Marietta City Schools

2025–2026 District Unit Planner

Precalculus

Unit title	*Unit 2: Modeling with Trigonometric Expressions and Functions*	**Unit duration (hours)**	*18.75 - 22.5*

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

GA DoE Standards

Standards

PC.FGR.3: Utilize trigonometric expressions to solve problems and model periodic phenomena with trigonometric functions.

- **PC.FGR.3.1:** Use the concept of a radian as the ratio of the arc length to the radius of a circle to establish the existence of 2π radians in one revolution.
- **PC.FGR.3.2: Utilize right triangles on the unit circle to determine the values of the six trigonometric ratios for π/6, π/4, and π/3. Use reflections of the triangles as reference angles to establish known values in all four quadrants of the coordinate plane.**
- **PC.FGR.3.3: Define the six trigonometric ratios in terms of x, y, and r using the unit circle centered at the origin of the coordinate plane. Interpret radian measures of angles as a rotation both counterclockwise and clockwise around the unit circle.**
- **PC.FGR.3.4:** Derive the fundamental trigonometric identities.
- **PC.FGR.3.5:** Determine the value(s) of trigonometric functions for a set of given conditions.
- **PC.FGR.3.6: Graph and write equations of trigonometric functions using period, phase shift, and amplitude in modeling contexts.**
- **PC.FGR.3.7:** Classify the six trigonometric functions as even or odd and describe the symmetry.
- **PC.FGR.3.8:** Restrict the domain of a trigonometric function to create an invertible function and graph the inverse function. Evaluate inverse trigonometric expressions.

PC.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics.

- **PC.MM.1.1** Explain contextual, mathematical problems using a mathematical model.
- **PC.MM.1.2** Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.

- **PC.MM.1.3** Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
- **PC.MM.1.4** Use various mathematical representations and structures with this information to represent and solve real-life problems.

Concepts/Skills to be Mastered by Students

Fluently convert between degree and radian measures.

Develop the radian measure of the quadrantal angles

Work with radian measures that are in terms of π and those not in terms of π.

Connect the radian angle names on the 17-point unit circle to portions of 2π radians.

Utilize the parametric interpretation of the coordinates on the unit circle as (cos(t), sin(t))

Develop the pythagorean identities

Explore reciprocal and co-functional identities

Determine the values of the six trigonometric functions for set conditions

Construct equations for contexts such as a Ferris Wheel ride, pendulum motion, tides, predator-prey models, sound waves, etc.

Restrict the domains of our trig functions to create inverse trig functions

Vocabulary

Parametric Equation, Radian Measure, Quadrantal Angle, Co-function, Reciprocal, Co-terminal Angles, Inverse Function, Invertible, Even Function, Odd Function, Sinusoidal, Transformation Features, Reference Angle, Modeling Philosophy

Essential Questions

1. How do we as mathematicians make sense of quantities and situations symbolically?
2. How can we as mathematicians create and apply generalizations from repeated reasoning when working with the Unit Circle?
3. How can we as mathematicians use trigonometric functions to model periodic phenomena in context?

4. How do we as mathematicians identify the relationships between the different trigonometric functions?
Assessment Tasks
List of common formative and summative assessments.
Formative Assessment(s): Unit 2 Quiz, Skill checks, Warm-ups **Summative Assessment(s):** Unit 2 Assessment(s)

Learning Experiences Add additional rows below as needed.		
Objective or Content	**Learning Experiences**	**Personalized Learning and Differentiation** All information included by PLC in the differentiation box is the responsibility and ownership of the local school to review and approve per Board Policy IKB.
PC.FGR.3: Utilize trigonometric expressions to solve problems and model periodic phenomena with trigonometric functions. ● **PC.FGR.3.2: Utilize right triangles on the unit circle to determine the values of the six trigonometric ratios for π/6, π/4, and π/3. Use reflections of the triangles as reference angles to establish known values in all four quadrants of the**	Connecting the Unit Circle I can justify that the values of the trigonometric functions are the coordinates of the point where the central angle intersects the circle.	**Supporting the Learning:** ● Anticipate any misconceptions or questions students might have about the task, materials or technology. Proactively address them with readily available and accessible resources through vertical alignment of the unit circle. ● Pose purposeful questions to assess prior knowledge from

coordinate plane. ● **PC.FGR.3.3: Define the six trigonometric ratios in terms of x, y, and r using the unit circle centered at the origin of the coordinate plane. Interpret radian measures of angles as a rotation both counterclockwise and clockwise around the unit circle.** ● PC.FGR.3.4: Derive the fundamental trigonometric identities. ● PC.FGR.3.5: Determine the value(s) of trigonometric functions for a set of given conditions. .		geometry and elicit student thinking to address concepts needing review since it has been longer since they saw the content.. **Extending the Learning**: ● Provided leveled practice to get them into extension problems **Language Supports:** ● Provide multiple opportunities for structured peer interactions or conversations (pairs or triads) to negotiate meaning using charts, graphic organizers, a word bank, and/or sentence stems. ● Provide I can statements at the start of the unit to encourage mastery of content and vocabulary.
PC.FGR.3 Utilize trigonometric expressions to solve problems and model periodic phenomena with trigonometric functions. ● **PC.FGR.3.2 Utilize right triangles on the unit circle to determine the values of the six trigonometric ratios for π 6 , π 4 , and π 3 . Use reflections of the triangles as reference angles to establish known values in all four quadrants of the coordinate plane.** ● **PC.FGR.3.3 Define the six trigonometric ratios in terms of x, y, and r using the unit circle centered at the origin of the coordinate plane. Interpret radian measures of angles as a rotation both counterclockwise and clockwise around the unit circle.**	Unwrapping the Unit Circle **Engage, Explore, Apply, Reflect** ● I can generate the graphs of the sine and cosine functions. ● I can determine the characteristics of the sine and cosine function. ● I can define amplitude, midline, and period.	Supporting the Learning ● Build on prior knowledge taught in geometry from the unit circle Language Supports: ● Providing I can statements at the start of the unit encourage mastery of content and vocabulary. Extend the Learning: ● Providing contextual situations to extend student thinking.

• PC.FGR3.6 Graph and write equations of trigonometric functions using period, phase shift, and amplitude in modeling contexts.		
Content Resources		
Delta Math **Math Medic** **Savvas**		