NJ-CCSS AREA: MATHEMATICS

North Brunswick Township Public Schools

Algebra III

Acknowledgements

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Date: New_____

Revision__May 2012_____
Board Adoption_____

Quarter I			Quarter II	
Unit 1: 6.4 6.5 6.6 (7 days)	**Unit 2:** 7.1 7.2 7.3 7.4 7.5 (18 days)	**Unit 3:** 8.1 8.2 8.3 (15 days)	**Unit 3: cont.** 8.4 8.5 8.6 (12 days)	**Unit 4:** 9.1 9.2 9.3 9.4 9.5 9.6 9.7 (31)
Quarter III			Quarter IV	
Unit 5: 12-1 12-2 12-3 12-4 12-5 12-6 12-7 (24 days)	**Unit 6:** 13-1 13-2 13-3 13-4 13-5 (18 days)	**Unit 6: cont.** 13.6 13.8 (days 7)	**Unit 7:** 14.1 14.2 14.3 (days 19)	**Unit 8:** 10.1 10.2 10.3 10.4 10.5 (19 days)

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- **Unit 1:** Review combining like terms.
- **Unit 2:** Use page 368 to review laws of exponents.
- **Unit 4:** Reinforce factoring.
- **Unit 5:** Review simple probability (9.7)
- **Unit 6:** Review coefficients (a, b, h, k) from previous chapters
- **Unit 7:** Recall right triangle trigonometry from Geometry**.**

New Jersey - Common Core State Standard for Mathematics

Unit 1: **Polynomials and Polynomial Functions**   **Grade: 12**   **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 6.4: Solve polynomial equations by graphing. Solve polynomial equations by factoring.	● 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. ● Review properties of sum of cubes and difference of cubes and factor cubic expressions. ● Solve polynomial equations using factoring and possibly the Quadratic Formula.	● Extended time ● Assignment modification ● Note taking guides ● Previewing materials ● Graphic organizers ● Color coding ● Highlighting/and underlining	**Formative:** ● In class practice problems ● Board work ● Do Now prompts ● Class work ● Homework ● Exit prompts	Unit 6 ≈ 7 days 3 days

| **Obj 6.5:** Solve equations using the Rational Root Theorem. Use the Irrational Root Theorem and the Imaginary Root Theorem. | • 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. | • "Think alouds"
• Reward systems
• Stations/centers | • Study Island assignments

Summative:

• Quiz 6.4
• Chapter 6 Test
• **Performance Assessment** - "Alcoholic Assessment" | 2 days

2days |
| **Obj 6.6:** Use the Fundamental Theorem of Algebra in solving polynomial equations with complex roots and find all zeros of a polynomial function | 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:
 Statistics | | |

Unit 2: __Radical Functions and Rational Exponents__   **Grade: _12_**   **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 Chapter 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: $\sqrt{\dfrac{a}{b}} = \dfrac{\sqrt{a}}{\sqrt{b}}$ ● Rationalize the denominator. Ex: $\dfrac{\sqrt{2}}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{\sqrt{6}}{3}$	● 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 ≈ 18 days 3 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.	● 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.	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • "Think alouds" • Reward systems • Stations/centers	**Formative:** • **HSPA Workout Chapter Seven pNJ31** • Radical Expressions in Formulas (p397) •Board work • Homework assignments	4 days
Obj 7.4: Simplify expressions with rational expressions.	● 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		**Summative:**	3 days

	radicals and the other using rational exponents, and have them match the problems that are equivalent. ● Simplify expressions with rational exponents. ● Reinforce that all values within parentheses are raised to the power indicated. Example:$(4x^8y^6)^{1/2} \neq 4x^8y^3$		● Quiz 7.3-7.54 ● Chapter 7 Test **(no calculators)**	
Obj 7.5: Solve square root and other radical equations.	● 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:** <u>Algebra 2</u>, Bellman, Bragg, et al.; Pearson Education, Inc., 2009			4 days

Unit 3: __Exponential and Logarithmic Functions__   Grade: __12__   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 ≈ 27 days 5 days

			Summative:	
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.		● Quiz 8.1-8.2 ● Quiz 8.3 ● Quiz 8.4-8.5 ● Chapter 8 Test ● Performance Assessment – "Too good to be true?"	5 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.			5 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:** ● <u>Algebra 2</u>, Bellman, Bragg, et al.; Pearson Education, Inc., 2009 **Interdisciplinary Connection** ● Business ● Social Studies ● Physics			4 days

Unit 4: **Rational Functions**   **Grade: 12**   **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 $y = \dfrac{15}{x}$. ● 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: $F = \dfrac{Gm_1m_2}{d^2}$:	• 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 ≈ 31 days 4 days

			Summative:	
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: $y = \dfrac{5}{x}$ given parent function with asymptotes at $x = -2$ and $y = 3$: $y = \dfrac{5}{x+2} + 3$		● Quiz 9.1 (scientific calculator only) ● Quiz 9.2-9.3 ● Quiz 9.4 ● Chapter 9 Test ● Performance Assessment – "Transformation II"	4 days
Obj 9.3: Identify properties of rational functions. Graph rational functions.	● Rational functions are written as $f(x) = \dfrac{P(x)}{Q(x)}$. Discuss points of discontinuity. Set denominator equal to zero and solve for point of discontinuity. ● Holes occur when binomial factors are cancelled out. Ex: $y = \dfrac{(x+1)(x+2)}{x+1}$ a hole occurs at $x = -1$. ● Vertical asymptotes occur on the lines where x values create a discontinuity. Ex: $y = \dfrac{x+1}{(x-2)(x-3)}$ vertical asymptotes will occur at $x = 2$ and $x = 3$. ● Go over all properties of horizontal asymptotes (p504)		**Summative:** ● Chapter 9 Test ● Performance Assessment – "Transformation II" ● Quiz 9.7	6 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."			6 days

Obj 9.5: Add and subtract rational expressions. Simplify complex fractions.	● 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.			6 days
Obj 9.6: Solve rational equations. Use rational equations in solving problems.	● 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)			3 days
	Materials: ● Algebra 2, Bellman, Bragg, et al.; Pearson Education, Inc., 2009			
.	**Interdisciplinary Connection:** Health (p. 489), Physics (p. 519)			2 days

Unit 5: **Probability and Statistics**   **Grade: 12**   **Date: May 2012**

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	Unit 12-24 days 2 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.		**Summative:** ●Quiz 12.1-12.4 ●Quiz 12.5-12.7	2 day
Obj 12.3 Calculate measures of central tendency, draw and	●Review the measures of central tendency and how to find them. ●Walk through the steps using the STAT menu on the graphing calculator to find the measures of central tendency.			2 days

interpret box-and-whisker plots.	● Find quartiles of a data set and use them and the median to make 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.			4 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.			2 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.			4 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)			4 days

Unit 6: **Periodic Functions and Trigonometry**   **Grade: 12**   **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	Unit 13-25 days 2 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.		**Summative:** ●Quiz 13.1-13.3 ●Quiz 13.4-13.6 ●Chapter 13 Test	4 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			4 days

	● Find the length of an intercepted arc given a radian measure and the radius of a circle.			
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.			4days
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.			4 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.			4 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.			3 days
	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);			

Unit 7: <u>**Trigonometric Identities and Equations**</u>   **Grade: <u>12</u>**   **Date: <u>May 2012</u>**

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 $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ 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
<u>**Obj 14.1**</u> Verify trigonometric identities.	● Use the definitions of the trigonometric functions to verify Pythagorean Identities. ● Verifying identities using definitions, Pythagorean Identities, and factoring.	● Extended time ● Assignment modification ● Note taking guides ● Color coding ● Highlighting/and underlining ● Reward systems ● Stations/centers	<u>**Formative:**</u> ● In class practice problems ● Board work ● Homework assignments ● HSPA Workout	Unit 14-19days 10 days
<u>**Obj 14.2**</u> Evaluate inverses of trigonometric functions.	● 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.		<u>**Summative:**</u> ● Quiz 14.1-14.3 <u>**Benchmark:**</u> ● Final Exam	5 days
<u>**Obj 14.3**</u> Find lengths of sides in a right triangle. Find measures of angles in a right triangle.	● 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.			4 days

	Materials: ● <u>Algebra 2</u>, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. ● Graphing calculator. **Interdisciplinary Connection** ● Physics pg.(786); Astronomy(pg.741); Wave Motion(pg.745); Parade(pg.766);			

Unit 8: __Quadratic Relations and Conic Sections__   Grade: __12__   Date: __May 2012__

NJ-CCSS Domain Essential Questions	NJ-CCSS Cluster.Standard Standards for Mathematical Practice
F-IF Interpreting Functions • How can we use mathematical models to describe physical relationships? • How can we use physical models to clarify mathematical relationships?	**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-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.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 10-1:__ Graph conic sections. Identify conic sections. __Obj 10-2:__ Write the equation of the parabola. Graph parabolas.	●Activity Lab: Conic Sections (p546) is used to develop basic notion of a conic sction as a curve formed by the intersection of a plane and a double cone. . ●Present pictures of common uses of conic sections in real world applications. ●For this section, identifying various forms of conic equations. Full graphing of conics is taught in the next sections. Graphing in this section relies on point plotting rather than using the key elements of the conics to graph. ●Students: Which conic section has two branches? Which has one branch? Which is the only one that can be a function and why? ●Activity: Graphing Conic Sections p554 ●Generate parabola from definition using paper-folding activity. ●Have students create note cards for the four parabolas on p556.	• Extended time • Assignment modification • Note taking guides • Color coding • Highlighting/and underlining • Reward systems • Stations/centers	__Formative:__ ●Activity Labs ●Board work ●Class work ●Homework assignments __Summative:__ ●Quiz 10-1 to 10-2 __Formative:__ ●Activity Labs ●Board work ●Class work ●Homework assignments	*Unit 10* *≈* *19 days* 4 days

	Provide various equations of parabolas and have students sort them into groups using the note cards. ●Students: how do you know when a parabola opens up or down? Right or left?		**Summative:** ●Quiz 10-3 to 10-4 ●Chapter 10 test	4 days
Obj 10-3: Write and graph the equation of a circle. Find the center and radius of a circle and use it to graph the circle.	●Students: What is the relationship between the equation of a circle and the center and radius of the circle? Are the coordinates inside the circle part of the circle? ●Define key terms and work through examples ●Remind students how the parameters (h, k) changed the graphs in previous work on quadratics and absolute value equations. Discuss how these parameters are used in graphing and writing equations of circles. ●Emphasize taking the opposite signs of those in the parentheses when finding the center of a circle. ●Show how becomes when the center of the circle is at the origin.			2 days
Obj. 10-4: Write the equation of an ellipse. Find the foci of an ellipse and graph an ellipse.	●Define key terms and work through examples. Demonstrate how distance to foci is constant sum using string and push pin at foci. ●Draw an ellipse with center (0, 0). Demonstrate the symmetry about both major and minor axis. Use to find the vertices, foci and reinforce when graphing. ●Discuss real world use, example that the sun is at a foci and earth's orbit is elliptical **Interdisciplinary Connection (Physics)** ●Emphasize that the form is the best one to learn for the ellipse.			4 days
Obj. 10-5: Graph hyperbolas. Find and use the foci of a hyperbola.	●Activity: Analyzing hyperbolas is used to develop understanding of relationship between foci and graph. ●Define key terms and work through examples ●Students: What is an asymptote? How are the asymptotes found and how are they related to the graph of the hyperbola? ●Compare the relationship of a, b, and c in the ellipse and the hyperbola. ●Reviewing the Study Tips throughout the lesson **Materials:** ●<u>Algebra 2</u>, Bellman, Bragg, et al.; Pearson Education, Inc., 2009. ●Graphing calculator. **Interdisciplinary Connection** ●Physics pg.(786); Astronomy(pg.741); Wave Motion(pg.745); Parade(pg.766);			5days

(2375) Algebra III   (Recommended for College Bound)
Grade 12
5 Credits - 1 Year

Course Description:

Core Algebra III is a full year course with topics to include a review of quadratic functions plus the following topics: rational functions, basic exponential functions and logarithms, basic trigonometry, and sequences and series. Optional topics would include data analysis and conics. This course is designed for (a) those students who successfully pass Core Algebra II and wish to continue their post-secondary education at a college and (b) for those students who pass Algebra II but earn less than a C in that course.

Proficiencies:

At the completion of this course the student will be able to:

1. Extend the properties of exponents to rational exponents.
2. Use properties of rational and irrational numbers.
3. Perform arithmetic operations with complex numbers.
4. Use complex numbers in polynomial identities and equations.
5. Perform arithmetic operations on polynomials.
6. Understand the relationship between zeros and factors of polynomials.
7. Represent and solve equations and inequalities graphically.
8. Understand the concept of a function and use function notation.
9. Build a function that models a relationship between two quantities.
10. Construct and compare linear, quadratic, and exponential models and solve problems.
11. Interpret expressions for functions in terms of the situation they model.
12. Extend the domain of trigonometric functions using the unit circle.
13. Model periodic phenomena with trigonometric functions.
14. Prove and apply trigonometric identities.
15. Apply trigonometry to general triangles.

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

Evaluation Procedures:

Marking period grades will be determined by:
Performance Assessments	75%
Homework	15%
Classwork	10%

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