Curriculum Sample Template
Max. 8 Pages

Grade Level	10th Grade	**Content Area**	Math
Course Title (grades 9-12 Only)	Geometry		
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	• Students understand how to work in precision partnerships effectively. • Students know how to use their math journals effectively. • Students are familiar with, and have used, the 8 CCSS Mathematical Practices. • Students will have mastered basic triangle properties. • Students will be familiar with the rules of similarity. • Students will be familiar with properties of right triangles.		
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.*	This unit is built on the framework of the SIOP Model and incorporates all 8 of the SIOP Model components. Sentence framing and precision partnering are instructional strategies which promote the use and mastery of academic language. Instructional technology is incorporated by teacher and students. The core curriculum is implemented with fidelity.		
Standard Number and Description *List the Number* and the full description for the Required Standard or Science Performance Objective listed in section A.6.*	Geometry Domain: Similarity, Right Triangles, and Trigonometry Standard: #6: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.		
Materials/Resources Needed	Chrome Books SMART Board Construction paper, protractors, rulers Whiteboards		

* ***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**	**Student Activities**
1	**Vocab:** **opposite, adjacent, hypotenuse** • Teacher will guide student pairs through construction of similar triangles, measurement of the similar triangles, and completion of their charts with their measurements and calculations. • Teacher will check for understanding and guide students with scaffolding questions while they are making their conclusions. • Teacher will facilitate whole-class discussion regarding conclusions made by students. • Teacher will provide and collect exit tickets to be used for intervention the following day.	• Students will add vocabulary definitions, pictures, and sentences/examples into their vocabulary journals. • Students will construct 3 similar triangles in partners using following guidelines: - Draw a diagonal across a rectangular piece of construction paper. Cut along the diagonal. -Draw an altitude on one of the triangles to its hypotenuse. Cut along the altitude. -Label each angle of the three triangles. • Students will measure all angles and side lengths for the 3 triangles using protractors and rulers. • Students will complete chart with their measurements. • Students will calculate the following ratios for each triangle and document them in the chart. -short side/hypotenuse -long side/hypotenuse -short side/long side • Students in pairs will make conclusions and write about their results. • Students will participate in a whole-class discussion/reflection on conclusions for the activity. • Students will complete a formative 'exit ticket' to demonstrate their understanding of similar triangles and their ratios of side lengths.
2	**Vocab:** **Tangent, Sine, Cosine, Trigonometric Ratios** • Teacher will allow students to complete bell ringer and pull selected students to provide intervention based on the students' exit ticket from previous day. • Teacher will establish heterogeneously selected group	• Students will add vocabulary definitions, pictures, and sentences/examples into their vocabulary journals. • Students will complete bell ringer activity related to previous day's tasks involving ratios of parts in similar triangles. • Students will work in small groups to measure each of the angles and side lengths of given triangles.

	to work collaboratively for the activity based on previous days exit slip and needs for intervention. • Teacher will have created sets of 2 similar triangles with labels A, B, and C for the corresponding angles. Each set of similar triangles should vary in angle sizes so that each group has different measurements. • Teacher will guide student groups through measurement of the similar triangles, and completion of their charts with their measurements and calculations. • Teacher will check for understanding and guide students with scaffolding questions while they are making their conclusions. • Teacher will facilitate whole-class discussion regarding conclusions made by students and establishing the formal names for each of the trigonometric ratios related to the calculations completed by the students. • Teacher will check for understanding regarding the relationship between the angles that are in the triangles and the trigonometric ratios. • Teacher will give each student a copy of a trigonometric table and monitor students reasoning with their partners. • Teacher will facilitate whole-class discussion regarding conclusions made by students. • Teacher will provide and collect exit tickets to be used for intervention the following day.	• Students will work together to complete charts with their measurements for each given triangle. • Students will calculate the following ratios for each triangle and document them in their chart. -side opposite of angle A/hypotenuse -side adjacent to angle A/hypotenuse - side opposite of angle A/side adjacent to angle A -side opposite of angle B/hypotenuse -side adjacent to angle B/hypotenuse - side opposite of angle B/side adjacent to angle B • Students will work with groups to make conclusions and write about their results. • Students will participate in a whole-class discussion/reflection on conclusions for the activity. • Students will include in their journals the additional conclusions and relationships that are made evident in their whole-class discussion. • Students will discuss and explain in their precision pairs how to read the trigonometric table and consider how it might be used. • Students will participate in a whole-class discussion/reflection on conclusions made for how to read the trigonometric table. • Students will complete a formative 'exit ticket' to demonstrate their understanding of trigonometric ratios and their relationship to the angles of a right triangle.
3	• Teacher will allow students to complete bell ringer and pulls selected students to provide intervention based on the students' exit ticket from previous day. • Teacher will provide practice problems for students to apply trigonometric ratios to triangles and determine their missing measure. • Teacher will guide students in pairs with scaffolding	• Students will complete bell ringer activity related to previous day's tasks involving ratios of parts in similar triangles. • Students will work in pairs to determine what they know and write out a devised a plan for how to they can use a trigonometric ratio to relate to the information in the triangle. • Students will participate in a whole-class discussion to

	questions while they are making their plans. • Teacher will facilitate whole-class discussion regarding the plans of the students and allow students to evaluate the different methods. If students have not formed a satisfactory plan teacher will provided an example. • Teacher will provide and collect exit tickets to be used for intervention the following day.	evaluate the plans created by the student pairs and refine their strategies for using the trigonometric ratios. • Students will practice applying the trigonometric ratios to solving for missing information in each triangle. • Students will complete a formative 'exit ticket' to demonstrate their understanding of trigonometric ratios and their application to determine missing information in a right triangle.
4	**Vocab:** **Angle of Elevation, Angle of Depression** • Teacher will allow students to complete bell ringer and pulls selected students to provide intervention based on the students' exit ticket from previous day. • Teacher will share with the whole-class the application at: http://www.mathopenref.com/trigfunctions.html • Teacher will prompt students to show their conclusions that are written on their whiteboards. • Teacher will demonstrate for students how to calculate an angle of elevation, or angle of depression using a square piece of construction paper and a protractor while projecting an image of something from sea level towards a tall object. (ex. tree, skyscraper, flying object) • Teacher will have students practice using the demonstrated method using the lighthouse image. Giving them the following problem: "You are in a small boat in the middle of a storm and see a lighthouse. You know that the height of the lighthouse from your records is 55m above sea level. You also know that in a storm the warning is for ships to stay at least 400m from the cliffs. Is your ship safe?" • Teacher will check for understanding and guide students with scaffolding questions while they are making their conclusions.	• Students will add vocabulary definitions, pictures, and sentences/examples into their vocabulary journals. • Students will complete bell ringer activity related to previous day's tasks involving trigonometric ratios. • Students will participate in whole-class demonstration of the application at http://www.mathopenref.com/trigfunctions.html • Students will make conclusions and write them out on a white board and when prompted show them to teacher. • Students will take notes of methods demonstrated by teacher using angles of elevation and depression. • Students will write out and devise a plan to solve the lighthouse problem in precision partners. • Students will solve the lighthouse problem using their plan and write out their conclusion. • Students will evaluate answers from pairs while participating in a whole-class discussion and make conclusions about the results. • Students will complete a formative 'exit ticket' to demonstrate their understanding of angle of elevation and angle of depression by applying the trigonometric

	• Teacher will facilitate whole-class discussion in order to evaluate the results from the lighthouse problem. • Teacher will provide and collect exit tickets to be used for intervention the following day.	ratios to right triangles.
5	• Teacher will allows students to complete bell ringer and pulls selected student to provide intervention based on the students completed tasks from previous day. • Teacher will provide additional review if needed. • Teacher will allow students to complete summative assessment.	• Students will complete bell ringer activity related to previous day's tasks involving applications of trigonometric ratios found in right triangles. • Students will complete the summative assessment.

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

Relating Trigonometric Ratios to Angles Quiz

Domain: Similarity, Right Triangles, and Trigonometry

Standard: #6: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

Essential Student Question: Can you explain how a trigonometric ratio is related to similar triangles?

1. Explain how the two triangles below are similar and what else will be the same about the triangles.

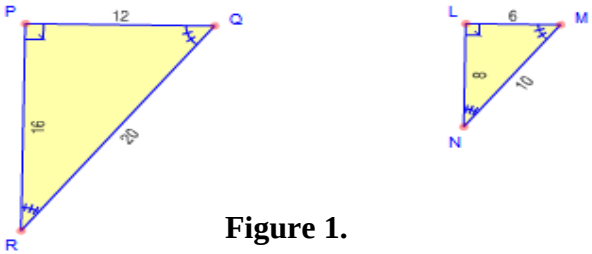


Figure 1.

2. Complete each ratio below for △PRQ in Figure 1.

sin (R) = _____ sin (Q) = _____

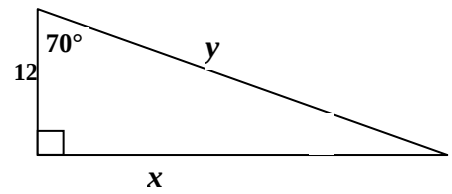
cos (R) = _____ cos (Q) = _____

tan (R) = _____ tan (Q) = _____

3. For △PRQ (above), explain the relationship between its acute angles and the sine and cosine ratios.

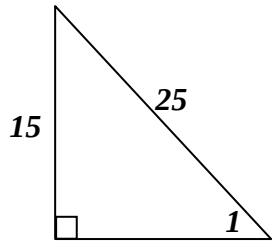
4. Find the value of x in Figure 2, round to the nearest tenth.

Figure 2.



5. Find the value of y in Figure 2, round to the nearest tenth.

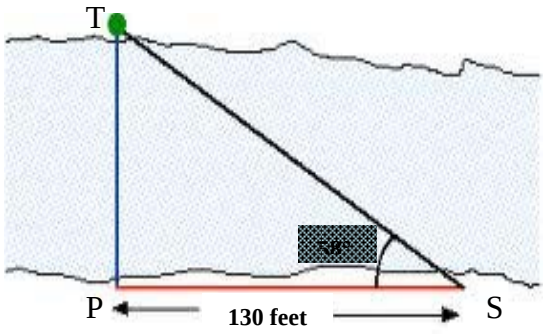
Figure 3.



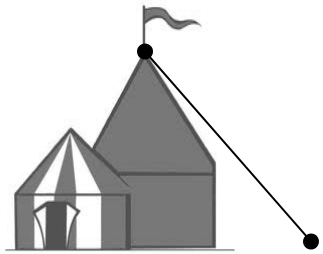
6. Find the value of angle 1 in Figure 3, round to the nearest tenth.

7. At the mall an escalator slopes up at an angle of 28° from the ground and is 22m in length. How many meters is a person lifted up to reach the next level?

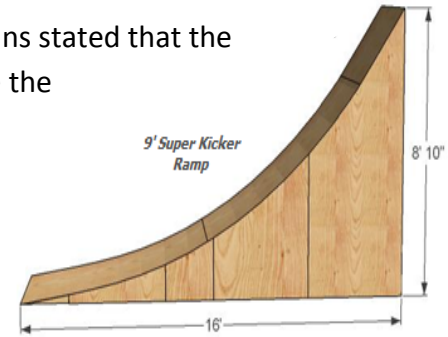
8. A surveyor marks a point "P" directly across the river from a tree (T). The surveyor moves 130 feet away from her point P, and she calculates the angle formed between the tree, herself, and the point to be 58°. Using trigonometric functions calculate the length across the river from point P to point T.



9. A 57ft. cable from a circus tent has broken and needs to be replaced. It was set to stabilize a main pole at a 72° of elevation. How high is the main pole that the cable holds in place and how far away is the cable anchored away from the pole?



10. Joel is planning to purchase a stunt bike ramp and was give the speculations shown below. The plans stated that the take-off angle for this ramp is the "standard competition" angle. Explain how Joel could determine the measurement of the take-off angle based on the given information in the plan.



Relating Trigonometric Ratios to Angles Quiz Answer Key

1. The triangles are similar because they have congruent corresponding angles, and the lengths of there corresponding sides are proportional to each other. Additionally the triangles will have the same trigonometric ratio values for their corresponding acute angles.
2. sin (R) = $\frac{12}{20}$ sin (Q) = $\frac{16}{20}$
   cos (R) = $\frac{16}{20}$ cos (Q) = $\frac{12}{20}$
   tan (R) = $\frac{12}{16}$ tan (Q) = $\frac{16}{12}$
3. The sin and cos ratios are the inverses of each other for the two acute angles.
4. x = 32.99
5. y = 35.09
6. ∠ 1 = 45.58°
7. 10.33 meters
8. 208.04 feet
9. The height of pole = 54.21ft., and the distance for the anchor is 17.61 ft.
10. He would need to find the tangent ratio using length of 16' as the opposite side, and the height of 8'10'' as the adjacent side. Then using a calculator he would need to apply the inverse tangent function to the ratio to calculate the angle at approximately 61°. It could also be concluded that a smaller value should be used as the opposite side length, but it is not reasonable to use any value less than 8 due to the curved hypotenuse. A tangent ratio using a length of 8’ as the opposite side, and the height of 8’10” as the adjacent side, would result in an angle of approximately 42°. The range of answers should then be expected to be between 61° and 42°. Where the actual answer is the average of the two at 51.5°.

Relating Trigonometric Ratios to Angles Quiz Scoring Guide

10 questions weighted at 1 point each **10 points total**

Raw score X 10 = _____/100 points

The 100 points possible assessment will reflect the school’s grading scale:

90 -100 = A – Mastery

80 – 89 = B - Mastery

70 – 79 = C – Needs Screening for Remediation

60 – 69 = D – Needs Remediation

0 – 59 = F – Needs Intensive Remediation