

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



Pre-Calculus/Trigonometry

Board Meeting Date: Jan 23, 2025	Course Length: 2 semesters
Proposed Grade Level(s): 9-12	Subject Area: Math Elective Area (if applicable):
Grading: A-F	Credits: 10
Prerequisite(s): Integrated Math 3	Corequisite(s):
CTE Sector/Pathway: NA	
Intent to Pursue 'A-G' College Prep Status: Yes	
A-G Course Identifier: (c) Mathematics	
Graduation Requirement: No	
Course Intent: Program (if applicable): K12 Stride Online Course	
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COURSE DESCRIPTION:

Pre-calculus weaves together concepts of algebra and geometry into a preparatory course for calculus. The course focuses on the mastery of critical skills and exposure to new skills necessary for success in subsequent math courses. Topics include quadratic, exponential, logarithmic, radical, polynomial, and rational functions; matrices; and conic sections in the first semester. The second semester covers an introduction to infinite series, trigonometric ratios, functions, and equations; inverse trigonometric functions; applications of trigonometry, including vectors; polar equations and polar form of complex numbers; arithmetic of complex numbers; and parametric equations.

Connections are made throughout the course to calculus and a variety of other fields related to mathematics. Purposeful concentration is placed on how the concepts covered relate to each other.

Demonstrating the connection between the algebra and the geometry of concepts highlights the interwoven nature of the study of mathematics.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Example of Summative Assessment
1. Introduction to Precalculus and Polynomial Functions	Students extend their understanding of quadratic, radical and rational equations to encompass inequalities of the same. Concepts and theorems of polynomial and rational equations and functions are reviewed and extended to include holes, slant asymptotes and limit notation for end behavior. ● Precalculus Introduction ● Solve Equations and Inequalities ● Divide Polynomials ● Solve Polynomial Equations ● Graph Polynomial Functions ● Graph Rational Functions	● Online or paper-based worksheets and practice sets ● Quizzes ● Threaded discussions	● Exams (unit, semester and final) ● Essays, research papers, and other writing assignments ● Presentations
Unit 1 Essential Standards: Interpret functions that arise in applications in terms of the context. Analyze functions using different representations.			

2. Matrices	Students are introduced to matrices and their uses. Students learn to solve a system of equations using matrices transformed into reduced row-echelon form, through the application of Cramer's rule, and through the formation and solving of a matrix equation. Real-world applications of matrices are demonstrated in the graded assignment in this unit. • Matrices Introduction • Solve Systems of Equations with Matrices • Operations with Matrices • Inverses of Matrices	• Online or paper-based worksheets and practice sets • Quizzes • Threaded discussions	• Exams (unit, semester and final) • Essays, research papers, and other writing assignments • Presentations
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Unit 2 Essential Standards:

Perform operations on matrices and use matrices in applications.

Represent and model with vector quantities.

3. Conic Sections	Conic sections are real-life phenomena that are found in architecture, space, nature, and more. Students explore how and where they occur as they progress through this unit, learning about four conic sections—circles, ellipses, hyperbolas, and parabolas. Derivations of the standard form of these conic sections are included to help foster student appreciation for the relationship that exists between algebra and geometry. • Conic Sections Introduction • Conic Sections	• Online or paper-based worksheets and practice sets • Quizzes • Threaded discussions	• Exams (unit, semester and final) • Essays, research papers, and other writing assignments • Presentations
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	• Circles • Ellipses • Hyperbolas • Parabolas • Solve Systems of Conics		
Unit 3 Essential Standards: Translate between the geometric description and the equation for a conic section.			
4. Exponential and Logarithms	A thorough understanding of logarithmic expressions and functions is necessary for success in higher mathematics. Students deepen their understanding of the relationship between exponential and logarithmic functions as they explore how the properties of logarithms allow for equivalent forms of logarithmic expressions, and for a variety of logarithmic and exponential equations to be solved. Concentration is on real-world application of exponential equations. • Exponents and Logarithms Introduction • Exponential Functions • From Exponential to Logarithmic Functions • Operating with Logarithms • Solve Exponential and Logarithmic Equations	• Online or paper-based worksheets and practice sets • Quizzes • Threaded discussions	• Semester Exam
Unit 4 Essential Standards: Analyze functions using different representations and solve exponential and logarithmic equations.			

5. Discrete Mathematics	Students build on their understanding of finite arithmetic and geometric sequences and series to explore infinite sequences and series. Students learn sigma notation, and properties of limits, as well as the ratio test as a method of determining if an infinite series converges or diverges. Students explore two different (but closely related) methods of expanding binomials. • Discrete Mathematics Introduction • Sequences and Series • Infinite Series and Sigma Notation • Convergence and Divergence • Pascal's Triangle and Binomial Expansion	• Online or paper-based worksheets and practice sets • Quizzes • Threaded discussions	• Exams (unit, semester and final) • Essays, research papers, and other writing assignments • Presentations
Unit 5 Essential Standards: Interpret the structure of expressions.			
6. Trigonometric Ratios	Students begin a three-unit exploration into trigonometry. In this unit, students review their understanding of the three basic trigonometric functions learned in geometry; sine, cosine and tangent; and extend this to include their reciprocal functions. Students learn radian measure and are introduced to the unit circle, the foundation of all of trigonometry. • Trigonometric Ratios	• Online or paper-based worksheets and practice sets • Quizzes • Threaded discussions	• Exams (unit, semester and final) • Essays, research papers, and other writing assignments • Presentations

	- Introduction • Angles and Angle Measures • Right Triangles and Trigonometric Ratios • The Unit Circle		
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Unit 6 Essential Standards:

Extend the domain of trigonometric functions using the unit circle.

7. Graph Trigonometric Functions	Students learn the graphs of the parent functions of the six trigonometric functions, as an extension of the unit circle, and explore transformations of these graphs. Students learn about inverse trigonometric functions and restrictions placed on them. Through applications of real-world problems involving trigonometric functions, students form connections between the algebra, the graph, and the description of scenarios that can be modeled with trigonometric functions. • Graph Trigonometric Functions Introduction • Graph Trigonometric Functions • Transformation of Trigonometric Functions • Real World Applications of Trigonometric Functions	• Online or paper-based worksheets and practice sets • Quizzes • Threaded discussions	• Exams (unit, semester and final) • Essays, research papers, and other writing assignments • Presentations
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Unit 7 Essential Standards:

Model periodic phenomena with trigonometric functions.

8. Trigonometric Laws and Identities	The study of trigonometry provides an opportunity to investigate the algebra of trigonometry. This extends to the verification of trigonometric identities, applications of sum, difference, double, and half angle formulas, derivations and applications of the laws of sine and cosine, alternate methods of determining the area of a triangle, and an exploration into angular and linear velocities and how they are related to one another. • Trigonometric Laws and Identities Introduction • Trigonometric Identities • Solve Trigonometric Equations • Laws of Sines and Laws of Cosines • Area of Triangles • Angular and Linear Velocities	• Online or paper-based worksheets and practice sets • Quizzes • Threaded discussions	• Exams (unit, semester and final) • Essays, research papers, and other writing assignments • Presentations
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Unit 8 Essential Standards:

Prove and apply trigonometric identities.

9. Complex Numbers and Vectors	Students learn about the polar coordinate system; how to plot points in polar form, graph polar equations, and convert between polar and rectangular forms. Understanding of these ideas is extended to highlight the advantages of the polar coordinate system such as	• Online or paper-based worksheets and practice sets • Quizzes • Threaded discussions	• Semester Final
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	evaluating complex numbers raised to powers. Students learn about both algebraic and geometric representations of vectors. Arithmetic operations and applications of vectors are presented, using both representations. Connections are made between transformations of vectors and matrices. Lastly, students are introduced to parametric equations. Concentration is placed on conversion between parametric and rectangular forms, and real-world applications of parametric equations. • Polar Form of Complex Numbers Introduction • The Polar Coordinate System • Polar and Rectangular Form • Operations with Complex Numbers • Polar Form of Complex Numbers • Vectors • Parametric Equations		
Unit 9 Essential Standards: Perform arithmetic operations with complex numbers.			

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.

[California Math Standards](#)

Link to Framework (if applicable):

Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.

[Precalculus Chapter of the Mathematics Framework](#)

Link to Subject Area Content Standards (if applicable):

Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.

[CA Dept of Education Precalculus Framework](#)

Link to Program Content Area Standards (if applicable):

Program Content Area Standards apply to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Board Approved (yes/no)	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
<i>Yes</i>		<i>Pre- Calculus/Trigonometry</i>	<i>K12/Stride</i>	K12 Stride		<i>2023</i>