



Curriculum Map - Scope and Sequence: High School Precalculus

Saddlebrook Preparatory School

Purpose of Planning	Unit One Q1, W1 - 3	Unit Two Q1, W4 - 7	Unit Three Q1, W8 - 9	Unit Four Q2, W1 - 8	Unit Five Q3, W1 - 5
Unit Topic and Overview:	Functions from the Perspective of Calculus	Properties of Polynomial and Rational Functions	Exponential and Logarithmic Functions	Trigonometric Functions	Analytic Trigonometry
Prerequisite Student Knowledge *What should students have previously mastered prior to this unit?	Students should know the basic concept of a function, operations on functions and inverses of functions.	Students should know the basic definitions and graphs of polynomial and rational functions.	Students should know how to graph exponential and logarithmic functions and the basic properties of each.	Students should know the definitions of sine, cosine and tangent, and know the values of these trigonometric functions for 30° , 45° , and 60° .	Students should be familiar with simple proofs and the basics of trigonometry.
Essential Knowledge & Student Expectations *What are the anticipated learning outcomes for students?	Students will be able to analyze the behavior of functions and their graphs and produce functions that model relationships between two quantities. <u>Essential Question:</u> How can we combine functions to create a new function that contains the information from each of the functions used?	Students will be able to model real-world data using polynomial functions, use the Remainder and Factor Theorems, determine real and complex zeros of polynomial functions, analyze graphs of rational functions, and solve polynomial and rational inequalities. <u>Essential Question:</u> How do the properties of polynomial and rational functions make them applicable to real-world situations?	Students will be able to model data using exponential, logarithmic and logistic functions, apply properties of logarithms, and solve logarithmic and exponential equations. <u>Essential Question:</u> How does the inverse relationship between exponential and logarithmic functions allow us to solve problems?	Students will be able to use trigonometric functions to solve right triangles, use the Law of Sines and the Law of Cosines to solve general triangles, find values of trigonometric functions of any angle, and graph trigonometric and inverse trigonometric functions. <u>Essential Question:</u> How does trigonometry allow us to calculate distances that can't be measured directly, and to model periodic phenomena?	Students will be able to verify trigonometric identities and solve trigonometric equations. <u>Essential Question:</u> How can we use simple trigonometric identities to prove more complex and interesting identities?



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Multi-Media Links: *Videos, presentations, any and all supplemental online material.	ConnectEd Khan Academy Khan Academy Teacher Facebook page	ConnectEd Khan Academy Khan Academy Teacher Facebook page	ConnectEd Khan Academy Khan Academy Teacher Facebook page	ConnectEd Khan Academy Khan Academy Teacher Facebook page	ConnectEd Khan Academy Khan Academy Teacher Facebook page
Instructional Practices: * Various Instructional Modalities, including Technology used	-Lecture with examples with and without a graphing calculator -Examine essential questions -Class discussion -Bell work -Homework (Practice)	-Lecture with examples with and without a graphing calculator -Examine essential questions -Class discussion -Bell work -Homework (Practice)	-Lecture with examples with and without a graphing calculator -Examine essential questions -Class discussion -Bell work -Homework (Practice)	-Lecture with examples with and without a graphing calculator -Examine essential questions -Class discussion -Bell work -Homework (Practice)	-Lecture with examples with and without a graphing calculator -Examine essential questions -Class discussion -Bell work -Homework (Practice)



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Assessments: *Types and Measurements of Mastery	Informal Assessments: Teacher questioning/class discussion, practice problems Formal Assessments: Unit test, quizzes, assignments, bell work, homework, class work. 80% of students will average a score of 80% on unit assessments.	Informal Assessments: Teacher questioning/class discussion, practice problems Formal Assessments: Unit test, quizzes, assignments, bell work, homework, class work. 80% of students will average a score of 80% on unit assessments.	Informal Assessments: Teacher questioning/class discussion, practice problems Formal Assessments: Unit test, quizzes, assignments, bell work, homework, class work. 80% of students will average a score of 80% on unit assessments.	Informal Assessments: Teacher questioning/class discussion, practice problems Formal Assessments: Unit test, quizzes, assignments, bell work, homework, class work, final exam. 80% of students will average a score of 80% on unit assessments.	Informal Assessments: Teacher questioning/class discussion, practice problems Formal Assessments: Unit test, quizzes, assignments, bell work, homework, class work. 80% of students will average a score of 80% on unit assessments.
Interdisciplinary Lessons & Projects: *State additional content areas and title all lesson(s) and project(s)	Assignment: Determine a function $A(x)$ that converts a rectangle's area from square inches to square meters. Then find the inverse of $A(x)$. <div style="text-align: center;">Science</div>	Assignment: Use Kepler's Third Law of Planetary Motion to determine Mars' average distance from the sun. <div style="text-align: center;">Physics</div>	Assignment: Determine how much money will be in an investment account given various interest rates and times, if \$10,000 is initially invested. <div style="text-align: center;">Finance</div>	Assignment: Determine a trigonometric model using the sine function of the tides in the Gulf of Mexico using actual data. <div style="text-align: center;">Meteorology</div>	Assignment: Verify graphically the sum identities. <div style="text-align: center;">Analytic Geometry</div>
Honors Course Differentiation(s):	-Additional test questions involving higher order questioning to denote mastery -Additional homework problems -Q1 project	-Additional test questions involving higher order questioning to denote mastery -Additional homework problems -Q1 project	-Additional test questions involving higher order questioning to denote mastery -Additional homework problems -Q1 project	-Additional test questions involving higher order questioning to denote mastery -Additional homework problems -Q2 project	-Additional test questions involving higher order questioning to denote mastery -Additional homework problems -Q3 project



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Integrated Common Core or NGSSS Standards (List): *See Below for Links	CCSS.Math.Content.HSF.IF.B.4 CCSS.Math.Content.HSF.IF.B.5 CCSS.Math.Content.HSF.IF.B.6 CCSS.Math.Content.HSF.IF.C.7	CCSS.MATH.CONTENT.HSF.IF.C.7 CCSS.MATH.CONTENT.HSF.IF.C.7.C CCSS.MATH.CONTENT.HSF.IF.C.7.D CCSS.MATH.CONTENT.HSF.IF.B.4	CCSS.MATH.CONTENT.HSF.LEA.1.C CCSS.MATH.CONTENT.HSF.LEA.2 CCSS.MATH.CONTENT.HSF.LEA.4 CCSS.MATH.CONTENT.HSF.LEB.5 CCSS.MATH.CONTENT.HSF.BF.B.5	CCSS.MATH.CONTENT.HSF.TF.A.1 CCSS.MATH.CONTENT.HSF.TF.A.2 CCSS.MATH.CONTENT.HSF.TF.A.3 CCSS.MATH.CONTENT.HSF.TF.A.4 CCSS.MATH.CONTENT.HSF.TF.B.5 CCSS.MATH.CONTENT.HSF.TF.B.6 CCSS.MATH.CONTENT.HSF.TF.B.7	CCSS.MATH.CONTENT.HSF.TF.C.8 CCSS.MATH.CONTENT.HSF.TF.C.9
Integrated CCSS Writing Standards (List): *See Below for Links	CCSS.ELA-Literacy.W.9-10.1.d CCSS.ELA-Literacy.W.9-10.2.d	CCSS.ELA-Literacy.W.9-10.1.d CCSS.ELA-Literacy.W.9-10.2.d	CCSS.ELA-Literacy.W.9-10.1.d CCSS.ELA-Literacy.W.9-10.2.d	CCSS.ELA-Literacy.W.9-10.1.d CCSS.ELA-Literacy.W.9-10.2.d	CCSS.ELA-Literacy.W.9-10.1.d CCSS.ELA-Literacy.W.9-10.2.d
Links to CCSS/NGSSS Curriculum Standards:	<p>The following links will be used to incorporate the CCSS and other applicable standards:</p> <ul style="list-style-type: none"> • The Common Core State Standard expectations in high school. • The K-12 English LA and Content Area Writing Standards • The K-12 Reading Standards • The K-12 Mathematics Standards • The K-12 NGSSS Science & Social Studies Standards 				



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Purpose of Planning	Unit Six Q3, W6 - 9	Unit Seven Q4, W1 - 3	Unit Eight Q4, W4 – 7	Unit Nine Q4, W8 - 9	
Unit Topic and Overview:	Vectors	Polar Coordinates and Complex Numbers	Conic Sections	Sequences and Series	
Prerequisite Student Knowledge *What should students have previously mastered prior to this unit?	Students should know how to draw rays in two-dimensions and the Distance Formula. Some students may have dealt with vectors in a Physical Sciences course.	Students should be able to perform algebraic operations on complex numbers.	Students should know the standard form of the equation of a circle.	Students should have some knowledge of finding patterns in a list of numbers.	
Essential Knowledge & Student Expectations *What are the anticipated learning outcomes for students?	Students will be able to represent and operate with vectors algebraically in two- and three-dimensions, find vector projections, cross products, and dot products of vectors. <u>Essential Question:</u> How do we use vectors to model motion in two- and three-dimensions?	Students will be able to plot points using polar coordinates, convert between polar coordinates and rectangular coordinates and vice versa, understand the Complex Plane, and convert between the polar and rectangular forms of a complex number. <u>Essential Question:</u> How do we understand more about complex numbers by looking at them using the polar coordinate system?	Students will be able to analyze, graph and write equations of parabolas, ellipses (including circles) and hyperbola and identify a conic section by its equation. <u>Essential Question:</u> How can we connect equations with particular geometrically defined shapes?	Students will be able to use sigma notation to write sums, determine if a sequence or series is arithmetic or geometric, and determine sums of arithmetic and geometric series, and apply the Binomial Theorem. <u>Essential Question:</u> How can we determine terms in a sequence or the sum of a series using pattern recognition?	



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Interdisciplinary Lessons & Projects: *State additional content areas and title all lesson(s) and project(s)	Assignment: Determine the work done if objects are being moved up inclined planes. <p style="text-align: center;">Physics</p>	Assignment: Examine microphone pickup patterns that are polar equations. <p style="text-align: center;">Engineering, music</p>	Assignment: Determine a quadratic equation that approximates the shape of the Gateway Arch in St. Louis. <p style="text-align: center;">Architecture</p>	Assignment: Examine the biological basis for the Fibonacci sequence. <p style="text-align: center;">Biology</p>	
Honors Course Differentiation(s):	-Additional test questions involving higher order questioning to demonstrate mastery -Additional homework problems -Q3 project	-Additional test questions involving higher order questioning to denote mastery -Additional homework problems -Q4 project	-Additional test questions involving higher order questioning to denote mastery -Additional homework problems -Q4 project	-Additional test questions involving higher order questioning to denote mastery -Additional homework problems -Q4 project	



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