Precalculus

Content Area: **Math**
Course(s):
Time Period:
Length: **90 Days**
Status: **Published**

School Mission Statement

The mission of Chartertech is to provide artists the opportunity to blend principles of artistic expression with cutting-edge technology, so artists will excel in academic, career, and civic pursuits and contribute to the harmony and productivity of the 21" century.

Artistic integration: Performing arts will be accessible to all artists as a skill and content area and will serve as a vehicle for imparting, enlivening, and motivating excellence in all academic topics, as well as providing a platform for learning multicultural appreciation and empathy, not just tolerance.

Technological integration: Technology will serve as the foundation for instructional delivery systems leading to knowledge acquisition, concept understanding, and skill mastery in all academic subjects. Technology will not be studied as a separate entity but infused into the very fabric of educational pursuits, exactly as it occurs in the business world. Artists will be prepared to compete in the modern workplace or post-secondary institution.

"Education has always been torn between vocational and utilitarian purposes on one hand and creative and holistic purposes on the other... We are rapidly entering a world that is hard to imagine. By developing the problem-solving skills, creativity, and discipline required in the arts, artists can prepare for life in the 21st century."

From Understanding How the Arts Contribute to Excellent Education

National Endowment for the Arts, 1991

School Goals

Goals for Arts Education:

Artists will learn the knowledge, skills, and abilities necessary to turn their passions and gifts in the arts into vocations or serious avocations.

Objective 1: Each year, each artist will take two semesters (10 credits) of career-oriented training (80 minutes per day) in their artistic major.
Objective 2: Each marking period, each artist will perform or produce frequently, in diverse settings and for diverse audiences.

Objective 3**:** Artistic instruction will be integrated into the study of all academic subjects.
Objective 4: Each year, each artist will complete at least twenty after-school "lab" hours in their artistic major. These will constitute career-oriented service to the school and/or community, and demonstrate accomplishment of the NJCCCS crosscutting workplace readiness standards.

Goal for Technology:
Chartertech will model the technology-intense workplace and artists will be able to compete successfully and perform well in a technology-intense workplace.

Objective 5: Each artist will routinely use technology in a workplace-like manner to acquire, analyze, communicate, and present information in every subject.
Objective 6: Each artist will have access to a computer every day, every class so that automated sources will be the main conduit for educational content.
Objective 7: All administrative and instructional functions of the school will be supported by the most modern technology available.

Goals for Academic Achievement:
Artists will apply themselves in the serious pursuit of knowledge and skills, especially skills in critical thinking, problem solving, decision making, and communication.

Objective 8: Each year, and to be promoted to the next grade each artist will pass five credits in English, Health, Social Studies, Science, Mathematics, and PE/Health. Between grades 9-12 artists will also complete 1year of Spanish.

Objective 9: In each academic subject, each year, each artist will complete a significant project that involves critical thinking, problem solving, decision making, and communication skills, and which demonstrates cross-content workplace readiness skills.

Objective 10: Each year artists will develop a artist resume to guide his/her academic and artistic studies and to document his/her academic and artistic accomplishments. This work will be done under the mentorship of the faculty in the artist's artistic major.

Objective 11: Academic instruction in all subjects will be highly cross-curricular, in accordance with curricula design and continuously improved by teachers, in compliance with the New Jersey Artist Learning Standards.

Course Description

Course Title:	Precalculus
Department:	Mathematics
Prerequisite:	Algebra II
Number of Credits:	5
Grade Level(s):	10 - 12

Standards:	Aligned to New Jersey Student Learning Standards for High School Mathematics
Description of Course	CP Pre-Calculus begins with an overview of functions, including minima and maxima, increasing and decreasing behavior and general graphical analysis of even and odd functions. This leads into a Unit on Polynomial and Rational Functions which primarily focuses on curve sketching. This lays down the groundwork for Calculus' focus on limits and derivatives. Honors Pre-Calculus differs from CP in that we begin the year with a focus on Rational Functions. In this unit, we explore in much greater depth, the behaviors of these functions through a graphical approach with the inclusion of Slant Asymptotes found by method of polynomial long division. Honors level Pre-Calculus students are also expected to persevere through a number of application and synthesis word problems found in the college level Pre-Calculus: A Concise Course textbook by Larson and Hostetler. The following unit directs the focus on Exponential and Logarithmic Functions. The primary focus of this unit is to understand overall concepts of exponential growth, the concept and utilization of Euler's constant, and the process by which we solve exponential and logarithmic equations. Briefly, we touch on the graphs of these functions as well to better prepare students for the topics listed previously in AP Calculus. Again, Honors students will have the expectation of analyzing and solving much higher level problems in this unit. The next unit, Trigonometry, is essentially the heart of the course and is where we spend most of our time. We begin with a basic overview of radians and their relationship to degrees and angles of rotation. This leads into one of our most challenging sections on arc length and linear and angular speed. Honors students are expected to solve extremely challenging physics problems that involve truly in-depth analysis as well as an understanding and application of unit conversions. At the conclusion of this section, students will come to understand the origin of the unit circle as well as its use in evaluating trigonometric functions. Honors students will be expected to create the unit circle from scratch. From here, we move forward into trigonometric identities where students will be challenged to provide detailed proofs for each identity utilize proven identities to solve trigonometric equations. The unit is concluded with an overview of the laws of sine and cosine, where honors students will again be expected to perform complex analysis to solve some of the most difficult application problems from the textbook mentioned above. Because our honors students start the course at a later point in the curriculum, the last units are designed primarily for them. In discrete mathematics and probability we explore the ideas of sample spaces and cardinality. We utilize these principles and apply them to concepts of combinations, permutations, and probability. Lastly, our honors students will be introduced to some of the fundamental ideas of Calculus – limits, derivatives, and instantaneous rates of change.

Overview & Pacing

Unit #	Major Content	Expected Time
1	Functions	10 days
2	Polynomial and Rational Functions	20 days
3	Exponential and Logarithmic Expressions	10 days
4	Trigonometry	30 days
5	Probability	20 days