CVA Precalculus Syllabus

Class Description

Precalculus is a fourth-year mathematics course option for students who have completed Advanced Algebra (or the equivalent). The course is intended to provide students with opportunities to develop a deeper understanding of Algebraic concepts that are critical to the study of Calculus. Students will also deepen their understanding of trigonometry and its applications.

Throughout the Precalculus course there should be a focus on notational fluency and the use of multiple representations. The course includes the study and analysis of piecewise and rational functions; limits and continuity as related to piecewise and rational functions; sequences and series with the incorporation of convergence and divergence; conic sections as implicitly defined curves; the six trigonometric functions and their inverses; applications of trigonometry such as modeling periodic phenomena, modeling with vectors and parametric equations, solving oblique triangles in contextual situations, graphing in the Polar Plane; solutions of trigonometric equations in a variety of contexts; and the manipulation and application of trigonometric identities.

This course has three sections: Precalculus A is the first half of the class and includes Units 1-3. Precalculus B is the second half of the class and includes Units 4-6. Precalculus Y is the entire class and includes Units 1-6.

Click [HERE](#) for the Precalculus Class Schedule which outlines the Units, Lessons, and Assessments for this course.

Click [HERE](#) for the Precalculus State standards.

Class Outline

Unit 1: Modeling with Rational and Piecewise-Defined Functions

This unit introduces students to piecewise-defined functions and rational functions. Limit notation is used as descriptors of function behavior. The study of piecewise functions solidifies the prior study of polynomials, basic rational functions, exponential and logarithmic functions, and radical functions. Characteristics such as domain, range, intervals of increase and decrease, intercepts, and end behavior are utilized. Skills of factoring and division are used to analyze the behavior of rational functions. Absolute value functions are investigated as piecewise functions and partial

fraction decomposition is investigated. Students will engage in solving various equations as well.

Unit 2: Modeling with Trigonometric Expressions and Functions

This unit will build the unit circle, connect radian measures to portions of 2π, work with radian measure not containing π, and utilize angles both in the clockwise and counterclockwise direction. Students will define the six trigonometric ratios in terms of x, y, and r using a circle centered at the origin of the coordinate plane and use the parametric interpretation of the coordinates on the unit circle as (cos(t), sin(t)). The six trigonometric functions will be developed and utilized for modeling periodic phenomena. Characteristics of the six trigonometric functions and their graphs will be investigated and used to classify these functions based on commonalities. These trigonometric relationships will be used to derive the fundamental trigonometric identities. This unit requires the development of attention to precision, notational fluency, and problem-solving perseverance as the trigonometric functions are used in a variety of contexts. The need to restrict the domain of each trigonometric function to develop its corresponding inverse function will be explored. The use of the inverse function will be related to prior inverse studies with restriction awareness developed for understanding subsequent contextual situations such as vectors, technology use, etc.

Unit 3: Applying Trigonometric Identities and Equations

This unit builds upon the foundations established in Unit 2, further exploring the relationships between trigonometric functions. Students will delve deeper into the fundamental identities and expand their understanding by incorporating the sum and difference, double angle, and half-angle formulas. Throughout this unit, students will have the opportunity to develop these identities, recognizing their connection to previously learned relationships.

Unit 4: Modeling with Conic Sections and Polar Equations

Students will analyze conic sections using different representations and extend their knowledge of trigonometry to the polar plane. Students will contrast their prior study of functions with the algebraic study of implicit forms of conic sections. Students should explore circles, parabolas, ellipses, and hyperbolas.
Also in this unit, the polar coordinate system will be defined and related to the rectangular coordinate system through appropriate conversions. Investigation of special polar equations, their application to contextual situations, and an appreciation for the simpler polar form will occur. The connection between the graph of a trigonometric function like $y = 3\cos(x)$ on a rectangular plane and its manifestation on the polar plane as $r = 3\cos(\theta)$ with a rotational input and radial distance output will be analyzed.

Unit 5: Modeling with Vector Quantities

Students will apply trigonometric concepts to solve real-world mathematical problems using vectors and parametric equations. Throughout the unit, students engage in abstract and quantitative reasoning, problem-solving, and precision. They develop fluency in notations for vectors and learn to interpret them in different representations, such as component form and magnitude-direction form, relating each representation to its geometric and graphical meaning. The unit incorporates various vector operations and addition methods. Students tackle contextual problems involving force, velocity, and more, and explore how parametric equations can serve as models for the motion of objects, emphasizing direction. Additionally, they delve into the connection between parametric equation sets of conic sections and the Pythagorean identities.

Unit 6: Modeling with Sequences and Series

This unit requires students to articulate the difference between a sequence and a series and utilize number sense when working with them. Sequences will be investigated graphically, numerically, and symbolically. Fluent work with sequences in contextual situations requires students to make sense of problems and attend to precision. The meaning of convergence and divergence of a sequence using technology and number sense will be explored. Divergence will be linked to a lack of convergence and to the meaning of the non-existence of a limit. Understanding a series as the sum of a sequence and the limit of its partial sums is a crucial exploration. Series will be explored graphically, numerically, and symbolically. This unit requires the development of notational fluency and precision in thinking. Derivation of the sum formulas for both the finite geometric series and infinite geometric series will occur. Applying the finite and infinite geometric sum formulas to contextual modeling situations require students to reason abstractly and quantitatively.

CVA Work Policy

- All classwork must be completed and submitted using the links in CTLS by the DUE DATE listed on the Class Schedule.
- Work should be completed in the order it is assigned on the Class Schedule.
- All work submitted on time will be graded within 48 hours.
- Assignments not submitted by the due date will be marked missing. Missing assignments are calculated as zeros in the coursework average. When students submit missing work, the assignment will be graded and calculated into the coursework average.

The CVA term ends prior to the end of the traditional school semester. The final date work will be accepted each term is posted on the [CVA website](cobbvirtualacademy.org) (cobbvirtualacademy.org) and the Class Schedule.

Grading

Grades for this course are calculated based on category percentages as follows:

Category	Weight
Assignment	30%
Quiz	25%
Test	35%
Final Exam	10%

CVA Exemption Incentive

To qualify for CVA's exemption incentive and exempt the Final Exam/lowest unit test or major assessment grade, CVA students must:
- Submit ALL assignments on OR before the due date
- Have an 85% coursework average or higher before the final exam
- Have no more than one academic integrity violation

Academic Integrity

Academic integrity is the cornerstone of learning at CVA and we take the integrity and authenticity of student work very seriously. When academic integrity is maintained, students will make decisions based on values that will prepare them to be productive, meaningful, and ethical citizens.

Students are required to abide by the CVA Academic Integrity Policy. Academic dishonesty in any form will not be tolerated. The CVA Academic Integrity Policy outlines the consequences if students fail to maintain academic integrity in their course.   For additional information, the CVA Academic Integrity Policy is posted on the CVA website.

Consequence	1st	2nd	3rd	4th
Parent contact by teacher	✅	✅	✅	✅
Resubmit work for full credit	✅			
Resubmit work for half credit		✅		
Automatic Zero			✅	✅
Parent contact by CVA Administration			✅	✅
Mandated proctored exam or course work				✅
Local school is notified of Academic Integrity violation		✅	✅	✅
Other as designated by CVA or local school administration	✅	✅	✅	✅

General Information

- The Cobb Teaching and Learning System (CTLS) is the platform used to deliver Cobb Virtual Academy classes.
- Students must earn 100% on the Student Orientation Quiz located inside each CVA Digital Classroom before they begin their Student Coursework.
- All coursework must be submitted through CTLS.
- All CCSD students have access to Microsoft 365 applications and must submit assignments in the requested format.
- Students in all sections of this course will take an online final exam during the window of time published on the CVA website and the Class Schedule.

Course Specific Information

- **Practice Assignments:** After reviewing each lesson, students will complete a practice assignment ONLINE. Each assignment has approximately 10 questions.
- **Quizzes and Tests:** Students should carefully review the feedback on graded items and be sure to understand the material prior to beginning the quiz or test.

Technology Requirements

CTLS is geo-restricted to the United States.

- A modern PC or Mac Computer

- o Lightweight or mobile devices such as Chromebooks, iPads, Android tablets, or smartphones **may not** be compatible with many of our courses.
  - o Windows or Mac based computer
- Access to Microsoft 365
- Internet access

CVA Expectations

Student
- Maintain consistent access to a computer and internet
- Login to the course daily and review the announcements
- Adhere to the deadlines listed on the Class Schedule
- Read and promptly respond to teacher communication
- Contact the teacher with questions
- Manage your time wisely

Teacher
- Welcome Phone Call in the first two weeks
- 24 – 48-hour turnaround on all communication
- 24 – 48-hour turnaround on grading for items submitted by the due date
- Provide relevant feedback on assignments
- Be accessible via email and phone or text during published hours
- Provide two or more live sessions per term

Remind

CVA students and parents are automatically enrolled in their CVA teacher's Remind class based on the phone numbers provided during registration. If a parent and student provide the same cell phone number, they will not sync to Remind and will have to join the class manually using the join code posted on the Teacher Information page of their course.

Student Support

A student's first source for support is their CVA teacher. However, additional support is available. The **CVA Learning Center** is staffed with facilitators and is available both **in person** and **virtually**.

Facilitators can assist students with getting started, class navigation, assignment instructions, submitting work, technical issues, and strategies for online success.

The in-person Learning Center is on the Cobb Horizon High School campus at 1765 The Exchange Atlanta, GA.

All CVA students are enrolled in the Student Support digital classroom which provides access to the Virtual Learning Center (VLC). Students use the CTLS chat feature to send a message to the Student Support Team during the hours it is open.

Live Sessions

Your teacher will post live session information to the Class Board.