Section 5.3 Learning Objectives:

- Video 1: The Sine and Cosine Functions on the Plane (7:48)

    - State the definitions of the sine and cosine functions using points on the plane.

    - State the sign relationships between the sine and cosine functions and the quadrants.

    - Understand the relationship between the definitions of the sine and cosine functions using points on the plane and the quadrants.

- Video 2: The Pythagorean Identity (5:13)

    - State the Pythagorean identity.

    - Understand the relationship between the Pythagorean identity and points on a circle.

    - Apply the Pythagorean identity to calculate sine and cosine functions.

- Video 3: Reference Angles (6:04)

    - State the definition of reference angles.

    - Understand reference angles and their application to the unit circle diagram.

- Video 4: The Unit Circle Diagram (12:41)

    - State the relationships between the sides of the 30-60-90 and 45-45-90 triangles.

    - State the values of the sine and cosine functions on the first quadrant.

    - Determine the sine and cosine functions of the common angles on the unit circle diagram.

Individual Learning Objective Binder Check: Before class, you should have completed the Learning Objective Worksheet for each of the learning objectives in the video. These should have been placed in a binder in an organized manner so that it can be quickly checked by the instructor. If you have specific questions, this is a good time to ask the professor about them. While you are waiting for the professor to make their way around the room, you can work on the rest of the activities.

Group Practice Problems: In a group of no more than 3 students, work on the following problems. While everyone in the group should work together, each student should write out their work for themselves. This work can prove to be helpful when working on the homework assignment. If questions arise as you're working on these problems, feel free to seek help from the instructor or other groups of students.

Group Practice Problems #1 - The Sine and Cosine Functions:

- Sketch the angle θ whose terminal side passes through the point $(-4, 3)$. Determine $\sin(\theta)$ and $\cos(\theta)$.

- Suppose $\sin(\theta) > 0$ while $\cos(\theta) < 0$. What is the quadrant of the angle θ?

- Suppose $\cos(\theta) = 0$. What are four possible values of θ? (Hint: Think about coterminal angles.)

Group Practice Problems #2 - The Pythagorean Identity:

- Suppose that $\sin(\theta) = \frac{5}{8}$ and that $\frac{\pi}{2} < \theta < \pi$. Determine $\cos(\theta)$.

- Suppose that $\cos(\theta) = -\frac{2}{3}$ and that $\pi < \theta < \frac{3\pi}{2}$. Determine $\sin(\theta)$.

- Suppose that $\cos(\theta) = -1$. Determine $\sin(\theta)$ and explain why you can determine this value without knowing additional information about the angle θ.

Group Practice Problems #3 - Reference Angles: Sketch the angle and the reference angle. Then determine the measure of the reference angle.

- $225°$

- $\frac{13\pi}{12}$

- $500°$

- $-\frac{7\pi}{4}$

Group Practice Problems #4 - Special Triangles: Draw the 30-60-90 and 45-45-90 triangles with hypotenuses of length 1 and label the sides and the angles.

Group Practice Problems #5 - Unit Circle Diagram: Draw the unit circle diagram, including labeling the common angles in both degrees and radians, and specifying the coordinates of the corresponding points.

Group Practice Problems #6 - Sine and Cosine Values: Determine the exact values of the following sine and cosine functions.

- $\sin(30°)$

- $\cos\left(\frac{\pi}{2}\right)$

- $\cos(210°)$

- $\sin(7\pi)$

Group Work Check: Present your work for the practice problems to the instructor for approval. The work will not be graded deeply, but simply graded on whether it appears that you have put in a good faith effort to do the work. If you are not confident about particular problems, this is a good time to ask about them.

Section 5.3 Homework:

- 5.3 (General Problems): #1, 5, 7, 9, 11, 13, 17

- 5.3 (Write-Up): #20, #21