VERNON TOWNSHIP
SCHOOL DISTRICT

# Algebra II CP
## Curriculum Map

Adapted from:
Understanding By Design

Reviewed by:
Vincent Gagliostro - Director of Curriculum & Instruction

Adopted:
March 2025

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## Course Description

**Algebra II CP** is offered to students who have successfully passed Algebra I. This course is designed to provide students with a thorough knowledge of numbers, functions and their graphs and real-world applications of functions. Topics such as data analysis, linear, quadratic, exponential, logarithmic functions and conic sections will be included. Graphing calculator activities will be presented throughout the course to make mathematics enjoyable and relevant to the students. NOTE: New Jersey State Colleges now require Algebra II of all students prior to admission.
Based upon the following list of proficiencies, each student must demonstrate a minimum competency level of 65%. Competencies will be measured by way of an evaluation program consisting of teacher observations of student performance, tests, quizzes, classwork, homework, projects, and class participation, as well as class attendance in accordance with the high school's attendance policy.

Successful completion of this course earns 5 credits toward graduation.

Various Levels of Text: Supplemental text and audio visual materials are provided for above grade level and below grade level for students who need them.

AI tools and Text to Speech tools may be used to adapt the lexile level of grade level materials.

## New Jersey learning Standards covered throughout the course

In conjunction with the New Jersey Student Learning Standards, students enrolled in the **Algebra II CP** courses will demonstrate the ability to:

- HSA-SSE.A.1.a Interpret parts of an expression, such as terms, factors, and coefficients.
- HSA-SSE.A.1.b Interpret complicated expressions by viewing one or more of their parts as a single entity.
- HSA-SSE.A.2 Use the structure of an expression to identify ways to rewrite it.
- HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.
- HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- HSA-CED.A.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.
- HSF-IF.B.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.
- HSF-IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- HSF-IF.B.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.
- HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more

complicated cases.

- HSF-IF.C.7.b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

| Grading Criteria |
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| • Major Grades 60%<br>• Minor Grades 40% |

**Course Resources**

**Text**

- Algebra II Common Core Edition, McGraw-Hill Companies, Inc.

**Technologies**

- School-issued computer with Internet access, a web browser and word processing, presentation software for both teacher and student use
- Software and web-based presentation resources
- Calculator

**Supplemental Materials**

- Learning Plans/Schoology
- Worksheets
- Extra Practice
- Homework
- Projects

**Scope and Sequence- Topical Outline**

| Unit | Title | Time |
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| 1 | Equations and Inequalities (DEI) | 3 Weeks |
| 2 | Linear Relations and Functions (Climate Change) | 3 Weeks |

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| 3 | Systems of Equations and Inequalities (Climate Change) (DEI) | 3 Weeks |
| 4 | Quadratic Functions and Relations (Climate Change) | 4 Weeks |
| 5 | Polynomials and Polynomial Functions | 4 Weeks |
| Exam | Midterm Exam | 1 Week |
| 6 | Radical Functions and Relations | 3 Weeks |
| 7 | Exponential and Logarithmic Functions and Relations (Climate Change) | 4 Weeks |
| 8 | Rational Functions and Relations | 3 Weeks |
| 10 | Sequence and Series | 2 Weeks |
| 11 | Statistics and Probability (Climate Change) (DEI) | 2 Weeks |
| 12 | Trigonomic Functions | 3 Weeks |
| Exam | Final Exam | 1 Week |

The timeline is only an approximation. The inclusion of a classroom project in any one of the above units would extend the time allotment.

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **1 Equations & Inequalities** |
| **Timeframe** | 3 Weeks |
| **Established Goals** | • MP.1 Make sense of problems and persevere in solving them.<br>• MP.2 Reason abstractly and quantitatively.<br>• MP.3 Construct viable arguments & critique the reasoning of others.<br>• MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision. |

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| | • MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSA-SSE.A.1.a Interpret parts of an expression, such as terms, factors, and coefficients.<br>• HSA-SSE.A.1.b Interpret complicated expressions by viewing one or more of their parts as a single entity.<br>• HSA-SSE.A.2 Use the structure of an expression to identify ways to rewrite it.<br>• HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.<br>• HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.<br>• HSA-CED.A.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. |
| **Essential Questions** | • How are symbols useful in mathematics?<br>• Why is it important to understand what the symbols in a formula represent?<br>• How are symbols used to write expressions, equations, and inequalities?<br>• How is the process for solving an inequality different from solving an equation?<br>• What is the difference between the solution to an equation different than the solution to an inequality? |
| **Content Knowledge** | *Students will learn:*<br>• Expressions and Formulas<br>• Properties of Real Numbers (Real, Rational, Irrational, Integers, Natural, Whole)<br>• Solving Equations (including Literal Equations)<br>• Solving Absolute Value Equations and Inequalities<br>• Solving Multi-Step and Compound Inequalities<br>• Write expressions in equivalent forms to solve problems<br>• Interpret the structure of expressions<br>• Understand solving equations as a process of reasoning and explain the reasoning |
| **Skills** | *Students will be able to:*<br>• Classify real numbers and use the properties of real numbers to evaluate expressions.<br>• Translate verbal expressions into algebraic expressions and equations and vice versa.<br>• Solve equations using properties of equality.<br>• Evaluate expressions involving absolute values and solve absolute value equations.<br>• Solve one step and multi-step inequalities. |

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| | • Solve compound inequalities and solve absolute value inequalities.<br>• Use the order of operations to evaluate expressions and use formulas. |
| **Performance Tasks** | • Quizzes<br>• Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | • Benchmark:<br>  ○ iReady Fall 2024<br>• Formative:<br>  ○ Warm up/Problem of the Day<br>  ○ Lesson<br>  ○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>  ○ Independent Practice/Classwork/Homework<br>• Summative:<br>  ○ Homework: Worksheets 1.1, 1.2, 1.3, 1.4, 1.5, 1.6,<br>  ○ Quizzes: Quiz 1.1-1.4<br>  ○ Tests: Chapter 1 Test |
| **Resources/Materials** | **Core Materials**<br>• Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>• Extra Practice Homework<br>• Schoology Links<br>• Quizizz |
| **Interdisciplinary Connections** | • Science: HS-PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.<br>  ○ Students use systems of equations to balance chemical reactions and determine unknown reactant amounts.<br>• Economics: 6.1.12.EconNE.9.a: Explain how economic indicators (e.g., GDP, inflation, unemployment) can be used to evaluate the health of the economy.<br>  ○ Students model wage growth vs. inflation using linear inequalities to analyze purchasing power over time. |

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| **Learning Activities** | • Homework Check<br>• Learn/Lesson<br>• Classwork/Homework |

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **2 Linear Relations & Functions** |
| **Timeframe** | 3 Weeks |
| **Established Goals** | • MP.1 Make sense of problems and persevere in solving them.<br>• MP.2 Reason abstractly and quantitatively.<br>• MP.3 Construct viable arguments & critique the reasoning of others.<br>• MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision.<br>• MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSA-SSE.A.1.b Interpret complicated expressions by viewing one or more of their parts as a single entity.<br>• HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.<br>• HSA-CED.A.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.<br>• HSF-IF.B.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.<br>• HSF-IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.<br>• HSF-IF.B.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.<br>• HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. |

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| | • HSF-IF.C.7.b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. |
| **Essential Questions** | • How can mathematical ideas be represented?<br>• How can a linear relationship be represented?<br>• What makes a real world problem a linear model? |
| **Content Knowledge** | *Students will learn:*<br><br>• Relations and Functions<br>• Linear Relations and Functions<br>• Rate of Change and Slope<br>• Writing Linear Equations<br>• Scatter Plots and Lines of Regression<br>• Special Functions (including Piecewise-Defined Functions, Greatest Integer, and Absolute Value Functions)<br>• Parent Functions and Transformations<br>• Graphing Linear and Absolute Value Inequalities |
| **Skills** | *Students will be able to:*<br>• Analyze relations and functions.<br>• Use equations of relations and functions.<br>• Identify linear relations and functions.<br>• Write linear relations and functions.<br>• Find rate of change and determine the slope of a line.<br>• Write a linear equation given the slope and a point on the line.<br>• Write a linear equation of a line parallel or perpendicular to a given line.<br>• Use scatter plots and prediction equations.<br>• Model data using lines of regression.<br>• Use a graphing calculator to create a scatter plot and prediction equations.<br>• Write and graph piecewise-defined functions<br>• Write and graph step and absolute value functions.<br>• Identify and use parent functions<br>• Describe transformations of functions.<br>• Graph linear inequalities and absolute value inequalities. |

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| **Performance Tasks** | ● Quizzes<br>● Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | ● Benchmark:<br>○ iReady Fall 2024<br>● Formative:<br>○ Warm up/Problem of the Day<br>○ Lesson<br>○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>○ Independent Practice/Classwork/Homework<br>● Summative:<br>○ Homework: Worksheet: 2.1, 2.2-2.3, 2.4, 2.6, 2.7, 2.8<br>○ Quizzes: Quiz 2.1-2.4, Quiz 2.6<br>○ Tests: Chapter 2 Test |
| **Resources/Materials** | **Core Materials**<br>● Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>● Extra Practice Homework<br>● Schoology Links<br>● Quizizz |
| **Interdisciplinary Connections** | ● Science: HS-LS2-1: Use mathematical representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.<br>○ Students analyze and predict population growth using linear models based on real-world data.<br>● Social Studies: 6.1.12.EconNE.5.a: Explain how economic indicators (e.g., GDP, inflation, unemployment) can be used to evaluate the health of the economy.<br>○ Students analyze unemployment trends and create linear models to predict future job market trends. |
| **Learning Activities** | ● Homework Check<br>● Learn/Lesson<br>● Classwork/Homework |

| **Subject Area: Math** |
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| Grade Level: Algebra II CP | |
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| **Unit** | **3 Systems of Equations & Inequalities** |
| **Timeframe** | 3 Weeks |
| **Established Goals** | • MP.1 Make sense of problems and persevere in solving them.<br>• MP.2 Reason abstractly and quantitatively.<br>• MP.3 Construct viable arguments & critique the reasoning of others.<br>• MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision.<br>• MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSA-CED.A.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. |
| **Essential Questions** | • How can you find the solution to a math problem?<br>• What are the benefits of having different strategies for solving systems of equations?<br>• What are the advantages of using matrices to solve problems?<br>• What does the solution to a system of equations represent?<br>• How does a solution to a system of inequalities differ from the solution to a system of equalities? |
| **Content Knowledge** | *Students will learn:*<br>• Solving systems of Equations<br>• Solving Systems of Inequalities by Graphing<br>• Systems of Equations in Three Variables |
| **Skills** | *Students will be able to:*<br>• Solve a system of linear equations graphically and algebraically.<br>• Solve a system of linear equations graphically and algebraically.<br>• Solve systems of inequalities by graphing.<br>• Solve the maximum and minimum values of a function over a region.<br>• Solve real world optimization problems using linear programming.<br>• Solve systems of linear equations in 3 variables. |

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| | ● Solve real world problems using systems of linear equations in 3 variables. |
| **Performance Tasks** | ● Quizzes<br>● Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | ● Benchmark:<br>○ iReady Fall 2024<br>● Formative:<br>○ Warm up/Problem of the Day<br>○ Lesson<br>○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>○ Independent Practice/Classwork/Homework<br>● Summative:<br>○ Homework: Worksheet: 3.1, 3.2, 3.3, 3.4<br>○ Quizzes: Do Now Quiz 3.1, Do Now Quiz 3.3<br>○ Tests: Test 3.1-3.4 |
| **Resources/Materials** | **Core Materials**<br>● Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>● Extra Practice Homework<br>● Schoology Links<br>● Quizizz |
| **Interdisciplinary Connections** | ● Science: HS-PS2-1: Analyze data to support the claim that Newton's Second Law of Motion describes the mathematical relationship among force, mass, and acceleration.<br>○ Students solve systems of equations to determine the velocity and acceleration of objects under different forces.<br>● Financial Literacy: 9.1.12.FP.3: Analyze and compare the cost of various types of loans and investments to develop a plan to reach financial goals.<br>○ Students set up and solve systems of equations to compare different loan repayment plans and optimize financial decision-making. |

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| **Learning Activities** | • Homework Check<br>• Learn/Lesson<br>• Classwork/Homework |

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **4 Quadratic Equations & Relations** |
| **Timeframe** | 4 Weeks |
| **Established Goals** | • MP.1 Make sense of problems and persevere in solving them.<br>• MP.2 Reason abstractly and quantitatively.<br>• MP.3 Construct viable arguments & critique the reasoning of others.<br>• MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision.<br>• MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSF-IF.B.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.<br>• HSF-IF.C.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.<br>• HSF-IF.C.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).<br>• HSF-BF.B.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. |
| **Essential Questions** | • Why do we use different methods to solve math problems?<br>• How do you know what method to use when solving a quadratic equation?<br>• What characteristics does a graph of quadratic function have?<br>• Why do we use different methods to graph quadratic equations? |

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| **Content Knowledge** | *Students will learn:*<br>● Graphing Quadratic Functions (Standard Form)<br>● Solving Quadratic Equations by Graphing<br>● Solving Quadratic Equations by Factoring<br>● Complex Numbers<br>● Completing the Square<br>● The Quadratic Formula and the Discriminant<br>● Transformations of Quadratic Graphs (Vertex Form)<br>● Quadratic Inequalities |
| **Skills** | *Students will be able to:*<br>● Find and interpret maximum and minimum values of a quadratic function.<br>● Solve quadratic equations by graphing and estimate solutions by graphing<br>● Solve a quadratic function ,find maximum and minimum values using a graphing calculator.<br>● Place a quadratic equation in standard form.Students able to solve a quadratic equation by factoring.<br>● Perform all operations with pure imaginary numbers and complex numbers.<br>● Solve quadratic equations by using square root property and by completing the square.<br>● Solve a quadratic equation by using the quadratic formula. Students also able to use the discriminant to determine the number and nature of the roots of a quadratic equation,<br>● Use a graphing calculator to comprehend transformations in the quadratic function.<br>● Write a quadratic function in vertex form. Students can transform graphs of quadratic functions.<br>● Graph and solve quadratic inequalities in 2 variables. |
| **Performance Tasks** | ● Quizzes<br>● Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | ● Benchmark:<br>○ iReady January 2025<br>● Formative:<br>○ Warm up/Problem of the Day<br>○ Lesson<br>○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>○ Independent Practice/Classwork/Homework<br>● Summative:<br>○ Homework: Worksheet: 4.1-4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8 |

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| | ○ Quizzes: Quiz 4.1, 4.2, 4.7, Factoring, Quiz 4.4, Quiz 4.3, 4.5, 4.6<br>○ Tests: Chapter 4 Test |
| **Resources/Materials** | **Core Materials**<br>● Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>● Extra Practice Homework<br>● Schoology Links<br>● Quizizz |
| **Interdisciplinary Connections** | ● Science: HS-PS2-4: Use mathematical representations to analyze and interpret the motion of objects.<br>○ Quadratic functions are commonly used to model projectile motion, such as the path of a ball or a rocket in physics.<br>● Social Studies: 6.1.12.D.12.a: Analyze historical trends and predict future outcomes using quadratic models.<br>○ Students can apply quadratic equations to predict patterns in population growth, economic trends, or other historical data.<br>● English Language Arts: RH.9-10.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a table or chart).<br>○ Students will read word problems that involve quadratic equations and convert them into mathematical representations to solve the problems. |
| **Learning Activities** | ● Homework Check<br>● Learn/Lesson<br>● Classwork/Homework |

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **5 Polynomials & Polynomial Functions** |
| **Timeframe** | 4 Weeks |

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| **Established Goals** | • MP.1 Make sense of problems and persevere in solving them.<br>• MP.2 Reason abstractly and quantitatively.<br>• MP.3 Construct viable arguments & critique the reasoning of others.<br>• MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision.<br>• MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSN-CN.C.9 Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.<br>• HSA-APR.A.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.<br>• HSA-APR.B.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 $p(x)$.<br>• HSA-APR.B.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.<br>• HSA-APR.D.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.<br>• HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.<br>• HSF-IF.B.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.<br>• HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. |
| **Essential Questions** | • Why is math used to model real-world situations?<br>• When would a nonlinear function be a good model?<br>• What are the advantages of using polynomial functions for modeling?<br>• What are the limitations of mathematical modeling?<br>• What is a complex number?<br>• How do the factors of a polynomial expression relate to the zeros of the related quadratic function? |

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| **Content Knowledge** | *Students will learn:*<br>● Operations with Polynomials<br>● Dividing Polynomials<br>● Polynomial Functions<br>● Analyzing Graphs of Polynomial Functions<br>● Solving Polynomial Equations<br>● The Remainder and Factor Theorems<br>● Roots and Zeros |
| **Skills** | *Students will be able to:*<br>● Multiply, divide,and simplify monomials and expressions involving powers.Students able to add, subtract, and multiply polynomials.<br>● Divide polynomials using long division and synthetic division.<br>● Identify general shapes of graphs of polynomial functions.<br>● Graph polynomial functions,locate their relative maximum, relative minimums and zeros of the function.<br>● Use a graphing calculator to graph and solve polynomial functionsFactor polynomials and solve polynomial equations by factoring.<br>● Evaluate polynomial functions using synthetic substitution.Students able to determine whether a binomial is a factor of a polynomial by using synthetic substitution.<br>● Determine the number and types of roots for a polynomial equation.Students able to find the zeros of a polynomial function. |
| **Performance Tasks** | ● Quizzes<br>● Chapter Assessments including released NJGPA and SAT questions<br>● Midterm Exam |
| **Other Assessment Evidence** | ● Benchmark:<br>○ iReady January 2025<br>● Formative:<br>○ Warm up/Problem of the Day<br>○ Lesson<br>○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>○ Independent Practice/Classwork/Homework |

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| | ● Summative:<br>○ Homework: Worksheets: 5.1, 5.2, 5.3 End Behavior, 5.3-5.4, 5.5, 5.6, 5.7-5.8<br>○ Quizzes: Quiz 5.1-5.3, 5.5 Factoring and Quiz 5.5-5.6, Quiz 5.3-5.4<br>○ Tests: Chapter 5 Test |
| **Resources/Materials** | **Core Materials**<br>● Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>● Extra Practice Homework<br>● Schoology Links<br>● Quizizz |
| **Interdisciplinary Connections** | ● Science: HS-PS2-4: Use mathematical representations of Newton's Law of Universal Gravitation to model the relationship between gravitational force and distance.<br>○ Students will use polynomial functions to model gravitational forces in physics (inverse square law and related polynomial expressions).<br>● Social Studies: 6.1.12.A.7.a: Analyze the impact of technological innovations and inventions on society, particularly how growth (or decline) can be modeled using polynomial functions over time.<br>○ Use polynomial functions to model the growth of technological innovation or economic phenomena over time, such as population growth or technological advancements.<br>● Language Arts: RH.9-10.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a table or chart).<br>○ Students will read and interpret word problems, convert them into polynomial expressions, and analyze the solutions using graphical representations. |
| **Learning Activities** | ● Homework Check<br>● Learn/Lesson<br>● Classwork/Homework |

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **6 Radical Functions & Relations** |

| Timeframe | 3 Weeks |
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| **Established Goals** | • MP.1 Make sense of problems and persevere in solving them.<br>• MP.2 Reason abstractly and quantitatively.<br>• MP.3 Construct viable arguments & critique the reasoning of others.<br>• MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision.<br>• MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSN-RN.A.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.<br>• HSN-RN.A.3 Simplify radicals, including algebraic radicals.<br>• HSA-SSE.A.1 Interpret expressions that represent a quantity in terms of its context.<br>• HSA-SSE.A.2 Use the structure of an expression to identify ways to rewrite it.<br>• HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.<br>• HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.<br>• HSA-CED.A.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.<br>• HSA-CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.<br>• HSA-REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.<br>• HSF-IF.B.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.<br>• HSF-IF.C.7.b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.<br>• HSF-IF.C.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).<br>• HSF-BF.A.1.b Combine standard function types using arithmetic operations.<br>• HSF-BF.B.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 |

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| | 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. |
| **Essential Questions** | • Why would you choose a square root function to model a set of data instead of a polynomial function?<br>• What constraints are placed on the domain of a radical function?<br>• How do graphs of radical functions with odd indices different from the graphs of radical functions with even indices?<br>• What does a rational exponent mean? |
| **Content Knowledge** | *Students will learn:*<br>• Operations on Functions<br>• Inverse Functions and Relations<br>• Square Root Functions and Inequalities<br>• $N^{th}$ Roots<br>• Operations with Radical Expressions<br>• Rational Exponents<br>• Solving Radical Equations and Inequalities |
| **Skills** | *Students will be able to:*<br>• Find the sum, difference, product and quotient of functions, and be able to find the composition of functions.<br>• Find the inverse of a function or a relation. Determine whether 2 functions are inverse.<br>• Graph and analyze square root functions and square inequalities.<br>• Simplify radicals and use a calculator to approximate radicals.<br>• Simplify radical expressions and will be able to add, subtract, multiply, and divide radical expressions.<br>• Write expressions with rational exponents in radical form and vice versa.<br>• Simplify expressions in exponential or radical form.<br>• Solve equations and inequalities containing radicals. |
| **Performance Tasks** | • Quizzes<br>• Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | • Benchmark:<br>  ○ iReady April/May 2025<br>• Formative:<br>  ○ Warm up/Problem of the Day |

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| | ○ Lesson<br>○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>○ Independent Practice/Classwork/Homework<br>● Summative:<br>○ Homework: Worksheets: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7<br>○ Quizzes: Quiz 6.1-6.3, Quiz 6.4-6.5<br>○ Tests: Chapter 6 Test |
| **Resources/Materials** | **Core Materials**<br>● Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>● Extra Practice Homework<br>● Schoology Links<br>● Quizizz |
| **Interdisciplinary Connections** | ● Science: HS-PS1-4: Develop models to illustrate the relationship between atomic structure and the properties of matter.<br>○ Students can use radical expressions to model quantities in chemistry, such as atomic radii or reaction rates that involve square roots or cube roots.<br>● Social Studies: 6.1.12.A.5.a: Evaluate how mathematical models, such as those involving radicals, are used to predict economic trends or growth.<br>○ Students will apply radical functions to model population growth or resource distribution, where square roots or cube roots are used in real-world economic models.<br>● English Language Arts: RH.9-10.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a table or chart).<br>○ Students will read word problems, convert them into radical equations, and solve them, using graphs or charts to represent their solutions. |
| **Learning Activities** | ● Homework Check<br>● Learn/Lesson<br>● Classwork/Homework |

| **Subject Area: Math** |
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| Grade Level: Algebra II CP | |
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| **Unit** | **7 Exponential & Logarithmic Functions** |
| **Timeframe** | 4 Weeks |
| **Established Goals** | • MP.1 Make sense of problems and persevere in solving them.<br>• MP.2 Reason abstractly and quantitatively.<br>• MP.3 Construct viable arguments & critique the reasoning of others.<br>• MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision.<br>• MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSA-SSE.A.2 Use the structure of an expression to identify ways to rewrite it.<br>• HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.<br>• HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.<br>• HSF-IF.C.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.<br>• HSF-BF.B.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.<br>• HSF-LE.A.4 For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where $b$, $c$, and $d$ are numbers and the base $b$ is 2, 10, or $e$; evaluate the logarithm using technology. |
| **Essential Questions** | • How can mathematical models help you make good decisions?<br>• What factors can affect good decision making?<br>• How can being financially literate help you to make good decisions?<br>• How does exponential growth differ from linear growth?<br>• What is an asymptote? |
| **Content Knowledge** | *Students will learn:*<br>• Graphing Exponential Functions<br>• Solving Exponential Equations and Inequalities<br>• Logarithms and Logarithmic Functions |

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| | • Solving Logarithmic Equations and Inequalities<br>• Properties of Logarithms<br>• Common Logarithms<br>• Base *e* and Natural Logarithms<br>• Using Exponential and Logarithmic Functions |
| **Skills** | *Students will be able to:*<br>• Graph exponential growth and decay functions.<br>• Solve exponential equations and inequalities.<br>• Evaluate logarithmic expressions and graph logarithmic functions.<br>• Use a graphing calculator to find exponential and logarithmic functions of best fit.<br>• Solve logarithmic equations and inequalities.<br>• Simplify and evaluate expressions using properties of logarithms.<br>• Solve logarithmic equations using properties of logarithms.<br>• Solve exponential equations and inequalities using common logarithms string change of base formula.<br>• Evaluate expressions involving the natural base and the natural logarithm.Students able to solve exponential equations and inequalities using natural logarithms<br>• Use logarithms to solve problems involving exponential growth and decay and logistical growth. |
| **Performance Tasks** | • Quizzes<br>• Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | • Benchmark:<br>  ○ iReady April/May 2025<br>• Formative:<br>  ○ Warm up/Problem of the Day<br>  ○ Lesson<br>  ○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>  ○ Independent Practice/Classwork/Homework<br>• Summative:<br>  ○ Homework: Worksheets 7.1, 7.2, 7.3, 7.4-7.5, 7.6, 7.7, 7.8<br>  ○ Quizzes: Quiz 7.1-7.2, Quiz 7.3-7.5<br>  ○ Tests: Chapter 7 Test |

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| **Resources/Materials** | **Core Materials**<br>● Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>● Extra Practice Homework<br>● Schoology Links<br>● Quizizz |
| **Interdisciplinary Connections** | ● Science: HS-PS1-6: Use mathematical representations to support the claims and explanations about the relationship between energy changes and chemical reactions.<br>○ Logarithmic functions are used in chemistry, especially when studying the pH scale and exponential decay in reactions.<br><br>● Social Studies: 6.1.12.A.10.a: Evaluate the impact of logarithmic models on technological and economic trends, such as the growth of populations or resource consumption over time.<br>○ Students will learn how logarithmic functions are used in economics to model population growth, technological advancement, and resource management.<br><br>● English Language Arts: RH.9-10.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a table or chart).<br>○ Students will read word problems, convert them into logarithmic equations, and graph or interpret the data to solve the problem. |
| **Learning Activities** | ● Homework Check<br>● Learn/Lesson<br>● Classwork/Homework |

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **8 Rational Functions & Relations** |
| **Timeframe** | 3 Weeks |
| **Established Goals** | ● MP.1 Make sense of problems and persevere in solving them.<br>● MP.2 Reason abstractly and quantitatively.<br>● MP.3 Construct viable arguments & critique the reasoning of others. |

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| | • MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision.<br>• MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSA-APR.D.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.<br>• HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.<br>• HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.<br>• HSA-REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. |
| **Essential Questions** | • Why are graphs useful?<br>• How are the properties of a rational function reflected in its graph?<br>• How does a vertical asymptote differ from a horizontal asymptote?<br>• Why are some values excluded from the domain of a rational? |
| **Content Knowledge** | *Students will learn:*<br>• Simplifying rational expressions<br>• Adding, subtracting, multiplying, and dividing rational expressions<br>• Graphing reciprocal functions<br>• Graphing rational functions<br>• Variation Functions<br>• Solving rational equations and inequalities |
| **Skills** | *Students will be able to:*<br>• Simplify rational expressions and complex fractions.<br>• Add and subtract rational expressions.<br>• Determine properties of reciprocal functions and graph transformations of reciprocal functions.<br>• Graph rational functions with vertical and horizontal asymptotes.Students able to graph rational functions with oblique asymptotes and point discontinuity.<br>• Recognize and solve direct and joint variation problems.Students able to recognize and solve inverse and and combined variation problems. |

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| | • Solve rational equations and inequalities. |
| **Performance Tasks** | • Quizzes<br>• Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | • Benchmark:<br>  ○ iReady April/May 2025<br>• Formative:<br>  ○ Warm up/Problem of the Day<br>  ○ Lesson<br>  ○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>  ○ Independent Practice/Classwork/Homework<br>• Summative:<br>  ○ Homework: Worksheets 8., 8.2, 8.3, 8.4, 8.5, 8.6<br>  ○ Quizzes: Quiz 8.1-8.2, Quiz 8.3-8.4<br>  ○ Tests: Chapter 8 Test |
| **Resources/Materials** | **Core Materials**<br>• Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>• Extra Practice Homework<br>• Schoology Links<br>• Quizizz |
| **Interdisciplinary Connections** | • Career Readiness Standard: NJSLS Career Readiness, Life Literacies, and Key Skills - 9.1.12.FP.3 Description: Analyze how personal financial decisions (e.g., loans, investments) impact short- and long-term financial stability.<br>  ○ Students create rational function equations to model loan repayments, linking math to financial planning.<br>• Engineering Standard: NJSLS Science - HS-ETS1-3 (Engineering Design) Description: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, and reliability.<br>  ○ Students model engineering problems with rational functions, evaluating design trade-offs like cost versus performance. |

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| **Learning Activities** | • Homework Check<br>• Learn/Lesson<br>• Classwork/Homework |

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **10 Sequences and Series** |
| **Timeframe** | 2 Weeks |
| **Established Goals** | • MP.1 Make sense of problems and persevere in solving them.<br>• MP.2 Reason abstractly and quantitatively.<br>• MP.3 Construct viable arguments & critique the reasoning of others.<br>• MP.4 Model with mathematics.<br>• MP.5 Use appropriate tools strategically.<br>• MP.6 Attend to precision.<br>• MP.7 Look for and make use of structure.<br>• MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSA-SSE.B.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.<br>• HSA-APR.C.5 Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of $x$ and $y$ for a positive integer $n$, where $x$ and $y$ are any numbers, with coefficients determined for example by Pascal's Triangle.<br>• HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.<br>• HSA-CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.<br>• HSF-IF.A.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.<br>• HSF-IF.B.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.<br>• HSF-BF.A.Write a function that describes a relationship between two quantities.<br>• HSF-BF.A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, |

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| | use them to model situations, and translate between the two forms. |
| **Essential Questions** | • Where are patterns found in the real world?<br>• How can recognizing patterns help you solve real-world problems?<br>• What is the difference between continuous and discrete?<br>• How can infinite geometric series have a sum? |
| **Content Knowledge** | *Students will learn:*<br>• Sequences as Functions<br>• Arithmetic Sequences and Series<br>• Geometric Sequences and Series |
| **Skills** | *Students will be able to:*<br>• Relate arithmetic sequences to linear functions and relate geometric sequences to exponential functions.<br>• Use arithmetic sequences and find the sums of arithmetic series.<br>• Use geometric sequences and find geometric sums.<br>• Find the sum of an infinite geometric series and use infinite geometric series to write repeating decimals as fractions.<br>• Recognize and use special sequences and iterate functions.<br>• Use Pascal's triangle to expand powers of binomials.Students able to use binomial theorem to expand powers of binomials. |
| **Performance Tasks** | • Quizzes<br>• Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | • Benchmark:<br>  ○ iReady April/May 2025<br>• Formative:<br>  ○ Warm up/Problem of the Day<br>  ○ Lesson<br>  ○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>  ○ Independent Practice/Classwork/Homework<br>• Summative:<br>  ○ Homework: Worksheets 10.1, 10.2, 10.3, 10.4, 10.5, 10.6<br>  ○ Quizzes: Quiz 10.1-10.4<br>  ○ Tests: Chapter 10 Test |

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| **Resources/Materials** | **Core Materials**<br>● Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>● Extra Practice Homework<br>● Schoology Links<br>● Quizizz |
| **Interdisciplinary Connections** | ● Social Studies Standard: NJSLS Social Studies - 6.1.12.EconNE.2.b Description: Use quantitative data to evaluate the impact of supply and demand on market equilibrium and analyze how markets adjust over time.<br>○ Students critique statistical reports on economic trends (math), linking these to supply-demand dynamics and market adjustments (social studies).<br>● Science Standard: NJSLS Science - HS-ESS3-5 Description: Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.<br>○ Students create scatter plots and fit models to climate data (math), using statistical analysis to forecast trends like temperature rise or sea level changes (science). |
| **Learning Activities** | ● Homework Check<br>● Learn/Lesson<br>● Classwork/Homework |

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **11 Statistics & Probability** |
| **Timeframe** | 2 Weeks |
| **Established Goals** | ● MP.1 Make sense of problems and persevere in solving them.<br>● MP.2 Reason abstractly and quantitatively.<br>● MP.3 Construct viable arguments & critique the reasoning of others.<br>● MP.4 Model with mathematics.<br>● MP.5 Use appropriate tools strategically.<br>● MP.6 Attend to precision.<br>● MP.7 Look for and make use of structure. |

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| | • MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | • HSS-ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.<br>• HSS-ID.A.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.<br>• HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.<br>• HSS-IC.B.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.<br>• HSS-IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.<br>• HSS-IC.B.6 Evaluate reports based on data.<br>• HSS-CP.A.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”).<br>• HSS-CP.A.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.<br>• HSS-CP.A.3 Understand the conditional probability of *A* given *B* as $P(A \text{ and } B)/P(B)$, and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.<br>• HSS-CP.A.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.<br>• HSS-CP.A.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.<br>• HSS-CP.B.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.<br>• HSS-CP.B.7 Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.<br>• HSS-CP.B.8 Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.<br>• CHSS-CP.B.9 Use permutations and combinations to compute probabilities of compound events and |

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| | solve problems.<br>● HSS-MD.B.6 Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).<br>● HSS-MD.B.7 Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). |
| **Essential Questions** | ● How can you effectively evaluate information?<br>● How can you use information to make decisions?<br>● How can probability be used in decision making?<br>● Can statistics lie? |
| **Content Knowledge** | *Students will learn:*<br>● Counting Techniques (permutations and combinations)<br>● Adding and Multiplying Probabilities<br>● Measure of Center, Spread, and Position<br>● Designing a Study (Survey, Experiment, and Observational Study)<br>● Distributions of Data<br>● Probability Distributions<br>● The Binomial Distribution<br>● The Normal Distribution |
| **Skills** | *Students will be able to:*<br>● Find the total number of events using a variety of methods then find their probability.<br>● Find probability of events by adding probabilities (or) .<br>● Find the probability of an event by multiplying probabilities (and).<br>● Calculate measures of central tendency and measures of spread and position.<br>● Classify statistical types and design statistical studies.<br>● Use the shape of distributions to select appropriate statistics.<br>Use the shapes of distributions to compare data.<br>● Construct a probability distribution and analyze a probability distribution and its summary statistics.<br>● Identify and conduct a binomial experiment.<br>● Find probabilities using binomial distributions.<br>● Use the empirical rule to analyze normally distributed variables and apply the standard normal distribution and z-values. |

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| **Performance Tasks** | ● Quizzes<br>● Chapter Assessments including released NJGPA and SAT questions |
| **Other Assessment Evidence** | ● Benchmark:<br>○ iReady April/May 2025<br>● Formative:<br>○ Warm up/Problem of the Day<br>○ Lesson<br>○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>○ Independent Practice/Classwork/Homework<br>● Summative:<br>○ Homework: Worksheets 11.1, 11.2, 11.3, 11.4, 11.5, 11.6<br>○ Quizzes: Quiz 11.1-11.3<br>○ Tests: Chapter 11 Test |
| **Resources/Materials** | **Core Materials**<br>● Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>● Extra Practice Homework<br>● Schoology Links<br>● Quizizz |
| **Interdisciplinary Connections** | ● Science: HS-ESS3-1: Use statistical models to analyze environmental data, predicting and explaining outcomes.<br>○ Students can apply probability and statistics to analyze environmental data, such as weather patterns or resource distribution.<br>● Social Studies: 6.1.12.D.12.b: Use data and statistics to understand historical trends and make predictions about future events.<br>○ Students will apply statistical analysis to historical trends, such as economic data or population growth, to make predictions.<br>● English Language Arts: RH.9-10.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a table, chart, or graph). |

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| | ○ Students will interpret data presented in word problems, convert them into statistical models, and analyze the data through various visual representations (graphs, tables). |
| **Learning Activities** | ● Homework Check<br>● Learn/Lesson<br>● Classwork/Homework |

| **Subject Area: Math**<br>**Grade Level: Algebra II CP** | |
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| **Unit** | **12 Trigonometric Functions** |
| **Timeframe** | 3 Weeks |
| **Established Goals** | ● MP.1 Make sense of problems and persevere in solving them.<br>● MP.2 Reason abstractly and quantitatively.<br>● MP.3 Construct viable arguments & critique the reasoning of others.<br>● MP.4 Model with mathematics.<br>● MP.5 Use appropriate tools strategically.<br>● MP.6 Attend to precision.<br>● MP.7 Look for and make use of structure.<br>● MP.8 Look for and express regularity in repeated reasoning. |
| **NJSLS** | ● HSF-TF.C.8 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.<br>● HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.<br>● HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.<br>● CHSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.<br>● HSF-BF.B.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.<br>● HSF-TF.A.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.<br>● HSF-TF.A.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric |

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| | functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.<br>● HSF-TF.B.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.<br>● HSF-TF.B.7 Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.<br>● HSF-TF.C.9 Prove the addition and subtraction formulas for sine, cosine, and tangent.<br>● HSG-SRT.D.9 Derive the formula $A = 1/2\ ab\ \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.<br>● HSG-SRT.D.10 Prove the Laws of Sines and Cosines and use them to solve problems. |
| **Essential Questions** | ● What types of real-world problems can be modeled and solved using trigonometry?<br>● How are inverses of trigonometric functions similar to inverses of other functions you have studied?<br>● How are special right triangles related to a unit circle?<br>● What information is necessary to use a trig function? Law of Sines? Law of Cosines? |
| **Content Knowledge** | *Students will learn:*<br>● Trigonometric Functions in Right Triangles<br>● Angles and Angle Measure<br>● Trigonometric Functions of General Angles<br>● Circular and Periodic Functions<br>● Graphing Trigonometric Functions<br>● Translations of Trigonometric Graphs |
| **Skills** | *Students will be able to:*<br>● Find trigonometric functions for acute angles.<br>● Use trigonometry to solve right triangles.<br>● Draw and find angles in standard position.<br>● Convert between degree measures and radian measures.<br>● Find values of trigonometric functions for general angles.<br>● Find values of trigonometric functions by using reference angles.<br>● Find the area of a triangle using 2 angles and an included angle.<br>● Use the Law of Sines to solve a triangle.<br>● Solve a triangle and be able to choose methods to solve triangles.<br>● Find values of trigonometric functions based on the unit circle.<br>● Use the properties of periodic functions to evaluate trigonometric functions. |

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| | • Describe and graph trigonometric functions.<br>• Describe and graph trigonometric functions and their translations.<br>• Find values of inverse trigonometric functions and solve equations using inverse trigonometric functions. |
| **Performance Tasks** | • Quizzes<br>• Chapter Assessments including released NJGPA and SAT questions<br>• Final Exam |
| **Other Assessment Evidence** | • Benchmark:<br>  ○ iReady April/May 2025<br>• Formative:<br>  ○ Warm up/Problem of the Day<br>  ○ Lesson<br>  ○ Scaffolded Classwork/Guided Practice that require students to extend understanding to new situations<br>  ○ Independent Practice/Classwork/Homework<br>• Summative:<br>  ○ Homework: Worksheets: 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8<br>  ○ Quizzes: Quiz 12.1-12.3, Quiz 12.4-12.5, Quiz 12.6-12.8<br>  ○ Tests: Chapter 12 Test |
| **Resources/Materials** | **Core Materials**<br>• Algebra II Common Core Edition, McGraw-Hill Companies, Inc.<br>**Supplemental Materials**<br>• Extra Practice Homework<br>• Schoology Links<br>• Quizizz |
| **Interdisciplinary Connections** | • Science Standard: NJSLS Science - HS-PS4-1 (Waves and Their Applications) Description: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.<br>  ○ Students model wave motion with trigonometric functions to represent amplitude and frequency (math), applying these to analyze wave properties like sound or electromagnetic waves (science).<br>• Engineering Standard: NJSLS Science - HS-ETS1-3 (Engineering Design) Description: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, and reliability. |

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| | ○ Students use trigonometric functions to calculate angles or heights in structural designs (math), evaluating trade-offs in engineering projects like bridges or towers (engineering). |
| **Learning Activities** | ● Homework Check<br>● Learn/Lesson<br>● Classwork/Homework |

| **Subject Area: Math** | **Level: Algebra II CP** |
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| **21st Century Skills Integration: Career Readiness, Life Literacies, and Key Skills** | ● 9.1.12.CFR.4: Demonstrate an understanding of the interrelationships among attitudes, assumptions, and patterns of behavior regarding money, saving, investing, and work across cultures.<br>● 9.1.12.CDM.1: Identify the purposes, advantages, and disadvantages of debt.<br>● 9.1.12.CDM.6: Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (e.g., student loans, credit cards, auto loans, mortgages, etc.).<br>● 9.1.12.CDM.8: Compare and compute interest and compound interest and develop an amortization table using business tools.<br>● 9.1.12.PB.1: Explain the difference between saving and investing.<br>● 9.1.12.PB.5: Analyze how changes in taxes, inflation, and personal circumstances can affect a personal budget.<br>● 9.1.12.PB.6: Describe and calculate interest and fees that are applied to various forms of spending, debt and saving.<br>● 9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.<br>● 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.<br>● 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.<br>● 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).<br>● 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).<br>● 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).<br>● 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).<br>● 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data. |

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| | • 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.<br>• 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).<br>• 9.1 Standards Link - https://www.nj.gov/education/standards/clicks/Docs/2020NJSLS-9.1FinancialLiteracy.pdf<br>• 9.2 Standards Link - https://www.nj.gov/education/standards/clicks/Docs/2020NJSLS-9.2CareerAwareness.pdf<br>• 9.4 Standards Link - https://www.nj.gov/education/standards/clicks/Docs/2020NJSLS-9.4LifeLiteraciesandKeySkills.pdf<br>• Our CTE offerings are extensive at the HS level. Currently, we offer 8 CTE programs at Vernon Township High School including: Engineering, Hospitality, Allied Health, Marketing, Construction, Computer Science, Cosmetology, and Graphic Design.<br>• ARTSTANDING is a district-wide event that allows all "Special" areas to be highlighted -- of which CTE programs and Career Pathways are included. |
| **Career Education with Diversity, Equity, and Inclusion** | • Data Analyst/Specialist<br>• Engineering<br>  ○ **Dr. Shirley Ann Jackson**. She is an African American physicist and electrical engineer who made significant contributions to telecommunications while working at Bell Labs. Her research laid the groundwork for technologies such as touch-tone dialing, fiber optics, and caller ID. Dr. Jackson later became the president of Rensselaer Polytechnic Institute (RPI) and was the first African American woman to earn a Ph.D. from MIT in any field.<br>• Accounting<br>• Economist<br>• Computer Science/Software Developer<br>  ○ **Rami Ismail**, a Dutch-Egyptian game developer and co-founder of Vlambeer, the studio behind popular indie games like *Nuclear Throne* and *Ridiculous Fishing*. He has been a strong advocate for diversity and inclusion in the gaming industry, helping developers from underrepresented backgrounds gain visibility and access to resources through his initiatives like *Presskit()* and *Medaverse*.<br>• Actuary<br>• Architect<br>  ○ **Zaha Hadid**, a British-Iraqi architect known for her bold, futuristic designs and innovative use of fluid, curving forms. She was the first woman to receive the **Pritzker Architecture Prize** in 2004 and designed iconic buildings such as the **Heydar Aliyev Center in Azerbaijan**, the **London Aquatics Centre**, and the **Guangzhou Opera House**. Her work pushed the boundaries of architecture, blending technology, art, and engineering in groundbreaking ways.<br>• Teacher<br>• Finance and Banking<br>• Sales and Marketing Analyst<br>• Construction and Carpentry<br>• Healthcare Careers |

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| **Diversity, Equity, and Inclusion** | **Analyzing Real-World Data on Social Issues**: Use functions and statistical analysis to examine data sets related to social justice topics, such as income inequality or environmental impacts on different communities. This approach helps students apply mathematical concepts to understand and discuss societal issues.<br><br>**Exploring Mathematics in Various Cultures**: Investigate mathematical contributions from diverse cultures, like the development of algebra in the Islamic world or ancient Chinese mathematics. This can deepen students' appreciation for the global nature of mathematical thought.<br><br>**Project-Based Learning on Community Issues**: Encourage students to identify local community challenges and use precalculus concepts to propose solutions. For example, modeling traffic patterns to improve safety or analyzing demographic trends to address local needs.<br><br>**Collaborative Group Work Emphasizing Diverse Perspectives**: Design group activities that require students to approach problems from multiple viewpoints, fostering an inclusive environment where diverse problem-solving strategies are valued. |
| **Technology Integrations: Computer Science and Design Thinking** | • Course catalog includes CTE programs such as Engineering, Computer Science, and Graphic Arts to provide technological opportunities to prepare for careers<br>• All students are one-to-one with Chromebooks for day-to-day use in the classroom<br>• All students log onto computers where they utilize a variety of instructional and online tools to enhance their classroom instruction as well as aid in the problem solving process<br>• Many of the concepts that are explored in the high school mathematics curriculum involve solving problems using a step by step process and are eventually summarized using and algorithm<br>• All classrooms have access to an interactive Smart Board with speaker system so lessons can include video, sound, and interactive lessons for all learners<br>• TECH.8.1.8 All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.<br>• TECH.8.1.8.A.CS1 Understand and use technology systems.<br>• TECH.8.1.8.A.CS2 Select and use applications effectively and productively.<br>• TECH.8.1.8.C Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.<br>• TECH.8.1.8.C.CS1 Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.<br>• TECH.8.1.8.F Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.<br>• TECH 8.2.12.D.1 Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review<br>• TECH 8.1.12.A.2 Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related are for review |

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| | • TECH 8.1.12.A.CS2 Select and use applications effectively and productively<br>• 8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.<br>• 8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.<br>• 8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis.<br>• 8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience<br>• 8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).<br>• 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).<br>• 8.2.12.ITH.1: Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.<br>• 8.2.12.ITH.2: Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.<br>• 8.2.12.ITH.3: Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture.<br>• 8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product.<br>• 8.2.12.NT.2: Redesign an existing product to improve form or function.<br>• 8.2.12.ETW.1: Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation, and maintenance of a chosen product.<br>• 8.2.12.ETW.2: Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment.<br>• 8.2.12.ETW.3: Identify a complex, global environmental or climate change issue, develop a systemic plan of investigation, and propose an innovative sustainable solution.<br>• 8.2.12.EC.1: Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made.<br>• 8.2.12.EC.2: Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.<br>• 8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.<br>• 8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints.<br>• https://www.nj.gov/education/standards/compsci/Docs/2020%20NJSLS-CSDT.pdf |

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| **Differentiation and Accommodations for: Special Education and 504's** | • Special Education modifications will be implemented as per the Individualized Education Programs of the students in the class.<br>• Such as:<br>  ○ Use of calculator, graphing calculator, desmos calculator (on chromebook)<br>  ○ Manipulatives - base blocks, algebra tiles, etc.<br>  ○ Graph Paper<br>• Please click here for an overview of the variety of accommodations set in place for IEP's and 504's<br>• Accommodations will be dictated by the general makeup of the class. |
| **MTSS/RTI** | • The VTSD Response to Intervention and MTSS Manual and the NJTSS Early Reading Screening Guidelines outline the policies and procedures that 'exist to ensure a coordinated system for planning, delivering, measurement, and modification of intervention and referral services implemented in each school by a multidisciplinary team to address the learning, behavioral, and health needs of all students. (N.J.A.C. 6A:16-8)' This requirement is fulfilled through the district New Jersey Tiered System of Support (NJTSS) Early Reading grant initiative and our Multi-Tiered Systems of Support (MTSS) Response to Intervention plan which includes<br>  ○ a. A continuum of supports and interventions available in each school to support learning, behavior, and health needs;<br>  ○ b. Action plans for interventions based on student data and desired outcomes;<br>  ○ c. Professional development for multidisciplinary teams and staff who provide interventions; and<br>  ○ d. Review and assessment of effectiveness of interventions (e.g., progress monitoring). |
| **English Language Learners** | • Coordinate activities with ESL teacher to accommodate individual learning needs<br>• Provide appropriate leveled texts<br>• Students complete the ACCESS 2.0 test yearly to measure growth and guide instruction |
| **Risk for School-Failure** | • Credit Retrieval Programs<br>• Apex - virtual<br>• Viking Success Academy<br>• Counseling interventions<br>• Parent meetings<br>• Student meetings<br>• Individual and Group counseling |
| **Gifted and Talented Learners** | • Inclusive Identification process that depicts the child as a whole in order to provide the best learning environment possible for each student. Click here for Identification Profile Sample<br>• Tiered Services utilizing NAGC K-12 Programming standards to ensure individual needs are being met. Click here for services map.<br>• Formative Assessment utilized in order to promote acceleration, curriculum compacting, grouping, and asynchronous learning where appropriate.<br>• Dynamic Model for Gifted Program Improvement is utilized in order to verify that our program is employing not only up to date methods, but also effective ones. |

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| | • Teacher training in Gifted Education. |
| **Climate Change** | • The following standards will be implemented in the topics that discuss using equations, functions, and statistics, specifically in unit 2, 3, 4, 7, and 11<br>• A.CED.A.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. Climate Change Example: Students may create equations and/or inequalities to represent the economic impact of climate change.<br>• A.CED.A.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. Climate Change Example: Students may represent constraints describing the economic impact of climate change by equations, inequalities, and/or by systems of inequalities, and interpret solutions as viable or nonviable options.<br>• A.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law to highlight resistance R. Climate Change Example: Students may rearrange formulas related to the economic impact of climate change to highlight a quantity of interest, using the same reasoning as in solving equations.<br>• S.ID.B.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. Climate Change Example: Students may represent geoscience data on two quantitative variables on a scatter plot and describe how the variables are related in order to analyze the data and the results from global climate models.<br>• S.ID.B.6a Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models. Climate Change Example: Students may use linear or exponential functions fitted to geoscience data to solve problems and analyze the results from global climate models to make an evidence-based forecast of the current rate of global climate change. |