

In Activity 7, we are proving and deriving identities graphically. In Aleks, you are asked to prove identities, simplify expressions, evaluate trig expressions and verify proofs. We are using identities to complete these tasks. The importance of identities is that either side of the identity can be replaced with the other in an expression or an equation. In order to understand and remember identities it helps to see where they come from. In this activity we are doing just that. It is also important to be able to connect graphical solutions with algebraic solutions. We will attempt to make those connections in this activity as well.

Review questions:

1. Define the angle measurement system of **degrees** and give a rationale for its importance.
2. Define the angle measurement system of **radians** and give a rationale for its importance.
3. Explain in your own words what an identity is.
4. Explain in your own words what it means to verify an identity.
5. Explain in your own words what it means to simplify an expression.
6. Explain in your own words what it means to evaluate an expression.
7. The identity  $\sin^2 x + \cos^2 x = 1$  is often called the Pythagorean Identity. Using the unit circle and triangles, build a convincing argument as to why this is a good name for this identity.
8. The half angle formula for sine is:  $\sin\left(\frac{u}{2}\right) = \pm\sqrt{\frac{1 - \cos u}{2}}$

Can you think of a scenario in which this formula would be useful? Imagine a world where calculators are suddenly unavailable. Write a story problem about a practical instance in such a world in which the formula above would be helpful. (Hint: use angle measures 30 degrees and 15 degrees. Why might these angle measures be a good choice for the story?)

9. Complete the right side of the equation to make the statement an identity:  
 $2\sin\left(3x - \frac{\pi}{6}\right) = 2\cos(\quad)$ . Explain how you could check your answer using a graphing calculator.