

NJ-CCSS AREA: MATHEMATICS

North Brunswick Township Public Schools

TRIGONOMETRY

Acknowledgements

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Date: New _____

Revision May 2012

Board Adoption _____

New Jersey - Common Core State Standards for Mathematics

Unit P – Real Numbers

Grade: 11-12

Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>P.1.1 N-Q The Real Number System</p> <ul style="list-style-type: none"> How do you define the sets of real numbers? 		<p>N-Q.1 Reason quantitatively and use units to solve problems. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively.</p>		
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
<p>Obj:</p> <ul style="list-style-type: none"> Define and illustrate real, rational, irrational, and natural numbers and integers Express inequalities in standard and bracket notation, and illustrate as intervals on the number line 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> how can to identify set that a number belongs to; what are the clues compare inequality symbols with interval notation; reinforce graphing on number line Teacher presentation Textbook reading Worksheets Practice problems <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Group investigations Note taking guides Daily record-keeping assistance Previewing materials Graphic organizers Color coding Highlighting/and underlining Cue cards Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Exit prompts 	1 day

Unit P – Real Numbers

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
P.1.2 N-Q The Real Number System <ul style="list-style-type: none"> • What are the order of operations? 		N-Q.1 Reason quantitatively and use units to solve problems. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. SMP.2 Reason abstractly and quantitatively. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> • Evaluate expressions involving one or more variables, exponents, and parentheses • Recognize and apply basic rules of algebra, negation, zero, fractions, and equality 	<ul style="list-style-type: none"> • Classroom discussion <ul style="list-style-type: none"> ○ Review order of operations focusing on simplifying expressions involving division • Teacher presentation • Textbook reading • Worksheets • Practice problems <u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u> , Larson, Houghton-Mifflin, 1997. Graphing Calculators	<ul style="list-style-type: none"> • Extended time • Note taking guides • Previewing materials • Graphic organizers • Mnemonics • Highlighting/and underlining • Stations/centers • Think-Tac-Toe • Small group instruction • Pair-share 	Formative: <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Exit prompts • Study Island assignments 	2 days

Unit P – Real Numbers

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
P.2 A-REI Reasoning with Equations and Inequalities <ul style="list-style-type: none"> How do you solve an equation? 		A-REI.3 Solve equations and inequalities in one variable. Solve linear equations and inequalities, including equations with coefficients represented by letters. SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.3 Construct viable arguments and critique the reasoning of others. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. Sole various types of equations. <ul style="list-style-type: none"> Review basic vocabulary including “equation”, “solution”, “identity”, and “conditional equation” Illustrate solutions of linear equations, equations involving fractional expressions and extraneous solutions Solve quadratic equations by factoring, using the quadratic equation formula, and by extracting square roots Solve absolute value equations and radical equations 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> Exploration to find ways to tell if an equation has a solution, is an identity, or has no solution. Review solving various equations Do less “thand” and “greater” than for absolute value and compound inequalities Teacher presentation Textbook reading Worksheets Practice problems <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Note taking guides Daily record-keeping assistance Previewing materials Highlighting/and underlining Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p><u>Summative:</u> Quiz on Sections P.1-P.2</p>	5 Days

Unit P – Real Numbers

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
P.3.1 A-REI Reasoning with Equations and Inequalities <ul style="list-style-type: none"> How do you graph an equation in two variables? 		A-REI.10 Represent and solve equations and inequalities graphically. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> Plot ordered pairs, and use the Pythagorean Theorem, distance and midpoint formulas Complete tables of values for equations in two variables and verify the graph on the graphing calculator 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> Discuss relation between Pythagorean Theorem and distance formula; students should memorize formulas Present entering data into graphing calculator; show how to find line-of-best-fit on calculator Teacher presentation Textbook reading Worksheets Practice Problems Technology Activity pg. 31, 33 Group Activity pg. 37 <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Mnemonics Color coding Manipulatives Simulations Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts 	2 days

Unit P – Real Numbers

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
P.3.2 F-IF Interpreting Functions <ul style="list-style-type: none"> How do you determine essential characteristics of linear functions? 		F-IF.7a 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 linear functions and show intercepts, maxima, and minima in context. SMP.2 Reason abstractly and quantitatively. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> Define x- and y-intercepts and graph equations on the graphing calculator to verify the actual intercepts Define x-axis, y-axis, and origin of symmetry and practice identifying these from graphs on the graphing calculator Distinguish between even and odd functions 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> Have students use graphs to explore relation between factors, roots, solutions Explore symmetry of parabola Develop notion of even – odd functions; look for patterns to help identify; insist students always verify Teacher presentation Textbook reading Worksheets Practice Problems Calculator Project – “making pictures using known functions” <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Mnemonics Color coding Manipulatives Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Quiz on Section P.3 	3 days

Unit P – Real Numbers

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
P.4 F-IF Interpreting Functions <ul style="list-style-type: none"> How do you graph a line? 		F-IF.7a 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 linear functions and show intercepts, maxima, and minima in context. SMP.3 Construct viable arguments and critique the reasoning of others. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> Define slope-intercept form of a linear equation Use the slope and y-intercept to graph straight lines Graph lines illustrating the 4 cases of slope Find the slope of a line given 2 points Use slope to determine when lines are parallel and perpendicular Write the equation of a lines given two points 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> Relate slope to rate of change and real world problems Help students identify four slopes (positive, negative, zero, undefined) from equation and from graph Teacher presentation Textbook reading Worksheets Practice Problems Graphing Calculator illustrations <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Highlighting/and underlining Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> Test on P.1-P.4 	5 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.3 G-SRT Similarity, Right Triangles, and Trigonometry <ul style="list-style-type: none"> How do we use trigonometry to solve triangles? 		G-SRT.6 Define trigonometric ratios and solve problems involving right triangles. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. 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. <ul style="list-style-type: none"> Identify parts of a right triangle Define the six trig functions Find the six trig functions given 2 sides of a triangle Find the exact values of the six trig functions for 30, 45, and 60 degree angles Use a calculator to evaluate trig functions for any acute angle in degree mode Solve word problems involving right triangles and angles of elevation and depression 	<ul style="list-style-type: none"> Classroom discussion Teacher presentation Textbook reading Worksheets Practice problems Graphing calculator illustrations Investigate basic identities: reciprocal, quotient, and Pythagorean Calculator Activities “Students chart steps using calculator to obtain conversions and values for the angles and Trig functions” <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Note taking guides Graphic organizers Mnemonics Color coding Highlighting/and underlining Manipulatives Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts 	5 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.8 G-SRT Similarity, Right Triangles, and Trigonometry <ul style="list-style-type: none"> How do you solve a right triangle and isosceles triangles using trig? 		G-SRT.8 Define trigonometric ratios and solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. 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. <ul style="list-style-type: none"> Use the trig functions to find all missing parts of a right triangle given any two parts Extend to the solution of isosceles triangles Solve additional problems involving angles of elevation and depression, including two angles of elevation or depression 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> Provide visual examples of angle of depression and angle of elevation Teacher presentation Textbook reading Worksheets Practice problems Graphing Calculator illustrations <u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u> , Larson, Houghton-Mifflin, 1997. Graphing Calculators	<ul style="list-style-type: none"> Extended time Note taking guides Graphic organizers Mnemonics Color coding Highlighting/and underlining Manipulatives Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<u>Formative:</u> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <u>Summative:</u> <ul style="list-style-type: none"> Quiz on sections 1.3, 1.8 	4 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.1 F-TF Trigonometric Functions <ul style="list-style-type: none"> How do you relate degree measure to radian measure? 		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. SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. 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. <ul style="list-style-type: none"> Define angle and related terms including initial side, terminal side, standard position, positive and negative angles, and coterminal angles Sketch angles in standard position using degree measure Find coterminal angles using degree measure Find complements and supplements using degree measure Define radian and establish equivalencies in degrees for 0, $\pi/2$, π, $3\pi/2$, and 2π radians Repeat all above activities using radians Convert between degree and radian measure Find arc length 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> Relate unit circle to graph of sine and cosine functions Review fractions to help students with graphing Students should memorize or find a way to recall the unit circle values Teacher presentation Textbook reading Worksheets Practice Problems Graphing Calculator illustrations Calculator Project – showing how the unit circle graph maps sine and cosine functions <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Note taking guides Graphic organizers Mnemonics Color coding Highlighting/and underlining Cue cards Manipulatives Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Mini quiz on 1.1 	5 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.2 F-TF Trigonometric Functions <ul style="list-style-type: none"> How do the values on the unit circle relate to trig ratios in right triangles? 		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. SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> Explain the relation between the unit circle and the result of wrapping a real number line around a circle with radius equal to 1 Determine the values of the six trigonometric functions based upon the fact that for any point $t(x,y)$ on the unit circle, $x = \cos t$ and $y = \sin t$, and that $\sin t / \cos t = \tan t$ Label the unit circle divided into 8 parts and 12 parts using correct radian measure and exact values for the x- and y- coordinates Determine trig functions for negative (clockwise) numbers 	<ul style="list-style-type: none"> Calculator activity to practice finding trig functions for angles in radian mode Classroom discussion Teacher presentation Textbook reading Worksheets Practice problems <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Note taking guides Graphic organizers Mnemonics Color coding Highlighting/and underlining Cue cards Manipulatives Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Mini quiz on 1.2 Graded assignment 	5 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.4 F-TF Trigonometric Functions <ul style="list-style-type: none"> How do you find a reference angle? 		F-TF.4 Extend the domain of trigonometric functions using the unit circle. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. SMP.2 Reason abstractly and quantitatively. SMP.3 Construct viable arguments and critique the reasoning of others. SMP.4 Model with mathematics. 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. <ul style="list-style-type: none"> Define the 6 trig functions for points on a circle whose radius is not equal to 1. Explain the meaning of odd and even functions and use calculator to verify that $\cos t = \cos (-t)$ and that $\sin t = -\sin t$. Find the six trig functions for special angles and quadrantal angles. Define and find reference angles. 	<ul style="list-style-type: none"> Calculator activity to practice finding trig functions for angles in radian mode Classroom discussion Teacher presentation Textbook reading Worksheets Practice Problems <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Note taking guides Graphic organizers Mnemonics Color coding Highlighting/and underlining Cue cards Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Test on 1.1-1.4, 1.8 	5 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.5.1 F-TF Trigonometric Functions <ul style="list-style-type: none"> • What does the graph of sine and cosine look like? 		F-TF.5 Model periodic phenomena with trigonometric functions. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. 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. <ul style="list-style-type: none"> • Complete a table of values for the equation $y=\sin x$ and $y=\cos x$ using radian measures for x and decimal values for y. • Plot the ordered pairs by hand and then using the graphing calculator to develop the cyclical nature of the curve. • Define and illustrate the amplitude and period of the sine and cosine curves • Graph the sine and cosine curves using five key points 	<ul style="list-style-type: none"> • Classroom discussion <ul style="list-style-type: none"> ○ Explore unwrapping the unit circle and graphing the sine curve ○ Define key terms and provide visual relationships between equation and graph • Teacher presentation • Textbook reading • Worksheets • Practice problems • Graphing calculator activities <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> • Extended time • Note taking guides • Graphic organizers • Manipulatives • Simulations • Stations/centers • Think-Tac-Toe • Small group instruction • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts 	2 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.5.2 F-TF Trigonometric Functions <ul style="list-style-type: none"> What happens to a sine/cosine graph when you change amplitude and period? 		F-TF.5 Model periodic phenomena with trigonometric functions. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> Determine the effects of changes in amplitude and period on the sine and cosine curves Write the equation of a sine or cosine curve based upon the graph 	<ul style="list-style-type: none"> Classroom discussion Teacher presentation Textbook reading Worksheets Practice Problems Graphing calculator activity, discussion, and illustration of how different amplitudes and period affect the appearance of the graphs Use colored pencils to plot graphs on the same grid to further emphasize the affects of equation changes <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Note taking guides Graphic organizers Mnemonics Manipulatives Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> Quiz on 1.5.1 and 1.5.2 	5 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.5.3 F-TF Trigonometric Functions <ul style="list-style-type: none"> What happens to the sine and cosine curves when you do a vertical or phase shift? 		F-TF.5 Model periodic phenomena with trigonometric functions. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> Determine the effects of changes in vertical shift and phase shift on the sine and cosine curves. Recognize an equation from a graph 	<ul style="list-style-type: none"> Graphing calculator activity to graph $y=\sin x + 1$, $y=\cos x - 2$, etc Discussion and illustration of vertical translation Use colored pencils to plot the basic curve and its vertical translation on the same grid Repeat the above for phase shift (horizontal translation) Classroom discussion Teacher presentation Textbook reading Practice problems Graphing calculator activity, discussion, and illustration of how different translations influence the appearance of the graphs Use colored pencils to plot graphs on the same grid to further emphasize the affects of equation changes <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Mnemonics Color coding Manipulatives Simulations Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Quiz 1.5.3 	6 days

Unit 1 – Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
1.6 F-TF Trigonometric Functions <ul style="list-style-type: none"> How do you graph tan, cot, sec, csc graphs? 		F-TF.5 Model periodic phenomena with trigonometric functions. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> Use a table of values to graph the other trigonometric functions Use the graphing calculator to examine the tangent graph and identify the period Verify graphs on the graphing calculator - Determine which functions are odd and which are even. 	<ul style="list-style-type: none"> Classroom discussion Teacher presentation Textbook reading Worksheets Practice Problems Use the overhead, demonstrate how to create the graph of $y = \cot x$ on the same grid as $y = \tan x$, using the properties of reciprocals Using colored pencils, students will repeat the process shown above Repeat for cosecant and secant curves, using the fact that they are reciprocals of sine and cosine, respectively. <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Color coding Manipulatives Simulations Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Test on graphing trig functions 	3 days

Unit 3 – Law of Sines and Law of Cosines

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
3.1 G-SRT Similarity, Right Triangles, and Trigonometry <ul style="list-style-type: none"> How do you solve an oblique triangle using Law of Sines? 		G-SRT.9 Apply trigonometry to general triangles. (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. G-SRT.10 Apply trigonometry to general triangles. (+) Prove the Laws of Sines and Cosines and use them to solve problems. G-SRT.11 Apply trigonometry to general triangles. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles. SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> Define oblique triangle and elicit the need for a method to solve other than right triangle trigonometry Derive the Law of Sines Use the Law of Sines to solve triangles involving ASA, AAS, and SSA (the ambiguous case) - State and apply the formula $A = \frac{1}{2} ab \sin C$ for area of an oblique triangle 	<ul style="list-style-type: none"> Classroom discussion Teacher presentation Textbook reading Worksheets Practice Problems Use the textbook illustrations on p. 268 Illustrate that the ambiguous case could result in 0, 1, or 2 solutions Student activity – redefine acronyms such as Soh-Cah-Toa and “all scholars take Calculus” <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Mnemonics Color coding Manipulatives Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> Quiz 3.1 	5 days

Unit 3 – Law of Sines and Law of Cosines

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
3.1 G-SRT Similarity, Right Triangles, and Trigonometry <ul style="list-style-type: none"> How do you solve an oblique triangle using Law of Cosines? 		G-SRT.9 Apply trigonometry to general triangles. (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. G-SRT.10 Apply trigonometry to general triangles. (+) Prove the Laws of Sines and Cosines and use them to solve problems. G-SRT.11 Apply trigonometry to general triangles. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles. SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> State and apply the Law of Cosines for oblique triangles State and apply Heron's formula to find the area of a triangle given its sides 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> Explore how to find measures for all triangles using the Law of Cosines; relate to Pythagorean Theorem Teacher Presentation Textbook reading Worksheets Practice Problems Demonstrate and discuss how to use the Law of Sines to complete the solution of the triangle <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Mnemonics Color coding Manipulatives Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Test on 3.1-3.2 	5 days

Unit 2 – Analytic Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
2.1 F-TF Trigonometric Functions <ul style="list-style-type: none"> How can you use identities to prove trigonometric identities? 		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 the reasoning of others. SMP.5 Use appropriate tools strategically. SMP.8 Look for and express regularity in repeated reasoning.		
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. <ul style="list-style-type: none"> State and illustrate the Pythagorean identities, co-function identities, and even/odd identities Use the graphing calculator to verify the various identities, such as calculating $\sin 50^\circ / \cos 50^\circ$ and comparing to $\tan 50^\circ$ Use the identities to find remaining trig functions when 1 or 2 of the functions are given Simplify expressions using the identities (i.e., express as a single function) 	<ul style="list-style-type: none"> Review the identities already used: reciprocal and quotient Classroom discussion Teacher presentation Textbook reading Worksheets Practice Problems Calculator project – show how graphing can be used to disprove but not prove an identity <p>Materials/Technology/Resources: Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Mnemonics Color coding Manipulatives Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Mini-quiz 2.1 	5 days

Unit 2 – Analytic Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions	NJ-CCSS Cluster.Standard Standards for Mathematical Practice			
<p>2-2 F-TF Trigonometric Functions</p> <ul style="list-style-type: none"> How can you use trig identities to verify trig identities? 	<p>(+)F-TF.9 Prove and apply trigonometric identities. Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.</p> <p>SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.3 Construct viable arguments and critique the reasoning of others. SMP.5 Use appropriate tools strategically. SMP.8 Look for and express regularity in repeated reasoning.</p>			
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
<p>Obj.</p> <ul style="list-style-type: none"> Verify trigonometric identities 	<ul style="list-style-type: none"> Classroom discussion <ul style="list-style-type: none"> Have students prove basic identities as a start Discuss ways to start proofs, such as looking for easiest expressions first. Students must memorize basic identities Teacher presentation Textbook reading Worksheets Practice problems Review algebraic concepts of factoring, foiling, and combining fractions <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Mnemonics Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> Quiz 2.2 Graded assignment 	5 days

Unit 2 – Analytic Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions	NJ-CCSS Cluster.Standard Standards for Mathematical Practice			
<p>2.3 F-TF Trigonometric Functions</p> <ul style="list-style-type: none"> How do you use trig identities to solve trig equations? 	<p>(+)F-TF.9 Prove and apply trigonometric identities. Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.</p> <p>SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.3 Construct viable arguments and critique the reasoning of others. SMP.5 Use appropriate tools strategically. SMP.8 Look for and express regularity in repeated reasoning.</p>			
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
<p>Obj.</p> <ul style="list-style-type: none"> Solve equations in which a trig function has to be isolated first Solve equations involving basic factoring Express solutions in trig equations in degrees and radians 	<ul style="list-style-type: none"> Classroom discussion Teacher presentation Textbook reading Worksheets Practice problems Review use of the calculator to find the measure of an angle when a trig function is known Review in which quadrants the various functions are positive or negative <p><u>Materials/Technology/Resources:</u> Textbook: <u>Trigonometry</u>, Larson, Houghton-Mifflin, 1997. Graphing Calculators</p>	<ul style="list-style-type: none"> Extended time Group investigations Note taking guides Graphic organizers Stations/centers Think-Tac-Toe Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> Test on Unit 2 	5 days

NORTH BRUNSWICK TOWNSHIP HIGH SCHOOL

(2313) Trigonometry

Grades 11, 12

Course Description:

Trigonometry is a semester course designed for college-preparatory students as an alternative to Precalculus. This course includes a review of CP Algebra II and CP Geometry topics as they relate to Trigonometry. Topics include circular functions and their graphs, trigonometric identities, properties of circular functions, inverse functions and the solution of triangles. The purchase of a TI-83+ graphing calculator is required.

Proficiencies:

Upon completion of this course the student should be able to:

1. Reason quantitatively and use units to solve problems.
2. Solve equations and inequalities in one variable.
3. Represent and solve equations and inequalities graphically.
4. Analyze functions using different representations.
5. Define trigonometric ratios and solve problems involving right triangles.
6. Extend the domain of trigonometric functions using the unit circle.
7. Model periodic phenomena with trigonometric functions.
8. Prove and apply trigonometric identities.
9. Apply trigonometry to general triangles.

Course Requirements:

1. Students will be expected to maintain a high level of participation and preparedness.
2. Students are expected to bring necessary supplies to class daily.
3. Attend class regularly with class attendance.
4. Successfully accomplish all graded work to include unit tests, quizzes, and graded assignments.
5. Be cooperative in class and contribute to the growth of class.

Evaluation Procedures:

Marking period grades will be determined by:

Performance assessments	80%
Homework	15%
Classwork/Preparedness	5%