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| Created on: | July, 2015 |
| Created by: |  |
| Revised on: |  |
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| **OCEAN COUNTY MATHEMATICS**  **CURRICULUM** | | | | | | | | | | | |
| **Content Area: Mathematics**  **Note: highlighted standards will be evaluated on the PARCC** | | | | | | | | | | | |
| **Course Title:** Algebra I | | | | | | | **Grade Level: High School** | | | | |
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|  | **Writing, Evaluating and Graphing of Linear Equations and Function Notation** | | |  | **6 weeks** | | | | | |  | |
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|  | **Writing, Evaluating and Graphing of Linear Inequalities, and Absolute Value Equations/Inequalities** | | |  | **6 weeks** | | | | | |  | |
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|  | **Systems of Equations and Inequalities** | | |  | **4 weeks** | | | | | |  | |
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|  | **Properties of Exponents, Exponential Functions, and Scientific Notation** | | |  | **3 weeks** | | | | | |  | |
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|  | **Polynomials: Factor and Operations** | | |  | **5 weeks** | | | | | |  | |
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|  | **Radical Expressions and Equations** | | |  | **3 weeks** | | | | | |  | |
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| **OCEAN COUNTY MATHEMATICS**  **CURRICULUM** | | | | | | | | |
| **Content Area: Mathematics** | | | | | | | | |
| **Course Title:** Algebra I | | | | | | **Grade Level: High School** | | |
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|  | **Quadratics: Solving and Graphing** |  | **6 weeks** | | | | |  | |
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|  | **Probability and Data Analysis** |  | **3 weeks** | | | | |  | |
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The following Standards for Mathematical Practice and select Common Core Content Standards should be covered throughout the various units of the curriculum.

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| Standards for Mathematical Practices | | | |
| MP.1 | Make sense of problems and persevere in solving them. | | * Find meaning in problems * Look for entry points * Analyze, conjecture and plan solution pathways * Monitor and adjust * Verify answers * Ask themselves the question: “Does this make sense?” |
| MP.2 | Reason abstractly and quantitatively. | | * Make sense of quantities and their relationships in problems * Learn to contextualize and decontextualize * Create coherent representations of problems |
| MP.3 | Construct viable arguments and critique the reasoning of others. | | * Understand and use information to construct arguments * Make and explore the truth of conjectures * Recognize and use counterexamples * Justify conclusions and respond to arguments of others |
| MP.4 | Model with Mathematics. | | * Apply mathematics to problems in everyday life * Make assumptions and approximations * Identify quantities in a practical situation * Interpret results in the context of the situation and reflect on whether the results make sense |
| MP.5 | Use appropriate tools strategically. | | * Consider the available tools when solving problems * Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) * Make sound decisions of which of these tools might be helpful |
| MP.6 | Attend to precision. | | * Communicate precisely to others * Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes * Calculate accurately and efficiently |
| MP.7 | Look for and make use of structure. | | * Discern patterns and structures * Can step back for an overview and shift perspective * See complicated things as single objects or as being composed of several objects |
| MP.8 | Look for and express regularity in repeated reasoning. | | * Notice if calculations are repeated and look both for general methods and shortcuts * In solving problems, maintain oversight of the process while attending to detail * Evaluate the reasonableness of their immediate results |
| Global Content Standards for Algebra 1 | | | |
| N-Q.1 | | Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. | |
| N-Q.2 | | Define appropriate quantities for the purposes of descriptive modeling. | |
| N-Q.3 | | Choose a level of accuracy appropriate to limitations on measurements when reporting quantities. | |
| Technology Goals for Algebra 1: | | | |
| Students will be able to use a graphing calculator to graph a function, set the window range, create scatter plots and use the regression feature including calculating the correlation coefficient, and solve a linear system by finding the point of intersection. | | | |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Unit Overview** | | |
| **Content Area: Mathematics Grade: High School** | | |
| **Unit: Writing, Evaluating and Graphing of Linear Equations and Function Notation** | | |
| **Domain:** Creating Equations/Reasoning with Equations & Inequalities/ Interpreting Functions/ Building Functions | | |
| **Unit Summary:** This unit focuses onmanipulating expressions, writing, solving, and graphing linear equations. Expressions and equations will be solved algebraically. Functions will be used in a variety of ways to describe real world relationships and patterns. | | |
| **Primary interdisciplinary connections:** Infused within the unit are connections to the 2014 NJCCCS for Mathematics, Language Arts Literacy, Science and Technology. | | |
| **21st century themes:** The unit will integrate the 21st Century Life and Career standards:  CRP2. Apply appropriate academic and technical skills.  CRP4. Communicate clearly and effectively and with reason  CRP6. Demonstrate creativity and innovation.  CRP7. Employ valid and reliable research strategies.  CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  CRP11. Use technology to enhance productivity. | | |
| **Learning Targets** | | |
| **Content Standards** | | |
| **Number** | **Common Core Standard for Mastery** | |
| A.REI.3 | Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | |
| A.CED.1 | Create equations and inequalities in one variable and use them to solve problems. | |
| A.CED.2 | Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. | |
| **Number** | **Common Core Standard for Introduction** | |
| A.CED.4 | Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. | |
| A.REI.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. | |
| A.CED.3 | Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. | |
| A.REI.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). | |
| F.IF.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). | |
| F.IF.2 | Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. | |
| F.IF.3 | Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. | |
| F.IF.5 | Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. | |
| F.IF.6 | Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. | |
| F.BF.1 | Write a function that describes a relationship between two quantities. | |
| F.BF.1.a | Determine an explicit expression, a recursive process, or steps for calculation from a context. | |
| F.LE.5 | Interpret the parameters in a linear or exponential function in terms of a context. | |
| **Unit Essential Questions**   * How do you translate real-life situations into equations? * How do you solve equations using algebra and other strategies? * How can linear equations be used to model real world data? * How can linear graphing be used to predict outcomes? * How can we model real world situations using function notation? | | **Unit Enduring Understandings**  *Students will understand that…*   * Equation solving is working backward and undoing operations. * Function notation provides instructions to be applied to mathematical expressions. * Input and output values in a table can be translated to a graph as the x and y coordinates. |
| **Unit Objectives**  *Students will know…*   * Expressions are simplified by various means * Equations can be solved using the properties of equality. * Slope is a constant change * The solution of a two variable equation can be represented as a linear graph. * Functional notation is a way to name a function that is defined by a graph. * Arithmetic sequences are linear functions. | | **Unit Objectives**  *Students will be able to…*   * Write algebraic expressions using variables. * Simplify expressions using order of operations, the distributive property, and combining like terms. * Translate expressions and statements into algebraic expressions and equations. * Evaluate variable expressions. * Check solutions of equations and inequalities. * Use a process including properties of equality and justification to solve equations. * Solve literal equations for a given variable. * Plot points & name coordinates of points on the coordinate plane. * Calculate slope of a line using the Slope Formula. * Identify the slope (average rate of change) 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 form, point-slope form, and standard form. * Represent the solution of a two-variable equation as a linear graph. * Use the graphing calculator to graph equations. * Identify the domain and range of a function. * Find the value of the range given the domain values. * Write Real World scenarios with independent and dependant variables using function notation. * Graph an equation presented in function notation. * Recognize that an arithmetic sequence is a linear function. |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Evidence of Learning** | |
| **Formative Assessments** | |
| * Observation * Homework * Class participation * Whiteboards/communicators * Think-Pair-Share | * DO-NOW * Notebook * Writing prompts * Exit passes * Self-assessment |
| **Summative Assessments**   * Chapter/Unit Test * Quizzes * Presentations * Unit Projects * Mid-Term and Final Exams | |
| **Modifications (ELLs, Special Education, Gifted and Talented)**   * Teacher tutoring * Peer tutoring * Cooperative learning groups * Modified assignments * Alternative assessments * Group investigation * 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:**  For further clarification refer to NJ Class Standard Introductions at [**www.njcccs.org**](http://www.njcccs.org).   * Graphing Calculator * Microsoft Excel/PowerPoint * Teacher-made tests, worksheets, warm-ups, and quizzes * Computer software to support unit * Smart board * Document camera * [www.ixl.com](http://www.ixl.com) * [www.purplemath.com](http://www.purplemath.com) * [www.Kutasoftware.com](http://www.Kutasoftware.com) * [www.Khanacademy.com](http://www.Khanacademy.com) * [www.brightstorm.com](http://www.brightstorm.com) * [www.coolmath.com](http://www.coolmath.com) * [www.desmos.com](http://www.desmos.com) | |
| **Teacher Notes:** | |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Unit Overview** | | |
| **Content Area: Mathematics Grade: High School** | | |
| **Unit: Writing, Evaluating and Graphing of Linear Inequalities and Absolute Value Equations/Inequalities** | | |
| **Domain:** Reasoning with Equations & Inequalities/Creating Equations | | |
| **Unit Summary:** This unit focuses on manipulating expressions and inequalities, writing, solving, and graphing linear equations and inequalities. Expressions, equations, and inequalities will be solved algebraically. Skills learned from linear equations will be applied to both inequality and absolute value graphs. | | |
| **Primary interdisciplinary connections:** Infused within the unit are connections to the 2014 NJCCCS for Mathematics, Language Arts Literacy, Science and Technology. | | |
| **21st century themes:** The unit will integrate the 21st Century Life and Career standards:  CRP2. Apply appropriate academic and technical skills.  CRP4. Communicate clearly and effectively and with reason  CRP6. Demonstrate creativity and innovation.  CRP7. Employ valid and reliable research strategies.  CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  CRP11. Use technology to enhance productivity. | | |
| **Learning Targets** | | |
| **Content Standards** | | |
| **Number** | **Common Core Standard for Mastery** | |
| A.REI.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. | |
| A.REI.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. | |
| **Number** | **Common Core Standard for Introduction** | |
| A.CED.3 | Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. | |
| A.REI.11 | Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equations f(x) = g(x); find solutions approximately: using technology to graph functions, make table of values or find successive approximations. | |
| **Unit Essential Questions**   * How do you translate real-life situations into inequalities? * How do you solve inequalities using algebra and other strategies? * How can we model real world situations using absolute value? | | **Unit Enduring Understandings**  *Students will understand that…*   * The rules for solving equations can be applied when solving inequalities and absolute value equations. * Solving inequalities is similar to solving equations, working backward and undoing operations, the exception being when multiplying or dividing by a negative number. * The solution to an inequality is a set, not just a single solution. * There is a connection between the graphs of both absolute value and linear equations. * Absolute value is the distance from zero. |
| **Unit Objectives**  *Students will know…*   * How to graph a wide variety of inequalities and absolute value equations. * How to recognize the differences in a graph of an inequality and absolute value equations. * How to use graphing skills to sketch inequalities and absolute value equations. * How to solve inequalities and absolute value equations. | | **Unit Objectives**  *Students will be able to…*   * Translate expressions and statements into algebraic expressions, equations and inequalities * Evaluate absolute-value expressions and inequalities. * Check solutions of equations and inequalities. * Use a process including properties of equality and justification to solve equations and inequalities. * Use the sign-change rule for multiplying or dividing both sides of a one variable inequality by a negative number. * Solve absolute value equations that contain 0, 1 or 2 solutions. * Solve absolute value inequality is an “and” or an “or” compound inequality. |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Evidence of Learning** | |
| **Formative Assessments** | |
| * Observation * Homework * Class participation * Whiteboards/communicators * Think-Pair-Share | * DO-NOW * Notebook * Writing prompts * Exit passes * Self-assessment |
| **Summative Assessments**   * Chapter/Unit Test * Quizzes * Presentations * Unit Projects * Mid-Term and Final Exams | |
| **Modifications (ELLs, Special Education, Gifted and Talented)**   * Teacher tutoring * Peer tutoring * Cooperative learning groups * Modified assignments * Alternative assessments * Group investigation * 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:**  For further clarification refer to NJ Class Standard Introductions at [**www.njcccs.org**](http://www.njcccs.org).   * Graphing Calculator * Microsoft Excel/PowerPoint * Teacher-made tests, worksheets, warm-ups, and quizzes * Computer software to support unit * Smart board * Elmo Machine * [www.ixl.com](http://www.ixl.com) * [www.purplemath.com](http://www.purplemath.com) * [www.Kutasoftware.com](http://www.Kutasoftware.com) * [www.Khanacademy.com](http://www.Khanacademy.com) * [www.brightstorm.com](http://www.brightstorm.com) * [www.coolmath.com](http://www.coolmath.com) * [www.desmos.com](http://www.desmos.com) | |
| **Teacher Notes:** | |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Unit Overview** | | |
| **Content Area: Mathematics Grade: High School** | | |
| **Unit: Systems of Equations and Inequalities** | | |
| **Domain:** Reasoning with Equations and Inequalities/Creating Equations | | |
| **Unit Summary:** This unit focuses on solving systems of equations and inequalities using the graphing, substitution, and elimination methods. Students will solve systems with 0, 1, and infinitely many solutions. | | |
| **Primary interdisciplinary connections:** Infused within the unit are connections to the 2014 NJCCCS for Mathematics, Language Arts Literacy, Science and Technology. | | |
| **21st century themes:** The unit will integrate the 21st Century Life and Career standards:  CRP2. Apply appropriate academic and technical skills.  CRP4. Communicate clearly and effectively and with reason  CRP6. Demonstrate creativity and innovation.  CRP7. Employ valid and reliable research strategies.  CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  CRP11. Use technology to enhance productivity. | | |
| **Learning Targets** | | |
| **Content Standards** | | |
| **Number** | **Common Core Standard for Mastery** | |
| A.REI.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. | |
| A.REI.6 | Solve systems of linear equations exactly and approximately (e.g. with graphs), focusing on pairs of linear equations in two variables. | |
| A.REI.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. | |
| A.CED.2 | Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. | |
| **Number** | **Common Core Standard for Introduction** | |
| A.REI.11 | Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equations f(x) = g(x); find solutions approximately: using technology to graph functions, make table of values or find successive approximations. | |
| A.CED.3 | Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. | |
| **Unit Essential Questions**   * How are systems of equations solved using graphing, substitution, and elimination? * When is it appropriate to use each method? * What are the three types of solutions to a system? * What does the intersecting region of a system of inequalities represent? * How can real world situations be solved using a system of equations? | | **Unit Enduring Understandings**  *Students will understand that…*   * The intersection of two lines provides a solution to the system. * Solving systems by graphing has its limitations. * Multiplying an entire equation by a non-zero constant does not change the value of the equation/inequality. * A solution to a system of equations has   significance in the real world. |
| **Unit Objectives**  *Students will know…*   * There are various methods to solve systems of equations and inequalities. * When to employ a particular method to solve the systems of equations. | | **Unit Objectives**  *Student will be able to ….*   * Solve systems using substitution. * Solve systems using elimination. * Solve systems using graphing. * Solve systems of linear inequalities. * Use systems to find the solutions to real world situations. |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Evidence of Learning** | |
| **Formative Assessments** | |
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| **Summative Assessments**   * Chapter/Unit Test * Quizzes * Presentations * Unit Projects * Mid-Term and Final Exams | |
| **Modifications (ELLs, Special Education, Gifted and Talented)**   * Teacher tutoring * Peer tutoring * Cooperative learning groups * Modified assignments * Alternative assessments * Group investigation * 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:**  For further clarification refer to NJ Class Standard Introductions at [**www.njcccs.org**](http://www.njcccs.org).   * Graphing Calculator * Microsoft Excel/PowerPoint * Teacher-made tests, worksheets, warm-ups, and quizzes * Computer software to support unit * Smart board * Elmo Machine * [www.ixl.com](http://www.ixl.com) * [www.purplemath.com](http://www.purplemath.com) * [www.Kutasoftware.com](http://www.Kutasoftware.com) * [www.Khanacademy.com](http://www.Khanacademy.com) * [www.brightstorm.com](http://www.brightstorm.com) * [www.coolmath.com](http://www.coolmath.com) * [www.desmos.com](http://www.desmos.com) | |
| **Teacher Notes:** | |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Unit Overview** | | |
| **Content Area: Mathematics Grade: High School** | | |
| **Unit: Properties of Exponents, Exponential Functions, and Scientific Notation** | | |
| **Domain:** Exponents and Exponential Functions/ The Real Number System/ Seeing Structure in Expressions/ Linear Exponential Models/ Interpreting Functions/ Building Functions/ Reasoning with Equations and Inequalities | | |
| **Unit Summary:** This unit focuses on simplifying expressions involving exponents and scientific notation. Real world problems will be modeled with exponential growth and decay equations and proportional applications. | | |
| **Primary interdisciplinary connections:** Infused within the unit are connections to the 2014 NJCCCS for Mathematics, Language Arts Literacy, Science and Technology. | | |
| **21st century themes:** The unit will integrate the 21st Century Life and Career standards:  CRP2. Apply appropriate academic and technical skills.  CRP4. Communicate clearly and effectively and with reason  CRP6. Demonstrate creativity and innovation.  CRP7. Employ valid and reliable research strategies.  CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  CRP11. Use technology to enhance productivity. | | |
| **Learning Targets** | | |
| **Content Standards** | | |
| **Number** | **Common Core Standard for Mastery** | |
| 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 radical and rational exponents using the properties of exponents. | |
| A.SSE.2 | Use the structure of an expression to identify ways to rewrite it. | |
| F.LE.2 | Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. | |
| F.IF.7 | Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. | |
| F.IF.7.e | Graph exponential and logarithmic functions, showing intercepts and end behavior, and explain different properties of the function. | |
| F.IF.8 | Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. | |
| F.IF.8.b | Use the properties of exponents to interpret expressions for exponential functions. | |
| 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. | |
| **Number** | **Common Core Standard for Introduction** | |
| A.SSE.3.c | Use the properties of exponents to transform expressions for exponential functions. | |
| F.IF.3 | Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. | |
| F.BF.1.a | 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. | |
| F.BF.3 | Identify the effect on the graph of replacing 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. | |
| F.LE.5 | Interpret the parameters in a linear or exponential function in terms of a context. | |
| A.REI.11 | Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute, exponential, and logarithmic functions. | |
| **Unit Essential Questions**   * How do we compare the differences between linear and exponential growth? * How can we apply the concept of exponential growth/decay to real world problems? * How are geometric sequences related to exponential functions/ * When do quantities have a nonlinear relationship? | | **Unit Enduring Understandings**  *Students will understand that…*   * There can still be a relationship between two numbers even if there is no linear pattern. * Predictions can be made using exponential growth and decay models. * Scientific notation can be used to represent extremely large or extremely small numbers. * Expressions involving exponents may be simplified by applying the laws of exponents. |
| **Unit Objectives**  *Students will know…*   * How to simplify exponents using the laws of exponents. * Scientific notation is primarily used to write very small or very large numbers. * How to recognize a growth or decay exponential equation or graph. * How to relate geometric sequences to exponential functions. | | **Unit Objectives**  *Students will be able to…*   * Multiply and divide monomials using the properties of exponents. * Evaluate and rewrite expressions involving rational exponents. * Find products and quotients of numbers expressed in scientific notation. * Graph exponential functions. * Solve problems involving exponential growth or decay. * Identify and generate geometric sequences. * Write exponential equations that model real-world growth and decay data * Observe exponential growth using tables and graphs |
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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Evidence of Learning** | |
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| **Summative Assessments**   * Chapter/Unit Test * Quizzes * Presentations * Unit Projects * Mid-Term and Final Exams | |
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| **Teacher Notes:** | |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Unit Overview** | | |
| **Content Area: Mathematics Grade: High School** | | |
| **Unit: Polynomials: Factor and Operations** | | |
| **Domain**: Arithmetic with Polynomials and Rational Expressions/ Seeing Structure in Expressions | | |
| **Unit Summary:** In this unit,students will begin working with polynomials. After naming polynomials they will perform the basic operations such as adding, subtracting, and multiplying two or more polynomials. Students will also factor polynomials. | | |
| **Primary interdisciplinary connections:** Infused within the unit are connections to the 2014 NJCCCS for Mathematics, Language Arts Literacy, Science and Technology. | | |
| **21st century themes:** The unit will integrate the 21st Century Life and Career standards:  CRP2. Apply appropriate academic and technical skills.  CRP4. Communicate clearly and effectively and with reason  CRP6. Demonstrate creativity and innovation.  CRP7. Employ valid and reliable research strategies.  CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  CRP11. Use technology to enhance productivity. | | |
| **Learning Targets** | | |
| **Content Standards** | | |
| **Number** | **Common Core Standard for Mastery** | |
| A.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. | |
| A.SSE.1 | Interpret expressions that represent a quantity in terms of its context. | |
| A.SSE.1.a | Interpret parts of an expression, such as terms, factors, and coefficients. | |
| A.SSE.3 | Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. | |
| A.SSE.3.a | Factor a quadratic expression to reveal the zeros of the function it  defines. | |
| **Number** | **Common Core Standard for Introduction** | |
| A.SSE.1.b | Interpret complicated expressions by viewing one or more of their parts as a single entity. | |
| A.SSE.2 | Use the structure of an expression to identify ways to rewrite it. | |
| **Unit Essential Questions**   * How would we perform the basic   mathematical operations on  polynomials and polynomial  equations?   * How could a polynomial be expressed as the product of two or more factors? * When can a polynomial be factored? * What terms are used to describe the zeros of a polynomial? * How can polynomial equations be used to solve real world problems? | | **Unit Enduring Understandings**  *Students will understand that…*   * Polynomials can be added and subtracted by combining like terms. * Polynomials can be classified by their degree and the number of terms. * Polynomials can be multiplied using a variety of methods. * Polynomials can be factored. |
| **Unit Objectives**  *Students will know…*   * How to determine a degree of a polynomial. * How to manipulate polynomials. * How to reverse a polynomial into factors. | | **Unit Objectives**  *Students will be able to…*   * Identify a polynomial function and determine its degree * Add, subtract and multiply polynomials. * Factor polynomials completely. * Factor a greatest common factor from a polynomial. * Factor a trinomial as the product of two binomials. * Write polynomials in standard form. |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Evidence of Learning** | |
| **Formative Assessments** | |
| * Observation * Homework * Class participation * Whiteboards/communicators * Think-Pair-Share | * DO-NOW * Notebook * Writing prompts * Exit passes * Self-assessment |
| **Summative Assessments**   * Chapter/Unit Test * Quizzes * Presentations * Unit Projects * Mid-Term and Final Exams | |
| **Modifications (ELLs, Special Education, Gifted and Talented)**   * Teacher tutoring * Peer tutoring * Cooperative learning groups * Modified assignments * Alternative assessments * Group investigation * 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:**  For further clarification refer to NJ Class Standard Introductions at [**www.njcccs.org**](http://www.njcccs.org).   * Graphing Calculator * Microsoft Excel/PowerPoint * Teacher-made tests, worksheets, warm-ups, and quizzes * Computer software to support unit * Smart board * Elmo Machine * [www.ixl.com](http://www.ixl.com) * [www.purplemath.com](http://www.purplemath.com) * [www.Kutasoftware.com](http://www.Kutasoftware.com) * [www.Khanacademy.com](http://www.Khanacademy.com) * [www.brightstorm.com](http://www.brightstorm.com) * [www.coolmath.com](http://www.coolmath.com) * [www.desmos.com](http://www.desmos.com) | |
| **Teacher Notes:** | |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Unit Overview** | | |
| **Content Area: Mathematics Grade: High School** | | |
| **Unit: Radical Expressions and Equations** | | |
| **Domain**: The Real Number System/ Reasoning with Equations and Inequalities/ Creating Equations/ Interpreting Functions | | |
| **Unit Summary:** This unit focuses on simplifying radical expressions and performing basic operations on radical expressions. Students will also learn to graph radical functions and solve radical equations. | | |
| **Primary interdisciplinary connections:** Infused within the unit are connections to the 2014 NJCCCS for Mathematics, Language Arts Literacy, Science and Technology. | | |
| **21st century themes:** The unit will integrate the 21st Century Life and Career standards:  CRP2. Apply appropriate academic and technical skills.  CRP4. Communicate clearly and effectively and with reason  CRP6. Demonstrate creativity and innovation.  CRP7. Employ valid and reliable research strategies.  CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  CRP11. Use technology to enhance productivity. | | |
| **Learning Targets** | | |
| **Content Standards** | | |
| **Number** | **Common Core Standard for Mastery** | |
| N.RN.2 | Rewrite expressions involving radicals and rational exponents using the properties of exponents. | |
| N.RN.3 | Explain why the sum or product of two ration numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. | |
| A.REI.2 | Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may rise. | |
| **Number** | **Common Core Standard for Introduction** | |
| A.CED.2 | Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. | |
| F.IF.4 | For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given verbal description of the relationship. | |
| F.IF.7.b | Graph square root, cube root, and piecewise-functions, including step functions and absolute value functions. | |
| **Unit Essential Questions**   * How do we know if a radical expression is in simplest form? * How can radical expressions be combined? * How can you use the properties of real numbers to performs operations an radical expressions? * How and why should you check your solution to radical equations? | | **Unit Enduring Understandings**  *Students will understand that…*   * The knowledge of radicals is a basis for higher level mathematics * Radical expression with like radicals can be added or subtracted. * Radical expressions must be in simplest form. * The graph of a square root function has unique characteristics. |
| **Unit Objectives**  *Students will know…*   * How to perform basic operations with radical expressions. * How to solve and graph basic radical equations. | | **Unit Objectives**  *Students will be able to…*   * Simplify radical expressions * Add, subtract, and multiply radical expressions * Solve radical equations * Graph the parent radical function () * Find the distance between two points using the distance formula. * Use properties of rational and irrational numbers. |

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| **Summative Assessments**   * Chapter/Unit Test * Quizzes * Presentations * Unit Projects * Mid-Term and Final Exams | |
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| **Teacher Notes:** | |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Unit Overview** | | |
| **Content Area: Mathematics Grade: High School** | | |
| **Unit: Quadratics: Solving and Graphing** | | |
| **Domain:** Arithmetic with Polynomials and Rational Expressions/ Seeing Structure in Expressions/ Reasoning with Equations and Inequalities/ Interpreting Functions | | |
| **Unit Summary:** This unit focuses on solving and graphing quadratic functions. The student will be able to determine the effect of 'a' of y =ax^2 to determine the direction of the graph, the vertex point and whether the vertex point is a maxim or a minimum point. This lesson is designed to help students solve quadratic equations by using the Quadratic Formula, factoring, and graphing. Students will identify the most efficient method for solving a quadratic equation and solve the quadratic equation. | | |
| **Primary interdisciplinary connections:** Infused within the unit are connections to the 2014 NJCCCS for Mathematics, Language Arts Literacy, Science and Technology. | | |
| **21st century themes:** The unit will integrate the 21st Century Life and Career standards:  CRP2. Apply appropriate academic and technical skills.  CRP4. Communicate clearly and effectively and with reason  CRP6. Demonstrate creativity and innovation.  CRP7. Employ valid and reliable research strategies.  CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  CRP11. Use technology to enhance productivity. | | |
| **Learning Targets** | | |
| **Content Standards** | | |
| **Number** | **Common Core Standard for Mastery** | |
| A.APR.3 | Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. | |
| F.IF.7 | Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. | |
| F.IF.7.a | Graph linear and quadratic functions and show intercepts, maxima, and minima. | |
| A.REI.4 | Solve quadratic equations in one variable. | |
| F.LE.1 | Distinguish between situations that can be modeled with linear functions and with exponential functions. | |
| A.APR.3 | Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. | |
| A.SSE.3.a | Factor a quadratic expression to reveal the zeros of the function if defines. | |
| **Number** | **Common Core Standard for Introduction** | |
| A.REI.4.a | Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p)2 = q that has the same solutions. | |
| A.REI.4.b | Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a±bi for real numbers a and b. | |
| A.SSE.3.b | Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. | |
| F.IF.8.a | Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. | |
| F.IF.9 | Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). | |
| **Unit Essential Questions**   * How can we model applications using quadratic functions? * How can we solve quadratic equations using the quadratic formula, factoring, or the graph of the parabola? * How can we choose a linear, exponential or quadratic equation to model a real world situation? * What terms are used to describe the zeros of a quadratic function? * What are the different ways to solve quadratic equations and when is each appropriate? * What does a quadratic function look like? | | **Unit Enduring Understandings**  *Students will understand that…*   * A quadratic function has the form , where * A quadratic equation can be solved by applying a variety of techniques. * A quadratic equation can be solved by using a graphing calculator. * The graph of a quadratic function results in a parabola. |
| **Unit Objectives**  *Students will know…*   * The graph of a quadratic function will intersect the x-axis in zero, one or two points. * Quadratic equations are solved by factoring or by applying the quadratic formula. * How to graph quadratic functions. * The roots are the x – intercepts of a quadratic function. | | **Unit Objectives**  *Students will be able to…*   * Graph parabolas * Find the x-intercepts of parabolas, roots and solutions. * Determine the vertex. * Utilize the zero-product property to solve equations. * Factor and solve quadratic equations. * Solve quadratic equations using the quadratic formula. * To use the discriminant to determine the number and type of real solutions. * To determine properties of a function given different representations. |

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| **Teacher Notes:** | |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM**  **Unit Overview** | | |
| **Content Area: Mathematics Grade: High School** | | |
| **Unit:** P**robability and Data Analysis** | | |
| **Domain:** Interpreting Categorical and Quantitative Data/ Making Inferences and Justifying Conclusions/ Conditional Probability and the Rules of Probability | | |
| **Unit Summary:** This unit will focus on determining the probability of an event. Students will analyze data in order to determine the probability of an event occurring and make predictions. The counting methods will be utilized to determine how many possible outcomes can occur. Students will recognize possible associations and trends in the data. | | |
| **Primary interdisciplinary connections:** Infused within the unit are connections to the 2014 NJCCCS for Mathematics, Language Arts Literacy, Science and Technology. | | |
| **21st century themes:** The unit will integrate the 21st Century Life and Career standards:  CRP2. Apply appropriate academic and technical skills.  CRP4. Communicate clearly and effectively and with reason  CRP6. Demonstrate creativity and innovation.  CRP7. Employ valid and reliable research strategies.  CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  CRP11. Use technology to enhance productivity. | | |
| **Learning Targets** | | |
| **Content Standards** | | |
| **Number** | **Common Core Standard for Mastery** | |
| 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 of more different data sets. | |
| S.ID.3 | Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). | |
| S.ID.6 | Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. | |
| S.ID.6.a | Fit a function to the data, use functions fitted to data to solve problems in the context of data. | |
| S.ID.6.b. | Informally assess the fit of a function by plotting and analyzing residuals. | |
| S.ID.6.c | Fit a linear function for a scatter plot that suggests a linear association. | |
| 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. | |
| 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. | |
| **Number** | **Common Core Standard for Introduction** | |
| S.IC.1 | Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population. | |
| S.IC.6 | Evaluate reports based on data. | |
| 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.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.8 | Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A), and interpret the answer in terms of the model. | |
| **Unit Essential Questions**   * How can we use experimental and theoretical probabilities to predict future events? * How do the individual probabilities of events impact compound probability situations? * How does the likelihood of an event occurring depend upon its’ probability’s proximity to the limits, 0 being impossible and 1 being certain? * How the collection, organization, interpretation, and display of data be used to answer questions. * How does the representation of data influence decisions? * How to determine if a conclusion is reasonable? * How do the results of a statistical investigation be used to support an argument? How can you apply to the media or political campaigns? * How are trends identified in data? | | **Unit Enduring Understandings**  *Students will understand that…*   * In order to find the total possible outcomes of multiple categories, one must apply the fundamental counting principle. * There is a difference between theoretical and experimental probability. * Compound probabilities involving two different circumstances, and / or, are calculated differently. * The results of a statistical analysis of an investigation can be used to support or refute an argument. * Data analysis and misleading statistics are parts of the world around us. |
| **Unit Objectives**  *Students will know…*   * How to calculate and apply permutations and combinations. * The definition of probability as the likelihood of an event occurring. * How to calculate the probability of an event occurring. * How to calculate compound probability. * How and when to use the fundamental counting principle. * How to represent data on the real number line. * How to determine the center (median, mean) and spread (interquartile range and standard deviation). * How to recognize trends in data. * How to fit a function to data by plotting and analyzing. * The difference between correlation coefficient and causation. | | **Unit Objectives**  *Students will be able to…*   * Use the Fundamental Counting Principle to determine the total number of possible outcomes. * Calculate the probability of a simple event occurring. * Determine the likelihood of an event occurring based upon 0, 0.5, and 1 as bench marks. * Use nPr as well as nCr to expand on the Fundamental Counting Principle with restrictions. * Determine compound probability. * Create dot plots, histograms, and box plots. * Compare center and spread of two of more data sets. * Interpret the context in data. * Create scatter plots in linear models. * Compute the correlation coefficient with and without technology. * Determine the difference between correlation and causation. |

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| **Teacher Notes:** | |

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| **Common Core State Standards for Mathematics (High School)** | | | | | |
| **Progression of Standards** | | | | | |
|  | **Algebra I** | **Geometry** | **Algebra II** | **Pre Calculus** | **Calculus** |
| **Number & Quantity** |  |  |  |  |  |
| ***The Real Number System (N-RN)*** |  |  |  |  |  |
| Extend the properties of exponents to rational exponents | I | D | M |  |  |
| Use properties of rational and irrational numbers | I | D | M |  |  |
| ***Quantities (N-Q)*** |  |  |  |  |  |
| Reason quanitatively and use units to solve problems | I | D | M |  |  |
| ***The Complex Number System (N-CN)*** |  |  |  |  |  |
| Perform arithmetic operations with complex numbers |  | I | D | M |  |
| Represent complex numbers and their operations on the complex plane |  |  | I | D | M |
| Use complex numbers in polynomial identities and equations |  |  | I | D | M |
| ***Vector and Matrix Quantities (N-VM)*** |  |  |  |  |  |
| Represent and model with vector quantities |  | I |  | D | M |
| Perform operations on vectors |  | I | D | M |  |
| Perform operations on matrices and use matrices in applications | I |  | D | M |  |
| **Algebra** |  |  |  |  |  |
| ***Seeing Structure in Expressions (A-SSE)*** |  |  |  |  |  |
| Interpret the structure of expressions | I | D | M |  |  |
| Write expressions in equivalent forms to solve problems | I | D | M |  |  |
| ***Arithmetic with Polynomials and Rational Expressions (A-APR)*** |  |  |  |  |  |
| Perform arithmetic operations on polynomials | I | D | M |  |  |
| Understand the relationship between zeros and factors of polynomials | I |  | D | M |  |
| Use polynomial identities to solve problems | I |  | D | M |  |
| Rewrite rational expressions | I | D | M |  |  |
| ***Creating Equations (A-CED)*** |  |  |  |  |  |
| Create equations that describe numbers or relationships | I | D | M |  |  |
| ***Reasoning with Equations and Inequalities (A-REI)*** |  |  |  |  |  |
| Understand solving equations as a process of reasoning and explain the reasoning | I | D | M |  |  |
| Solve equations and inequalities in one variable | I | D | M |  |  |
| Solve systems of equations | I |  | D | M |  |
| Represent and solve equations and inequalities graphicallly | I |  | D | M |  |
| **Functions** |  |  |  |  |  |
| ***Interpreting Functions (F-IF)*** |  |  |  |  |  |
| Understand the concept of a function and use function notation | I | D | M |  |  |
| Interpret functions that arise in applications in terms of the context | I | D | M |  |  |
| Analyze functions using different representations |  |  |  |  |  |
| ***Building Functions (F-BF)*** | I |  | D | M |  |
| Build a function that models a relationship between two quantities | I | D | M |  |  |
| Build new functions from existing functions | I |  | D | M |  |
| ***Linear, Quadratic, and Exponential Models (F-LE)*** |  |  |  |  |  |
| Construct and compare linear, quadratic, and exponential models and solve problems | I |  | D | M |  |
| Interpret expressions for functions in terms of the situation they model | I |  | D | M |  |
| ***Trigonometric Functions (F-TF)*** |  |  |  |  |  |
| Extend the domain of trigonometric functions using the unit circle |  | I | D | M |  |
| Model periodic phenomena with trigonometric function |  | I | D | M |  |
| Prove and apply trigonometric identities |  | I |  | D | M |
| **Geometry** |  |  |  |  |  |
| ***Congruence (G-CO)*** |  |  |  |  |  |
| Experiment with transformations in the plane |  | I |  | D | M |
| Understand congruence in terms of rigid motions |  | I |  | D | M |
| Prove geometric theorems |  | I |  | D | M |
| Make geometric constructions |  | I |  | D | M |
| ***Similarity, Right Triangles, and Trigonometry (G-SRT)*** |  |  |  |  |  |
| Understand similarity in terms of similarity transformations |  | I |  | D | M |
| Prove theorems involving similarity |  | I |  | D | M |
| Define trigonometric ratios and solve problems involving right triangles | I | D |  | M |  |
| Apply trigonometry to general triangles |  | I |  | D | M |
| ***Circles (G-C)*** |  |  |  |  |  |
| Understand an apply theroems about circles |  | I |  | D | M |
| Find arc lenghts and areas of sectors of circles |  | I |  | D | M |
| ***Expressing Geometric Properties with Equations (G-GPE)*** |  |  |  |  |  |
| Translate between the geometric description and the equation for a conic section |  | I |  | D | M |
| Use coordinates to prove simple geometric theorems algebraically |  | I |  | D | M |
| ***Geometric Measurement and Dimension (GGMD)*** |  |  |  |  |  |
| Explain volume formulas and use them to solve problems |  | I |  | D | M |
| Visualize relationships between two-dimensional and three-dimensional objects |  | I |  | D | M |
| ***Modeling With Geometry (G-MG)*** |  |  |  |  |  |
| Apply geometric concepts in modeling situations |  | I |  | D | M |
| **Statistics and Probability** |  |  |  |  |  |
| ***Interpreting Categorical and Quantative Data S-ID)*** |  |  |  |  |  |
| Summarize, represent, and interpret data on a single count or measurement variable | I |  | D | M |  |
| Summarize, represent, and interpret data on two categorical and quantitative variables | I |  | D | M |  |
| Interpret linear models | I |  | D | M |  |
| ***Making Inferences and Justifying Conclusions (S-IC)*** | I |  | D | M |  |
| Understand and evaluate random processes underlying statistical experiments | I |  | D | M |  |
| Make inferences and justify conclusions from sample surveys, experiments and observational studies | I |  | D | M |  |
| ***Conditional Probability and the Rules of Probability S-CP)*** |  |  |  |  |  |
| Understand independence and conditional probability and use them to interpret data | I |  | D | M |  |
| Use the rules of probability to compute probabilities of compound events in a uniform probability model | I |  | D | M |  |
| ***Using Probability to Make Decisions (S-MD)*** |  |  |  |  |  |
| Calculate expected values and use them to solve problems | I |  | D | M |  |
| Use probability to evaluate outcomes of decisions | I |  | D | M |  |