

Algebra 2 Honors Unit 4

Marking Period	Unit Title	Recommended Instructional Days
3	Trigonometric Functions	14-15 days
Domain: Functions		
<p>NJSLS Strand:</p> <p>Key:</p> <p>■ Major Cluster □ Supporting Cluster ○ Additional Cluster</p> <p>F-TF.A.1 (+) Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.</p> <p>F-TF.A.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.</p> <p>F-TF.A.3 (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$,</p>	<p>Progress Indicator: <i>Tests • Quizzes • Practice problems for homework • Online textbook • Worksheets • Leveled assessments</i></p>	<p style="text-align: center;">Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-CLKS within Unit</p> <p>Essential Question/s: How are trigonometric functions used to solve real-world problems?</p> <p>Activity Description: Right Angle Trigonometry Angles of Rotation The Unit Circle Inverse Trigonometric Functions Law of Sines Law of Cosines</p> <p>Interdisciplinary Connections: Art Domain ; Content: Creating; NJSLS#: 1.2.8.Cr1a: 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.</p>

$\pi/4$ 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.

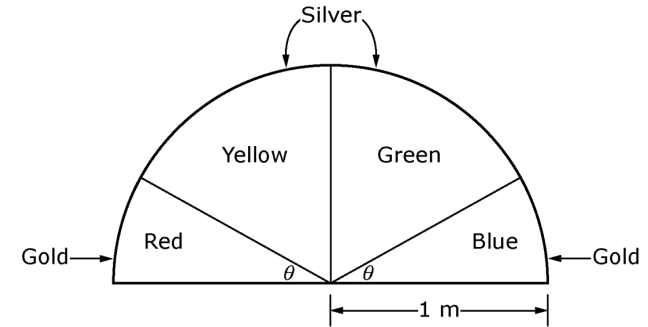
F-TF.A.4 (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

F-TF.B.7 (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.*

G-SRT.D.9(+) Derive the formula $A = 1/2Absin(c)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

G-SRT.D.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.

G-SRT.D.11 (+) Understand and apply the Law of Sines and Law of Cosines to find



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

Answer:

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

Example Tasks:

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

Task 1

Evaluate without using a calculator by using ratios in a reference triangle.

- $\tan 300^\circ$
- $\csc(3\pi/4)$
- $\cos(7\pi/3)$
- $\cot(13\pi/4)$
- $\cos(17\pi/4)$

Answer:

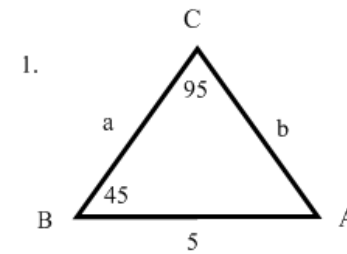
- $-\sqrt{3}$

unknown measurements in right and non-right triangles (e.g. surveying problems, resultant forces)

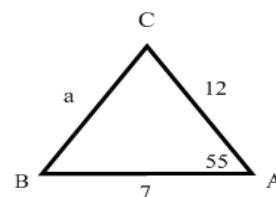
- b. $\sqrt{2}$
- c. $\frac{1}{2}$
- d. 1
- e. $\frac{\sqrt{2}}{2}$

Task 2:

Use the Law of Sines to solve the following triangle:



Use the Law of Cosines to solve the following triangle:



Answer:

- $180 - 95 - 45 = 40 = A$
 $\frac{\sin 40}{a} = \frac{\sin 95}{5}; a = 3.23$
 $\frac{\sin 45}{b} = \frac{\sin 95}{5}; b = 3.55$

- $a^2 = b^2 + c^2 - 2bc \cos A$
 $a^2 = 144 + 49 - 2(12)(7)\cos 55$
 $a^2 = 193 - 168\cos 55$
 $a^2 = 96.6392$
 $a = 9.831$

$$b^2 = a^2 + c^2 - 2ac \cos B$$
$$144 = 96.64 + 49 - 2(9.831)(7)\cos B$$
$$-1.64 = -137.634\cos B$$
$$\frac{-1.64}{-137.634} = \cos B; B = 89.3$$

$$C = 180 - 55 - 89.3 = 35.7$$

Task 3:

The base on a baseball diamond is 90 feet apart, and the front edge of the pitcher's rubber is 60.5 feet from the back corner of home plate. Find the distance from the center of the front edge of the pitcher's rubber to the far corner of first base.

Answer:

By the Law of Cosines,

$$c^2 = 60.5^2 + 90^2 - 2(60.5)(90)\cos 45^\circ$$

$$c = \sqrt{60.5^2 + 90^2 - 2(60.5)(90)\cos 45^\circ}$$

$$c \approx 63.7$$

The distance from first base to the pitcher's rubber is about 63.7 feet.

Task 4:

Evaluate:

a. $\sin\left(\frac{7\pi}{6}\right)$

b. $\sin\left(-\frac{\pi}{6}\right)$

c. $\sin\left(\frac{11\pi}{6}\right)$

d. $\sin\left(\frac{19\pi}{6}\right)$

Answer:

a, b, c, d all equal $-1/2$

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

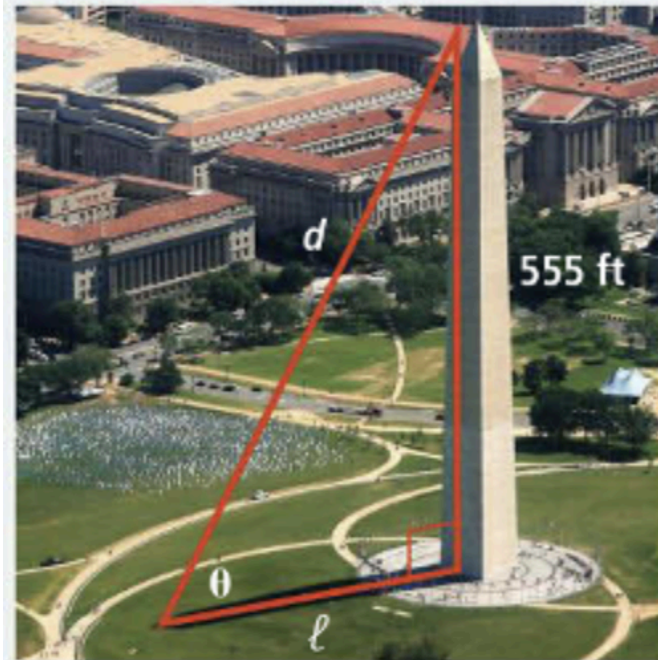


ASSESSMENT PRACTICE

35. In $\triangle EFG$, $m\angle E = 35^\circ$, $e = 5.8$, and $f = 10$. Choose Yes or No to tell whether each is a possible value for $m\angle F$.

	Yes	No
There are no possible values.	<input type="checkbox"/>	<input type="checkbox"/>
6.2°	<input type="checkbox"/>	<input type="checkbox"/>
60.3°	<input type="checkbox"/>	<input type="checkbox"/>
81.5°	<input type="checkbox"/>	<input type="checkbox"/>
98.5°	<input type="checkbox"/>	<input type="checkbox"/>
119.7°	<input type="checkbox"/>	<input type="checkbox"/>

Performance Task The Washington Monument is 555 ft tall. The angle of elevation from the end of the monument's shadow to the top of the monument has a cosecant of 1.10.



Part A What is the measure of the angle θ ?

Part B What is the distance d from the end of the monument's shadow to the top of the monument? Round to the nearest tenth of a foot.

Part C What is the length l of the monument's shadow? Round to the nearest tenth of a foot.

		<p>Spot Light on: LGBT&Q 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.</p>
<p>Mathematics Practices</p>		
<ol style="list-style-type: none"> 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. 		
<p>Social and Emotional Learning: <i>Competencies</i></p>	<p>Social and Emotional Learning: <i>Sub-Competencies</i></p>	
<p>Self- awareness</p> <p>Social Awareness</p> <p>Self- Management</p> <p>Relationship Skills</p> <p>Responsible Decision-Making</p>	<p>Recognizing the importance of self-confidence in handling daily tasks and challenges.</p> <p>Demonstrate an awareness of the expectations for social interactions in a variety of ways.</p> <p>Demonstrate an understanding of the need for mutual respect when viewpoints differ.</p>	

	<p>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.</p>		
<p>Assessments (Formative) <i>To show evidence of meeting the standard/s, students will successfully engage within:</i></p>		<p>Assessments (Summative) <i>To show evidence of meeting the standard/s, students will successfully complete:</i></p>	
<p><u>Formative Assessments:</u></p> <ul style="list-style-type: none"> • Entry and Exit Slips • Quizzes • Self Assessments 		<p><u>Benchmarks:</u></p> <ul style="list-style-type: none"> • Chapter Tests • Projects • LinkIT <p><u>Summative Assessments:</u></p> <ul style="list-style-type: none"> • District Assessments • Midterms • Standardized Tests 	
<p>Differentiated Student Access to Content: Teaching and Learning Resources/Materials</p>			
<p>Core Resources</p>	<p>Alternate Core Resources IEP/504/At-Risk/ESL</p>	<p>ELL Core Resources</p>	<p>Gifted & Talented Core Resources</p>
<ul style="list-style-type: none"> • Savvas Envision • Achieve the core • Khan Academy • Desmos 	<ul style="list-style-type: none"> • Skill building worksheets • Math Manipulatives 	<ul style="list-style-type: none"> • Dictionary for native languages • Videos in their native language. 	<ul style="list-style-type: none"> • Leveled Assessments • Enrichment worksheets
<p>Supplemental Resources</p>			

Technology: <ul style="list-style-type: none"> • Chromebooks, Graphing Calculators, Smartboards Other: <ul style="list-style-type: none"> • Zoom and Google Meets, Schoology,, 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
<ul style="list-style-type: none"> • Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics, repeat 	<ul style="list-style-type: none"> • 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 seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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
NJSLs CAREER READINESS,	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.	

LIFE LITERACIES & KEY SKILLS		
	Performance Expectation/s:	<ul style="list-style-type: none"> • 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	
<p>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.</p>		

New Jersey Legislative Statutes and Administrative Code
(place an "X" before each law/statute if/when present within the curriculum map)

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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