Course Title: Algebra III / Trigonometry   Course Number: 3342/3363   Grade: 9-12
Level: College Prep / Career College Prep

I.   Course Description/Overview

This course continues the study of functions addressed in Algebra 2. Students revisit the topic of systems of equations and are introduced to matrices, operations with matrices, and solving matrix equations. They also will explore rational function operations, solve rational equations, and graph rational functions. Students formalize their understanding of trigonometry, focusing on graphing trigonometric functions, solving trigonometric equations, proving trigonometric identities, and using the Law of Sines and Cosines. Other concepts include combinatorics, and topics from probability and statistics.

II.   Course Objectives

Extend the domain of trigonometric functions past 90° by relating to the coordinates on a unit circle
Use analytic trigonometry to solve triangles for their missing parts
Perform operations and solve equations involving rational expressions
Investigate the rational function with a focus on the polynomials inherent in the function
Introduce matrices and use them to solve systems of equations
Understand the definitions and properties of matrix operations
Introduce and apply permutations and combinations to solve systematic counting problems
Revisit Pascal's Triangle and explore its connections to the binomial expansion

III.   Course Content (Key Concepts/Skills)

A.   Introduction to Trigonometry
Use special angles to find coordinates on a unit circle
Evaluate the sine, cosine, and tangent functions for any angle
Solve equations involving trigonometric functions
Explore the graph characteristics of the sine, cosine, and tangent functions
Use the graphs of trigonometric functions to solve problems
Prove and use the basic trigonometric identities
Solve a triangle for its missing parts
Derive and use the Law of Sines and the Law of Cosines
Investigate and use Heron's Formula

B.   Linear Algebra
Review techniques for solving two equations with two unknowns
Extend algebraic techniques to solve systems of three equations with three unknowns
Understand the definition of a matrix as an organized array of numbers
Convert between a system of linear equations and matrix form
Investigate Gaussian Elimination and apply it to solve a system with and without a calc
Compute dot products, sums, differences, products, and inverses of matrices
Interpret and solve problems using matrix calculations

C.   Rational Functions
>   Understand the definition of a rational function
>   Gain a proficiency in rational function operations
>   Solve equations involving rational expressions
>   Examine the rational function as the ratio of two polynomial functions
>   Investigate the characteristics of the reciprocals for the basic functions
>   Explore the concept of a limit as it pertains to end behavior of the function
>   Sketch the graphs of simple rational functions in the form $y = \frac{ax+b}{cx+d}$ and $y = \frac{a}{x} + k$

D.   Combinatorics
>   Explore combinatorics and the types of problems you can solve with them
>   Investigate multiple strategies for systematic counting
>   Develop and use formulas for finding the number of permutations $_nP_r$
>   Develop and use formulas for finding the number of combinations $_nC_r$.
>   Apply counting strategies to solve Pascal's Paths problem
>   Relate the coefficients of a binomial expansion to Pascal's Triangle

IV.   Types of Student Assessments and Evaluations
Quizzes, tests, oral presentations, and graded homework.

V.   Grading Policy
Grades are based on a point system. Averages are calculated by dividing the total points earned by the student by the total number of possible points. The school scale is used to determine grades: A (90% and above), B (80% and above), C (70% and above), D (60% and above), and F (59% and below). Final grades are determined as follows: first marking period (40%), second marking period (40%), and final exam (20%).

VI.   Homework
Homework is given on a regular basis. Most assignments are due the next day.

VII   Resources
Graphing calculators (TI-Nspire recommended), rulers, protractors, compasses, graph paper, <u>CME Project: Algebra II</u>, <u>CME Project: PreCalculus</u> (CME Project Development Team)

Strath Haven Respect Statement: All members of the school community are expected to be respectful of each other. Negative comments about anyone's race, nationality, religion, physical appearance or ability, intellectual capabilities, gender identity, sexual orientation, work ethic, or character are unacceptable and will not be tolerated. Students are encouraged to discuss any concerns with any adult in the building.