Max. 8 Pages

Grade Level	12thth	**Content Area**	Math
Course Title (grades 9-12 Only)	Trigonometric Functions		
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Students should be familiar with using the sin, cos, and tan functions on their scientific calculators. Students must also have had exposure to degrees and radians when working with circular equations. Students should be able to sketch triangles using both positive and negative referenced angles.		
Alignment to Program of Instruction *Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.*	Students will use their one-to-one computers and Canvas. Canvas will provide diagnostic data and videos/modules for introduction to new material/direct instruction. At the end of the lesson, students will use Canvas again to complete a formative assessment. For the summative assessment, students will also use Canvas. Direct instruction will use multiple checks for understanding, and computer-based Kagan cooperative strategies will be implemented during guided practice.		
Standard Number and Description *List the Number* and the full description for the Required Standard or Science Performance Objective listed in section A.6.*	(F-TF) A.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, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x, where x is any real number. .		
Materials/Resources Needed	Computers, interactive notebooks, headphones, practice sheets in the online forum, timer, graphing software.		

* ***Standard Number****: For English Language Arts (Reading and Writing), use Grade, Strand, Standard (e.g., 3.RI.2). For K-8 Math, use Grade, Domain, Standard (e.g., 6.EE.7). For HS Math, use Conceptual Category-Domain, Standard (e.g., A-REI.6). For Science, use Grade, Strand, Concept, PO (e.g., 4.1.3.1).*

Lesson (add as needed)	Instructional Strategies TW = teacher will. SW = students will. CFU = checks for understanding.	Student Activities
1	**Objective**: SWBAT use special triangles to determine geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6.	Students will write down the objective and key points in their online notebooks.
	Activation of Prior Knowledge: Teacher will place a "Do Now" activity in Canvas and instruct students to begin. The "Do Now" problem will ask students to identify the type of special triangle from given triangle diagrams. Teacher will post check for understanding questions within Canvas and ask students to complete each question. Teacher will review mistakes and explain the objective for the lesson.	Student will complete the "Do Now" activity diligently and quietly. For the Do Now, students will identify the type of special triangle from given triangle diagrams. Students will respond to all checks for understanding and will share their answers via the online learning system.
	INM/Modeling: Teacher will instruct students to complete the Acellus "sine, cosine, and tangent" diagnostic and continue onto the new material modules. The new material modules will provide instructional examples and the steps use special triangles to determine geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6. The module will include practice questions to ensure understanding. The teacher will use their own checks for understanding located in Canvas to ensure comprehension.	Students will use the Acellus to complete the sine, cosine, and tangent deficiency diagnostic. Other screens unrelated to the lesson will be prohibited. Students will complete the diagnostic before moving onto the new material modules about using special triangles to determine geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6. Students will take notes during the module via online notebook and will sit quietly and respectfully when finished.
	Guided Practice: Teacher will ask students to open the special triangles discussion forum. Students are expected to solve for each sine, cosine, and tangent of π /3, π/4 and π/6 by using special triangles. Teacher will model how to write the steps towards solving the problem using correct sine, cosine, and tangent terminology.	Students will solve for each sine, cosine, and tangent of π /3, π/4 and π/6 by using special triangles. Students will use correct mathematical language for sine, cosine, and tangent and will clearly express the steps to solving the problems.
	Independent Practice: Teacher will direct students to open their formative assessment within Acellus. The formative	Students will use Acellus to complete the formative

	assessment will provide special triangles and students must use these special triangles to determine geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6. Students must score above 80% to achieve mastery. **Exit Ticket**: Teacher will present an exit ticket special triangle at the conclusion of the lesson. Students will complete the special triangle and leave it on their desks to be picked up after class. This special triangle will ask students to determine geometrically the value of sine, cosine, and tangent for either π /3, π/4 or π/6.	assessment/independent practice. Students will do their best to achieve 80% mastery of determining geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6. Students will remain respectful during independent practice and will check their answers once finished. Students will complete the exit ticket problems and will exit once finished. The exit ticket problem asks students to determine geometrically the value of sine, cosine, and tangent for either π /3, π/4 or π/6 using a given special triangle. Students will ask any final questions or make any final comments before departing.
2	**Objective**: SWBAT use the unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x, where x is any real number. **Key Points/Terms:** • Remember our key points from last lesson: $1^{\circ} = \pi/180^{\circ}$ **Activation of Prior Knowledge**: Teacher will place a "Do Now" activity in the online learning system discussion portal and instruct students to begin. The "Do Now" problem will ask students to use a special triangle to determine geometrically the values of sine, cosine, and tangent for π /3, π/4 and π/6. Teacher will post discussion questions about the "Do Now" in the Canvas online learning system and ask students to complete each question. Teacher will post checks for understanding questions in the "Do Now" to ensure understanding. **INM/Modeling**: Teacher will instruct students to complete the Acellus "unit circles" diagnostic and continue onto the new material modules. The new material modules will provide instruction examples of using unit circles to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x. The module	Students will write down the objective and key points in their online notebooks. Student will complete the "Do Now" activity diligently and quietly. Students will use a special triangle to determine geometrically the values of sine, cosine, and tangent for π /3, π/4 and π/6. Students will respond to all checks for understanding and will share their answers via the online learning system. Students will use the Acellus modules to complete the introduction to new material. Other screens unrelated to the lesson will be prohibited. Students will complete the diagnostic before moving onto the new material modules. Students will take notes and copy examples of using unit circles to express the

	will include practice questions to ensure understanding and the teacher will use built in checks for understanding to monitor progress. Teacher will direct students to further modules if necessary. **Guided Practice**: Teacher will ask students to open the unit circles partner teaching forum. Inside the forum, teacher will have written instructions to complete a mini lesson designed to teach their classmates how to use a unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x. Teacher will monitor progress via online tracking and will redirect students to further discussion posts if necessary. **Independent Practice**: Teacher will direct students to the formative assessment/independent practice section of Acellus. The independent practice will consist of three questions where students must use a unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x. Teacher will reference the expected behavior in the online learning system and monitor progress via online tracking. Teacher will remind students that they must answer 80% of the unit circle diagram correct to master the lesson. **Exit Ticket**: Teacher will present students with an index card unit circle and students must use this unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x.	values of sine, cosine, and tangent for π-x, π+x, and 2π-x. Students will participate in the guided practice activity by complete a mini lesson designed to teach their classmates how to use a unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x. Students will use correct mathematical language and will clearly express the steps when demonstrating how to solve the problems. Students will answer all checks for understanding and will remain quiet once finished. Students will use Acellus to complete the formative assessment/independent practice. Students will do their best to achieve 80% mastery on expressing the values of sine, cosine, and tangent for π-x, π+x, and 2π-x using a unit circle. Students will use their index card unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x. Students will hand the index card to their teacher when leaving class.
3	**Objective**: SWBAT sketch the appropriate referenced triangle when given only partial components of sin, cos, and tan. **Key Points/Terms:** • Positive angles travel in a counter clock wise direction **Activation of Prior Knowledge**: Teacher will place a "Do Now" activity in Canvas and instruct students to begin. The "Do Now" problem will ask students to complete a unit circle diagram,	Students will write down the objective and key points in their online notebooks. Student will complete the "Do Now" unit circles activity diligently and quietly. Students will respond to all checks for understanding

	similar to mastery check from last class. Teacher will post discussion questions about the "Do Now" in the online learning system and ask students to complete each question.	and will share their answers via the online learning system.
	INM/Modeling: Teacher will instruct students to Acellus to continue onto the new material modules about sketching the reference triangle when given sin, cos, and tan values. The new material modules will provide instructional activities and include practice questions to ensure comprehension. The teacher will use checks for understanding located in the online learning system to ensure comprehension and will monitor progress via online tracking. Teacher will provide assistance when necessary through the online learning system and will redirect students to additional modules if needed.	Students will use the Acellus modules to complete the introduction to new material. Other screens unrelated to the lesson will be prohibited. Students will complete the diagnostic before moving onto the new material modules. Students will take notes during the module via online notebook and will sit quietly and respectfully when finished.
	Guided Practice: Teacher will ask students to open their graphic software and the referenced triangles guided practice model within Canvas. Inside the forum, teacher will have written instructions to help students complete the guided practice exercise. Students are expected to write the steps and provide examples for sketching each triangle problem. Teacher will monitor progress via online tracking and will redirect students to further discussion posts if necessary.	Students will participate in the Canvas guided practice activity by writing the steps to solving and providing example sketches. Students will use correct mathematical language and will reference the key points when necessary. Students will answer all checks for understanding and will remain quiet once finished.
	Independent Practice: Teacher will direct students to the formative assessment/independent practice section of Acellus. Teacher will reference the expected behavior in the online learning system and monitor progress via online tracking. Teacher will remind students that they must answer 80% of the questions correctly in order to master the standard. The formative assessment will ask students to sketch 5 triangles.	Students will use Acellus to complete the formative assessment/independent practice. Students will do their best to achieve 80% mastery on the formative assessment. Students will remain respectful during independent practice and will check their answers once finished.
	Exit Ticket: Teacher will present two exit ticket sketches at the conclusion of the lesson. These sketches will take place in Canvas and once complete, students can leave the module. Teacher will instruct students to make any final comments or questions in the appropriate forum location before exiting the	Students will complete the exit ticket problems and will exit Canvas when complete. Students will ask any final questions or make any final comments in the appropriate forum location before leaving the module.

	module.	
4	**Assessment Introduction:** Teacher will welcome students and lead them though calming warm up exercises to decrease test anxiety. Teacher will ask students to recall and share test-taking strategies. Teacher will direct students to the Acellus portal and help them find the summative assessment. Teacher will model appropriate test taking behavior and direct students to the login screen. **Assessment:** The Acellus summative will consist of 20 questions. Students much achieve 80% or better to master this standard. Teacher will monitor student progress via online tracking.	Students will prepare for the summative by completing the calming exercises and sharing their test taking strategies. Students will complete the summative assessment to the best of their ability. Students must score 80% or better to master the standard.

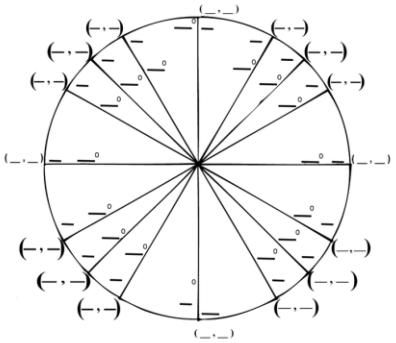
Summative Assessment Items: *Attach here.* For each summative assessment item, include an answer key or scoring rubric describing how points are to be awarded.

(two points each, 10 points total. 8/10 is needed to master the standard)

1. Complete the missing boxes within the table:

Degrees	Radians
0	0
30	
	$\pi/4$
60	
	$\pi/2$

2. Fill in the blank of this unit circle:



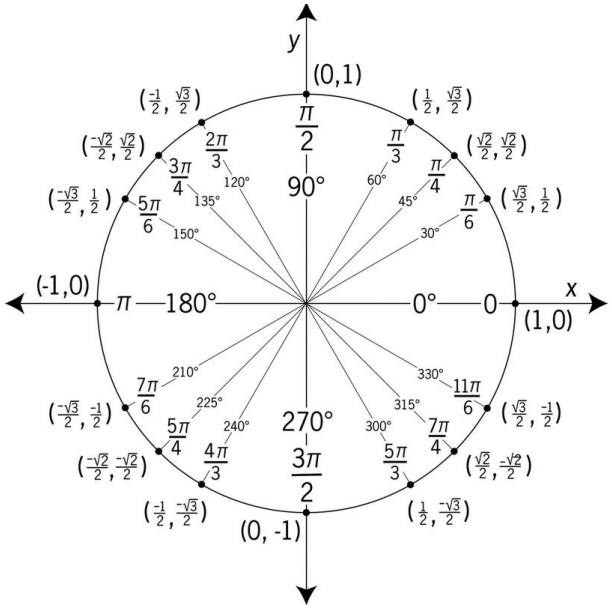
3. Determine the value and sketch the reference triangle for: **sin(300°)**

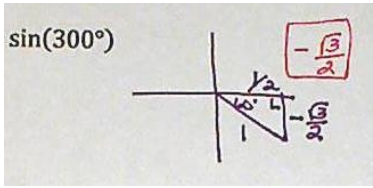
4. Determine the value and sketch the reference triangle for: **cos $7\pi/4$**

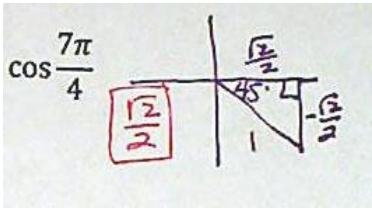
5. Determine the value and sketch the reference triangle for: **csc(390°)**

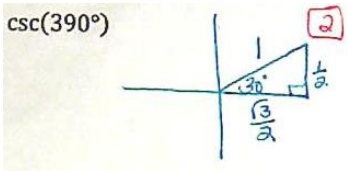
Answer Key

Degrees	Radians
0	**0**
30	$\pi/6$
45	$\pi/4$
60	$\pi/3$
90	$\pi/2$

2. 
y
x
(0,1)
(1,0)
(-1,0)
(0, -1)
$\frac{\pi}{2}$
90°
$\frac{\pi}{3}$
60°
$\frac{\pi}{4}$
45°
$\frac{\pi}{6}$
30°
0
0°
π
180°
$\frac{2\pi}{3}$
120°
$\frac{3\pi}{4}$
135°
$\frac{5\pi}{6}$
150°
$\frac{7\pi}{6}$
210°
$\frac{5\pi}{4}$
225°
$\frac{4\pi}{3}$
240°
$\frac{3\pi}{2}$
270°
$\frac{5\pi}{3}$
300°
$\frac{7\pi}{4}$
315°
$\frac{11\pi}{6}$
330°
$(\frac{1}{2}, \frac{\sqrt{3}}{2})$
$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(\frac{\sqrt{3}}{2}, \frac{1}{2})$
$(\frac{-1}{2}, \frac{\sqrt{3}}{2})$
$(\frac{-\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(\frac{-\sqrt{3}}{2}, \frac{1}{2})$
$(\frac{-\sqrt{3}}{2}, \frac{-1}{2})$
$(\frac{-\sqrt{2}}{2}, \frac{-\sqrt{2}}{2})$
$(\frac{-1}{2}, \frac{-\sqrt{3}}{2})$
$(\frac{1}{2}, \frac{-\sqrt{3}}{2})$
$(\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2})$
$(\frac{\sqrt{3}}{2}, \frac{-1}{2})$

3. 
sin(300°)
$-\frac{\sqrt{3}}{2}$
$\frac{1}{2}$
60°
1
$-\frac{\sqrt{3}}{2}$

4. 
$\cos\frac{7\pi}{4}$
$\frac{\sqrt{2}}{2}$
45°
1
$-\frac{\sqrt{2}}{2}$
$\frac{\sqrt{2}}{2}$

5. 
csc(390°)
2
1
30°
$\frac{1}{2}$
$\frac{\sqrt{3}}{2}$