

OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT

**Content Area: Mathematics**

**Course Title: Transitional Math**

**Grade Level: 11, 12**

**Unit Plan 1  
Linear Equations and Inequalities,  
Absolute Value Equations and  
Applications**

**Pacing Guide  
5 weeks**

**Unit Plan 2  
Polynomials, Exponents  
and Factoring**

**Pacing Guide  
5 weeks**

**Unit Plan 3  
Quadratics and Radicals**

**Pacing Guide  
5-6 weeks**

**Unit Plan 4  
Pythagorean Theorem and  
Special Right Triangles**

**Pacing Guide  
4 weeks**

**Unit Plan 5  
Probability/Data Analysis/Percents**

**Pacing Guide  
4 weeks**

**Unit Plan 6  
Proportions and Similar Triangles**

**Pacing Guide  
2-3 weeks**

**Unit Plan 7  
Transformations**

**Pacing Guide  
1-2 Weeks**

**Unit Plan 8  
Systems of Equations and  
Matrix Operations**

**Pacing Guide  
5 weeks**

**Unit Plan 9  
Functions**

**Pacing Guide  
3-4 weeks**

**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: Linear Equations and Inequalities, Absolute Value Equations and Applications**

**Target Course/Grade Level: Transitional Math / 11, 12**

**Unit Summary**

In this unit, the topics covered will include solving linear equations with one variable, literal equations, inequalities, compound inequalities, and absolute value equations and inequalities. A focus will be put on the applications of these topics. Also included in this unit is the study of two variables graphing including slope and various forms for the equation of a line. Furthermore, predicting outcomes and estimating from unknown data by using a line of best fit to predict.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

The unit will integrate the 21<sup>st</sup> 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 NJ Class Standard Introductions at: <http://www.state.nj.us/education/cccs/>

**Learning Targets**

**Content Standards**

**Seeing Structure in Expressions A-SSE**

Interpret the structure of expressions

1. Interpret expressions that represent a quantity in terms of its context.
  - a. Interpret parts of an expression, such as terms, factors, and coefficients.

**Creating Equations A-CED**

Create equations that describe numbers or relationships

1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law  $V = IR$  to highlight resistance  $R$ .*

**Reasoning with Equations and Inequalities A-REI**

Understand solving equations as a process of reasoning and explain the reasoning

1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Solve equations and inequalities in one variable

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

**Represent and solve equations and inequalities graphically**

10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
12. Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

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

**Unit Essential Questions**

- How can we use variables in algebraic expressions to represent real-life situations?
- How can equations and inequalities be used to solve real-life problems?
- How do you solve equations and inequalities using algebra and other strategies?
- How can linear graphing be used to predict outcomes?
- When is it reasonable to estimate with a line of best fit?

**Unit Enduring Understandings**

*Students will understand that...*

- Algebra can be utilized to represent real-life situations and expand the ability to solve problems.
- Equation solving is working backward and undoing operations.
- Algebraic concepts and processes can be used to concisely express, analyze and model real life situations.
- The solution to an inequality is a set, not just a single solution.

**Unit Objectives**

*Students will know...*

- Write algebraic expression using variables.
- Use a process including properties of equality and justification to solve equations and inequalities.
- Check solutions of equations and inequalities.
- Solve literal equations for given value.
- Write algebraic expressions, equations and inequalities using variables.
- Solve absolute value equations that contain 0, 1, 2 solutions.
- Plot points and name coordinates of points.
- Calculate slope of a line using the slope formula.
- Identify the slope of a line from its graph.
- Write the equation of a line given its graph or two points on the line.
- Write an equation in slope intercept, point slope, and standard form.
- Graph real data as a scatter plot and calculate line of best fit to predict an outcome.
- Calculate linear regression with a graphing calculator.
- Represent the solution of a linear inequality as a graph.
- Graph and solve absolute value equations and inequalities.

**Unit Objectives**

*Students will be able to...*

- Solve a wide variety of equations and inequalities using aforementioned skills.
- Graph a wide variety of equations and inequalities using the aforementioned skills.
- Interpret and analyze graphs of real world data and use these interpretations to predict.

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Evidence of Learning**

**Formative Assessments**

For additional ideas please refer to NJ State DOE classroom application documents:

<http://www.state.nj.us/education/cccs/>

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

**Summative Assessments**

For additional ideas please refer to NJ State Academic website:

<http://www.state.nj.us/education/cccs/>

- 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
- Computer software to support unit

**Teacher Notes:**

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Unit Overview**

**Content Area: Mathematics**

**Unit Title: Polynomials, Exponents and Factoring**

**Target Course/Grade Level: Transitional Math / 11, 12**

**Unit Summary**

In this unit, students will work with polynomials. After naming polynomials, they will perform operations on two or more polynomials including addition, subtraction, multiplication and factoring. Students will also study exponents and learn how to multiply and divide expressions containing powers with the same base. Then use these concepts to find powers of products and quotients, in addition to writing and using numbers in scientific notation.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

The unit will integrate the 21<sup>st</sup> Century Life and Career stand 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:**

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**Learning Targets**

**Content Standards**

**Arithmetic with Polynomials and Rational Expressions- A-APR**

**Perform arithmetic operations on polynomials**

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.

**Seeing Structure in Expressions - A-SSE**

**Interpret the structure of expressions**

1. Interpret expressions that represent a quantity in terms of its context.
  - a. Interpret parts of an expression, such as terms, factors, and coefficients.
  - b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret  $P(1+r)^n$  as the product of  $P$  and a factor not depending on  $P$ .*
2. Use the structure of an expression to identify ways to rewrite it. *For example, see  $x^4 - y^4$  as  $(x^2)^2 - (y^2)^2$ , thus recognizing it as a difference of squares that can be factored as  $(x^2 - y^2)(x^2 + y^2)$ .*

**Write expressions in equivalent forms to solve problems**

3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
  - a. Factor a quadratic expression to reveal the zeros of the function it defines.

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

<p><b>Unit Essential Questions</b></p> <ul style="list-style-type: none"> <li>• How do polynomials form a system similar to the integers?</li> <li>• How would we perform the basic mathematical operations on polynomials and polynomial equations?</li> <li>• How can exponential form and scientific notation concisely represent an algebraic expression written in standard notation?</li> </ul>	<p><b>Unit Enduring Understandings</b> <i>Students will understand that...</i></p> <ul style="list-style-type: none"> <li>• Similar to integers, polynomials can be added, subtracted and multiplied.</li> <li>• Recognize and evaluate polynomials.</li> <li>• Factor polynomials.</li> <li>• Simplify exponents using the laws of exponents.</li> <li>• Write number in scientific and standard notation.</li> </ul>
<p><b>Unit Objectives</b> <i>Students will know...</i></p> <ul style="list-style-type: none"> <li>• Simplify polynomial expressions using addition, subtraction, and multiplication.</li> <li>• Factor a greatest common factor from a polynomial.</li> <li>• Factor a trinomial to the product of two binomials.</li> <li>• Factor a polynomial using the difference of two squares and sum/difference of two cubes.</li> <li>• Identify a polynomial function and determine its degree.</li> <li>• Multiplication &amp; division properties of exponents.</li> </ul>	<p><b>Unit Objectives</b> <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• Extend their study of functions to higher degree polynomials.</li> <li>• Investigate the notation, concepts, and properties associated with polynomials and perform operations.</li> <li>• Factor various polynomials by a common factor, into two binomials and using special patterns.</li> <li>• Simplify expressions with exponents.</li> <li>• Find powers of products and quotients.</li> <li>• Write and calculate in scientific notation.</li> <li>• Simplify exponents using the laws of exponents.</li> </ul>

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Evidence of Learning**

**Formative Assessments**

For additional ideas please refer to NJ State DOE classroom application documents:

<http://www.state.nj.us/education/cccs/>

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

**Summative Assessments**

For additional ideas please refer to NJ State Academic website:

<http://www.state.nj.us/education/cccs/>

- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects
- 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
- Mathematics Websites

**Teacher Notes:**

**OCEAN COUNTY MATHEMATICS CURRICULUM**  
**SOUTHERN REGIONAL SCHOOL DISTRICT**  
Unit Overview

**Content Area: Mathematics**

**Unit Title: Quadratics and Radicals**

**Target Course/Grade Level: Transitional Math / 11, 12**

**Unit Summary**

In this unit students will learn the main features of quadratic functions. They will simplify radicals involving integers and variables and identify the difference between rational and irrational results. Also, students will perform addition, subtraction and multiplication of radicals. Students will also solve radical equations. The students will solve quadratic equations by using various methods including radicals, factoring, the quadratic formula and graphing. Students will identify the most efficient method for solving a quadratic and implement that method.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

The unit will integrate the 21<sup>st</sup> 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:**

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**Learning Targets**

**Content Standards**

**The Real Number System N-RN**

**Extend the properties of exponents to rational exponents.**

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. *For example, we define  $5^{1/3}$  to be the cube root of 5 because we want  $(5^{1/3})^3 = 5(1/3)^3$  to hold, so  $(5^{1/3})^3$  must equal 5.*
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.

**Seeing Structure in Expressions A-SSR**

**Write expressions in equivalent forms to solve problems**

3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
  - a. Factor a quadratic expression to reveal the zeros of the function it defines.

**Interpreting Functions F-IF**

**Analyze functions using different representations**

7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
  - a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

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

<p><b>Unit Essential Questions</b></p> <ul style="list-style-type: none"> <li>• How can we model applications using quadratic functions?</li> <li>• How can we solve quadratic equations using the quadratic formula, factoring, or the graph of a parabola?</li> <li>• How do I simplify radical expressions without finding an exact final number and how do I simplify radical quantities involving radical expressions?</li> </ul>	<p><b>Unit Enduring Understandings</b> <i>Students will understand that...</i></p> <ul style="list-style-type: none"> <li>• Apply algebraic skills to linear functions and quadratics.</li> <li>• Simplify radical constants by pulling out the radical with the largest perfect square.</li> <li>• Simplify radical variable expressions with both even and odd exponents and utilizing absolute value symbols when necessary.</li> <li>• Understand what a quadratic equation is.</li> <li>• Determine how to manually solve a quadratic equation.</li> <li>• Be able to recognize the form of a quadratic equation.</li> </ul>
<p><b>Unit Objectives</b> <i>Students will know...</i></p> <ul style="list-style-type: none"> <li>• How to solve quadratic functions.</li> <li>• How to graph parabolas.</li> <li>• How to find the x-intercepts of parabolas, roots and solutions.</li> <li>• How to simplify radicals and perform radical operations.</li> <li>• How to determine the vertex and general form of a quadratic.</li> <li>• How to utilize the zero product property to solve equation.</li> <li>• How to factor and solve quadratic equations.</li> <li>• How to solve quadratic equations using the quadratic formula.</li> <li>• How to solve radical equations.</li> </ul>	<p><b>Unit Objectives</b> <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• Solve quadratic equations by factoring or quadratic formula.</li> <li>• Graph quadratic functions and know that their roots are the x-intercepts.</li> <li>• Use the ability to solve quadratics to determine whether the graph of the quadratic function will intersect the x-axis in zero, one or two points.</li> <li>• Perform radical operations and solve radical equations.</li> </ul>

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Evidence of Learning**

**Formative Assessments**

For additional ideas please refer to NJ State DOE classroom application documents:

<http://www.state.nj.us/education/cccs/>

- Homework
- Class Participation
- Teacher Observation
- DO-NOW
- Class Discussions

**Summative Assessments**

For additional ideas please refer to NJ State Academic website:

<http://www.state.nj.us/education/cccs/>

- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects
- 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
- Mathematics Websites
- Computer programs geared toward graphing skills

**Teacher Notes:**

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Unit Overview**

**Content Area: Mathematics**

**Unit Title: Pythagorean Theorem and Special Right Triangles**

**Target Course/Grade Level: Transitional Math / 11, 12**

**Unit Summary**

Students will re-discover the Pythagorean Theorem and use it to calculate the distance between two points. They will also apply their knowledge of Pythagorean Theorem and radicals to find patterns with special triangles. Students will also apply their knowledge to real life applications. This unit will also include basic right triangle trigonometry and its applications.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

The unit will integrate the 21<sup>st</sup> 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:**

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**Learning Targets**

**Content Standards**

**Similarity, Right Triangles, and Trigonometry G-SRT**

**Define trigonometric ratios and solve problems involving right triangles**

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.
7. Explain and use the relationship between the sine and cosine of complementary angles.
8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. Understand independence and conditional probability and use them to interpret data.

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

<p><b>Unit Essential Questions</b></p> <ul style="list-style-type: none"> <li>• How can we measure the distance between any two points by utilizing horizontal and vertical change?</li> <li>• How can we measure distance between two points in a coordinate plane?</li> <li>• How can we use our knowledge of radicals and the Pythagorean Theorem to find missing sides in special right triangles?</li> <li>• What is the relationship between sides of a right triangle and trigonometric functions?</li> </ul>	<p><b>Unit Enduring Understandings</b> <i>Students will understand that...</i></p> <ul style="list-style-type: none"> <li>• Pythagorean theorem has many applications outside of calculating the third side in a triangle.</li> <li>• Knowing just one side of a right triangle, they can find the other sides and angles either by using special patterns or trigonometric ratios.</li> <li>• Distance formula in coordinate geometry.</li> </ul>
<p><b>Unit Objectives</b> <i>Students will know...</i></p> <ul style="list-style-type: none"> <li>• Pythagorean Theorem.</li> <li>• Simplifying radicals.</li> <li>• Distance formula.</li> <li>• Converse of Pythagorean theorem.</li> <li>• Pythagorean triples.</li> <li>• Uses of trigonometric ratios including finding missing sides and angles.</li> </ul>	<p><b>Unit Objectives</b> <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• Use the relationships between sides of a right triangle to solve the triangle</li> <li>• Utilize trigonometric relationships to determine side and angle measure</li> <li>• Calculate the distance between two points on the coordinate plane.</li> </ul>

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Evidence of Learning**

**Formative Assessments**

For additional ideas please refer to NJ State DOE classroom application documents:

<http://www.state.nj.us/education/cccs/>

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

**Summative Assessments**

For additional ideas please refer to NJ State Academic website:

<http://www.state.nj.us/education/cccs/>

- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects
- 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
- Mathematics Websites
- Computer programs geared toward geometric skills

**Teacher Notes:**

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Unit Overview**

**Content Area: Mathematics**

**Unit Title: Probability/Data Analysis/Percents**

**Target Course/Grade Level: Transitional Math / 11, 12**

**Unit Summary**

Students will conduct and draw conclusions from independent and dependent probability experiments. They will use concepts from simple probability and apply them to compound probability, permutations and combinations. Students will also collect, organize, and analyze data mathematically. Students will make inferences based on data and be able to calculate percentages including percent of increase and decrease.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

The unit will integrate the 21<sup>st</sup> 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:**

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**Learning Targets**

**Content Standards**

**Interpreting Categorical and Quantitative Data S-ID**

**Summarize, represent, and interpret data on a single count or measurement variable**

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. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

**Interpret linear models**

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
8. Compute (using technology) and interpret the correlation coefficient of a linear fit.

**Making Inferences and Justifying Conclusions S-IC**

**Understand and evaluate random processes underlying statistical experiments**

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

**Conditional Probability and the Rules of Probability S-CP**

**Understand independence and conditional probability and use them to interpret data**

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  $B$ .  
Use the rules of probability to compute probabilities of compound events in a uniform probability model.

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.
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.
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.
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?
- How are graphs used to display real world data?
- How do you use measures of central tendency in predictions?
- How do you compare data?
- How does percent increase or decrease get used in real world applications?

#### Unit Enduring Understandings

*Students will understand that...*

- 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.
- Applications of percentages in real world data situations.

#### Unit Objectives

*Students will know...*

- How to calculate experimental probability given trial data.
- How to calculate theoretical probability
- How to calculate probability of independent events using union and intersection.
- Combinations and permutations.
- Comparisons of data.
- Display and interpret data using appropriate graphs.
- How to find mean median mode and range.
- How to estimate the mean.
- How to create and analyze scatter plot and using appropriate equation to predict data.
- Percentage calculations.

#### 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**

For additional ideas please refer to NJ State DOE classroom application documents:

<http://www.state.nj.us/education/cces/>

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

**Summative Assessments**

For additional ideas please refer to NJ State Academic website:

<http://www.state.nj.us/education/cces/>

- Chapter/Unit Test
- Open-Ended Writing Assignments
- Quizzes
- Unit Projects
- 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
- Mathematics Websites

**Teacher Notes:**

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Unit Overview**

**Content Area: Mathematics**

**Unit Title: Proportions and Similar Triangles**

**Target Course/Grade Level: Transitional Math/11, 12**

**Unit Summary**

Review ratio, proportion, area and volume, define similar triangles and polygons, discover short cuts for similar triangles and discover the relationship about area and volume of similar polygons and solids.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

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**Technology connections:**

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**Learning Targets**

**Content Standards**

**Similarity, Right Triangles, and Trigonometry G-SRT**

**Understand similarity in terms of similarity transformations**

1. Verify experimentally the properties of dilations given by a center and a scale factor:
  - a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.
  - b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

**Prove theorems involving similarity**

4. Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*
5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

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

<p><b>Unit Essential Questions</b></p> <ul style="list-style-type: none"> <li>• When do figures have identical shapes?</li> <li>• What is the relationship in space of similar figures?</li> <li>• How can you use the properties of similar triangles to measure objects indirectly?</li> </ul>	<p><b>Unit Enduring Understandings</b> <i>Students will understand that...</i></p> <ul style="list-style-type: none"> <li>• Ratios and proportions.</li> <li>• Similar triangle proofs.</li> <li>• Similar polygons.</li> <li>• Indirect measurements.</li> <li>• Area and volume of similar figures.</li> </ul>
<p><b>Unit Objectives</b> <i>Students will know...</i></p> <ul style="list-style-type: none"> <li>• How to simplify ratios and solve proportions.</li> <li>• How to determine measurements of similar figures.</li> <li>• How to determine area and volume of similar figures.</li> </ul>	<p><b>Unit Objectives</b> <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• See beyond congruence and onto similar figures and solids. They will see another application for solving proportions and applications to scale drawings in real world plans.</li> </ul>

**OCEAN COUNTY MATHEMATICS CURRICULUM**  
**SOUTHERN REGIONAL SCHOOL DISTRICT**  
**Evidence of Learning**

**Formative Assessments**

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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: Transformations**

**Target Course/Grade Level: Transitional Math / 11, 12**

**Unit Summary**

Recognize, draw and calculate transformations of geometric shapes. Discover basic properties of transformations and symmetry.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

The unit will integrate the 21<sup>st</sup> Century Life and Career stand 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.

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**Learning Targets**

**Content Standards**

**Congruence G-CO**

**Experiment with transformations in the plane**

1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

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

<p><b>Unit Essential Questions</b></p> <ul style="list-style-type: none"> <li>• What are the basic properties of transformations and symmetry?</li> <li>• What are some techniques used to create a tessellation?</li> </ul>	<p><b>Unit Enduring Understandings</b> <i>Students will understand that...</i></p> <ul style="list-style-type: none"> <li>• Three types of isometries</li> <li>• Symmetry</li> <li>• Tessellations using the three isometries</li> <li>• Transformations of graphs using algebraic expressions</li> </ul>
<p><b>Unit Objectives</b> <i>Students will know...</i></p> <ul style="list-style-type: none"> <li>• How to draw and construct tessellations.</li> <li>• How to differentiate between different types of tessellations.</li> <li>• The three main types of isometries.</li> </ul>	<p><b>Unit Objectives</b> <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• Model transformations algebraically.</li> <li>• Construct their own unique tessellation.</li> </ul>

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**Teacher Notes:**

**OCEAN COUNTY MATHEMATICS CURRICULUM  
SOUTHERN REGIONAL SCHOOL DISTRICT  
Unit Overview**

**Content Area: Mathematics**

**Unit Title: Systems of Equations and Matrix Operations**

**Target Course/Grade Level: Transitional Math / 11, 12**

**Unit Summary**

Solving systems of equations and inequalities using a variety of methods including graphing, substitution, algebraic elimination and matrices.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

The unit will integrate the 21<sup>st</sup> Century Life and Career stand 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:**

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**Learning Targets**

**Content Standards**

**Reasoning with Equations and Inequalities A-REI**

**Solve systems of equations**

5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line  $y = -3x$  and the circle  $x^2 + y^2 = 3$ .*
8. (+) Represent a system of linear equations as a single matrix equation in a vector variable.
9. (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension  $3 \times 3$  or greater).

**Vector and Matrix Quantities N-VM**

**Perform operations on matrices and use matrices in applications.**

6. (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
7. (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
8. (+) Add, subtract, and multiply matrices of appropriate dimensions.
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.
10. (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

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

<p><b>Unit Essential Questions</b></p> <ul style="list-style-type: none"> <li>• How to solve a system of equations or inequalities presented in a variety of ways?</li> <li>• Understanding the appropriateness of each method</li> <li>• How to solve a system of inequalities graphically?</li> <li>• How to represent and arithmetically manipulate matrices?</li> </ul>	<p><b>Unit Enduring Understandings</b> <i>Students will understand that...</i></p> <ul style="list-style-type: none"> <li>• The intersection of two lines provides a solution to a system.</li> <li>• Scalar multiplication of a system is a feasible method to assisting in the solving of a system.</li> <li>• How to set up and solve real life systems using a variety of methods.</li> <li>• Some systems do not have a single solution.</li> <li>• How matrices represent data.</li> </ul>
<p><b>Unit Objectives</b> <i>Students will know...</i></p> <ul style="list-style-type: none"> <li>• Matrix operations.</li> <li>• How to solve systems graphically, using substitution, algebraically through elimination and via matrices on a calculator.</li> <li>• How to solve inequalities graphically.</li> </ul>	<p><b>Unit Objectives</b> <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• Represent real world systems and solve them using an appropriate method.</li> <li>• Use a calculator and matrix representations to solve a variety of higher dimension systems.</li> </ul>

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**Teacher Notes:**

**OCEAN COUNTY MATHEMATICS CURRICULUM  
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Unit Overview**

**Content Area: Mathematics**

**Unit Title: Functions**

**Target Course/Grade Level: Transitional Math / 11, 12**

**Unit Summary**

Students will utilize and understand function notation and utilize terms including domain and range. They will be able to define a function and use function notation to show transformations of graphs.

**Primary interdisciplinary connections:**

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

**21<sup>st</sup> Century Themes:**

The unit will integrate the 21<sup>st</sup> 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:**

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**Learning Targets**

**Content Standards**

**Interpreting Functions F-IF**

**Understand the concept of a function and use function notation**

1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ .
2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

**Building Functions F-BF**

**Build a function that models a relationship between two quantities**

1. Write a function that describes a relationship between two quantities. ★
  - c. (+) Compose functions. *For example, if  $T(y)$  is the temperature in the atmosphere as a function of height, and  $h(t)$  is the height of a weather balloon as a function of time, then  $T(h(t))$  is the temperature at the location of the weather balloon as a function of time.*

**Build new functions from existing functions**

3. Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
4. Find inverse functions.
  - a. Solve an equation of the form  $f(x) = c$  for a simple function  $f$  that has an inverse and write an expression for the inverse. *For example,  $f(x) = 2x^3$  or  $f(x) = (x+1)/(x-1)$  for  $x \neq 1$ .*
  - b. (+) Verify by composition that one function is the inverse of another.
  - c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.

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

<p><b>Unit Essential Questions</b></p> <ul style="list-style-type: none"> <li>• How can we tell if a relation is a function?</li> <li>• How can you use function notation to represent transformations of graphs?</li> <li>• How can you determine if a function has an inverse and if not, how to restrict the domain?</li> <li>• How to find the inverse of a function and verify the solution?</li> </ul>	<p><b>Unit Enduring Understandings</b> <i>Students will understand that...</i></p> <ul style="list-style-type: none"> <li>• Functions may be used to represent many real world situations.</li> <li>• Composition of functions can show more than one real world events impact of other events.</li> <li>• What an inverse is and how to calculate it.</li> </ul>
<p><b>Unit Objectives</b> <i>Students will know...</i></p> <ul style="list-style-type: none"> <li>• Function notations.</li> <li>• Transformation of functions.</li> <li>• Definition of domain and range.</li> <li>• Definition of inverse functions.</li> <li>• Domain restrictions for inverses.</li> <li>• Horizontal and vertical line test.</li> <li>• Sketching inverses and finding inverses given a sketch.</li> <li>• Composition of functions.</li> </ul>	<p><b>Unit Objectives</b> <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• Compose functions and model real world situations using composition of functions.</li> <li>• Calculate inverses given a function or a graph and verify functions are inverses of each other.</li> <li>• Transform graphs using function notation.</li> <li>• Indicate the domain and range of a function and restrict the domain to insure the existence of an inverse.</li> </ul>

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