

Section 7.3 Learning Objectives:

- Video 1: The Double Angle Identities (5:57)
 - State the double angle identities for the sine and cosine functions.
 - Determine the value of expressions using the double angle identities.
 - Understand the derivation of the double angle identities from the sum of angles identities.
- Video 2: Applications of the Double Angle Identities (6:26)
 - Determine the exact values of trigonometric functions of angles given partial information about the angles.
 - Prove trigonometric identities using the double angle identities.
- Video 3: The Power Reduction Formulas (5:29)
 - Simplify expressions using the power reduction identities.
- Video 4: The Half-Angle Identities (5:42)
 - Determine the exact values of trigonometric functions of certain angles beyond the common angles of the unit circle using the half angle identities.

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 - Identifying Expressions: Use a double angle identity to rewrite the expression in terms of a single sinusoidal function.

- $\cos^2(75^\circ) - \sin^2(75^\circ)$
- $6 \sin(5x) \cos(5x)$

Group Practice Problems #2 - Values of Trigonometric Functions: Determine $\sin(2\theta)$, $\cos(2\theta)$, and $\tan(2\theta)$ from the given information.

- $\sin(\theta) = \frac{5}{13}$ and θ is in the second quadrant.
- $\cos(\theta) = -\frac{3}{7}$ and θ is in the third quadrant.

Group Practice Problems #3 - Tangent Identity: Prove the following double angle identity for tangent twice. For the first time, use the double angle identities for the sine and cosine functions. For the second time, use the sum of angles identity for the tangent function. (See the previous in-class worksheet.)

- $\tan(2\theta) = \frac{2 \tan(\theta)}{1 - \tan^2(\theta)}$

Group Practice Problems #4 - Solving Equations: Solve the equation. Then list the solutions on the interval $[0, 2\pi)$. Describe your steps and state any identities that you use.

- $\cos(2t) = \cos(t)$
- $2\sin(2t) + 3\cos(t) = 0$

Group Practice Problems #5 - Power Reduction Formulas: Use the formulas $\cos^2(\theta) = \frac{1+\cos(2\theta)}{2}$ and $\sin^2(\theta) = \frac{1-\cos(2\theta)}{2}$ to write the expression without exponents.

- $\sin^4(3x)$
- $\cos^4(8x)$

Group Practice Problems #6 - Half Angle Formulas: Use the formulas $\cos\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1+\cos(\theta)}{2}}$ and $\sin\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1-\cos(\theta)}{2}}$ to calculate the given expressions.

- $\sin(15^\circ)$
- $\cos(105^\circ)$

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 7.3 Homework:

- 7.3 (General Problems): #1, 3, 7, 11, 15, 19, 21
- 7.3 (Write-Up): #21, 25