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| Created on: | July, 2015 |
| Created by:  |  |
| Revised on: |  |
| Revised by: |  |

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| **OCEAN COUNTY MATHEMATICS****CURRICULUM** |
| **Content Area:** Mathematics**Note: highlighted standards will be evaluated on the PARCC** |
| **Course Title:** Algebra II | **Grade Level: High School** |
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|  | Linear Functions |  | **4 weeks** |  |
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|  | Quadratic Functions |  | **8 weeks** |  |
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|  | Polynomial Functions |  | **6 weeks** |  |
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|  | Radical Functions |  | **4 weeks** |  |
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|  | Sequences and Series |  | **2 weeks** |  |
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|  | Exponential / Logarithmic Functions |  | **4 weeks** |  |
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|  | Rational Functions |  | **3 weeks** |  |
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|  | Probability and Statistics |  | **2 weeks** |  |
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|  | Trigonometry |  | **2 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 2 |
| N-Q.2 | Define appropriate quantities for the purposes of descriptive modeling. |
| 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. |
| F-BF.1.b | Combine standard function types using arithmetic operations.  For example, build a function that models the temparture of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. |
| S-ID.6.a | Fit a function to the data; use functions fitted to data to solve problems in the context of the data.  Use given functions or choose a function suggested by the context.  Emphasize linear and exponential models. |
| Technology goals for Algebra 2:   |
| Students will be able to use a graphing calculator to graph a function, set the window range, find the zeros of a function, find the extrema of a function, analyze the graph to determine domain and range, analyze and interpret tables of data, create scatter plots and use the regression feature including calculating the correlation coefficient, calculate measures of center and measures of variation, solve a system by finding the point of intersection, evaluate a logarithm, evaluate an exponential expression.   |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview**  |
| **Content Area:** Mathematics **Grade:** |
| **Unit:** Linear Functions |
| **Domain:** Creating Equations/Interpreting Functions/Reasoning with Equations and Inequalities/Vectors and Matrix Quantities |
| **Unit Summary**In this Unit, students will review Algebra I skills and explore all aspects of linear functions.  Students will use function notation, graphs, the graphing calculator, inequalities, etc. to explain constraints and 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 reasonCRP6. 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** |
| ACED.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. |
| ACED .2 | Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. |
| ACED .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. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* |
| ACED. 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.* |
| F-IF.5 | Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* |
| 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. |
| A-REI.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 x 3 or greater). |
| 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 value, exponential, and logarithmic functions. |
| N-VM.6 | Use matrices to represent and manipulate data. |
| N-VM.7 | Multiply matrices by scalars to produce new matrices. *For example, as when all of the payoffs in a game are doubled.* |
| N-VM.8 | Add, subtract, and multiply matrices of appropriate dimensions. |
| A-REI.6 | Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. |
| F-LE.5 | Interpret the parameters in a linear or exponential function in terms of a context. |
| **Unit Essential Questions*** How are systems of equations, inequalities, and their graphs used to solve real world problems?
* How and why are relations and functions represented in multiple ways?
* How does the graph of a given function or relation reflect its characteristics?
 | **Unit Enduring Understandings***Students will understand that…** Algebraic properties govern the fluent manipulation of symbols in expressions, equations, and inequalities.
* Linear functions can be represented verbally, numerically, graphically, and analytically to understand patterns and relationships.
* Rates of change can be represented verbally, mathematically, and graphically.
 |
| **Unit Objectives***Students will know…** The difference between a relation and a function.
* How to find slope.
* Relationship between parallel and perpendicular lines.
* Slope-intercept form and standard form.
* The steps for graphing.
* How to create an equation from a word problem.
* How to find domain and range.
* How to solve systems by graphing, substitution and linear combinations.
* Procedures for performing addition, subtraction and scalar multiplication on matrices.
 | **Unit Objectives***Students will be able to…** Use slope to determine if a function is linear.
* Translate and solve linear equations and inequalities.
* Solve and graph systems of equations and inequalities.
* Translate and graph piecewise functions.
* Translate and graph absolute value functions.
* Solve real world problems involving systems of equations and inequalities.
* Interpret solutions of real world problems as viable or non viable options.
* Solve literal equations.
* Use matrices to solve systems of equations.
* Add, subtract and multiply matrices.
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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
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* **Follow all IEP modifications/504 plan**
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* [www.brightstorm.com](http://www.brightstorm.com)
* [www.coolmath.com](http://www.coolmath.com)
* [www.desmos.com](http://www.desmos.com)
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| **Teacher Notes:** |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview**  |
| **Content Area:** Mathematics  **Grade:** |
| **Unit:** Quadratic Functions |
| **Domain:** Complex Number System/Seeing Structure in Expressions/Reasoning with Equations and Inequalities/Interpreting Functions |
| **Unit Summary** This unit develops the structural similarities between the system of quadratics and the system of integers.   Students identify zeros of quadratics, including complex zeros of quadratic polynomials, and make connections between zeros of quadratics and solutions of quadratic 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 reasonCRP6. 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-CN.1 | Know there is a complex number *I* such that *i*2 = –1, and every complex number has the form *a + bi* with *a* and *b* real. |
| N-CN.2 | Use the relation *i*2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. |
| N-CN.7 | Solve quadratic equations with real coefficients that have complex solutions. |
| A-SSE.1 | Interpret expressions that represent a quantity in terms of its context. |
| A-SSE.1a | Interpret parts of an expression, such as terms, factors, and coefficients. |
| A-SSE.1b | 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.* |
| A-SSE.2 | Use the structure of an expression to identify ways to rewrite it. *For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).* |
| A-SSE.3a | Factor a quadratic expression to reveal the zeros of the function it defines. |
| A-SSE.3b | Complete the square in a quadratic expression to reveal the maximum of minimum value of the function it defines. |
| A-REI.4a | 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. Derive the quadratic formula from this form. |
| A-REI.4b | Solve quadratic equations by inspection (e.g., for x2 = 49), 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 ± b*i* for real numbers a and b. |
| 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.7a | Graph linear and quadratic functions and show intercepts, maxima, and minima. |
| F-IF.8a | 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. |
| **Number** | **Common Core Standard for Introduction** |
| N-CN.3 | Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. |
| A-CED.2 | Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. |
| G-GPE.2 | Derive the equation of a parabola given a focus and directrix. |
| **Unit Essential Questions*** How do you know if an equation is quadratic?
* How do you know which method to use when solving quadratics?
* When is it more efficient to use standard form over vertex form (and vice versa) when graphing a parabola?
* When do we use quadratic functions to solve everyday problems?
 | **Unit Enduring Understandings***Students will understand that…** There are several strategies to solve quadratic equations.
* Simplifying expressions and solving equations allows us to take a complex situation and make it simple.
* Quadratic functions model real world phenomena.
 |
| **Unit Objectives***Students will know…** The vocabulary: Quadratic, Factors, Zeros, Monomial, Binomial, Trinomial.
* How to solve quadratic equations by: factoring, completing the square, quadratic formula, using zero feature on a graphing calculator.
* How to derive and graph quadratics using standard, vertex, and intercept forms given various forms of information, including, but not limited to, focus and directrix.
* How to determine if the vertex is a max or min.
* How to write algebraic models of real world applications.
 | **Unit Objectives***Students will be able to…** Factor and solve quadratics using the zero product property.
* Solve quadratic equations by using the quadratic formula.
* Solve quadratic equations by completing the square.
* Perform arithmetic operations with complex numbers.
* Solve quadratic equations over the real and complex number systems.
* Determine the axis of symmetry and vertex of a quadratic in standard and vertex form.
* Determine if the vertex is a minimum or maximum.
* Find the x and y intercepts of a quadratic equation.
* Solve real world applications involving quadratics.
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* Homework
* Class participation
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* Think-Pair-Share
 | * DO-NOW
* Notebook
* Writing prompts
* Exit passes
* Self-assessment
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| **Teacher Notes:** |
| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview**  |
| **Content Area:** Mathematics **Grade:**  |
| **Unit:** Polynomial Functions |
| **Domain**: Seeing Structure in Expressions/Arithmetic with Polynomials and Rational Functions/Interpreting Functions |
| **Unit Summary** This unit develops the structural similarities between the system of polynomials and the system of integers.  Students draw on analogies between polynomial arithmetic and base-ten computation, focusing on properties of operations, particularly the distributive property. Students connect multiplication of polynomials with multiplication of multi-digit integers, and division of polynomials with long division of integers.  Students identify zeros of polynomials, including complex zeros of quadratic polynomials, and make connections between zeros of polynomials and solutions of polynomial equations.  The unit culminates with the fundamental theorem of algebra. A central theme of this unit is that the arithmetic of rational expressions is governed by the same rules as the arithmetic of rational numbers.**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 reasonCRP6. 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-SSE.1 | Interpret expressions that represent a quantity in terms of its context. |
| A-SSE.1a | Interpret parts of an expression, such as terms, factors, and coefficients. |
| A-SSE.1b | 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. |
| 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-APR.2 | Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x). |
| 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.7c | Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. |
| F-IF.9 | Compare properties of two functions each represented in a different way (algebraically, numerically in tables, or by verbal descriptions). |
| **Number** | **Common Core Standard for Introduction** |
| 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 a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. |
| F-IF.5 | Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. |
| 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. |
| A-APR.4 | Prove polynomial identities and use them to derive numerical relationships. |
| A-REI.7 | Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. |
| **Unit Essential Questions*** How can I use the remainder and factor theorems to solve polynomials?
* How do we model, solve, and compare polynomial functions to make real world predictions?
 | **Unit Enduring Understandings***Students will understand that…** Defining and solving the problem begins by selecting the appropriate procedural tool.
* The characteristics of polynomial functions and their representations are useful in solving real-world problems.
* The domain and range of polynomial functions can be extended to include the set of complex numbers.
 |
| **Unit Objectives***Students will know…** The vocabulary: Polynomial, Factors, Rational Zeros, Degree of polynomials, Synthetic Substitution, Synthetic Division, Divisor, Quotient, and Coefficients.
* How to perform operations on polynomials and solve polynomial equations, including systems of polynomial equations.
* How to evaluate, graph, and find zeros of polynomial functions.
* How to prove polynomial identities
* How to compare two polynomial functions.
 | **Unit Objectives***Students will be able to…** Express polynomials in standard form.
* Classify polynomial functions based on degree.
* Perform arithmetic operations on polynomials.
* Factor and solve higher order polynomials.
* Factor and solve polynomials using sums/differences of cubes.
* Factor and solve polynomials by grouping.
* Evaluate a polynomial using synthetic substitution.
* Use long and synthetic division to divide polynomials
* Create a basic graph of a polynomial.
* Identify zeros and describe the end behavior of the graphs of polynomial functions.
* Describe numerical relationships by proving polynomial identities.
* Compare two polynomial functions that are represented in different ways.
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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Evidence of Learning** |
| **Formative Assessments** |
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* 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
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| **Modifications (ELLs, Special Education, Gifted and Talented)*** Teacher tutoring
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* **Follow all IEP modifications/504 plan**
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| **Teacher Notes:** |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview**  |
| **Content Area:** Mathematics **Grade:** |
| **Unit:** Radical Functions |
| **Domain:** Reasoning with Equations and Inequalities, Interpreting Functions, Building Functions |
| **Unit Summary**  In this unit, students extend their work by solving equations with exponents and radicals.**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 reasonCRP6. 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.2 | Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. |
| 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-BF.4a | Find inverse functions. 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) =2x3 for x > 0 or f(x) = (x+1)/(x–1) for x ≠ 1. |
| N-RN.1 | Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. |
| N-RN.2 | Rewrite expressions involving radicals and rational exponents using the properties of exponents. |
| A-SSE.3c | Use the properties of exponents to transform expressions for exponential functions. |
| **Number** | **Common Core Standard for Introduction** |
| F-BF.4b | Verify by composition that one function is the inverse of another |
| F-BF.4c | Read values of an inverse function from a graph or a table, given that the function has an inverse. |
| F-BF.4d | Produce an invertible function from a non-invertible function by restricting the domain. |
| **Unit Essential Questions*** How do we perform operations with radical expressions?
* How are graphs of inverse functions related?
* How do we solve and graph rational equations?
* What effect does changing an exponent or a coefficient have on the graph of a function.
 | **Unit Enduring Understandings***Students will understand that…** There is more than one way to simplify or solve a problem.
* Domain restrictions (asymptotes or undefined values) have affects on the graph of a function.
* There may be extraneous solutions when solving radical equations.
 |
| **Unit Objectives***Students will know…** nth roots and rational exponents.
* The properties of rational exponents.
* Power functions and function operations.
* Properties of inverse functions.
* How to graph square root and cube root functions.
* How to solve radical equations.
 | **Unit Objectives***Students will be able to…** Recognize that a power function is a particular type of polynomial function.
* Evaluate nth roots of real numbers using both radical notation and rational exponent notation.
* Simplify radical expressions.
* Perform operations with functions including composition of functions and power functions.
* Find the inverse of a function and determine the relationship between the function and its inverse.
* Use composition of functions to verify inverse functions.
* Solve equations with radicals and rational exponents.
* Solve equations with extraneous solutions.
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| **Teacher Notes:** |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview**  |
| **Content Area:** Mathematics  |
| **Unit Title:** Sequences and Series |
| **Domain:** Seeing Structure in Expressions/Interpreting Functions/Building Functions/Linear, Quadratic, and Exponential Models |
| **Unit Summary** In this unit, students will identify appropriate types of functions to model a sequence.  Also, in this unit an informal notion of “limit” will be introduced by finding the sum of geometric series.**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 reasonCRP6. 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-SSE.4. | Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* |
| F-IF.3. | Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n + 1) = f(n) + f(n – 1) for n ≥ 1. |
| F-BF.1a. | Determine an explicit expression, a recursive process, or steps for calculation from a context. |
| F-LE.2 | Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table.) |
| **Number** | **Common Core Standard for Introduction** |
| F-BF.2 | Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situation, and translate between the two forms.  |
| **Unit Essential Questions*** How can you use a pattern to predict outcomes?
* What kinds of iteration rules yield different sequences?
* What makes a series infinite?
 | **Unit Enduring Understandings**Students will understand that…* Patterns emerge from data.
* Patterns show different ways of solving the same problem.
* Patterns are used to make predictions.
* Patterns are represented in different ways.
 |
| **Unit Objectives***Students will know…** The vocabulary: Sequences, Series, Arithmetic, Geometric, Recursive, and Explicit.
* How to find terms of sequences and write algebraic rules to define sequences.
* How to use summation and notation and find sums of arithmetic and geometric series.
 | **Unit Objectives***Students will be able to…** Explore sequences and patterns.
* Determine if a sequence is arithmetic or geometric.
* Write the explicit rule for arithmetic sequences.
* Write the recursive rule for arithmetic sequences.
* Write the explicit rule for geometric sequences.
* Write the recursive rule for geometric sequences.
* Calculate a finite geometric series.
* Calculate an infinite geometric series.
* Solve real world problems involving geometric series.
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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
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| **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**
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| **Teacher Notes:** |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview**  |
| **Content Area:** Mathematics **Grade:** |
| **Unit:** Exponential and Logarithmic Functions |
| **Domain:** Interpreting Functions/Building Functions/Linear, Quadratics, and Exponential Models |
| **Unit Summary** In this unit, students will extend their work with exponential functions to include solving exponential equations with logarithms.  They identify appropriate types of functions to model a situation, they adjust parameters to improve the model, and they compare models by analyzing appropriateness of fit and making judgments about the domain over which a model is a good fit.**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 reasonCRP6. 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** |
| 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.7e | Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. |
| F-IF.8b | Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (.97)t, y = (1.1)t/10, and classify them as representing exponential growth or decay. |
| F-BF.1 | Write a function that describes a relationship between two quantities. |
| F-BF.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. |
| F-LE.4 | For exponential models, express as a logarithm the solution to abct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. |
| F-LE.5 | Interpret the parameters in a linear or exponential function in terms of a context. |
| **Number** | **Common Core Standard for Introduction** |
| F-BF.5 | Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. |
| **Unit Essential Questions*** Why do we need “e”?
* How does the relationship between logs and exponents affect how we solve them?
 | **Unit Enduring Understandings***Students will understand that…** Nth roots are inverses of power functions. Understanding the properties of power functions and how inverses behave explains the properties of nth roots.
* Computing with rational exponents is no different from computing with integral exponents.
* Logarithmic functions are inverses of exponential functions. Understanding the properties of exponential functions and how inverses behave explains the properties and graphs of logarithms.
* Exponential and logarithmic functions behave the same as other functions with respect to graphical transformations.
* Two special logarithmic functions are common logarithms and natural logarithms. These special functions occur often in nature.
 |
| **Unit Objectives***Students will know…** The vocabulary: Logarithm, Inverse, Irrational, Exponential Form, Asymptote, Common Logarithm, Compounded continuously, Compounded interest, and Natural Logarithm
* How to graph and use exponential, logarithmic, and logistic growth functions.
* How to use the number e and the definition of properties of logarithms.
* How to solve exponential and logarithmic equations.
 | **Unit Objectives***Students will be able to…** Graph exponential functions, showing intercepts and end behavior.
* Analyze functions using different representations.
* Construct and compare exponential models and solve problems.
* Understand the relationship between properties of logarithms and the properties of exponents.
* Use the definition and properties of logarithms.
* Simplify logarithmic expressions.
* Solve exponential and logarithmic equations.
* Apply the number e.
* Compare and contrast logarithmic function graphs.
* Design graphs using technology and relate them to other functions.
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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Evidence of Learning** |
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* Homework
* Class participation
* Whiteboards/communicators
* Think-Pair-Share
 | * DO-NOW
* Notebook
* Writing prompts
* Exit passes
* Self-assessment
 |
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* Quizzes
 | * Presentations
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* Mid-Term and Final Exams
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| **Teacher Notes:** |
| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview**  |
| **Content Area:** Mathematics **Grade:** |
| **Unit:** Rational Functions |
| **Domain:** Interpreting Functions/Building Functions/Linear, Quadratics, and Exponential Models |
| **Unit Summary** In this unit, students will explore the characteristics of rational functions by analyzing their graphs and solving rational equations. A central theme of this unit is that the arithmetic of rational expressions is governed by the same rules as the arithmetic of rational numbers.**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 reasonCRP6. 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.2 | Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. |
| F-IF.5 | Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function* *h(n) gives the number of person-hours it takes to assemble n engines in a* *factory, then the positive integers would be an appropriate domain for the* *function* |
| **Number** | **Common Core Standard for Introduction** |
| F-BF.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.* |
| 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 a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. |
| A-APR.7 | (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. |
| F-IF.7.d | (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. |
| A-APR.6 | Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x) where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x) using inspection, long division, or, for the more complicated examples, a computer algebra system. |
| **Unit Essential Questions*** How do we decide which method is most appropriate when solving rational equations?
* When are asymptotes used to graph rational functions?
 | **Unit Enduring Understandings***Students will understand that…** Simplified expressions are essential in being able to solve equations.
* Domain affects graphing and solving of rational functions.
 |
| **Unit Objectives***Students will know…** The characteristics of simple rational function graphs.
* How and why the domain affects the graphing and solving of rational functions.
* That solving rational functions directly relate to basic rational operations.
* How to perform polynomial division and write results in polynomial and remainder forms.
 | **Unit Objectives***Students will be able to…** Graph simple rational functions and identify; domain, range, asymptotes, end behavior and intercepts.
* Solve simple rational equations and check for extraneous solutions.
* Use variation models and rational models in real-life situations
* Perform polynomial long division and write results in polynomial and remainder forms.
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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Evidence of Learning** |
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* Homework
* Class participation
* Whiteboards/communicators
* Think-Pair-Share
 | * DO-NOW
* Notebook
* Writing prompts
* Exit passes
* Self-assessment
 |
| **Summative Assessments*** Chapter/Unit Test
* Quizzes
* Presentations
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| **Teacher Notes:** |

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| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview**  |
| **Content Area:** Mathematics **Grade:** |
| **Unit:** Probability and Statistics |
| **Domain:** Interpreting Categorical and Quantitative Data, Making Inferences and Justifying Conclusions, Conditional Probability and the Rules of Probability |
| **Unit Summary** In this unit, students see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions.  They identify different ways of collecting data - including sample surveys, experiments, and simulations - and the role that randomness and careful design play in the conclusions that can be drawn.**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 reasonCRP6. 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.4. | Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets and tables to estimate areas under the normal curve. |
| S-IC.1 | Understand that statistics is a process for making inferences about population parameters based on a random sample from that population. |
| S-IC.2. | Decide if a specified model is consistent with results from a given data-generating process, e.g. using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model? |
| S-IC.3. | Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each. |
| S-IC.4. | Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. |
| S-CP.1. | Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”) |
| S-CP.2. | Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent. |
| S-CP.3 | Understand the conditional probability of *A* given *B* as *P(A* and *B)/P(B),* and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*. |
| S.CP.6. | Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model. |
| S.CP.7. | Apply the Addition Rule, P(A or B)=P(A) + P(B) - P(A and B), and interpret the answer in terms of the model. |
| S.CP.9. | (+) Use permutations and combinations to compute probabilities of compound events and solve problems. |
| **Number** | **Common Core Standard for Introduction** |
| S-IC.5. | Use data from a randomized experiment to compare two treatments; justify significant differences between parameters through the use of simulation models for random assignment. |
| S-IC.6. | Evaluate reports based on data. |
| S-CP.4 | Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. |
| S.CP.5 | Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. |
| **Unit Essential Questions*** How do we use probability in real-life situations?
* How does technology influence and enhance experimental studies?
* How does analysis of data inform and influence decisions?
 | **Unit Enduring Understandings***Students will understand that…** Probability is the likelihood of an event occurring.
* The study of statistics includes observational studies, sample surveys, and experimental design.
* Describing center, spread, and shape is essential analysis of both univariate and bivariate data.
* Probability is indispensable for analyzing data; data is indispensable for estimating probabilities.
 |
| **Unit Objectives***Students will know…** How to count the number of ways an event can happen.
* How to calculate and use probabilities.
* How to use binomial and normal distributions.
* How to interpret and apply conditional probability in everyday language and everyday situations.
 | **Unit Objectives***Students will be able to…** Use the fundamental counting principle, permutations, and combinations to count the number of ways an event can happen.
* Use the binomial theorem to expand a binomial that is raised to a power.
* Find theoretical, experimental and geometric probabilities.
* Find the probability of compound , independent and dependent events
* Calculate probabilities using binomial and normal distributions
* Make inferences and justify conclusions from sample surveys, experiments, and observational studies.
* Analyze data using center and spread to draw conclusions.
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* Think-Pair-Share
 | * DO-NOW
* Notebook
* Writing prompts
* Exit passes
* Self-assessment
 |
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| **Teacher Notes:** |
| **OCEAN COUNTY MATHEMATICS CURRICULUM****Unit Overview** |
| **Content Area:** Mathematics  **Grade:** 10-12 |
| **Unit Title:** Trigonometry |
| **Domain:** Functions-Trigonometric Functions  |
| **Unit Summary** In this unit, topics covered will include the definitions of the six trigonometric functions and their relationships, not only to each other but also their connection to the unit circle. Evaluation of trigonometric functions of any angle, using both degrees and radians, will be covered. Graphs of trig functions will be discussed in the context of using periodic functions to model periodic phenomena. Basic trig identities will be introduced and used to prove the Pythagorean Identity.**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 reasonCRP6. 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** |
| F-TF-1 | Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. |
| F-TF-2 | Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. |
| F-TF-5 | Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. |
| F-TF-8 | Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle. |
| **Unit Essential Questions*** How can you apply the trigonometric ratios to understanding a wide variety of physical phenomena including orbits, sound waves, rotations and vibrations?
* How does trigonometry deal with relationships among sides and angles and triangles to develop astronomy, navigation and surveying?
* How do we use graphing to model real-life data?
* What equations can be used to represent patterns observed from graphing?
 | **Unit Enduring Understandings***Students will understand that…** Their exists a relationship between degree and radian relationship
* The unit circle can be utilized in many ways
* Trigonometric functions are periodic around the unit circle and can each be evaluated for any angle
* Graphs of trig functions can be used to model periodic phenomenon
 |
| **Unit Objectives***Students will know…** How to convert between degrees and radians
* How to identify a unit circle and its relationship to real numbers
* How to evaluate trigonometric functions of any angle
* How to translate a trigonometric graph
* Identify the x-intercepts, extrema, period, amplitude, and midline of a trig function
* Identify the domain and range for all 6 trig functions
* How to verify trigonometric identities.
 | **Unit Objectives***Students will be able to…** Evaluate trigonometric functions for any angle on the unit circle.
* Utilize radian measurement for all calculations in decimal and pi form.
* Graph trigonometric functions on a coordinate plane and use the rules for translations and stretching/shrinking the graph.
* Employ trigonometric graphs to model real-life data
* Understand the importance of the fundamental identities in solving, simplifying, verifying and evaluating trig expressions and equations.
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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 |   |