Marking Period: 4	Unit Title: Applications of Trigonometric Functions	Recommended Instruction Days: 15 - 20

Standard-New Jersey Student Learning Standards: N-CN, N-VM
Applications of Trigonometric Functions (Chapter 6)

Strand:

N-CN: The Complex Number System

Perform arithmetic operations with complex numbers

3. Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers

Represent complex numbers and their operations on the complex plane

4. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.
5. Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.
6. Calculate the distance between numbers in the complex plane as modules of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

N-VM: Vectors and Matrix Quantities

Represent and model with vector quantities

1. Recognize vector quantities as having both magnitude and directions. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v)
2. Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
3. Solve problems involving velocity and other quantities that can be represented by vectors.

Perform operations on vectors

4. Add and subtract vectors
   a. add vectors end-to-end, component wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitude.
   b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
   c. Understand vector subtraction v - w as v + (-w), where -w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.
5. Multiply a vector by a scalar.

a. Represent scalar multiplication graphically by scaling vectors and possible reversing their direction; perform scalar multiplication component-wise

b. Compute the magnitude of a scalar multiple cv using ||cv|| = |c|v. Compute the direction of cv knowing that when |c|v ≠ 0, the direction of cv is either along v (for c > 0) or against v (for c < 0)

LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*

Sally Ride - American astronaut and physicist.

The mission is to ensure that every student is able to see themselves in our rich and diverse history.

Social and Emotional Learning: ***Competencies***	**Social and Emotional Learning:** ***Sub-Competencies***
Self-Awareness Social Awareness Self-Management Relationship Skills Responsible Decision-Making	• Recognizing the importance of self-confidence in handling daily tasks and challenges. • Demonstrate an awareness of the expectations for social interactions in a variety of ways. • Demonstrate an understanding of the need for mutual respect when viewpoints differ. • Recognize the skills needed to establish and achieve personal and educational goals. • Utilize positive communication and social skills to interact effectively with others. • Develop, implement, and model effective problem solving and critical thinking skills.

Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-CLKS within Unit

Essential Questions	Progress Indicators	Activity Description
• What are the main components of a two-dimensional vector? • How is the magnitude and direction of a vector determined? • How are operations such as multiplication and addition performed with vectors? • What is the dot product?	• Tests • Quizzes • Practice problems for homework • Worksheets • Leveled assessments • Projects	❖ Vectors in the Plane ❖ Dot Product of Vectors ❖ Example Tasks Below **Interdisciplinary Connections:** **Science Domain: Motion and Stability: Forces and Interactions** Gravity: A force of 30 pounds just keeps a box from sliding down a ramp with an incline at 20 degrees. Find the weight of the box. **Answer:** We are given that $\lvert\overrightarrow{AD}\rvert = 30$. Let $\lvert\overrightarrow{AD}\rvert = w$; then $\sin 20° = \frac{\lvert\overrightarrow{CB}\rvert}{w} = \frac{30}{w}$ $w = \frac{30}{\sin 20°} \approx 87.71.$ The weight of the box is about 87.71 pounds. **Task**

		• Which of the following is not a factor in determining whether two vectors are equal? A. Direction of each vector. B. Location of each vector in the plane. C. Length or magnitude of each vector. D. None of the above. • Tell whether the quantity is a vector, a scalar, or neither. A. The velocity of an object in motion. B. The direction angle of a vector. C. The horizontal component of a vector. D. A product of a scalar and a vector. E. The speed of an object in motion. F. A sum of two vectors. **Answer** • B, Location of each vector in the plane. • A: Vector B: Scalar C: Scalar D: Vector E: Scalar F: Vector **Task**

		• Find two vectors **u** and **v** such that **u** is a scalar multiple of **v** but **u** and **v** have different unit vectors. • Can a vector have more than one angle direction? Explain. • What is the range of possible values of the magnitude of a vector? **Answer** • Any two vectors that point in opposite directions; for example, **u** = < -3, 4 > and **v** = < 6, -8>. • Yes; for example, a direction angle of -30° is the same as a direction angle of 330 °. • [0, ∞) **Spot Light On:** *Use multiple ways of assessing student understanding.*
Mathematical Practices		

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***	**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
Formative Assessment: ● Entry and Exit Slips ● Quizzes ● Self Assessments ● Focus Packets	**Benchmarks:** ● Chapter Tests ● Projects **Summative Assessments:** ● District assessments

Differentiated Student Access to Content: **Teaching and Learning *Resources/Materials***			
Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**

online .albert resource online achievethecore resource online learnzillion resource online khanacademy resource online desmos resource online edulastic resource	Reteaching worksheets Skill building workbook Math manipulatives Leveled practice worksheets	Dictionary for native language Video tutorial in native language Success for English Learners worksheets Leveled Strategies for English Learners Linguistic Support	Enrichment worksheets Art of Problem Solving Leveled assessments

Supplemental Resources

- Technology: Chromebooks, Graphing Calculators, Smartboards,
- Other: Zoom and Google Meets, Schoology, Google Classroom

Differentiated Student Access to Content:
Recommended *Strategies & Techniques*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**
Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics, repeat	Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential	Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual dictionary, and modified assessment and/or rubric.	Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related

	seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.		

New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)									
	Amistad Law: *N.J.S.A. 18A 52:16A-88*		Holocaust Law: *N.J.S.A. 18A:35-28*	**x**	LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*	**x**	Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*		Standards in Action: *Climate Change*