Marietta City Schools

2024–2025 District Unit Planner

AP Precalculus

Unit title	**Unit 3 - Trigonometric and Polar Functions**	**Unit duration (hours)**	*30-40 hours*

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): ***What will students learn?***

GA DoE Standards

Standards:

3.1 Periodic Phenomena:
3.1.A: Construct graphs of periodic relationships based on verbal representations.
3.1.B: Describe key characteristics of a periodic function based on a verbal representation.

3.2 Sine, Cosine, and Tangent:
3.2.A: Determine the sine, cosine, and tangent of an angle using the unit circle.

3.3 Sine and Cosine Function Values:
3.3.A: Determine coordinates of points on a circle centered at the origin.

3.4 Sine and Cosine Function Graphs:
3.4.A: Construct representations of the sine and cosine functions using the unit circle.

3.5 Sinusoidal Functions:
3.5.A: Identify key characteristics of the sine and cosine functions.

3.6 Sinusoidal Function Transformations:
3.6.A: Identify the amplitude, vertical shift, period, and phase shift of a sinusoidal function.

3.7 Sinusoidal Function Context and Data Modeling:
3.7.A: Construct sinusoidal function models of periodic phenomena.

3.8 The Tangent Function:
3.8.A: Construct representations of the tangent function using the unit circle.
3.8.C: Describe additive and multiplicative transformations involving the tangent function.

3.9 Inverse Trigonometric Functions:
3.9.A: Construct analytical and graphical representations of the inverse of the sine, cosine, and tangent functions over a restricted domain.

3.10 Trigonometric Equations and Inequalities:
3.10.A: Solve equations and inequalities involving trigonometric functions.

3.11 The Secant, Cosecant, and Cotangent Functions:
3.11.A: Identify key characteristics of functions that involve quotients of the sine and cosine functions.

3.12 Equivalent Representations of Trigonometric Functions:
3.12.A: Rewrite trigonometric expressions in equivalent forms with the Pythagorean identity.
3.12.B: Rewrite trigonometric expressions in equivalent forms with sine and cosine sum identities.
3.12.C: Solve equations using equivalent analytic representations of trigonometric functions.

3.13 Trigonometry and Polar Coordinates:
3.13.A: Determine the location of a point in the plane using both rectangular and polar coordinates.

3.14 Polar Function Graphs:
3.14.A: Construct graphs of polar functions.

3.15 Rates of Change in Polar Functions:
3.15.A: Describe characteristics of the graph of a polar function..

Concepts/Skills to support mastery of standards:

2.B Construct equivalent graphical, numerical, analytical, and verbal representations of functions that are useful in a given mathematical or applied context, with and without technology.

3.A Describe the characteristics of a function with varying levels of precision, depending on the function representation and available mathematical tools.

2.A Identify information from graphical, numerical, analytical, and verbal representations to answer a question or construct a model, with and without technology.

3.B Apply numerical results in a given mathematical or applied context.

1.C Construct new functions, using transformations, compositions, inverses, or regressions, that may be useful in modeling contexts, criteria, or data, with and without technology.

3.C Support conclusions or choices with a logical rationale or appropriate data.

1.A Solve equations and inequalities represented analytically, with and without technology

1.B Express functions, equations, or expressions in analytically equivalent forms that are useful in a given mathematical or applied context.

Vocabulary: Parametric Equation, Radian Measure, Quadrantal Angle, Coterminal Angles, Inverse Function, Even Function, Odd Function, Sinusoidal, Transformation Features (midline, amplitude, vertical shift, vertical stretch, phase shift, period, and input-coefficient), Ambiguous Case, Identity, Law of Cosines, Law of Sines, Polar Coordinate System

Notation

Essential Questions

- Since energy usage goes up and down through the year, how can I use trends in data to predict my monthly electricity bills when I get my first apartment?
- How do we model aspects of circular and spinning objects without using complex equations from the x-y rectangular-based coordinate system?
- How does right triangle trigonometry from geometry relate to trigonometric functions?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s): Quizzes, TOTD, DeltaMath, Warm Ups, Desmos Activities

Summative Assessment(s): Quiz (3.1- 3.3), Unit 3 A Assessment (3.1- 3.7), Quiz (3.8- 3.12), End Unit 3 Test

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation

3.4.A: Construct Representations of the sine and cosine functions using the unit circle	Spaghetti Wave Students will use the unit circle and different colors monkey strings to create their graphs.	Unit circle filled will be provided for the students who need them The teacher shows an example of the graphs. Individual Assisting will be provided.
Content Resources		
Math Medic **AP Classroom** **Passwater** **Flamingo math**		