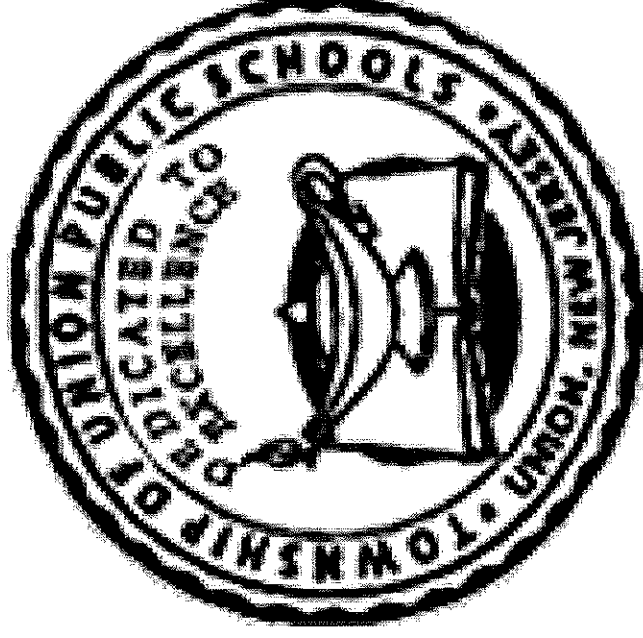


TOWNSHIP OF UNION PUBLIC SCHOOLS



Pre-Calculus
Adopted June 17, 2015
Updated February 14, 2020

District Mission Statement

The Township of Union Board of Education believes that every child is entitled to an education, designed to meet his or her individual needs, in an environment that is conducive to learning. State standards, federal and state mandates, and local goals and objectives, along with community input, must be reviewed and evaluated on a regular basis to ensure that an atmosphere of learning is both encouraged and implemented. Furthermore, any disruption to or interference with a healthy and safe educational environment must be addressed, corrected, or, when necessary, removed, in order for the district to maintain the appropriate educational setting.

District Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is the formulation of a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

Course Description

This course is designed to cover topics in Algebra ranging from polynomial, rational, and exponential functions to conic sections. Trigonometry concepts such as Law of Sines and Cosines will be introduced. Students will then begin analytic geometry and calculus concepts such as limits, derivatives, and integrals. This class is important for any student planning to take a college algebra or college pre-calculus class.

Recommended Textbooks:

College Algebra & Trigonometry (5th edition) (Lial, Hornsby & Schneider) - Pearson

Curriculum Units

Unit 1: Equations and Inequalities

Unit 2: Graphs and Functions

Unit 3: Polynomial and Rational Functions

Unit 4: Systems and Matrices

Unit 5: Inverse, Exponential, and Logarithmic Functions

Unit 6: Trigonometric Functions

Unit 7: The Circular Functions and Their Graphs

Unit 8: Trigonometric Identities and Equations

Unit 9: Applications of Trigonometry

Pacing Guide

Unit 1: Equations and Inequalities	3 weeks
Unit 2: Graphs and Functions	3 weeks
Unit 3: Polynomial and Rational Functions	4 weeks
Unit 4: Systems and Matrices	3 weeks
Unit 5: Inverse, Exponential, and Logarithmic Functions	3 weeks
Unit 6: Trigonometric Functions	4 weeks
Unit 7: The Circular Functions and Their Graphs	4 weeks
Unit 8: Trigonometric Identities and Equations	4 weeks
Unit 9: Applications of Trigonometry	4 weeks

Unit 1: EQUATIONS AND INEQUALITIES

NJSLs	NJSLs Content	Learning Activities
12.F-IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.	Homework review
12.F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	Direct instruction (board notes/presentations)
12.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	Guided and independent practice
12.A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	Investigation activities
12.A-REI.B.3	Solve linear equations and inequalities in one variable including equations with coefficients represented by letters.	Flipped classroom
12.A-REI.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.	
12.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.	

Unit 1 Proficiencies

Students will be able to:

- Solve application problems (geometry, motion, mixture)

- Operate on complex numbers
- Solve a quadratic equation
- Solve for a specific variable
- Solve rational equations, work rate problems, equations with radicals,
- Solve linear inequalities, three-part inequities, quadratic inequalities
- Solve absolute value equations and inequalities

Suggested Differentiation for Unit 1

- **Tier 1 Learners:**
 - Have guided notes filled out at different levels according to ability.
 - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
 - Group students by similar interest when working on application problems.
 - Use mini lessons to reteach to those having difficulty.
 - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
 - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
 - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
 - Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
- **Tier 3 Learners:**
 - Have problems posted around the room. Have students loop to specific questions based on difficulty.

Curriculum Resources

- Textbook - College Algebra & Trigonometry

Formative Assessments

Homework
Classroom whiteboard problem solving
Exit tickets
Review Games
Teacher Observations
Use of technology (Google Suite)
Do nows
Oral questioning
Short constructed responses

Summative Assessments

Quiz
Chapter Test
Projects

Interdisciplinary Connections/Technology

Physics: Rates of change can be applied to motion, electricity, heat, light, and astronomy.
Biology: Calculus is used to compute birth and death rates or population growth/decline.

Unit 2: GRAPHS AND FUNCTIONS

NJSLs	NJSLs Content	Learning Activities
A-REI.4ab	To solve and graph a linear equation.	Homework review Direct instruction (board notes/presentations) Guided and independent practice Investigation activities Flipped classroom
N-CN 1,2	To use properties of complex and imaginary numbers.	
A-REI2,3	To use graphs of quadratic and linear equations/systems to solve real world problems.	
A-REI3	To solve and graph an inequality/system of inequalities.	
A-REI-2	To define, solve, and graph a rational equation.	

Unit 2 Proficiencies

Students will be able to:

- Solve a quadratic equation
- Identify complex numbers
- Use graphs of quadratic and linear equations/systems in real life
- Solve an inequality/system of inequalities
- Recognize a function
- Determine the types of functions that exist

- Construct a graph of a function without any electronic aid
- Determine the zeros of a function

Suggested Differentiation for Unit 2

- **Tier 1 Learners:**
 - Have guided notes filled out at different levels according to ability.
 - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
 - Group students by similar interest when working on application problems.
 - Use mini lessons to reteach to those having difficulty.
 - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
 - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
 - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
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- **Tier 3 Learners:**
 - Have problems posted around the room. Have students loop to specific questions based on difficulty.

Curriculum Resources

- Textbook - College Algebra & Trigonometry

Formative Assessments

Homework
Classroom whiteboard problem solving
Exit tickets

Summative Assessments

Quiz
Chapter Test

Review Games Teacher Observations Use of technology (Google Suite) Do nows Oral questioning Short constructed responses	Projects
Interdisciplinary Connections/Technology	
Physics: Rates of change can be applied to motion, electricity, heat, light, and astronomy.	

Unit 3 : POLYNOMIAL AND RATIONAL FUNCTIONS

NJSLs	NJSLs Content	Learning Activities
12.F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	Homework review
12.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.	Direct instruction (board notes/presentations)
12.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function	Guided and independent practice
12.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	Investigation activities
		Flipped classroom

Unit 3 Proficiencies

Students will be able to:

- Graph/Solve quadratic functions
- Use synthetic division
- Evaluate polynomial functions using the remainder theorem
- Understand how to solve quadratic equations by completing the square
- Test potential zeroes
- Use the Conjugate Zeros theorem

Suggested Differentiation for Unit 3

- **Tier 1 Learners:**
 - Have guided notes filled out at different levels according to ability.
 - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
 - Group students by similar interest when working on application problems.
 - Use mini lessons to reteach to those having difficulty.
 - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
 - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
 - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
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- **Tier 3 Learners:**
 - Have problems posted around the room. Have students loop to specific questions based on difficulty.

Curriculum Resources

- Textbook - College Algebra & Trigonometry

Formative Assessments

- Homework
- Classroom whiteboard problem solving
- Exit tickets
- Review Games
- Teacher Observations
- Use of technology (Google Suite)
- Do nows
- Oral questioning
- Short constructed responses

Summative Assessments

- Quiz
- Chapter Test
- Projects

Interdisciplinary Connections/Technology

Epidemiology: The rate at which a disease spreads and how far it spreads can be modeled and analyzed using calculus.
Medicine: Medicine dosage rates can be modeled using differential equation.

Unit 4 : SYSTEMS AND MATRICES

NJSLs	NJSLs Content	Learning Activities
N-VM-6	(+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.	<p>Homework review</p> <p>Direct instruction (board notes/presentations)</p> <p>Guided and independent practice</p> <p>Investigation activities</p> <p>Flipped classroom</p>
N-VM-7	(+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.	
N-VM-8	(+) Add, subtract, and multiply matrices of appropriate dimensions.	
N-VM-9	(+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	
N-VM-10	(+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	
N-VM-11	(+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	
N-VM-12	(+) Work with 2×2 matrices as transformations of the plane and interpret the absolute value of the determinant in terms of area.	
N-VM-6	(+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.	

Unit 4 Proficiencies

- TO USE MATRICES TO ORGANIZE, MANIPULATE AND DISPLAY INFORMATION

Suggested Differentiation for Unit 4

- **Tier 1 Learners:**
 - Have guided notes filled out at different levels according to ability.

- Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
- Group students by similar interest when working on application problems.
- Use mini lessons to reteach to those having difficulty.
- Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
- Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
- Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
 - Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
- **Tier 3 Learners:**
 - Have problems posted around the room. Have students loop to specific questions based on difficulty.

Curriculum Resources

- Textbook - College Algebra & Trigonometry
- Connect the Dots; <https://www.kqed.org/mindshift/25063/connecting-the-dots-teaching-how-to-think>

Polar Coordinates

- [Converting Polar Coordinates \(YouTube\)](#)
- [Converting Polar Equations to Rectangular Equations \(YouTube\)](#)
- [Converting Rectangular Equations to Polar Equations \(YouTube\)](#)

Formative Assessments

Homework

Summative Assessments

Quiz

Classroom whiteboard problem solving

Exit tickets

Review Games

Teacher Observations

Use of technology (Google Suite)

Do nows

Oral questioning

Short constructed responses

Chapter Test

Projects

**SOLVE FOR X IF
 $3X + A = B$, WHERE**

A = |1| AND B = [4]

|3|

[2]

Unit 5 : Inverse, Exponential, and Logarithmic Functions

NJSLs	NJSLs Content	Learning Activities
HSF-IF-A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.	Homework review
HSF-BF-B.4	Find inverse functions. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$. Verify by composition that one function is the inverse of another. Read values of an inverse function from a graph or a table, given that the function has an inverse. Produce an invertible function from a non-invertible function by restricting the domain	Direct instruction (board notes/presentations) Guided and independent practice
HSF-IF-C.7.e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	Investigation activities
HSF-BF-B.5	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	Flipped classroom
HSF-LE-A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.	
HSF-LE-A.4	For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a , c , and d are numbers and the base b is 2, 10, or e ; evaluate the logarithm using technology.	
HSF-IF-A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an	

	<p>element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.</p>
<p>HSF-BF-B.4</p>	<p>Find inverse functions. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$. Verify by composition that one function is the inverse of another. Read values of an inverse function from a graph or a table, given that the function has an inverse. Produce an invertible function from a non-invertible function by restricting the domain</p>

<p>Unit 5 Proficiencies</p>
<p>Students will be able to:</p> <ul style="list-style-type: none"> • One-to-one functions • Find the equation of the inverse and graph the inverse • Define, graph and apply exponential functions • Define, graph and apply logarithmic functions • Use properties of logarithms • Solve and apply exponential and logarithmic equations

<p>Suggested Differentiation for Unit 5</p>
<ul style="list-style-type: none"> • Tier 1 Learners: <ul style="list-style-type: none"> ○ Have guided notes filled out at different levels according to ability. ○ Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty. ○ Group students by similar interest when working on application problems. ○ Use mini lessons to reteach to those having difficulty.

- Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
- Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
- Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
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- **Tier 3 Learners:**
 - Have problems posted around the room. Have students loop to specific questions based on difficulty.

Curriculum Resources

- Textbook - College Algebra & Trigonometry
- Desmos: <https://teacher.desmos.com/functions>
- Desmos: <https://teacher.desmos.com/exponential>
- Internet based resources - videos, interactive manipulative, online tutors
 - Khan Academy
 - Virtual Nerd
 - BuzzMath
 - Kuta Software
 - YouTube

Formative Assessments

Homework
 Classroom whiteboard problem solving
 Exit tickets
 Review Games

Summative Assessments

Quiz
 Chapter Test
 Projects

Teacher Observations

Use of technology (Google Suite)

Do nows

Oral questioning

Short constructed responses

- Is the function $f(x) = \sqrt{x} + 1$ one-to-one? Find the solution graphically and algebraically.
- Verify that the functions $f(x) = 2x^3 - 1$ and $g(x) = \sqrt[3]{\frac{x+1}{2}}$ are inverses of each other, both graphically and algebraically.
- There are three options for investing \$500. The first earns 7% compounded annually, the second earns 7% compounded quarterly and the third earns 7% compounded continuously. Find the equations that model the growth of each investment and use a graph to determine which investment yields the highest return after 20 years. What are the differences in earnings among the three investments?
- Graph: $f(x) = \log_2 x$. Determine the domain, range and asymptote(s).
- Use the properties of logarithms to rewrite as a single logarithm:
 $3\log_p x + \frac{1}{2}\log_p y - \frac{3}{2}\log_p z - 3\log_p a$
- Kurt wants to buy a \$30,000 car. He has saved \$27,000. Find the number of years (to the nearest tenth) it will take for his \$27,000 to grow to \$30,000 at 4% interest compounded quarterly.

Interdisciplinary Connections/Technology

Global Perspectives: Real data that describes different nations' economies and populations will be used as examples of linear growth, exponential growth, exponential decay, and periodic functions.

Unit 6 : Trigonometric Functions

NJSLs	NJSLs Content	Learning Activities
G-SRT.6, 8	To find the values of the six trigonometric functions and use them to solve right triangles	Homework review Direct instruction (board notes/presentations) Guided and independent practice Investigation activities Flipped classroom
F-TF.1, 2	To find measure of angles in standard position using degree and radian measure	
G-C.5	To calculate arc lengths and areas of sectors	
F-TF.1, 2, G-C.5	Application problems	
F-TF.5	To evaluate trigonometric functions of any angle	
F-TF.6, 7	To evaluate inverse trigonometric functions	
G-SRT.10,11	To use the Law of Sines and the Law of Cosines to find the sides and angles of a triangle.	

Unit 6 Proficiencies

Students will be able to:

- Determine the relationship that exists among the sides of a right triangle

- Convert an angle measured in degrees to radian measure
- Measure the angle θ in radians when finding the arc length of a sector of a circle
- Use trigonometry in real life
- Determine the reference angle for a non-quadrantal angle

Suggested Differentiation for Unit 6

- **Tier 1 Learners:**
 - Have guided notes filled out at different levels according to ability.
 - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
 - Group students by similar interest when working on application problems.
 - Use mini lessons to reteach to those having difficulty.
 - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
 - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
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Curriculum Resources

- Textbook - College Algebra & Trigonometry
- Desmos: <https://teacher.desmos.com/functions>
- Desmos: <https://teacher.desmos.com/exponential>

• Internet based resources - videos, interactive manipulative, online tutors

- Khan Academy
- Virtual Nerd
- BuzzMath
- Kuta Software
- YouTube

Formative Assessments

- Homework
- Classroom whiteboard problem solving
- Exit tickets
- Review Games
- Teacher Observations
- Use of technology (Google Suite)
- De-nos
- Oral questioning
- Short constructed responses

Summative Assessments

- Quiz
- Chapter Test
- Projects

Unit 7 : The Circular Functions and Their Graphs

NJSLs	NJSLs Content	Learning Activities
G-SRT.6, 8	To find the values of the six trigonometric functions and use them to solve right triangles	Homework review Direct instruction (board notes/presentations) Guided and independent practice Investigation activities Flipped classroom
F-TF.1, 2	To find measure of angles in standard position using degree and radian measure	
G-C.5	To calculate arc lengths and areas of sectors	
F-TF.1, 2,	Application problems	
F-TF-1	Measuring angles indegrees and radians	
F-TF	Finding coterminal angles	
F-TF	Trigonometric Ratios	

Unit 7 Proficiencies

Students will be able to:

- Convert an angle measured in degrees to radian measure

- Measure the angle θ in radians when finding the arc length of a sector of a circle
- Graph sin and cosine functions
- Translate the graphs of sine and cosine functions

Suggested Differentiation for Unit 7

- **Tier 1 Learners:**
 - Have guided notes filled out at different levels according to ability.
 - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
 - Group students by similar interest when working on application problems.
 - Use mini lessons to reteach to those having difficulty.
 - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
 - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
 - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
 - Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
- **Tier 3 Learners:**
 - Have problems posted around the room. Have students loop to specific questions based on difficulty.

Curriculum Resources

- Textbook - College Algebra & Trigonometry

Formative Assessments

Homework

Summative Assessments

Quiz

Classroom whiteboard problem solving

Exit tickets

Review Games

Teacher Observations

Use of technology (Google Suite)

Do nows

Oral questioning

Short constructed responses

Chapter Test
Projects

Unit 8 : Trigonometric Identities and Equations

NJSLs	NJSLs Content	Learning Activities
F-TF-1	Measuring angles in degrees and radians	
F-TF	Finding coterminal angles	
F-TF	Trigonometric Ratios	
F-TF-8	Trigonometric Identities	
F-TF-9	Solving word problems using trigonometric ratios	
F-TF-2	Evaluating trigonometric functions of any angles	
F-TF	Graphing sine, cosine, tangent, cotangent, cosecant and secant functions	Homework review
	Inverse trigonometric functions of sine, cosine, and tangent	Direct instruction (board notes/presentations)
		Guided and independent practice
		Investigation activities
		Flipped classroom
F-TF		

Unit 8 Proficiencies

Students will be able to:

- Radian and Degree Measure

- Trigonometric Functions: The Unit Circle
- Right Triangle Trigonometry
- Trigonometric Functions of Any Angle
- Graphs of Sine and Cosine Functions
- Graphs of Other Trigonometric Functions
- Inverse Trigonometric Functions
- Applications and Models

Suggested Differentiation for Unit 8

- **Tier 1 Learners:**
 - Have guided notes filled out at different levels according to ability.
 - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
 - Group students by similar interest when working on application problems.
 - Use mini lessons to reteach to those having difficulty.
 - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
 - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
 - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
 - Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
- **Tier 3 Learners:**
 - Have problems posted around the room. Have students loop to specific questions based on difficulty.

Curriculum Resources

- Textbook - College Algebra & Trigonometry
- Desmos: <https://teacher.desmos.com/functions>

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Formative Assessments

Homework
 Classroom whiteboard problem solving
 Exit tickets
 Review Games
 Teacher Observations
 Use of technology (Google Suite)
 Do nows
 Oral questioning
 Short constructed responses

Summative Assessments

Quiz
 Chapter Test
 Projects

Interdisciplinary Connections/Technology

Students will discuss that trig is used in applications involving vibrations, sound waves, light rays, planetary orbits, vibrating strings, pendulums and orbits of atomic particles.

Unit 9: Applications of Trig Functions

NJSLs	NJSLs Content	Learning Activities
A-APR-1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	
A-APR-2	Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a , the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.	
A-APR-3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	
A-APR-4	Prove polynomial identities and use them to describe numerical relationships. <i>For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.</i>	Homework review
A-APR-5	Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.1	Direct instruction (board notes/presentations) Guided and independent practice Investigation activities Flipped classroom

Students will be able to:

- STUDENT WILL USE KNOWLEDGE OF TRIANGLE TRIGONOMETRY TO SOLVE PROBLEMS DONE BY PILOTS, SURVEYORS AND NAVIGATORS.

Suggested Differentiation for Unit 3

- **Tier 1 Learners:**
 - Have guided notes filled out at different levels according to ability.
 - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
 - Group students by similar interest when working on application problems.
 - Use mini lessons to reteach to those having difficulty.
 - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
 - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
 - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
 - Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
- **Tier 3 Learners:**
 - Have problems posted around the room. Have students loop to specific questions based on difficulty.

Curriculum Resources

- Textbook - Precalculus: Graphical, Numerical, Algebraic

Formative Assessments

Summative Assessments

<p>Homework Classroom whiteboard problem solving Exit tickets Review Games Teacher Observations Use of technology (Google Suite) Do nows Oral questioning Short constructed responses</p>	<p>Quiz Chapter Test Projects</p> <p>A SHORELINE RUNS NORTH-SOUTH, AND A BOAT IS DUE EAST OF THE SHORELINE. THE BEARINGS OF THE BOAT FROM TWO POINTS ON THE SHORE ARE 110° AND 100°. ASSUME THE TWO POINTS ARE 550 FT APART. HOW FAR IS THE BOAT FROM THE SHORE? A POINT ON THE TIP OF A TUNING FORK VIBRATES IN HARMONIC MOTION DESCRIBED BY THE EQUATION $d=14 \sin(\omega t)$. FIND ω FOR A TUNING FORK THAT HAS A FREQUENCY OF 528 VIBRATION PER SEC.?</p>
<p>Interdisciplinary Connections/Technology</p> <p>Aeronautics: Triangle Trig to solve problems done by pilots, surveyors, and navigators.</p>	

Additional Suggested Modifications for Units

Below is an additional list of modifications and accommodations opportunities. This includes, but is not limited to,:

1. English Language Learners.
 - a. Read written instructions.
 - b. Model and provide examples
 - c. Extended time on assessments when needed.
 - d. Establish a non-verbal cue to redirect student when not on task.

e. Students may use a bilingual dictionary.

English Language Development Standard 3: Language of Mathematics: English language learners communicate information, ideas and concepts necessary for academic success in the content area of mathematics.

2. Special Education/504 Students.

- a. Extended time on assessments when needed.
- b. Preferred seating to be determined by student and teacher.
- c. Provide modified assessments when necessary.
- d. Student may complete assessments in alternate setting when requested.
- e. Establish a non-verbal cue to redirect student when not on task.
- f. Maintain strong teacher / parent communication.
- g. Conversion chart

New Jersey Student Learning Standards - Technology

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations

B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.

C. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning.

E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.

F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

***See Guide for Technology Integration.**

Career Readiness Practices

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

NJSLS 9.2 - Career Awareness, Exploration, and Preparation

9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.