

## **Abstract Reasoning with Trigonometric Functions and Their Inverses**

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### **Synopsis**

This curriculum unit, written primarily for Precalculus students, addresses the first seven “Trigonometric Functions” standards in the High School Functions domain of the Common Core State Standards for Mathematics. One of my greatest challenges in teaching how to solve trigonometric equations is explaining why there are an infinite number of solutions, and how to find and denote them based on the calculator’s response to  $\sin^{-1}$ ,  $\cos^{-1}$ , or  $\tan^{-1}$  of some value. Students struggle with inverse trigonometric functions because these functions, being periodic, are not one-to-one unless the domain is restricted. My goal for this curriculum unit is to extend my previous work on all types of functions in my 2014 Yale National Initiative curriculum unit to, specifically, trigonometric functions. That unit set the groundwork for working with inverse trigonometric functions by focusing heavily on domains and ranges when defining and working with functions. This curriculum unit extends my previous unit by also emphasizing the algebraic structure for the set of functions that have inverses, the operation performed on the set, and the role of the Identity element.