

PRECALCLUS

<i>COURSE OUTLINE</i>		
Unit 1 Chapter One	Real Numbers Algebraic Expressions Rational Expressions Equations Modeling with Equations Inequalities	<i>21 days</i>
Unit 2 Chapter Two	What is a Function? Graphs of Functions Increasing and Decreasing Functions Quadratic Functions Modeling with Functions Combining Functions Inverse Functions	<i>21 days</i>
Unit 3 Chapter Three	Polynomial Functions and Their Graphs Dividing Polynomials Real Zeros of Polynomials Complex Zeros and the Fundamental Theorem of Algebra Graphing Rational Functions	<i>25 days</i>
Unit 4 Chapter Four	Exponential Functions Logarithmic Functions Laws of Logarithms Exponential and Logarithmic Equations Modeling with Exponential Functions	<i>24 days</i>
Unit 5 Chapter Eleven	Sequences and Summation Notation Arithmetic Sequences Geometric Sequences The Binomial Theorem	<i>21 days</i>
Unit 6 Chapter Five/Six	The Unit Circle Trigonometric Functions of Real Numbers Angle Measure Trigonometry of Right Triangles Trigonometric Functions of Angles Law of Sines Law of Cosines Trigonometric Graphs Modeling Harmonic Motion	<i>27 days</i>
Unit 7 Chapter Seven	Trigonometric Identities Addition and Subtraction Formulas Double Angle, Half Angle, Lowering Powers and Sum Product Formulas Inverse Trigonometric Functions Trigonometric Equations	<i>26 days</i>
Unit 8 Chapter Ten	Parabolas Ellipses Hyperbolas Shifted Conics	<i>21 days</i>

School-wide Academic Expectations Taught In This Course

- Analysis
- Collaboration
- Communication
- Literacy

School-wide Social and Civic Expectations Taught in This Course

- Demonstrate Resiliency
- Demonstrate Responsibility
- Demonstrate Respect

Content Standards Taught in This Course

- HSA.REI.A.2
- HSA.APR.A.1
- HSA.REI.B.3
- HSA.REI.B.4
- HSF-BF.1,3, 4
- HSS-ID.6-9
- HSF-IF.1,2,4,5,7
- HSF-LE.2
- HSA-APR.1,2,3,4,6,7
- HSN-CN.1,2,3,7,8,9
- HSF-BF.1,3, 4
- HAS-SSE.3
- HSS-ID.6
- HSF-IF.7,8
- HSF-LE.2
- HSG-C.5
- HSG-SRT.8,9
- HSF-TF.1-7
- HSF-LE.2

Unit 1: Chapter 1 Fundamentals

Introduction and Established Goals: In this first chapter, students review the real numbers, equations, and the coordinate plane. They are probably already familiar with these concepts, but it is helpful to get a fresh look at how these ideas work together to solve problems and model real-world situation.

Desired Outcome(s): Students will feel comfortable with this review material in order to have a strong foundation of the basics before moving to more challenging concepts.

CT State Standard(s) / Common Core Standard(s):

- HSA.REI.A.2
- HSA.APR.A.1
- HSA.REI.B.3
- HSA.REI.B.4

Math Practice(s):

- SMP1
- SMP2
- SMP4
- SMP7

Essential Question(s):

- How can we use mathematics to model real-world situations?

Key Terms/Concepts: natural numbers, integers, rational numbers, additive identity, multiplicative identity, origin, coordinate line, elements, set-builder notation, union, intersection, empty set, absolute value, monomial, binomial, trinomial, Principle of Substitution, domain, range, LCD, compound fraction, solutions/roots, completing the square, extraneous solutions, quadratic type, test values

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSA.REI.A.2	<ol style="list-style-type: none">1. Understand and apply set and interval notation2. Understand and apply the characteristics of Union and Intersection	<ul style="list-style-type: none">○ Section 1.1 Exercises	Warm Up Exit Slip
HSA.REI.A.2	<ol style="list-style-type: none">3. Add, subtract, and multiply polynomials	<ul style="list-style-type: none">○ Section 1.3 Exercises	Warm Up Exit Slip Quiz

	4. - Factor in all forms, including common factors, difference of squares, sum and difference of cubes, grouping, trinomials, and fractional exponents		
HSA.APR.A.1	5. Find the domain of a rational expression 6. Simplify, multiply, divide, add, and subtract a rational expression 7. Simplify a compound fraction 8. Rationalize the denominator or numerator	○ Section 1.4 Exercises	Warm Up Exit Slip
HSA.REI.B.3	9. Solve linear, quadratic, fractional expressions/rational, radical, absolute value, and fractional power equations	○ Section 1.5 Exercises	Warm Up Exit Slip Quiz
HSA.REI.B.3	10. Solve real world problems involving interest, dimensions, mixtures, work, and distance	○ Section 1.6 Exercises	Warm Up Exit Slip
HSA.REI.B.4	11. Solve linear, quadratic, quotient, and absolute value inequalities 12. Model work problems using inequalities	○ Section 1.7 Exercises	Warm Up Exit Slip Quiz
			Performance Task
			Unit Test

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

Suggested Technology: Graphing calculator

Unit 2: Chapter 2 Functions

Introduction and Established Goals: Functions are used to model real-world applications involving relationships between multiple quantitative variables. Functions can be represented algebraically, graphically, numerically, and verbally. One representation may sometimes be more helpful than another, and used together, multiple representations give a fuller understanding of a problem.

Desired Outcome(s): Students will know:

- Functions are a type of relation between a pair of quantitative variables
- Rigid and non-rigid transformations can be applied the same way to different parent functions
- One-to-one functions have inverse functions that undo the actions of the original function
- Scatter plots and least squares regression can be used to create useful models of real world data

CT State Standard(s) / Common Core Standard(s):

- HSF-BF.1,3, 4
- HSS-ID.6-9
- HSF-IF.1,2,4,5,7
- HSF-LE.2

Math Practice(s):

- SMP1
- SMP4
- SMP5

Essential Question(s):

- What is a mathematical model, and how can we construct them so they can be applied to solve real-world problems?
- How do I use mathematical tools to create models for real-world situations and then solve them efficiently for a given set of conditions?
- What different information can be determined about a problem when we examine it from a graphical, numerical, and algebraic standpoint?
- What factors can be used to determine whether an analytic or graphical strategy is most advantageous in solving a problem?

Key Terms/Concepts: Value of f at x , image of x under f , domain, range, independent/dependent variable, input, output, linear function, constant function, step function, increasing, decreasing, average rate of change, even function, odd function, parabola, one to one function

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSF-BF.1,3, 4	<ol style="list-style-type: none"> 1. Determine if a relation is a function (given a graph, table, list of values, and diagram) 2. Understand, apply, and evaluate using function notation 3. Evaluate piecewise functions 4. Find the domain of functions including square roots and radicals. 	<ul style="list-style-type: none"> ○ Section 2.1 exercises 	Warm Ups Exit Slips
HSF-BF.1,3, 4	<ol style="list-style-type: none"> 5. Graph families of functions and understand how all are related to their appropriate parent functions 6. Transform functions 7. Explain transformations of functions 8. Sketch piecewise functions 9. Determine and understand the characteristics of even and odd functions 10. Find the Domain and range of all the functions 	<ul style="list-style-type: none"> ○ Section 2.2 Exercises ○ Section 2.4 Exercises 	Warm Ups Exit Slips Quiz
HSF-IF.1,2,4,5,7	<ol style="list-style-type: none"> 11. Find intervals of increase/decrease for all the families of functions and piecewise functions 12. Find the average rate of change and be able to explain what it represents 	<ul style="list-style-type: none"> ○ Section 2.3 Exercises 	Warm Ups Exit Slips
HSF-IF.1,2,4,5,7	<ol style="list-style-type: none"> 13. Put quadratic functions in h-k form while finding vertex, maximum/minimum values, domain, range, and intercepts 14. Find maximum/minimum using $x = -\frac{b}{2a}$ 15. Solve application problems by finding maximum or minimum values when given an equation. 	<ul style="list-style-type: none"> ○ Section 2.5 Exercises 	Warm Ups Exit Slips Quiz
HSF-IF.1,2,4,5,7	<ol style="list-style-type: none"> 16. Solve word problems by finding maximum or minimum values 17. Set up and solve an equation 	<ul style="list-style-type: none"> ○ Section 2.6 Exercises 	Warm Ups Exit Slips
	<ol style="list-style-type: none"> 18. Add, subtract, multiply, and divide functions 19. Find the domain of the quotient of two functions 20. Compose functions 21. Decompose functions 	<ul style="list-style-type: none"> ○ Section 2.7 Exercises 	Warm Ups Exit Slips
HSF-LE.2	<ol style="list-style-type: none"> 22. Identify one-to-one functions 	<ul style="list-style-type: none"> ○ Section 2.8 Exercises 	Warm Ups

	23. Be able to check to see if two functions are inverses 24. Find the inverse of a function algebraically and graphically.		Exit Slips Quiz
			Performance Task
			Unit Test

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

Suggested Technology: Graphing Calculator

Unit 3: Chapter 3 Polynomial and Rational Functions

Introduction and Established Goals: Students will discover the characteristics of polynomial and rational functions in this chapter. Students will see that polynomial functions have continuous graphs with unbounded end behavior, but may have local minima and maxima. Rational functions, on the other hand, may be discontinuous and their graphs may exhibit asymptotic behavior.

Desired Outcome(s): Students will know:

- Techniques for sketching the graphs of polynomial functions
- The Fundamental Theorem of Algebra
- The Linear Factorization Theorem
- Statements about conjugate pairs of complex zeros
- Factoring techniques
- The Rational Root Theorem
- Rational functions can be sketched by finding asymptotes, end behavior, and intercepts.

CT State Standard(s) / Common Core Standard(s):

- HSA-APR.1,2,3,4,6,7
- HSN-CN.1,2,3,7,8,9
- HSF-BF.1,3, 4
- HAS-SSE.3
- HSS-ID.6
- HSF-IF.7,8
- HSF-LE.2

Math Practice(s):

- SMP2
- SMP5
- SMP7

Essential Question(s):

- What types of real-world situations can be modeled by polynomials?
- Why is it important to identify the end behavior, intercepts, extrema, domain and range of polynomial functions?
- What types of real-world situations can be modeled by rational functions?
- How do I describe what is happening at an asymptote and why is it important?

Key Terms/Concepts: Intermediate Value Theorem, zero of multiplicity m , local minimum point, local maximum point, local extrema, Remainder Theorem, Factor Theorem, Fundamental Theorem of Algebra, Complete Factorization, multiplicity k

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSA-APR.1,2,3,4,6,7	<ol style="list-style-type: none"> 1. Identify degree, leading coefficient, and constant values of functions 2. Identify end behavior of functions 3. Sketch graphs by end behavior, zeroes, y-intercept, and other points 4. Find zeros, factors, roots, x-intercepts, and solutions. 5. Find local maximum and minimum 6. Find the multiplicity of zeros 	<ul style="list-style-type: none"> ○ Section 3.1 Exercises 	Warm Ups Exit Slips
HSN-CN.1,2,3,7,8,9	<ol style="list-style-type: none"> 7. Divide polynomials using long and synthetic division 8. Understand and apply the Factor and Remainder Theorems 	<ul style="list-style-type: none"> ○ Section 3.2 Exercises 	Warm Ups Exit Slips Quiz
HSF-BF.1,3, 4	<ol style="list-style-type: none"> 9. Understand and apply the Rational Zeros Theorem 10. Identify upper and lower bounds 	<ul style="list-style-type: none"> ○ Section 3.3 Exercises 	Warm Ups Exit Slips
HSA-SSE.3	<ol style="list-style-type: none"> 11. Understand and apply the Fundamental Theorem of Algebra 12. Find ALL zeros (real and imaginary) 13. Conjugate zeros theorem 14. Multiplicity of zeros 15. Make connections (sketching graphs and analyzing sketches) 	<ul style="list-style-type: none"> ○ Section 3.5 Exercises 	Warm Ups Exit Slips Quiz
HSS-ID.6	<ol style="list-style-type: none"> 16. Find the domain, vertical/horizontal asymptotes, zeroes, y-intercept, hole, and slant of rational functions 17. Sketch the graph of rational functions 	<ul style="list-style-type: none"> ○ Section 3.6 Exercises 	Warm Ups Exit Slips
			Performance Task
			Unit Test

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

Suggested Technology: Graphing calculator

Unit 4: Chapter 4 Exponential and Logarithmic Functions

Introduction and Established Goals: Students will discover that exponential functions represent quantities that increase or decrease by a constant multiple for each unit increase in the independent variable. We will also discuss how logarithmic functions are the inverses of exponential functions, where each unit increase in value of the function corresponds to an increase or decrease by a constant multiple in the independent variable.

Desired Outcome(s): Students will know:

- Techniques for graphing and analyzing exponential and log functions
- The properties of exponents, logarithms, and the Change of Base Formula can be used to simplify and rewrite exponential and logarithmic expressions so they can be used to solve equations.
- Exponential and logarithmic functions are used to model many important real world situations.

CT State Standard(s) / Common Core Standard(s):

- HSA-APR.1,2,3,4,6,7
- HSN-CN.1,2,3,7,8,9
- HSF-BF.5
- HSS-ID.6
- HSF-IF.7,8
- HSF-LE.2,3,4

Math Practice(s):

- SMP1
- SMP4
- SMP5

Essential Question(s):

- How are exponential functions and logarithms used to model and solve real-life problems?
- Why do we need logarithms?
- How are exponential and logarithmic functions related?

Key Terms/Concepts: Exponential function with base a , continuously compounded interest, logarithmic function with base a , logarithmic form, exponential form, common logarithm, natural logarithm, Change of Base, exponential growth

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSA-APR.1,2,3,4,6,7	<ol style="list-style-type: none"> 1. Graph exponential functions by finding domain, range, intercept, and asymptotes 2. Solve compound and continuous interest problems 	<ul style="list-style-type: none"> ○ Section 4.1 Exercises 	Warm Ups Exit Slips
HSA-APR.1,2,3,4,6,7	<ol style="list-style-type: none"> 3. Graph logarithmic functions by converting to exponential form and finding domain, range, intercept, and asymptote. 	<ul style="list-style-type: none"> ○ Section 4.2 Exercises 	Warm Ups Exit Slips Quiz
HSN-CN.1,2,3,7,8,9	<ol style="list-style-type: none"> 4. Expand and condense expressions using the laws of logarithms 	<ul style="list-style-type: none"> ○ Section 4.3 Exercises 	Warm Ups Exit Slips
HSN-CN.1,2,3,7,8,9	<ol style="list-style-type: none"> 5. Solve all types of exponential and log equations 	<ul style="list-style-type: none"> ○ Section 4.4 Exercises 	Warm Ups Exit Slips Quiz
HSF-BF.5	<ol style="list-style-type: none"> 6. Model exponential growth and decay 7. Understand and apply the Radioactive Decay Model 8. Work with Newton's Law of Cooling 9. Understand problems involving pH scale, Richter Scale, and Decibel Scale 	<ul style="list-style-type: none"> ○ Section 4.5 Exercises 	Warm Ups Exit Slips
			Performance Task
			Test

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

Suggested Technology: Graphing Calculator

Unit 5: Chapter 11 Sequences and Series

Introduction and Established Goals: Sequences and Series are a direct result of finding patterns, which can help solve real-world problems. We will identify arithmetic and geometric sequences and understand similarities and differences between them.

Desired Outcome(s): Students will know:

- A sequence can be thought of as a function whose domain is the set of positive integers.
- How to write terms of a sequence given a formula for a_n
- How to use factorial and summation notation
- How to find partial sums and infinite series
- How to find the common difference/ratio

CT State Standard(s) / Common Core Standard(s):

- HSA-REI.5,6,7,8,9
- HSN-VM.6,7,8,9
- HSF-LE.2

Math Practice(s):

- SMP1
- SMP2
- SMP4

Essential Question(s):

- What is the relationship between linear/exponential functions and arithmetic/geometric sequences?
- Why is mathematics considered the “science of patterns”?

Key Terms/Concepts: Terms, recursive, Fibonacci Sequence, first partial sum, second partial sum, n th partial sum, sequence of partial sums, summative notation, sigma notation, index of summation, summation variable, common difference, arithmetic sequence, geometric sequence, common ratio, infinite series, Binomial Theorem, Pascal’s Triangle

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSA-REI.5,6,7,8,9	<ol style="list-style-type: none"> 1. Find the first several terms of a sequence 2. Write a sequence as an explicit and recursive formula 3. Find partial sums given sigma notation and the actual series 4. Write the sum in sigma notation 	<ul style="list-style-type: none"> ○ Section 11.1 Exercises 	Warm Ups Exit Slips
HSA-REI.5,6,7,8,9	<ol style="list-style-type: none"> 5. Find the first several terms of an arithmetic sequence 6. Find the “n”th term and a specific term given two terms 7. Find partial sums using the sum formula 8. Find the sum given sigma notation 	<ul style="list-style-type: none"> ○ Section 11.2 Exercises 	Warm Ups Exit Slips
HSN-VM.6,7,8,9	<ol style="list-style-type: none"> 9. Find the first several terms of a geometric sequence 10. Find the “n”th term using an explicit formula 11. Find partial sums using the sum formula 12. Find the sum given sigma notation 13. Find infinite geometric sums 14. Solve word problems 	<ul style="list-style-type: none"> ○ Section 11.3 Exercises 	Warm Ups Exit Slips Quiz
HSN-VM.6,7,8,9	<ol style="list-style-type: none"> 15. Expand binomials using Pascal’s Triangle and combinations 16. Find a specific term of an expansion 	<ul style="list-style-type: none"> ○ Section 11.6 Exercises 	Warm Ups Exit Slips
			Performance Task
			Test

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

Suggested Technology: Graphing Calculator

Unit 6: Chapter 5/6 Trigonometric Functions of Real Numbers and Angles

Introduction and Established Goals: In this chapter we introduce new functions called the trigonometric functions. They can be defined as functions of angles or functions of real numbers. We study both approaches because different applications require that we view these functions differently. The Trigonometric functions are ratios whose values can be found from right triangles or the unit circle.

Desired Outcome(s):

- Understand that one revolution, 360 degrees, and 2π radians are equivalent angle measures
- Know that angles have coterminal, complementary, and supplementary angles
- Understand the relationship between the radius of a circle, a central angle, and the arc length subtended by that angle
- Solve a variety of real-world problems using values of trigonometric functions including bearings and harmonic motion

CT State Standard(s) / Common Core Standard(s):

- HSG-C.5
- HSG-SRT.8,9
- HSF-TF.1-7
- HSF-LE.2

Math Practice(s):

- SMP1
- SMP4
- SMP7

Essential Question(s):

- What connections exist between trigonometry and geometry?
- How can triangles relate to a circle?
- How do geometric relationships and measurements help us solve problems involving periodic behavior and make sense of our world?

Key Terms/Concepts: Terminal point, reference number t , circular functions, trigonometric identities, measure, degree, radians, coterminal angles, standard position, arc length, area of sector, linear speed, angular speed, cosine, sine, tangent, secant, cosecant, cotangent, solving a triangle, SOHCAHTOA, quadrantal angles, Law of Sines, Law of Cosines, SSS, SAS, semiperimeter

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSG-C.5	<ol style="list-style-type: none"> 1. Find a terminal point 2. - Find a reference number. 	<ul style="list-style-type: none"> ○ Section 5.1 Exercises 	Warm Up Exit Slip
HSG-C.5	<ol style="list-style-type: none"> 3. Find trig functions given angle measure 4. Understand even/odd properties of trig functions 5. Understand and apply reciprocal identities 6. Understand and apply Pythagorean identities 7. Understand and apply quotient identities 8. Write one trig function in terms of another 	<ul style="list-style-type: none"> ○ Section 5.2 Exercises 	Warm Up Exit Slip Quiz
HSG-SRT.8,9	<ol style="list-style-type: none"> 9. Convert between radians and degrees 10. Find co-terminal angles 11. Determine arc length 12. Calculate the area of a sector 13. - Compare/contrast angular and linear speed 	<ul style="list-style-type: none"> ○ Section 6.1 Exercises 	Warm Up Exit Slip
HSF-TF.1-7	<ol style="list-style-type: none"> 14. Use SOHCAHTOA to solve right triangles 15. Apply SOHCAHTOA to solve problems involving angles of elevation and depression 	<ul style="list-style-type: none"> ○ Section 6.2 Exercises 	Warm Up Exit Slip Quiz
HSF-TF.1-7	<ol style="list-style-type: none"> 16. Understand and apply the definitions of trig functions 17. Understand the signs of trig functions 18. Find reference angles 19. Evaluate trig functions using reference angles 20. Understand and apply reciprocal, quotient, and Pythagorean identities 21. - Express one function as another 	<ul style="list-style-type: none"> ○ Section 6.3 Exercises 	Warm Up Exit Slip
HSF-TF.1-7	<ol style="list-style-type: none"> 22. Understand and apply cases to use the law of sines, including ASA, SAA, and SSA 23. Understand ambiguous cases 24. Solve triangles using the Law of sines 25. Solve real world problems using the law of sines 	<ul style="list-style-type: none"> ○ Section 6.4 Exercises 	Warm Up Exit Slip

HSF-TF.1-7	26. Understand and apply cases to use the law of cosines, including SAS and SSS 27. Solve triangles using the Law of Cosines 28. Solve real world problems using the law of cosines	<ul style="list-style-type: none"> ○ Section 6.5 Exercises 	Warm Up Exit Slip Quiz	
			Performance Task	
			Unit Test	

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

Suggested Technology: Graphing Calculator

Unit 6 Continued: Chapter 5 Graphing the Trigonometric Functions

Introduction and Established Goals: In this chapter we discuss the parent functions and their transformations of all trigonometric graphs. Graphs of trigonometric functions are periodic and can be used to model real-world situations of a periodic nature.

Desired Outcome(s):

- Apply techniques for graphing the six parent trigonometric functions and transformations of those functions

CT State Standard(s) / Common Core Standard(s):

- HSG-C.5
- HSG-SRT.8,9
- HSF-TF.1-7
- HSF-LE.2

Math Practice(s):

- SMP1
- SMP4
- SMP7

Essential Question(s):

- What connections exist between trigonometry and geometry?
- How can triangles relate to a circle?
- How do geometric relationships and measurements help us solve problems involving periodic behavior and make sense of our world?

Key Terms/Concepts: Periodic, period, one complete period, sine curves, cosine curves, sinusoidal, phase shift, amplitude, vertical asymptotes, simple harmonic motion, damped harmonic motion, damping constant

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSG-C.5	1. Find and/or calculate amplitude, periods, phase shifts, vertical	<ul style="list-style-type: none">○ Section 5.3 Exercises	Warm Up Exit Slip

	shifts, and asymptotes of sine, cosine, and tangent functions		
HSG-SRT.8,9	2. Find and/or calculate amplitude, periods, phase shifts, vertical shifts, and asymptotes of cosecant, secant, and cotangent functions	○ Section 5.4 Exercises	Warm Up Exit Slip Quiz
HSF-TF.1-7	3. Model simple harmonic motion 4. Find amplitude, period, and frequency of harmonic motion	○ Section 5.5 Exercises	Warm Up Exit Slip
			Performance Task
			Unit Test

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

Suggested Technology: Graphing Calculator

Unit 7: Chapter 7 Analytic Trigonometry

Introduction and Established Goals: Up until this point, we have studied the graphical and geometric properties of trigonometric functions. In this chapter, however, we will study the algebraic aspects of trig – simplifying and factoring expressions as well as solving equations that involve trigonometric functions. Trigonometric identities can be used to convert expressions to equivalent expressions that can be more effectively used to solve a problem. Trigonometric equations can be treated like much more basic equations by using the concept of substitution

Desired Outcome(s):

- Students will understand trigonometric identities (reciprocal, quotient, Pythagorean, co-function, even/odd) and techniques to use them.
- Students will understand sum and difference, double angle, half angle, product-to-sum, and sum-to-product formulas and techniques to use them.

CT State Standard(s) / Common Core Standard(s):

- HSG-C.5
- HSG-SRT.6,7
- HSF-TF.8,9
- HSF-LE.2

Math Practice(s):

- SMP1
- SMP4
- SMP7

Essential Question(s):

- How can we find the best form of a trigonometric expression?
- What is the value in knowing trigonometric identities?
- How does solving trigonometric equations relate to solving algebraic equations?

Key Terms/Concepts: Trigonometric identities, addition formula for cosine, subtraction formula for cosine, cofunction, double angle, half angle, product sum, triple angle, lowering powers, sum to product, inverse trigonometric functions, arcsine, arccosine, arctangent, trigonometric equation

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSG-C.5	<ol style="list-style-type: none"> Understand and apply trig identities, such as reciprocal, quotient, Pythagorean, even/odd, and co-function Simplify and verify trig identities 	<ul style="list-style-type: none"> Section 7.1 Exercises 	Warm Up Exit Slip
HSG-SRT.6,7	<ol style="list-style-type: none"> Use addition/subtraction formulas to find exact values Simplify and verify using these formulas 	<ul style="list-style-type: none"> Section 7.2 Exercises 	Warm Up Exit Slip Quiz
HSG-SRT.6,7	<ol style="list-style-type: none"> Evaluate $\sin(2x)$, $\cos(2x)$, and $\tan(2x)$ Simplify and verify using double angle, half angle, lowering powers, and sum-product formulas Express an expression in terms of the first power of a trig function Use half angle formulas and sum-product formulas to find exact values 	<ul style="list-style-type: none"> Section 7.3 Exercises 	Warm Up Exit Slip
HSF-TF.8,9	<ol style="list-style-type: none"> Graph all three inverse trig functions Evaluate expressing using inverse trig functions 	<ul style="list-style-type: none"> Section 7.4 Exercises 	Warm Up Exit Slip Quiz
HSF-LE.2	<ol style="list-style-type: none"> Solve equations in an interval Find all general solutions to a trig equation 	<ul style="list-style-type: none"> Section 7.5 Exercises 	Warm Up Exit Slip
			Performance Task
			Unit Test

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

Suggested Technology: Graphing Calculator

Unit 8: Chapter 10 Analytic Geometry

Introduction and Established Goals: Conic sections are the curves we get when we make a straight cut in a cone. For example, if a cone is cut horizontally, the cross section is a circle. Our goal in this chapter is to find equations whose graphs are the conic sections.

Desired Outcome(s):

- Students will know the standard form of the equation, geometric definition, and definition in terms of the intersection of a plane and a cone for circles, parabolas, ellipses, and hyperbolas.

CT State Standard(s) / Common Core Standard(s):

- HSG-GPE.1,2,3
- HSF-LE.2

Math Practice(s):

- SMP1
- SMP4
- SMP7

Essential Question(s):

- What real-life situations can be modeled by conic sections?

Key Terms/Concepts: Parabola, focus, directrix, axis of symmetry, latus rectum, focal diameter, major axis, minor axis, eccentricity, central box, branches, transverse axis, hyperbola, ellipse, shifted conics,

LEARNING PLAN

STANDARD	LEARNING OBJECTIVES (Content and Skill)	INSTRUCTIONAL STRATEGIES	ASSESSMENT EVIDENCE
HSG-GPE.1,2,3	<ol style="list-style-type: none">1. Find the focus, directrix, and focal diameter of a parabola2. Sketch a parabola using key points3. Find an equation of a parabola given information or a graph	<ul style="list-style-type: none">○ Section 10.1 Exercises	Warm Up Exit Slip
HSG-GPE.1,2,3	<ol style="list-style-type: none">4. Find vertices, foci, eccentricity, and major/minor axes of an ellipse	<ul style="list-style-type: none">○ Section 10.2 Exercises	Warm Up Exit Slip Quiz

	5. Sketch an ellipse 6. Write an equation in standard form 7. Find an equation of an ellipse given information or a graph		
HSG-GPE.1,2,3	8. Find vertices, foci, and asymptotes of a hyperbola 9. Sketch a hyperbola 10. Write an equation in standard form 11. Write an equation for a hyperbola given information or a graph	<ul style="list-style-type: none"> ○ Section 10.3 Exercises 	Warm Up Exit Slip
HSG-GPE.1,2,3	12. Find focus, directrix, and focal diameter of shifted parabolas 13. Find vertices, foci, eccentricity, and major/minor axes of shifted ellipses 14. Find vertices, foci, asymptotes of shifted hyperbolas 15. Complete the square to determine the type of conic an equation represents and then graph it	<ul style="list-style-type: none"> ○ Section 10.4 Exercises 	Warm Up Exit Slip Quiz
			Performance Task
			Unit Test

Suggested Resources and Texts: Precalculus, Fifth Edition. Mathematics for Calculus. Stewart, Redlin, and Watson.

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