

Marking Period	Unit Title	Recommended Instructional Days
3	Trigonometric Functions	14-15 days
Domain:		
NJSLS Strand: F-IF.7. Graph functions expressed symbolically and show key features if the graph, by hand in simple cases and using technology for more complicated cases.* e.Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. F-TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. F-TF.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	Progress Indicator: <i>Tests • Quizzes • Practice problems for homework • Online textbook • Worksheets • IXL • Leveled assessments</i>	Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-CLKS within Unit <u>Essential Question/s:</u> How are trigonometric functions used to solve real-world problems? <u>Activity Description:</u> Trigonometric functions and acute angles Angles and the unit circle Trigonometric function and real numbers Graphing sine and cosine Graphing other Trigonometric Functions <u>Interdisciplinary Connections:</u> Art Domain Creating The top of a door is to be decorated with stained glass panes that are arranged in a semicircular shape as shown below. The radius of the semicircular shape is 1 meter and its outside edge is trimmed with metal cord. The red and blue sectors are trimmed with gold cord and the yellow and green sectors are trimmed with silver cord, as shown in the diagram below.

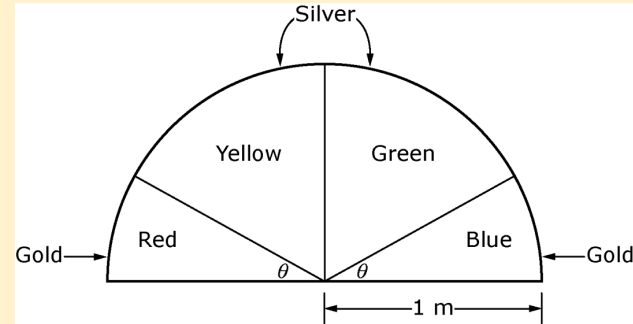
F-TF.3(+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosines, and tangent for x , $\pi + x$, and $2\pi - x$ in terms of their values for x , where x is any real number.

F-TF.4(+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

F-TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline*.

F-TF.6(+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

F-TF.7(+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using



If the angle θ in the red and blue sectors measures 0.5 radians, what length of silver cord is needed?

Answer:

$$\pi - 1 \text{ meters or } 2.14 \text{ meters}$$

technology, and interpret them in terms of the context.*

Angle measure in radians	Angle measure in degrees
$\frac{\pi}{4}$	45°
$\frac{\pi}{2}$	90°
$\frac{10\pi}{9}$	200°
$\frac{5\pi}{2}$	450°
$\frac{5\pi}{12}$	75°
$\frac{7\pi}{10}$	126°
$\frac{9\pi}{4}$	405°
$\frac{4\pi}{15}$	48°

Example Tasks:

At the end of each topic please review the Assessment Practice and Performance Tasks questions.



ASSESSMENT PRACTICE

43. Match each angle measure in degrees in the left column with its corresponding measure in radians in the right column.

I. 60°

A. $\frac{\pi}{8}$

II. -15°

B. $-\frac{\pi}{12}$

III. -200°

C. $\frac{4\pi}{3}$

IV. -108°

D. $-\frac{10\pi}{9}$

V. 22.5°

E. $-\frac{3\pi}{5}$

VI. 240°

F. $\frac{\pi}{3}$



ASSESSMENT PRACTICE

21. Find the key features of the function $y = 8\cos\left(\frac{\pi}{6}x\right)$. Write the correct value from the box next to each key feature.

amplitude =

3

8

12

period =

$\frac{1}{8}$

$\frac{1}{12}$

$\frac{\pi}{3}$

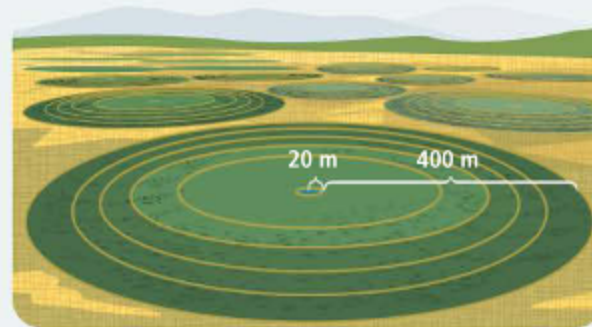
frequency =

midline =

$x = 0$

$y = 0$

45. Performance Task A center-pivot circular irrigator has sprayers that follow concentric circular paths as the irrigator rotates. The radius of the innermost path is 20 m and to the outermost path is 420 m more.



Part A What is the length of the path covered by the innermost sprayer when the irrigator rotates through an angle of $\frac{3\pi}{2}$ radians?

Part B What angle must the irrigator rotate through for the outermost sprayer to cover a path of the same length?

		23. Performance Task Danielle is investigating how the signs of the parameters a and b create transformations of the sine function. Part A Graph $y = \sin(2x)$ and $y = -\sin(2x)$ on the same coordinate plane. Part B How are the graphs of $y = \sin(2x)$ and $y = -\sin(2x)$ related? Part C Graph $y = \sin(2x)$ and $y = \sin(-2x)$ on the same coordinate plane. Part D How are the graphs of $y = \sin 2x$ and $y = \sin(-2x)$ related? Part E How is the graph of $y = a \sin(bx)$ affected when a or b is replaced with its opposite? Explain. Spot Light on: Wanda Diaz-Merced is an astronomer best known for using sonifications to turn large data sets into audible sound. She currently works at the International Astronomical Union Office for Astronomy Outreach in Mitaka, Japan.
Mathematics Practices 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reason 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.		
Social and Emotional Learning:	Social and Emotional Learning:	
<i>Competencies</i>	<i>Sub-Competencies</i>	
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.	
Assessments (Formative) <i>To show evidence of meeting the standard/s, students will successfully engage within:</i>		Assessments (Summative) <i>To show evidence of meeting the standard/s, students will successfully complete:</i>
Formative Assessments: • Entry and Exit Slips • Quizzes • Self Assessments		Benchmarks: • Chapter Tests • Projects Summative Assessments: • District Assessments

		• Midterms • Standardized Tests	
Differentiated Student Access to Content: Teaching and Learning <i>Resources/Materials</i>			
Core Resources	Alternate Core Resources <i>IEP/504/At-Risk/ESL</i>	ELL Core Resources	Gifted & Talented Core Resources
• Textbooks websites • Achieve the core • Khan Academy • Desmos	• Skill building worksheets • Math Manipulatives	• Dictionary for native languages • Videos in their native language.	• Leveled Assessments • Enrichment worksheets
Supplemental Resources			
Technology: • Chromebooks, Graphing Calculators, Online math manipulatives Other: • Zoom and Google Meets, Google Classroom, Interactive Textbooks			
Differentiated Student Access to Content: Recommended <i>Strategies & Techniques</i>			
Core Resources	Alternate Core Resources <i>IEP/504/At-Risk/ESL</i>	ELL Core Resources	Gifted & Talented Core
• 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.		
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NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	Disciplinary Concept: Creativity and Innovation	
	Core Ideas:	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.
	Performance Expectation/s:	• 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. • 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
	Career Readiness, Life Literacies, & Key Skills Practices	
	Act as a responsible and contributing community member and employee. Attend to financial well-being. Consider the environmental, social and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Model integrity, ethical leadership and effective management. Plan education and career paths aligned to personal goals. Use technology to enhance productivity, increase collaboration and communicate effectively. Work productively in teams while using cultural/global competence.	

Content Area: Mathematics (NJSLS-M) Grades K - 12
Grade:

Dev. Date:
December 2021

	Amistad Law: <i>N.J.S.A. 18A 52:16A-88</i>		Holocaust Law: <i>N.J.S.A. 18A:35-28</i>	X	LGBT and Disabilities Law: <i>N.J.S.A. 18A:35-4.35</i>		Diversity & Inclusion: <i>N.J.S.A. 18A:35-4.36a</i>		Standards in Action: <i>Climate Change</i>
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