to everyday problems including project timing and traveling to various cities the cheapest, shortest or just best way. It involves many applications to real-world situations including resolving conflicts or providing for safety measures. Topics will include: Graph Notation & Identification, Planarity, Bipartite, Directed Graphs, Project Modeling, Conflict Scheduling, Traversability of Graphs, Traveling Salesman, Spanning Trees and Shortest Routes.

Primary interdisciplinary connections:

Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:

The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:

For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

Apply geometric concepts in modeling situations

G-MG.1. Use geometric shapes, their measures, and their properties to describe objects G-MG.3. Apply geometric methods to solve design problems.

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• How can graphs help me organize my life? • How can graphs help settle conflicts? • How can graphs save me money?	*Students will understand that…* • Graphs can help organize data. • Graphs can settle conflicts. • Graphs can promote efficiency.
Unit Objectives *Students will know…* • How to model projects with graphs and find their completion time. • How to decide on whether a graph is a circuit or a path. • How to settle conflicts by finding the chromatic number of a graph. • How to find a realistic and efficient solution to the traveling salesperson problem. • Find the finishing placement in tournaments.	**Unit Objectives** *Students will be able to…* • Model projects with graphs and find their completion time. • Decide on whether a graph is a circuit or a path. • Settle conflicts by finding the chromatic number of a graph. • Find a realistic and efficient solution to the traveling salesperson problem. • Find the finishing placement in tournaments.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments

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Modifications (ELLs, Special Education, Gifted and Talented)

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- Differentiated instruction
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- Follow all IEP modifications/504 plan

Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook and Textbook Resources
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- Teacher-made tests, worksheets, warm-ups, and quizzes

Teacher Notes:

Time may not permit addressing all topics in this unit. Teacher should choose what topics to address based on available time.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics

Unit Title: Codes and Cryptography

Target Course/Grade Level: Discrete Mathematics / Probability & Statistics / 11, 12

Unit Summary
The mathematics behind various codes is investigated concentrating on check digits. These codes include zip codes, universal product codes (upc's), international standard book numbers (isbn's), vehicle identification numbers (vin's), bank routing numbers and credit card numbers. Cryptography and code breaking is also investigated concentrating on the mathematics behind enciphering and deciphering secret codes.

Primary interdisciplinary connections:
Infused within the unit is connection to the 2009 NJCCCS for Mathematics, Language Arts Literacy and Technology.

21st century themes:
The unit will integrate the 21st Century Life and Career strand 9.1 strands A-D. These strands include: Critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Technology connections:
For further clarification refer to Common Core State Standards at:
http://www.corestandards.org/the-standards/mathematics

Learning Targets

Content Standards

Perform operations on matrices and use matrices in applications.
N-VM.6. Use matrices to represent and manipulate data.
N-VM.8. Add, subtract, and multiply matrices of appropriate dimensions.

Create equations that describe numbers or relationships.
A-CED.1. Create equations and inequalities in one variable and use them to solve problems.

CONTENT STANDARDS LINK: http://www.corestandards.org/the-standards/mathematics/

Unit Essential Questions	**Unit Enduring Understandings**
• What do the various parts of codes stand for? • What are check digits and how are they calculated? • How can mathematics be used for the purposes of encoding and decoding secret messages? • How can mathematics be used to break codes?	*Students will understand that…* • Each part of a code identifies a key aspect of what is being coded. • Most codes have a check digit which is calculated by a mathematical algorithm. • Mathematics can be used to encipher, decipher, and code break.
Unit Objectives *Students will know…* • How to identify what each part of a zip code, upc, isbn, vin, bank routing number and credit card number represents. • How calculate the check digit for a zip code, upc, isbn, vin, bank routing number and credit card number. • How to encipher and decipher codes using the Atbash Cipher, Caesar Cipher, Keyword Cipher, Playfair Cipher and matrix multiplication**.**	**Unit Objectives** *Students will be able to…* • Identify what each part of a zip code, upc, isbn, vin, bank routing number and credit card number represents. • Calculate the check digit for a zip code, upc, isbn, vin, bank routing number and credit card number. • Encipher and decipher codes using the Atbash Cipher, Caesar Cipher, Keyword Cipher, Playfair Cipher and matrix multiplication.

OCEAN COUNTY MATHEMATICS CURRICULUM
SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments

- Homework
- Teacher Observation
- Class participation
- DO-NOW
- Notebook
- Open-Ended Writing Assignments

Summative Assessments
For additional ideas please refer to Resources page for the Common Core State Standards: http://www.corestandards.org/resources

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- Quizzes
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- Quarterly Tests

Modifications (ELLs, Special Education, Gifted and Talented)
Teacher tutoring

- Peer tutoring
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Curriculum Development Resources/Instructional Materials/Equipment Needed Teacher Resources:

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Teacher Notes:

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