NJ-CCSS AREA: MATHEMATICS

North Brunswick Township Public Schools

CP ALGEBRA II

Acknowledgements

Kelly Harrity, Mathematics Teacher
Lyndsay Beck, Mathematics Teacher

Diane M. Galella, Supervisor of Mathematics

Date: New_____

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Board Adoption_____

Quarter I			Quarter II		
Units 1 & 2: Review Variables, terms, coefficients (1-2) Solving equations and inequalities (1-3) Relation and function (2-1) Linear equations (2-2) *Study Skills (5 days)	**Unit 3:** 3-1 3-2 3-3 3-4 3-5 3-6 3-7 (12 days)	**Unit 4:** 5-1 5-2 5-3 5-4 5-5 5-6 5-7 5-8 (approx 20 days) **Quarterly Test Units 3 & 5 (1 day)**	**Unit 5:** 6-1 6-2 6-3 6-4 6-5 6-6 6-7 6-8 (approx 18 days)	**Unit 6:** 7-1 7-2 7-3 7-4 7-5 7-6 7-7 7-8 (18 days)	**Unit 7:** 8-1 8-2 8-3 8-4 8-5 8-6 (12 days) **Quarterly Test Units 6-8** 2 day Midterm Review **Midterm Exam on Units 3- 7** (Textbook Chapters 3, 5-8)

Quarter III		Quarter IV	
Unit 8: 9-1 9-2 9-3 9-4 9-5 9-6 (17 days)	**Unit 9:** 1-6 9-7 12-1 12-2 12-3 12-4 12-5 12-6 12-7 (20 days) **Quarterly Test Units 9 & 12** (1 day)	**Unit 10:** 13-1 13-2 13-3 13-4 13-5 13-6 13-7 13-8 (20 days)	**Unit 11:** 14-1 14-2 14-3 (15 days) 2 day Final Review **Final Exam on Units 8 – 11** (Textbook Chapters 9, 12-14)

- Math Vocabulary: Monday do-nows
- **Units 1 & 2:** Most of the sections in Unit 1 and 2 will be reviewed as do-nows or homework prior to sections where these concepts are needed as pre-requisite skills. Rules for operating with signed numbers are reviewed during this time. Study skills will be taught in conjunction with these review sections. This should not be rushed and should be strongly reinforced throughout the first quarter and checked periodically throughout the year.
- **Unit 3:** Prior to unit three – review graphing linear functions.
- **Unit 4:** Emphasis on factoring – review constantly.
- **Unit 5:** Review combining like terms.
- **Unit 6:** Use page 368 to review laws of exponents.
- **Unit 8:** Reinforce factoring

New Jersey - Common Core State Standard for Mathematics

Units 1 & 2: **Tools of Algebra, Functions, Equations and Graphs** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A.SSE Seeing Structure in Expressions **A.CED** Creating Equations **F.BF** Building Functions • How can you use the properties of real numbers to simplify algebraic expressions? • How can you model data with a linear equation?	**A.SSE.1.b Interpret the structure of expressions.** Interpret parts of an expression, such as terms, factors, and coefficients. **A.CED.1 Create equations that describe numbers or relationships.** Create equations and inequalities in one variable and use them to solve problems. **F.BF.1 Build a function that models a relationship between two quantities**. Write a function that describes a relationship between two quantities. **SMP.1** Make sense of problems and persevere in solving them. **SMP.4** Model with mathematics.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative Benchmarks	**Pacing**
Obj: Evaluate algebraic expressions. Simplify algebraic expressions. **Obj:** Solve equations. Solve problems by writing equations. **Obj:** Solve and graph inequalities. Solve and write compound inequalities **Obj:** Graph relations. Identify functions. **Obj:** Graph linear equations. Write equations of lines. Graph piecewise functions.	**Note: Unit 1 and 2 are review units. Pacing is fast. Pre-diagnostic assessment such as a do-now before each section is recommended.** • Graph and order real numbers on a number line. Have students provide a rational and an irrational number between two numbers on a number line. • Review vocabulary terms such as reciprocal and inverse • Watch for errors in equations such as where students tend to perform wrong order of operations. • Review graphing linear functions and writing the equation of a line. **Materials/Technology/Resources:** • Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. **Interdisciplinary Connections:** Science, pg 9 (65 – 70); History, pg 13 (example 3)	• Extended time • Daily record-keeping assistance • Manipulatives • Simulations • Highlighting and coloring • Stations/centers • Small group instruction • Pair-share	**Formative:** • In class practice problems • Board work • Do Now prompts • Class work • Problem solving activities • Think and Discuss • Open-ended questions **Summative:** • Ch 1 & 2 test	5 days

Unit 3: **Linear Systems** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A.REI Reasoning with Equations and Inequalities • How does representing functions graphically help you solve a system of equations? • How does writing equivalent equations help you solve a system of equations?	**A-REI.2 Understand solving equations as a process of reasoning and explain the reasoning.** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. **A.REI.3 Solve equations and inequalities in one variable**. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **A.REI.5 Solve systems of equations**. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. **A.REI.6 Solve systems of equations**. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **A-REI.11 Represent and solve equations and inequalities graphically.** 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, radical, absolute value, and exponential functions. **SMP.1** Make sense of problems and persevere in solving them. **SMP.4** Model with mathematics. **SMP.6** Attend to precision.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative Benchmarks	**Pacing**
Obj 3.1: *Solve a system by graphing.	**Note: Starred sections in Unit 3 are review. Pacing is fast. Pre-diagnostic assessment such as a do-now before each section is recommended.** ● Pi Pizzeria Activity – find revenue and cost equations for a business and solve system of equations to find break-even point ● Technology Activity: Analyzing Graphs – Discover then determine intersecting, parallel, or coinciding lines based on slope and y-intercept ● Compare/contrast methods for solving: substitution, graphing, elimination.	• Extended time • Group Investigations • Daily record-keeping assistance • Simulations • Highlighting and coloring • Stations/centers • Small group instruction • Pair-share	**Formative:** • In class practice problems • Board work • Do Now prompts • Class work • Problem solving activities • Think and Discuss	Unit 3 ≈ 12 days 2 days

	● Provide real life problems and have students explain the meaning of the solution in context. ● Remind students that solutions are stated as an ordered pair of coordinates written with parentheses ● Solve a system of equations without a unique solution – discover systems with an infinite number of solutions or no solution		• Open-ended questions **Summative:** • Quiz 3.1 – 3.4	
Obj 3.2: *Solve a system by substitution. *Solve a system by elimination.	● Remind students to pick an easy test point, like (0,0) when trying to decide where to shade ● Caution students on shading based only on directions of inequality symbol (see error prevention TE p. 134)			2 days
Obj 3.3: *Solve systems of linear inequalities.	● Activity: Finding a Minimum Value – write a system of inequalities to represent restrictions of number of tapes and number of CDs. Find minimum value by testing vertices (p. 139) ● Provide real life examples to demonstrate linear programming methods and meaning of solution ● Use appropriate vocabulary during instruction but do not require students to use exact wording. Emphasis on understanding what the vocabulary terms represent. .			2 days
Obj 3.4: Find maximum and minimum values. Solve problems with linear programming.	**Materials/Technology/Resources:** ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. ● Calculators, colored pencils **Interdisciplinary Connections:** Business (p. 139),			2 days

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
F-IF Interpreting Functions • How does representing functions graphically help you solve a system of equations? • How does writing equivalent equations help you solve a system of equations?	**F-IF.9 Analyze functions using different representations.** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **SMP.1** Make sense of problems and persevere in solving them. **SMP.4** Model with mathematics. **SMP.6** Attend to precision.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative Benchmarks	**Pacing**
Obj 3.5: Graph points in three dimensions. **Obj 3.6**: Solve systems in three variables by elimination. Solve systems in three variables by substitution.	● Model a 3-dimensional coordinate system using three dimensions labeled in corner of classroom. Then identify locations in the classroom using coordinates. ● Provide computer visuals to demonstrate three dimensional graphs and colored pencils to help with visualization. ● Remind students that three-dimensional implies they must find three coordinates for the solution. ● Systems in three variables should be limited to those with integer solutions and small integral coefficients. **Materials/Technology/Resources:** ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. ● Calculators, colored pencils **Interdisciplinary Connections:** Business (p. 156), Geometry (p. 158)	• Extended time • Group Investigations • Daily record-keeping assistance • Simulations • Highlighting and coloring • Stations/centers • Small group instruction • Pair-share	**Formative:** • In class practice problems • Board work • Do Now prompts • Class work • Problem solving activities • Think and Discuss • Open-ended questions **Summative:** • Unit 3 Test	2 days 2 days

Unit 4: **Quadratic Equations and Functions** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
F.IF Interpreting Functions **F.BF** Building Functions • What are the advantages of a quadratic function in vertex form? In standard form? • How is any quadratic function related to the parent quadratic function $y=x^2$? • How are the real solutions of a quadratic equation related to the graph of the related quadratic equation?	**F-IF.4 Interpret functions that arise in applications in terms of the context.** 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. **F-IF.5 Interpret functions that arise in applications in terms of the context.** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **F-IF.6 Interpret functions that arise in applications in terms of the context.** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **F-IF.9 Analyze functions using different representations.** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **F-BF.1.b Build a function that models a relationship between two quantities.** Write a function that describes a relationship between two quantities. Combine standard function types using arithmetic operations. **F-BF.3 Build new functions from existing functions.** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, and $f(kx)$ 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. **SMP.1** Make sense of problems and persevere in solving them. **SMP.5** Use appropriate tools strategically

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative Benchmarks	**Pacing**
Obj 5.1: Identify quadratic functions and graphs. Model data with quadratic functions.	• Play 'Guess My Rule'. Teacher uses both linear and quadratic functions, and students try to determine equation based on ordered pairs. • Recognize situations in which quadratic models are appropriate; create interpret quadratic models to answer questions. • Remind students to label graphs	• Extended time • Group Investigations • Daily record-keeping assistance • Simulations • Highlighting and coloring	**Formative:** • In class practice problems • Board work • Do Now prompts • Class work	Unit 5 ≈ 24 days 2 days

Obj 5.2: Graph quadratic functions. Find maximum and minimum values of quadratic equations. **Obj 5.3**: Use the vertex form of a quadratic equation. **Obj 5.4:** Find common and binomial factors of quadratic expressions. Factor special quadratic expressions. **Obj 5.5**: Simplify radical expressions. Solve quadratic equations by factoring and by finding square roots. Solve quadratic equations by graphing.	• Find and identify key properties of a parabola: vertex, axis of symmetry. • Find vertex by using: $x = \frac{-b}{2a}$, then substitute value of x into original equation to find y. This will help to find the vertex which will be a maximum or a minimum. • Use point-plotting to graph parabola in standard form. Emphasize putting in standard form to identify "a" correctly. • Emphasize that selection of x is important to sketch both sides of parabola. (use axis of symmetry as guide) • Vertex Form $y = a(x-h)^2 + k$ use for transformations • Review transformations comparing equation and graph • Pipe Cleaner Activity – Practice transformations of quadratic functions in vertex form using pipe cleaners as curves. • Factoring Practice – factor ten expressions completely in ten minutes. • Review perfect squares and simplifying radical expressions. • Work examples by factoring and by the square root method. This will help students remember that there will be two solutions when the square root method is used. • Compare factoring method to graphical solutions. Define "zeros of a function". • Recognize the relationship between the intercepts of the graph and its factors. • Writing Equations from Roots – Use the Zero-Product Property to write a quadratic equation from its roots. **Materials/Technology/Resources:** • Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. • Calculators, pipe cleaners **Interdisciplinary Connections:** Physics (p. 241), History (p. 250)	• Stations/centers • Small group instruction • Pair-share	• Problem solving activities • Think and Discuss • Open-ended questions • Pipe Cleaner Activity • Competing the square activity **Summative:** • Quiz 5.1 – 5.3 (scientific calculator only) • Quiz 5.4 – 5.5 (no calculator) • Performance Assessment – "Smile" • Unit 5 Test	2 days 2 days

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
N.CN The Complex Number System • How are the complex solutions of a quadratic equation related to the graph of the related quadratic equation?	**N-CN.1 Perform arithmetic operations with complex numbers.** 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 Perform arithmetic operations with complex numbers.** Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. **N-CN.7 Use complex numbers in polynomial identities and equations.** Solve quadratic equations with real coefficients that have complex solutions. **N-CN.8 Use complex numbers in polynomial identities and equations.** (+) Extend polynomial identities to the complex numbers. **SMP.1** Make sense of problems and persevere in solving them. **SMP.4** Model with mathematics. **SMP.5** Use appropriate tools strategically **SMP.6** Attend to precision.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative Benchmarks	**Pacing**
Obj 5.6: Identify and graph complex numbers. Add, subtract, and multiply complex numbers.	• Explain why complex numbers were developed. Define complex numbers • Develop powers of *i* through induction reasoning with patterns. Remind students that *i* is not a variable.	• Extended time • Group Investigations • Daily record-keeping assistance • Simulations • Highlighting and coloring • Stations/centers • Small group instruction • Pair-share	**Formative:** • In class practice problems • Board work • Do Now prompts • Class work • Problem solving activities • Think and Discuss • Open-ended questions • Pipe Cleaner Activity • Competing the square activity	3 days
Obj 5.7: Solve equations by completing the square. Rewrite functions by completing the square.	• Completing the Square – Construct a paper model. Physically 'complete the square' and solve for x. • Develop process by first having students find "c" only in a quadratic expression. Begin with examples involving only real number solutions. • Remind students that all terms containing a variable must be on the same side of the equation and to combine any like terms before completing the square.			3 days
Obj 5.8: Solve quadratic equations by using the Quadratic Formula. Determine types of solutions by using the discriminant. (Solve quadratic inequalities)	• Demonstrate the derivation of the Quadratic Formula by completing the square. • Students must memorize the Quadratic Formula. • Warn students to be careful when working with the signs under		**Summative:** • Unit 5 Test	3 days

	the radical sign in the Quadratic Formula. ● Describe how the discriminant indicates the nature of solutions of the quadratic equation. ● Relate the number of real solutions to the graph of the quadratic equation. ● Relate the number of real solutions to the graph of the quadratic equation. ● Compare/contrast methods of solutions: factoring, completing the square, quadratic formula. Select and explain which method is appropriate for a given equation. ● Solving Quadratic Inequalities Activity – methods ● Enter two sides of inequality into the graphing calculator. Use table to determine when inequality is true. ● Solve algebraically by setting equal to zero, factoring, and using a sign graph. **Materials/Technology/Resources:** ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. ● Calculators, tiles **Interdisciplinary Connections:** Physics (p. 295)			

Unit 5: **Polynomials and Polynomial Functions** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A-SSE Seeing Structure in Expressions **A-APR** Arithmetic with Polynomials and Rational Expressions. • What does the degree of a polynomial tell you about its related function? • For a polynomial function, how are factors, zeros, and x-intercepts related? • For a polynomial equation, how are factors and roots related?	**A-SSE.1a Interpret the structure of expressions.** Interpret parts of an expression, such as terms, factors, and coefficients. **A-SSE.1b Interpret the structure of expressions.** Interpret complicated expressions by viewing one or more of their parts as a single entity. **A-APR.1 Perform arithmetic operations on polynomials.** 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 Understand the relationship between zeros and factors of polynomials.** 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 Understand the relationship between zeros and factors of polynomials.** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph **A-APR.6 Rewrite rational expressions.** 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. **SMP.2** Reason abstractly and quantitatively. **SMP.6** Attend to precision. **SMP.7** Look for and make use of structure.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative Benchmarks	**Pacing**
Obj 6.1: Classify polynomials and model data using polynomial functions. **Obj 6.2**: Analyze the factored form of a polynomial. Write a polynomial function from its zeros.	• **Technology** Activity: Graphs of Polynomial Functions. Graph Polynomial functions on index cards for comparing various behaviors (p306). **Interdisciplinary Connection (Statistics)** • How does the degree of the polynomial affect the shape of its graph? How is the end behavior affected by the leading coefficient? • Generalize and describe degree, number of terms, and end behavior. Extension (p312) • Write polynomials in standard form and factored form. • Explore the relation of factors to zeros using graphing calculator. • Define and use "multiplicity" to write polynomials	• Extended time • Assignment modification • Note taking guides • Previewing materials • Graphic organizers • Color coding • Highlighting/and underlining • "Think alouds" • Reward systems • Stations/centers	**Formative:** • In class practice problems • Board work • Do Now prompts • Class work • Homework • Exit prompts • Study Island assignments **Summative:**	Unit 6 ≈ 14 days 1 day 2 days

Obj 6.3: Divide polynomials using long division. Divide polynomials using synthetic division. **Obj 6.4:** Solve polynomial equations by graphing. Solve polynomial equations by factoring. **Obj 6.5:** Solve equations using the Rational Root Theorem. Use the Irrational Root Theorem and the Imaginary Root Theorem. **Obj 6.6:** Use the Fundamental Theorem of Algebra in solving polynomial equations with complex roots and find all zeros of a polynomial function	• Students may not be familiar with long division. Perform long division on numbers then on polynomials following the same algorithm. • Present synthetic division, reminding students that this can only be used when dividing by a linear factor • Show how repeated use of synthetic division provides method to completely factor a polynomial. • Limit divisor to a linear or factorable quadratic polynomial. • Solve polynomial equations by graphing using one of two methods: A) Graph each side of the equation and find their intersection (p327); or B) Set equation equal to zero; graph; and find zeros. • Introduce properties of sum of cubes and difference of cubes and factor cubic expressions. • Solve polynomial equations using factoring and possibly the Quadratic Formula. • Use the Rational Root Theorem to find possible rational roots and test them. • Remind students that complex and irrational roots have conjugates, simplifying their work. Activity: Counting Zeros. Review Fundamental Theorem of Algebra, and apply it to find all zeros of a polynomial. **Materials:** Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009 **Interdisciplinary Connections:** Geometry (p.331), Fine Arts (p.317)		• Quiz 6.1 – 6.3 • Unit 6 Test • **Performance Assessment** - "Alcoholic Assessment" **Benchmark:** MP 1 Quarterly	2 days 3 days 3 days 3 days

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A-SSE Seeing Structure in Expressions **A-APR** Arithmetic with Polynomials and Rational Expressions • What is the difference between a combination and a permutation? • What is the difference between theoretical and experimental probability?	**A-APR.5 Use polynomial identities to solve problems.** (+) 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 **A-SSE.1a Interpret the structure of expressions.** Interpret parts of an expression, such as terms, factors, and coefficients. **A-SSE.1b Interpret the structure of expressions.** Interpret complicated expressions by viewing one or more of their parts as a single entity. **A-SSE.2 Interpret the structure of expressions.** Use the structure of an expression to identify ways to rewrite it. **SMP1** Make sense of problems and persevere in solving them **SMP.4** Model with mathematics.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative Benchmarks	**Pacing**
Obj 6.7 Count permutations. Count combinations. **Obj 6.8** Use Pascal's Triangle. Use the Binomial Theorem.	• Permutations and Combinations – Determine the number of possible baseball lineups from 15 players and the number of possible starting soccer teams from 15 players. • Provide multiple ways to determine: lists, trees, formulas, calculator. • Give a concrete example that illustrates that there will be more permutations than combinations in a particular problem. • Continually emphasize that if order matters in the problem permutations should be met. • Use a geometric pattern to develop Pascal's Triangle(pg.352). (optional) • Relate values in Pascal's Triangle to expansion of binomials. **Materials:** Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009	• Extended time • Assignment modification • Note taking guides • Previewing materials • Graphic organizers • Color coding • Highlighting/and underlining • "Think alouds" • Reward systems • Stations/centers	**Formative:** • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities **Summative:** • Quiz 6.7-6.8	4 days 2 days 2 days

Unit 6: **Radical Functions and Rational Exponents** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A-APR Arithmetic with Polynomials and Rational Expressions **F-IF** Interpreting Functions • To simplify the nth root of an expression, what must be true about the expression?	**A-APR.7 Rewrite rational expressions.** (+) 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.8b Analyze functions using different representations.** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the properties of exponents to interpret expressions for exponential functions. **SMP.1** Make sense of problems and persevere in solving them. **SMP.7** Look for and make use of structure.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative Benchmarks	**Pacing**
Obj 7.1: Apply properties of exponents. Simplify nth roots. **Obj 7.2**: Multiply radical expressions. Divide radical expressions.	**All Unit 7 procedures are to be done without a calculator except for exploration of patterns** ● Review basic properties of exponents (p368). Use patterns to reinforce meaning of negative and zero exponents: $2^3 = 8$; $2^2 = 4$; $2^1=2$ notice dividing by 2 as we decrease; if we divide by 2 again then 2^0 =? (2/2=1); continue to divide, writing answer in fraction form 2^{-1}=? (1/2=1/2) , and so on. ● Remind students that any expression to zero power equals 1, including those with variables. ● Define nth root by creating a pattern of equations. Ex: $5^2=25$, 5 is a square root of 25; $5^3=125$, 5 is the cube root of 125; etc. ● Find all real nth roots of a number. ● Simplify radical expressions. ● Remind students to express answers in simplest radical form when doing computations involving radicals. ● Multiply radical expressions. Ex: $\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$ ● Divide radicals. Ex: $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ ● Rationalize the denominator. Ex: $\frac{\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{6}}{3}$	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • "Think alouds" • Reward systems • Stations/centers	**Formative:** • In class practice problems • Board work • Do Now prompts • Class work • Homework assignments **Summative:** ● Quiz 7.1 – 7.2 **(no calculators)**	Unit 7 (part I) ≈ 4 days 4 days

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A-SSE Seeing Structure in Expressions **A-APR** Arithmetic with Polynomials and Rational Expressions **A-REI** Reasoning with Equations and Inequalities **F-IF** Interpreting Functions • When you square each side of an equation, is the resulting equation equivalent to the original?	**A-SSE.2 Interpret the structure of expressions.** Use the structure of an expression to identify ways to rewrite it. **A-APR.7 Rewrite rational expressions.** (+) 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. **A-REI.2 Understand solving equations as a process of reasoning and explain the reasoning.** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. **F-IF.8a Analyze functions using different representations.** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. **F-IF.8b Analyze functions using different representations.** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the properties of exponents to interpret expressions for exponential functions. **SMP.4** Model with mathematics.. **SMP.7** Look for and make use of structure.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative **Benchmarks**	**Pacing**
Obj 7.3: Add and subtract radical expressions. Multiply and divide binomial radical expressions. **Obj 7.4:** Simplify expressions with rational expressions.	● Add and subtract radical expressions. ● Emphasize that expressions must be simplified first and that only like radicals can be combined through addition or subtraction ● Multiply binomial radical expressions. ● Multiply conjugates. Ex:$(a+\sqrt{b})(a-\sqrt{b})$ ● Rationalize binomial radical denominators using conjugates. ● Expand on properties of exponents to include rational exponents. Caution students not to confuse rational exponents with negative exponents that reciprocate fractions. ● Give students two sets of equivalent problems, one set using radicals and the other using rational exponents, and have them match the problems that are equivalent. ● Simplify expressions with rational exponents.	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • "Think alouds" • Reward systems • Stations/centers	**Formative:** • HSPA Workout Ch. 7 p NJ 31 • Radical Expressions in formulas p 397 • Board work • Homework assignments **Summative:** ● Quiz 7.3 – 7.5 **(no calculators)**	Unit 7 (part II) ≈ 7 days 2 days 2 days

Obj 7.5: Solve square root and other radical equations.	● Reinforce that all values within parentheses are raised to the power indicated. Example: $(4x^8y^6)^{1/2} \neq 4x^8y^3$ ● Begin by solving simple radical equations that do not involve extraneous roots. Build process by starting with simplest form, such as $\sqrt{x} = 12$ and increase number of steps needed to solve (ex: $4 - \sqrt{x+2} = -6$ so that students see importance of isolating radical. ● For equations with extraneous solutions, have students graph example equations on the graphing calculator and note the number of solutions found. When solving these first sample equations by hand, ask students why there appears to be two solutions. Check solutions and use to define and explain extraneous solutions. ● Remind students to always isolate the radical expression and to check for extraneous solutions. ● Solve radical equations with one or more rational exponents. ● Activity: Radical Expressions in Formulas (p397) **Materials:** Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009 **Interdisciplinary Connections:** Physics (p. 377 & p. 383)			3 days

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A-APR Arithmetic with Polynomials and Rational Expressions **F-IF** Interpreting Functions **F-BF** Building Functions • How are a function and its inverse function related?	**A-APR.7 Rewrite rational expressions.** (+) 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.7c Analyze functions using different representations**. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. **F-IF.8a Analyze functions using different representations.** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. **F-IF.8b Analyze functions using different representations.** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the properties of exponents to interpret expressions for exponential functions.

	F-BF.1.b Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Combine standard function types using arithmetic operations. **SMP.4** Model with mathematics.. **SMP.7** Look for and make use of structure.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative **Benchmarks**	**Pacing**
Obj 7.6: Add, subtract, multiply, and divide functions. Find the composite of two functions.	● Emphasize that function notation f(x) is not implying multiplication of *f* with *x*. ● Add, subtract, multiply and divide functions. ● Provide various notation forms for compositions: $f°g = f(g(x))$. Remind students to work from the inside-out. ● Create and evaluate composite functions: $(g \circ f)(x)=g(f(x))$ where f(x) is calculated first then using the result calculate g(x).	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • Reward systems • Stations/centers	**Formative:** • HSPA Workout Ch. 7 p NJ 31 • Board work • Homework assignments	Unit 7 (part III) ≈ 7 days 2 days
Obj 7.7: Find the inverse of a relation or function.	● Find inverse relations of functions by interchanging *x* and *y*. ● Present inverse function notation, emphasizing that the negative exponent does not imply reciprocal of the function. $f^{-1}(x)$ ● Discuss need to identify domain and range; example $f(x) = \sqrt{x+1}, x \geq -1$ $and f^{-1}(x) = x^2$ -1, x≥ 0. ● Explore relationship between function and its inverse using the graphing calculator. Graph a function, its inverse, and *y* = *x* in the same plane; discuss results. ● Graph relation and its inverse by plotting 3 points of the form (a, b), and then plot the corresponding points of the form (b, a). Verify that the two graphs are reflections of each other in the line *y* = *x*.		**Summative:** ● Quiz 7.6 – 7.7 **(no calculators)**	3 days
Obj 7.8: Graph square root and other radical functions	● Identify domain and range of square root functions. ● Compare graphs of various basic radical functions to their inverse. ● Graph radical functions using transformations of parent function.			

	Materials: ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009 **Interdisciplinary Connections:** Economics (p. 401)			3 days

Unit 7: **Exponential and Logarithmic Functions** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A-REI Reasoning with Equations and Inequalities **A-CED** Creating Equations **F-IF** Interpreting Functions **F-LQE** Linear, Quadratic, and Exponential Models • How do you model a quantity that changes regularly over time by the same percentage? • How are exponents and logarithms related? • How are exponential functions and logarithmic functions related	**A-REI.11 Represent and solve equations and inequalities graphically.** 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, radical, absolute value, and exponential functions. **A-CED.2 Create equations that describe numbers or relationships.** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A-CED.3 Create equations that describe numbers or relationships.** 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. **F-IF.7e Analyze functions using different representations.** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. **F-LQE.4 Construct and compare linear and exponential models and solve problems.** For exponential models, express as a logarithm the solution to $a\,b^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. **SMP.4** Model with mathematics.. **SMP.7** Look for and make use of structure.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative **Benchmarks**	**Pacing**
Obj 8.1: Model exponential growth. Model exponential decay.	• Introduction to Exponential Growth: Present salary activity to have students choose between steady salary or doubling of salary. • Use the exponential growth model $y = ab^x$ where x is a real number, $a \neq 0, b > 1, b \neq 0$ to solve population and simple interest problems • Use the exponential decay model $y = ab^x$ where x is a real number, $a \neq 0, b < 1, b \neq 0$, and to solve half- life and depreciation problems. • Activity: Tournament Play (p432) Relate how the NCAA basketball brackets demonstrate exponential decay.	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • Reward systems • Stations/centers	**Formative:** • In class practice problems • Board work • Homework assignments • Salary activity • Tournament Play activity(pg.432) • HSPA Workout	Unit 8 ≈ 14 days 2 days

Obj 8.2 Identify the role of constants in. Use e as a base.	● Graph exponential functions using transformations (summary on p441). ● Maintain focus on asymptotic behavior. ● Evaluate e on a calculator and use it to calculate continuously compounded interest. $A = Pe^{rt}$ ● Discuss significance of e in real life situations.		**Summative:** ● Quiz 8.1-8.4 ● Unit 8 Test ● Performance Assessment – "Too good to be true?"	3 days
Obj 8.3 Write and evaluate logarithmic expressions. Graph logarithmic functions.	● Introducing logs: Analyze two separate earthquakes on the Richter Scale to understand the logarithmic scale/ ● Convert between logarithmic form and exponential form to evaluate logarithms without a calculator. ● Remind students that a logarithm equals the exponent of its inverse. ● Use transformation summary (p449) to graph logarithmic functions and translations of logarithmic functions.		**Benchmark:** MP 2 Quarterly	3 days
Obj 8.4 Use the properties of logarithms.	● Discover properties of logs using activity (p 454) and use those properties to simplify and expand logarithms. ● **Students must memorize properties.**			4 days
Obj 8.5: Solve exponential equations. Solve logarithmic equations.	● Use properties to solve exponential equations. ● Introduce change of base formula to solve logarithmic equations.			4 days
Obj 8.6: Evaluate natural logarithmic expressions. Solve equations using natural logarithms.	● Apply same properties to natural logarithms using base e to simplify, expand, and solve. **Materials:** ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009 **Interdisciplinary Connection:** Business (p. 437), Chemistry (p. 448), Astronomy (p. 467)			2 days

Unit 8: **Rational Functions** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
A-APR Arithmetic with Polynomial and Rational Expressions **A-REI** Reasoning with Equations and Inequalities **A-CED** Creating Equations • Are two quantities inversely proportional if an increase in one corresponds to a decrease in the other? • What kind of asymptotes are possible for a rational function? • Are a rational functional and its simplified form equivalent?	**A-APR.6 Rewrite rational expressions.** 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. **A-APR.7 Rewrite rational expressions.** (+) 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. **A-REI.11 Represent and solve equations and inequalities graphically.** 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, radical, absolute value, and exponential functions. **A-CED.2 Create equations that describe numbers or relationships.** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **SMP.1** Make sense of problems and persevere in solving them. **SMP.6** Attend to precision **SMP.7** Look for and make use of structure.

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative **Benchmarks**	**Pacing**
Obj 9.1: Use inverse variation. Use joint and other variations.	• Introduce inverse variation playing Guess My Rule (some with inverse variation, some with direct variation). • Review direct variation y = kx where k ≠ 0. Model inverse variation xy = k where k ≠ 0. • Use given values to write the function that models the inverse variation. Ex: x and y vary inversely and $x = 3$ when $y = 5$ then $y = \frac{15}{x}$. • Use real life connection of heart rates and life span to estimate the average life span of a given animal. • Use formulas to demonstrate joint variation. Ex: $F = \frac{Gm_1m_2}{d^2}$:	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • Reward systems • Stations/centers	**Formative:** • In class practice problems • Board work • Homework assignments • HSPA Workout	Unit 9 ≈ 15 days 2 days

Obj 9.2: Graph reciprocal functions. Graph translations of reciprocal functions.	F varies jointly with the masses m_1 and m_2 and and F varies inversely with the square of the distance d. ● Graph inverse variation by creating a chart and/or by using the shift of the reciprocal function. ● Identify branches and asymptotes. ● Demonstrate the stretching or shrinking of a reciprocal function. ● Go over the key concepts of parent function and the reciprocal function family (p497) ● Go through steps of graphing a translation. Step 1: draw the asymptotes; step 2: translate from the parent function; step 3: plot a few points and draw branches. ● Write the equation of a transformation. Ex: $y = \frac{5}{x}$ given parent function with asymptotes at $x = -2$ and $y = 3$: $y = \frac{5}{x+2} + 3$		**Summative:** ● Quiz 9.1 – 9.3 (scientific calculator only) ● Unit 9 Test ● Performance Assessment – "Transformation II"	2 days
Obj 9.3: Identify properties of rational functions. Graph rational functions.	● Rational functions are written as $f(x) = \frac{P(x)}{Q(x)}$. Discuss points of discontinuity. Set denominator equal to zero and solve for point of discontinuity. ● Holes occur when binomial factors are cancelled out. Ex: $y = \frac{(x+1)(x+2)}{x+1}$ a hole occurs at $x = -1$. ● Vertical asymptotes occur on the lines where x values create a discontinuity. Ex: $y = \frac{x+1}{(x-2)(x-3)}$ vertical asymptotes will occur at $x = 2$ and $x = 3$. ● Go over all properties of horizontal asymptotes (p504)			2 days
Obj 9.4: Simplify rational expressions. Multiply and divide rational expressions.	● Simply rational expressions (factor numerator and denominator) then sketch graphs using asymptotes and branches. ● Multiply rational expressions (look for common factors that can cancel before completing multiplication). ● Divide rational expressions by multiplying by the reciprocal of the second rational expression. Remind students frequently that it is the second expression that is "flipped."			3 days

Obj 9.5: Add and subtract rational expressions. Simplify complex fractions. **Obj 9.6:** Solve rational equations. Use rational equations in solving problems. .	● Add and subtract rational expressions. ● Remind students of the basic concept of adding and subtracting fractions (common denominator). Be careful to distribute the subtraction symbol throughout the numerator. ● Solve rational equations; if possible, use cross-products method by reducing each side to one expression. ● Discuss domain restrictions and affect on solutions. Check solutions for extraneous roots. ● Remind students to always indicate restrictions as part of their answer. ● Real life examples (p523) **Materials:** ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009 **Interdisciplinary Connection:** Health (p. 489), Physics (p. 519)			3 days 3 days

Unit 9: **Probability** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
S-MD Using Probability to make decisions. • How can we use mathematical models to describe physical relationships? • How can we use physical models to clarify mathematical relationships?	**S-MD.6 Use probability to evaluate outcomes of decisions.** (+) Use probabilities to make fair decisions. **S-MD.7 Use probability to evaluate outcomes of decisions.** (+) Analyze decisions and strategies using probability concepts. **SMP.1** Make sense of problems and persevere in solving them. **SMP.2** Reason abstractly and quantitatively. **SMP.3** Construct viable arguments and critique to reasoning of others. **SMP.4** Model with mathematics

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative **Benchmarks**	**Pacing**
Obj 1.6 Find experimental probabilities. Find theoretical probabilities.	● Present difference between experimental and theoretical probability, using example such as when flipping a coin 100 times. ● Hands on Activity – students drop folded index cards and record the number of each position to determine experimental probabilities (p39). ● Determine probabilities of a genetic trait from a Punnet Square.	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • Reward systems • Stations/centers	**Formative:** ● In class practice problems ● Board work ● Homework assignments ● HSPA Workout **Summative:** ● Quiz 1.6 & 9.7	Probability ≈ 5 days 2 days
Obj 9.7 Find the probability of the event 'A and B'. Find the probability of the event 'A or B'	● Hands on Activity – play the game 'Primarily Odd' with a partner to study probability of multiple events (p531). ● Define independent versus dependent events; mutually exclusive events. ● Using Venn diagrams to picture events that are not mutually exclusive can be very helpful to students. **Materials:** ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. ● Index Cards ● Number			3 days

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
S-ID Interpreting Categorical and Quantitative Data **S-IC** Making Inferences and Justifying Conclusions • How are the measures of central tendency different from standard deviation?	**S-ID.4 Summarize, represent, and interpret data on a single count or measurement variable.** 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 and evaluate random processes underlying statistical experiments.** Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population. **S-IC.2 Understand and evaluate random processes underlying statistical experiments.** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. **SMP.1** Make sense of problems and persevere in solving them. **SMP.2** Reason abstractly and quantitatively. **SMP.3** Construct viable arguments and critique to reasoning of others. **SMP.4** Model with mathematics

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative **Benchmarks**	**Pacing**
Obj 12.1 Make a probability distribution and use a probability distribution in conducting a simulation.	● Define a frequency table and a probability distribution. ● Discuss how to make a frequency table given a set of data. ● Use a frequency table to find the probability distribution for certain outcomes. ● Real world connection: Genetics pg.650 example 4.	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • Reward systems • Stations/centers	**Formative:** ● In class practice problems ● Board work ● Homework assignments ● HSPA Workout **Summative:** ● Quiz 12.1-12.4 ● Quiz 12.5-12.7 **Benchmark:** MP 3 Quarterly	Unit 12-12 days 1 day
Obj 12.2 Find conditional probability, use formulas, and tree diagrams.	● Discuss how to find the conditional probability given a table of outcomes. ● Provide the conditional probability formula. Use the formula to find conditional probability. ● Demonstrate how to make a tree diagram given a set of observations.			1 day
Obj 12.3 Calculate measures of central tendency, draw and interpret box-and-whisker plots.	● Review the measures of central tendency and how to find them. ● Walk through the steps of using the STAT menu on the graphing calculator to find the measures of central tendency. ● Find quartiles of a data set and use them and the median to make			1 day

	a box and whisker plot. ● Find percentiles of a data set.			
Obj 12.4 Find the standard deviation of a set of values. Use standard deviation in real-world situations.	● Discuss measures of variation. ● Find IQR and standard deviation by hand given a data set. ● Find standard deviation using a graphing calculator. ● Use the standard deviation to find the z score of a value in the set.			2 days
Obj 12.5 Find sample proportions and find the margin of error.	● Define sample, random sample, and sample proportion. ● Find the sample proportion given a population. ● Use the margin of error to estimate sample size.			1 days
Obj 12.6 Find binomial probabilities and use binomial distribution.	● Define binomial experiment. ● Use the formula for binomial probability to determine the probability of an event occurring in a binomial experiment. ● Use binomial expansion to find the probability of an event occurring.			2 days
Obj 12.7 Use normal distribution and use the standard normal curve.	● Use normal distribution to determine the percentage of data that lies in certain regions under the curve. ● Apply the formula for z score to find the values within certain standard deviations of the mean. **Materials:** ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. ● Graphing calculator. **Interdisciplinary Connection** ● Government pg.(666); Olympics(pg.666); Energy(pg.671); Weather(pg.688)			2 days

Unit 10: **Periodic Functions and Trigonometry** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
F-TF Trigonometric Functions • How can you model periodic behavior? • What function has as its graph a sine curve with amplitude 4, period π, and a minimum at the origin? • If you know the value of sinθ, how can you find cosθ, tanθ, cscθ, secθ, and cotθ?	**F-TF.1 Extend the domain of trigonometric functions using the unit circle.** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. **F-TF.2 Extend the domain of trigonometric functions using the unit circle.** 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 Model periodic phenomena with trigonometric functions**. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. **SMP.1** Make sense of problems and persevere in solving them. **SMP.2** Reason abstractly and quantitatively. **SMP.3** Construct viable arguments and critique to reasoning of others. **SMP.4** Model with mathematics

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative **Benchmarks**	**Pacing**
Obj 13.1 Identify cycles and periods of periodic functions. Find the amplitude of periodic functions.	• Define periodic function, cycle, and period. • Analyze periodic functions and find their period and amplitude.	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • Reward systems • Stations/centers	**Formative:** • In class practice problems • Board work • Homework assignments • HSPA Workout **Summative:** • Quiz 13.1-13.3 • Quiz 13.4-13.5 • Unit 13 Test	Unit 13-20 days 1 day
Obj 13.2 Work with angles in standard position. Find coordinates of points on the unit circle.	• Define standard position, initial side, and terminal side of an angle. • Measure an angle in standard position and sketch an angle in standard position. • Use the unit circle to find the value of sine and cosine of an angle. • Use the unit circle and right triangles to find exact values of sine and cosine of an angle that is not in standard position.			2 days
Obj 13.3 Use radian measure for angles. Find the length of an arc of a circle.	• Review the definitions for central angle, intercepted arc, and radian. • Convert from degrees to radians and radians to degrees. • Find sine and cosine values of radian measures • Find the length of an intercepted arc given a radian measure and the radius of a circle.			2 days

Obj 13.4 Identify properties of the sine function. Graph sine curves.	● Interpret the graph of the sine function and determine its properties. ● Estimate the sine value in radians. ● Given a graph find the amplitude and period of the sine curve. ● Sketch the sine curve given an amplitude and a period. ● Graph a sine curve given a function rule.			3 days
Obj 13.5 Graph and write cosine functions. Solve trigonometric equations.	● Interpret the graph of the cosine function and determine its properties. ● Given a graph find the amplitude and period of the cosine curve. ● Sketch the cosine curve given a function rule and an interval. ● Write an equation to model a graph and a real life situation replicating the cosine function. ● Use the cosine function to solve for a variable in a given interval.			3 days
Obj 13.6 Graph the tangent function.	● Use tangent graph to find values of radians. ● Identify the period and asymptotes given a tangent function. ● Sketch the tangent curve given a function.			3 days
Obj 13.7 Graph translations of trigonometric functions. Write equations of translations.	● Identify phase shifts given a function rule. ● Graph translations and phase shifts of the sine and the cosine function.			2 days
Obj 13.8 Evaluate reciprocal trigonometric functions. Graph reciprocal trigonometric functions.	● Define the reciprocal functions. ● Use the values of sine, cosine, and tangent to find the values of their reciprocal functions. ● Apply the unit circle and the values of sine, cosine, and tangent to find exact values of the reciprocal functions of given angle measures. ● Find the value of the reciprocal functions of radians using the graphing calculator. ● Sketch graphs of the reciprocal functions using the graphs of sine, cosine, and tangent. **Materials:** ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. ● Graphing calculator. **Interdisciplinary Connection** ● Music pg.(740); Astronomy(pg.741); Wave Motion(pg.745); Parade(pg.766)			2 days

Unit 11: **Trigonometric Identities and Equations** **Grade: 10-11** **Date: May 2012**

NJ-CCSS **Domain** **Essential Questions**	**NJ-CCSS** **Cluster.Standard** **Standards for Mathematical Practice**
F-TF Trigonometric Functions • How do you verify that an equation involving the variable *x* is an identity? • A trigonometric function corresponds one number to many, so how can its inverse be a function? • How do trigonometric functions relate to the trigonometric ratios for a right triangle?	**F-TF.8 Prove and apply trigonometric identities**. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant. **SMP.1** Make sense of problems and persevere in solving them. **SMP.2** Reason abstractly and quantitatively. **SMP.3** Construct viable arguments and critique to reasoning of others. **SMP.4** Model with mathematics

Skills/Objectives SWBAT…	**Instructional Strategies** Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	**Modifications** ESL / Special Education Academic Support/G&T Differentiated Instruction	**Assessments** Formative Summative **Benchmarks**	**Pacing**
Obj 14.1 Verify trigonometric identities. **Obj 14.2** Evaluate inverses of trigonometric functions. **Obj 14.3** Find lengths of sides in a right triangle. Find measures of angles in a right triangle.	• Use the definitions of the trigonometric functions to verify Pythagorean Identities. • Verifying identities using definitions, Pythagorean Identities, and factoring. • Use the graph of the inverse of cosine to find angles with a given cosine value. • Find the measures of all angles with a given cosine using the unit circle. • Find the inverse of sine and tangent using a graphing calculator. • Solve trigonometric equations by factoring and using inverse trigonometric functions. • Use trigonometric ratios to find the lengths of the sides in a right triangle. • Find the missing side of a right triangle to write trigonometric ratios. • Calculate the measure of an angle using right triangles and inverse trigonometric functions. **Materials:** • Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009.	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • Reward systems • Stations/centers	**Formative:** • In class practice problems • Board work • Homework assignments • HSPA Workout **Summative:** • Quiz 14.1-14.3 **Benchmark:** • Final Exam	Unit 14-15 days 6 days 4 days 3 days

	● Graphing calculator. **<u>Interdisciplinary Connection</u>** ● Physics pg.(786); Astronomy(pg.741); Wave Motion(pg.745); Parade(pg.766);			

NORTH BRUNSWICK TOWNSHIP HIGH SCHOOL

(2325, 2326) CP Algebra II
Grades 10-11
5 credits – one year
Pre-requisite: CP Algebra I and CP Geometry

Course Description:
CP Algebra II is a second year of algebra that requires a solid foundation in CP Algebra I. Topics covered include: solving and graphs of equations - linear, quadratic, absolute value, exponential, logarithmic, and trigonometric; data analysis; factoring (extended to cubics); functions and composition of functions. The unit circle as a function of trigonometry is introduced. The graphing calculator is used in areas of graphing. A T1-83+ or better graphing calculator is highly recommended.

Proficiencies:
At the completion of this course the student will be able to:
- Interpret the structure of expressions.
- Understand solving equations as a process of reasoning and explain the reasoning.
- Represent and solve equations and inequalities graphically.
- Write expressions in equivalent forms to solve problems.
- Create equations that describe numbers or relationships.
- Understand the relationship between zeros and factors of polynomials.
- Use polynomial identities to solve problems.
- Interpret functions that arise in applications in terms of the context.
- Analyze functions using different representations.
- Build a function that models a relationship between two quantities.
- Build new functions from existing functions.
- Construct and compare linear, quadratic, and exponential models and solve problems.
- Perform arithmetic operations with complex numbers.
- Use complex numbers in polynomial identities and equations.
- Perform arithmetic operations on polynomials.
- Rewrite rational expressions.
- Extend the domain of trigonometric functions using the unit circle.
- Model periodic phenomena with trigonometric functions.
- Prove and apply trigonometric identities.
- Summarize, represent, and interpret data on a single count or measurement variable.
- Understand and evaluate random processes underlying statistical experiments.
- Make inferences and justify conclusions from sample surveys, experiments and observational studies.
- Use probability to evaluate outcomes of decisions.

Course Requirements:
- Students will be expected to maintain a high level of participation and preparedness. Students are expected to bring necessary supplies to class daily.
- Students will be expected to attend class regularly.
- Students will be expected to complete all assignments.
- Students will be expected to successfully accomplish all graded work to include unit tests, quizzes and reports, and all class projects.
- Students will be cooperative in class and contribute to the growth of the class.

Evaluation Procedures: Marking period grades will be determined by:

Assessments	80%
Homework	15%
Classwork/Preparedness	5%