

Points of Emphasis in M205

A key component of M205 is an emphasis on developing a deep conceptual understanding of the meaning of radian angle measure. Often when students encounter radians, instructional time is focused on memorization; students memorize the definition of a radian and key conversions between radians and degrees (e.g., π is equivalent to 180 degrees). By contrast, in M205, students should view radians, the unit circle, and trigonometric functions as logical extensions of topics they have already encountered. In particular, they should:

- engage in discussion on the usefulness of radians as a vehicle for extending the domain of trigonometric functions to all real numbers (LP 3).
- use the structure of the unit circle to justify claims about the values of sine, cosine, and tangent for different angle measures, as well as the symmetry and periodicity of trigonometric functions (LP 3).
- focus their time on reasoning about the structure of the unit circle, rather than performing computations or memorizing (LP 3).

Student time can also be focused on procedural exercises that involve generating trigonometric functions that meet precise requirements (e.g., an amplitude of 7.5 and a phase shift of $\frac{\pi}{4}$). These exercises are usually devoid of any real-world contextual meaning and focus mostly on developing procedural skill with graphing and memorization of rules about the parameters of trigonometric functions. In M205 by contrast, students should be given opportunities to use a variety of representations to understand and analyze trigonometric functions. When possible, students should also use trigonometric functions in the context of realistic real-world applications and use technology as a tool for problem-solving. In particular, students should:

- use trigonometric functions as a problem-solving tool in authentic real-world situations, especially those that are related to authentic science and engineering disciplines (LP 1).
- explain the meaning of parameters for a trigonometric function that models a real-world situation (LP 3).
- engage with their peers to explain how an algebraic representation relates to a graphical representation of a trigonometric function (LP 2).
- engage in frequent experiences where they must make sense of given information, construct diagrams, test solution methods, and revise their thinking (LP 1).
- solve problems that shed light on social and/or environmental issues (LP 6).
- engage in learning experiences that emphasize reasoning and explanation over performing computations with trigonometric ratios (LP 2).
- employ a variety of tools, such as calculators and geometry software, to analyze and interpret trigonometric functions (LP 7).