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Grade/Subject Area: Algebra

Date of Lesson: 01/27

1. Purpose: To solve for unknown sides in a right triangle using basic trigonometry.
   1. All students will be able to identify key aspects of a right triangle.
   2. Some students will be able to simplify equations involving the basic trigonometric ratios.
   3. Few students will be able to solve for unknown sides by isolating variables.

Essential Question: How does trigonometry help us solve for unknown sides in right triangles?

1. Vocabulary:
   1. Inverse operation
   2. Variable
   3. Isolation
   4. Cross multiplication
   5. Identity Property of 1
2. Skills
   1. All students will be able to identify key characteristics of a right triangle such as the location of the variable, lengths of the sides, location of right angle and hypotenuse.
   2. Some students will create equations for solution when given equations.
   3. Few students will be able to isolate and solve for variables when given an angle and a missing side in a right triangle.

1. Objectives:
   1. All students will identify characteristics of right triangles.
   2. Some students will determine an appropriate trigonometric ratio for a given situation.
   3. Few students will isolate and solve for unknown side lengths in a right triangle.
2. Standards

* 1. [CCSS.MATH.CONTENT.HSG.SRT.C.6](http://www.corestandards.org/Math/Content/HSG/SRT/C/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.

* 1. [CCSS.MATH.CONTENT.HSG.SRT.C.8](http://www.corestandards.org/Math/Content/HSG/SRT/C/8/)  
     Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.\*

1. Pre-Assessment:
   1. Students have worked with basic trigonometry ratios.
2. Presentation
   1. What is identity?
      1. Identity is what makes something unique
      2. In mathematics identity is any property that makes a number itself.
         1. Multiplication and division by 1
         2. Addition and subtraction by 0
   2. Review of basic trigonometry ratios
      1. Sine, Cosine, Tangent
   3. Review of inverse operations
      1. Addition/Subtraction, Multiplication/Division, Square/Square root
      2. Used to isolate variables
      3. Must be done evenly on both sides of an equation
      4. Cross multiplication
         1. An inverse operation that allows us to perform multiplication twice in the same step
         2. Students will review how this is done in two steps and as one step
         3. When a number on one side of the equal sign is not in a fractional form we can use the identity property of 1 to help us cross multiply
   4. Our goal is to use these properties to solve for unknown sides in right triangles
   5. How to solve for an unknown side
      1. Step 1 Observe the information given and the variable that needs to be solved for.
      2. Step 2 determine the appropriate trigonometric ratio to use for the situation
      3. Step 3 set up the equation
      4. Step 4 evaluate the sine, cosine or tangent
      5. Step 5 use inverse functions to solve for the variable
   6. Review of examples
      1. All students will identify the attributes of a given triangle
      2. Some students will chose the appropriate ratio
      3. Few students will isolate and solve for variables
   7. What this all means
      1. If we are given an angle in a right triangle, we can solve for the third angle
         1. Students will solve for unknown angles in triangles used for examples.
      2. If we have two sides of a right triangle, we can solve for the third side using the Pythagorean theorem
         1. Review of Pythagorean theorem.
            1. a2 + b2 = c2
   8. Conclusion
      1. Inverse functions can be used to isolate variables.
      2. When given a side length and an additional a right triangle we can solve for unknown sides
      3. With this information we can solve for all sides and angles of a right triangle
3. Materials:
   1. Teacher generated notes/response sheets
   2. TI 84 plus
   3. Worksheets
4. Follow Up:
   1. Using ratios to determine angle magnitude
5. Students will be evaluated based on their completion of the worksheets given, their participation in discussions and teacher observations.
6. Differentiation.
   1. All students will identify the key characteristics of right triangles.
   2. Some students will identify the appropriate ratios for given situations.
   3. Few students will solve for unknown sides by isolating variables.
7. Webilography
   1. <http://coachforrester.weebly.com/uploads/1/3/1/9/13191763/sohcahtoa_practice.pdf>
   2. http://www.virtualnerd.com/pre-algebra/algebra-tools/number-properties/commutative-associative-identity-properties/identity-definition