

Pre-Calculus with Trigonometry

Course Overview

Pre-Calculus with Trigonometry is designed as the fourth course in a five-year sequence of college preparatory mathematics for high school students. In addition to covering all of the key concepts found in traditional trigonometry, pre-calculus, or math analysis courses, it emphasizes several big ideas that form a foundation for calculus and other college mathematics curricula.

The key ideas presented are:

- Transformations of functions
- Periodic functions and their graphs
- Area under a curve as a foundation for integration
- Inverses, exponentials, and logarithmic equations and applications
- Limits to infinity and at a point
- Properties of functions including continuity, increasing vs. decreasing, and concavity
- Average rates of change and instantaneous rates of change as a foundation for derivatives
- Other graphical systems including polar and parametric
- Applications of vectors and trigonometric functions
- Algebraic fluency and simplification techniques
- Modeling using a variety of functions

This course is structured around investigations and problem solving. Students will explore concepts and develop mathematical relationships through observation, application, and both formal and informal proof. Lessons are designed to facilitate teamwork and encourage students to pose conjectures, justify solutions and defend their thinking.

Some lessons are specifically designed to be teacher-directed, but most have strong components that require students to work in study teams. We expect that the lesson objectives found at the start of each lesson will provide valuable guidance. Concepts are developed over time so that students can master key ideas with conceptual understanding, not merely memorization.

Each chapter is divided into sections that focus on a major concept for the chapter. Individual lessons are focused on one or two key ideas that build into a core concept for the chapter. Students will investigate a concept or property and have the ideas summarized in the form of a “Math Note.” These notes allow students easy access for review if they struggle with a particular concept. Homework is designed as both a review of the day’s lesson as well as practice with concepts previously introduced. Each chapter concludes with a closure section that has review problems and often a “merge problem” that pulls together several ideas learned in the chapter.