## Activity Plan Template

**Title:** Teaching the Unit Circle More Effectively

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**Topic**: Teaching teachers a variety of tricks and activities they can use to better teach students about the trigonometric ratios found in the Unit Circle.

**Connection to Core Curriculum**:

**Mathematics III**: Strand: Functions - Trigonometric Functions

**Standard F.TF.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 $\pi - x$, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.

**Overview**: This activity will provide prospective teachers with a method of teaching the unit circle by using right triangles and recognizing similarities between different quadrants.

**Objectives**: Participants will learn a method of teaching the unit circle to students by implementing special right triangles and trig identities from right triangles. They will make connections between the distances along the unit circle to specific radian measures. Participants will explain that $\pi/4$ is ($\sqrt{2}/2$, $\sqrt{2}/2$) because at $\pi/4$, $\theta=45°$ which makes a 45-45-90° right triangle. They will also connect $\pi/6$ and $\pi/3$ with 30° and 60° respectively, which both utilize 30-60-90° right triangles to find the cartesian coordinates on the unit circle.

**Materials Needed:** Applet, papers for each table.

**Technology:** We will be using the unit circle applet that was created by Nicola. This applet can be found on her website under assignments.

**Role of Technology:** The applet is important for this activity because it shows how the different groups of similar angles relate to the same triangles (either 45-45-90° or 30-60-90° triangles). By using the checkboxes, we can show or hide the different groups of angles on the unit circle. This will allow us to introduce them one set at a time, and show their similarities and differences. The applet also shows the students how the radians align with the degrees on the unit circle. We will also be using the feature that allows us to show only the adjacent side or only the opposite side of the triangle. This will allow us to better explain how the right triangle properties apply to the unit circle.

**Web Reference:**

**Activity Plan:**

1.      Introduce applet and its purpose to help students memorize the unit circle

2.      Explain trig properties for each type of right triangle (45, 45, 90 triangle and 30, 60, 90 triangle).

3.      Ask the students to try to explain to their classmates at their table how to make those triangle relationships apply to a unit circle of radius length 1. Then ask them how they would explain to their students how the triangle relationships help them determine coordinate points on the unit circle.

4.      Have the class discuss together what they learned in their groups and how the applet and triangle activity helped them learn how to teach the material better.

5.      If time permits, explain how $\sqrt{3/2}$ is larger than $\frac{1}{2}$ and how that helps you know which one goes first in the coordinate point (Relate lengths of sides of triangle to location of coordinate point values). Ask the class, "what are things that your teachers taught you that helped you understand or remember the unit circle better?"

**Background:** The unit circle is often taught in a confusing manner where the students end up finding some way to memorize the numbers. However, if teachers knew better ways about how to communicate the ratios and relationships within the unit circle, there would be less confusion on what the unit circle can be used for as well as how to best remember the unit circle.

**Included documents**: We will have a copy of the following for each table. We will also give them 3 different colored sharpies that they can use to mark the three different angles for each quadrant.