



Marietta City Schools
2025–2026 District Unit Planner

Precalculus

Unit title	<i>Unit 5 - Modeling with Vector Quantities</i>	Unit duration (hours)	<i>15-18.75</i>
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Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

PC.AGR.6: Represent and model vector quantities to solve problems in contextual situations.

- PC.AGR.6.1 Represent vector quantities as directed line segments; represent magnitude and direction of vectors in component form using appropriate mathematical notation
- PC.AGR.6.2 Add and subtract vectors and multiply vectors by a scalar to find the resultant vector.
- PC.AGR.6.3 Add and subtract vectors on a coordinate plane using different methods.
- PC.AGR.6.4 Solve contextual vector problems, such as those involving velocity, force, and other quantities.
- PC.AGR.6.5 Sketch the graph of a curve represented parametrically, indicating the direction of motion.
- PC.AGR.6.6 Apply parametric equations to contextual problems.

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

- Find the magnitude of a vector

- Find the direction angle of a vector
- Find the magnitude of a three-dimensional vector
- Add vectors
- Subtract vectors
- Find the magnitude and direction of a vector sum
- Multiply a vector by a scalar
- Find the magnitude of a vector scalar multiple
- Determine the direction of a vector scalar multiple
- Multiply vectors by a scalar to find the resultant vector
- Graph a resultant vector using the triangle method
- Graph a resultant vector using the parallelogram method
- Model a situation like a tug-of-war or a boat crossing a river with vectors
- Solve problems involving velocity, force, or displacement using vectors
- Use a calculator to find vector magnitudes/directions or perform operations
- Understand the role of the parameter: ex: Recognize that the parameter, typically t , (often represents time)
- Create a table of values and develop the ability to choose a sufficient range of t values and calculate the corresponding (x, y) coordinates.
- Eliminate the parameter using trigonometric identities to obtain rectangular equations (conics)

Vocabulary

Component Form, Conic Sections, Direction Equivalent Vectors, Force, Initial Point, Magnitude and Direction Form, Parallel Vectors, Parameter, Parametric Equations, Parametric Function, Pythagorean Identities, Resultant Vectors, Scalar, Terminal Point, Trigonometry, Vector Addition, Vector Operations, Vector Representations, Vectors, Velocity

Essential Questions

1. How do we as mathematicians determine the difference between a scalar and a vector?
2. How do we as mathematicians add/subtract vectors? Algebraically? Geometrically?
3. What happens when you multiply a vector by a scalar?
4. How do we as mathematicians find the resultant vector?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s):

Unit 5 Quiz, Skills Checks, Warm-ups

Summative Assessment(s):

Unit 5 Assessment (s)

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
<p>PC.AGR.6: Represent and model vector quantities to solve problems in contextual situations.</p> <ul style="list-style-type: none"> ● PC.AGR.6.1 Represent vector quantities as directed line segments; represent magnitude and direction of vectors in component form using appropriate mathematical notation ● PC.AGR.6.2 Add and subtract vectors and multiply vectors by a scalar to find the resultant vector. ● PC.AGR.6.3 Add and subtract 	<p>Vector Voyagers - Engage, Explore, Reflect</p> <ul style="list-style-type: none"> ● I can determine and interpret the magnitude and direction of a vector. ● I can use vectors in component form or in magnitude-direction form to represent and solve problems. ● I can convert vectors from one form to another. ● I can apply the operations of vectors to the tail-to-end method. ● I can use vectors to represent and solve problems. 	<p style="text-align: center;">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.</p> <p>Supporting the Learning: Make explicit connections between current and prior content knowledge, Cardinal directions (North, South, East, and West), Basic trigonometry, Inverse trigonometry, and, Finding distance between points on a coordinate plane. Anticipate any misconceptions or questions students might have about the task, materials or technology. Proactively address them with readily available and accessible resources.</p>

<p>vectors on a coordinate plane using different methods.</p> <p>PC.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics.</p> <ul style="list-style-type: none"> PC.MM.1.1 Explain applicable, mathematical problems using a mathematical model. 		<ul style="list-style-type: none"> Students may overlook the quadrant when considering the inverse trigonometric function. Students may treat vectors as numbers, not understanding that vectors have both magnitude and direction. Students may only consider magnitude and direction and not consider the components. Students may consider force or direction only. Students may not have a working knowledge of directional headings and how that pertains to positive and negative values. When finding direction, students may not find the correct angle due to lack of attention to the component form of the vector.
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Content Resources

Savvas
Math Medic