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This study investigated undergraduate students' (who were enrolled in a pre-service secondary education program) understandings of trigonometric functions with the initial intention of exploring their notions of periodicity. However, the students' conceptions of the unit circle hindered their ability to correctly solve the tasks given during the first teaching experiment session. The students attempted to relate the described problem contexts to the unit circle by executing calculations, but had difficulty determining and justifying their calculations beyond referring to "unit-cancellation." The students' calculations did not stem from reasoning about the radius as a unit of measure. In response, we implemented tasks that asked the students to reason about relationships between the measure of a quantity and the magnitude of the unit used to make the measure. In this presentation, we discuss the students' activity on these tasks and their solutions to subsequent tasks. The students' progress suggests that ideas of measurement play a critical role in coming to understand important concepts of trigonometry, such as the unit circle and angle measure. The findings also reveal the difficult process students face in re-conceptualizing the mathematics that they understand. (Received August 01, 2011)