University of Mary Division of Education

Lesson Plan

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Mathematics (Algebra II)

**Materials Needed:** Power point, projector, white board, dry-erase markers, pen/pencil, notebook, notes, worksheet, purple exit slips

Standards:

**G.SRT.6, 7, 8** Define trigonometric ratios and solve problems involving right triangles.

Objectives:

* Students should understand and be able to interpret the definitions of trigonometric ratios.
* Students should be able to find all six trigonometric functions using the ratios.
* Students should be able to solve problems that involve right triangles.

Learning Activities:

 (PowerPoint slide references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Last night the students should have watched the video on Reference Triangles and Reference Angles. <https://www.youtube.com/watch?v=brImGWobn4Y>
* Start the lesson by doing a recap of reference angles, reference triangles, and finding all six trigonometric functions using a point on the terminal side.
* (#1. Given the angle measure of $135°$, sketch the angle and the reference triangle and then find the reference angle.)
* Going off of last class, what quadrant is my terminal angle going to be in? [*quadrant II*]
* Now that we have our angle sketched, how do I construct my reference triangle? [*drop a perpendicular line to the x-axis*]
* With the reference triangle constructed, which angle is my reference angle? [*angle at the origin*] [*the angles supplementary angle*-this is the angle measure that if added to our original angle sums to $180°$]
* So, what is the reference angle? [*45*$°$]
* (#2. How about $-60°$?)
* The negative means we must go clockwise instead of counterclockwise so what quadrant should my terminal side be in? [*quadrant IV*]
* So now we drop a perpendicular to the x-axis.
* In this case, what is my reference angle? [*60*$°$]
* (#3. How about $\frac{2π}{3}$?)
* We know that $180°=π$. So if we split the top half of our coordinate plane into thirds we can approximate where our terminal side should go. [*quandrant II*]
* To check to see if we are correct, we must convert from radians into degrees using the ratio: $\frac{\# of degrees}{360}=\frac{\# of radians}{2π}$.
* Doing this, what degree do we get? [*120*$°$]
* Moving onto evaluating the six trig. functions. Can anyone tell me what we should do first? [*plot the point and connect point to origin*]
* Now, to make a triangle we need to drop a perpendicular, similar to reference triangles.
* With the information we have we should be able to find the length of two sides of our triangle. Length of the side on the x-axis? [*6*] Length of the other leg? [*8*]
* How can we find the third side of the triangle? [*Pythagorean theorem*] So what is the third side length or our hypotenuse? [*10*]
* Now, using SOH-CAH-TOA we can find sine, cosine, and tangent.
* Sin $θ=\frac{4}{5}$, cos $θ=-\frac{3}{5}$, and tan $θ=-\frac{4}{3}$.
* Point out that cosecant is the reciprocal of sine, secant is the reciprocal of cosine, and cotangent is the reciprocal of tangent.
* Also point out that it is easiest to do the reciprocal before simplifying.
* Ask students to put up a thumbs up if they understand it, a thumbs down if they are completely lost, and a thumbs sideways if they are somewhere in between.

**15 min Daily Activities:**

* Hand out the worksheet.
* Have students work individually on the worksheet and walk around to help students with any problems they might have.
* Keep track of time and make sure to leave enough time to complete the exit slip.
* If most students finish before the 35-minute mark, show (slides 5, 6, and 7) so that they may check their answers.

**35 min Exit Slip:**

* (On slide 9, there is an exit problem for the students to complete before they leave class.)
* Hand out purple exit slip paper.
* Make sure to inform students that the exit slip must be done on their own and it will be graded.
* Collect purple slip before student leaves.

**39 min Final Announcements/Clean-Up Time:**

* Have worksheet completed for Friday’s class as well.
* Make sure to watch the video for Friday’s class.

**40 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment:

The assessment I am using for this lesson is the exit slip. I will collect the exit slip and be able to see what students understood the lesson and what students struggled with understanding the lesson. I also plan to collect the worksheet the following class period but not for a grade. I would like to collect the worksheet simply to figure out what each student is not understanding and hopefully help them to understand the content at a later time.
Reflection:
Overall I think the lesson went really well. I would like to show more examples on the reference triangle and make more of an emphasis on the reference triangles. I would also like to do more examples of finding sine, cosine, etc. Next time I would teach this lesson, I would make sure to go over the examples slower and have multiple different students giving answers. I think the answers that I was getting were all coming from the same few students.

**Evaluating Trigonometric Functions of Any Angle**

**Name: ­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Use the given point on the terminal side of an angle** $θ$ **in standard position to evaluate the six trigonometric functions of** $θ$**.**

1. **(8, 15) 2) (-9, 12)**

sin θ = \_\_\_\_\_\_ csc θ = \_\_\_\_\_\_ sin θ = \_\_\_\_\_\_ csc θ = \_\_\_\_\_\_

cos θ = \_\_\_\_\_\_ sec θ = \_\_\_\_\_\_ cos θ = \_\_\_\_\_\_ sec θ = \_\_\_\_\_\_

tan θ = \_\_\_\_\_\_ cot θ = \_\_\_\_\_\_ tan θ = \_\_\_\_\_\_ cot θ = \_\_\_\_\_\_

1. **(-7, -24) 4) (5, -12)**

sin θ = \_\_\_\_\_\_ csc θ = \_\_\_\_\_\_ sin θ = \_\_\_\_\_\_ csc θ = \_\_\_\_\_\_

cos θ = \_\_\_\_\_\_ sec θ = \_\_\_\_\_\_ cos θ = \_\_\_\_\_\_ sec θ = \_\_\_\_\_\_

tan θ = \_\_\_\_\_\_ cot θ = \_\_\_\_\_\_ tan θ = \_\_\_\_\_\_ cot θ = \_\_\_\_\_\_

**5) (5, -**$\sqrt{11}$**) 6) (-6, 9)**

sin θ = \_\_\_\_\_\_ csc θ = \_\_\_\_\_\_ sin θ = \_\_\_\_\_\_ csc θ = \_\_\_\_\_\_

cos θ = \_\_\_\_\_\_ sec θ = \_\_\_\_\_\_ cos θ = \_\_\_\_\_\_ sec θ = \_\_\_\_\_\_

tan θ = \_\_\_\_\_\_ cot θ = \_\_\_\_\_\_ tan θ = \_\_\_\_\_\_ cot θ = \_\_\_\_\_\_

**Sketch the angle. Thn find the reference angle.**

**7)** $-100°$ **8)** $150°$ **9)** $320°$

**10)** $-370°$ **11)** $\frac{-5π}{6}$ **12)** $\frac{8π}{3}$

**13)** $\frac{15π}{4}$ **14)** $\frac{-13π}{6}$