Precalculus 1B

Course Description

Precalculus 1B is the second semester of a two-semester course designed to prepare students to study calculus and other college mathematics courses. This course begins by reviewing basic concepts in trigonometry. As students progress through the course, they learn about approximate values, trigonometric identities, graphs, and equations, logarithms, vectors, complex numbers, and polar coordinates. Throughout the course, students discover examples of the role of mathematics in daily life.

The course incorporates several graphing calculator exercises. Reading and writing skills are emphasized in each unit as students participate in discussion groups and complete math vocabulary exercises and writing assignments on math topics. Each unit provides students with Internet resources for further information about course concepts.

Overview

Unit 1 – Introductory Concepts
- Lesson 1: Sets, Lines, and Coordinates
- Lesson 2: Distance in a Plane, Functions, Angles
- Lesson 3: The Trigonometric Ratios and Functions

Unit 2 – Approximate Values and Right Triangles
- Lesson 1: Finding and Using Approximate Values of the Functions
- Lesson 2: Reference Angles, Right Triangles, and Special Angles
- Lesson 3: Solving, Applying Right Triangles

Unit 3 – Trigonometric Identities
- Lesson 1: Introduction to Trigonometric Identities
- Lesson 2: Functions of Two Angles
- Lesson 3: Half-Angle Identities, Products, and Sums

Unit 4 – Trigonometric Graphs and Equations
- Lesson 1: Graphing the Trigonometric Functions
- Lesson 2: Solving Trigonometric Equations
- Lesson 3: Inverse Functions and Trigonometric Equations

Unit 5 – Logarithms and Oblique Triangles
- Lesson 1: Logarithms
- Lesson 2: Calculating and Solving Logarithmic Equations
- Lesson 3: Solving Oblique Triangles

Unit 6 – Vectors, Complex Numbers, Polar Coordinates
- Lesson 1: Vectors and Vector Applications
- Lesson 2: Complex Numbers and Operations
- Lesson 3: Polar Coordinates and Equations

Objectives

Students completing this course will be able to demonstrate the following skills:

- Use set-builder notation and lists to define sets.
- Identify and use directed line segments.
- Determine the absolute value of a number.
- Locate points on the rectangular coordinate plane, and apply the formula for finding the distance between points.
- Determine the domain and range of a function, and graph functions and relations.
- Use the distance formula and the Pythagorean Theorem to identify right triangles.
- Use the calculator and tables to evaluate trigonometric functions and angles.
- Use reference angles to find trigonometric functions, and apply trigonometric functions to solve right triangles.
- Given one trigonometric function, name its reciprocal function and compute the values of the other five trigonometric functions.
- Use tables of approximate values to evaluate trigonometric functions or determine angles.
- Use reference angles to find approximate trigonometric values for any angle.
- Solve problems involving right triangles by applying understanding of trigonometric functions.
- Solve applied problems using line of sight, angle of elevation, angle of depression, bearing, and other practical settings.
- Simplify or prove trigonometric expressions by using the eight trigonometric identities.
- Use the formulas for the sine, cosine, and tangent of the sum and difference of two angles and for twice an angle and half an angle.
- Define and sketch graphs of the six trigonometric functions, and find periods and amplitudes.
- Solve trigonometric equations and check for extraneous solutions.
- Find, graph, evaluate, and solve inverse trigonometric functions.
- Solve problems involving logarithmic and exponential expressions.
- Apply the Law of Sines and the Law of Cosines to solve problems involving oblique triangles.
- Determine the area of triangles.
- Solve and graph vector problems.
- Apply operations on complex numbers, sketch graphs of polar equations, and convert numbers and equations from rectangular to polar system and vice versa.

Activities and Assessments

- **Calculator Exercises and 69 Practice Sets –** In addition to several calculator exercises throughout the course, there is a self-check practice exercise after each of the 69 topics.

- **6 Online Discussion Group Activities** – At the end of each of the six units, students participate in a group discussion of a math-related topic. The teacher evaluates the students' contributions to the discussion and provides grading and feedback.

- **18 Vocabulary Reviews and 6 Writing Assignments** – After each of the 18 lessons, students complete a self-check vocabulary review activity. At the end of each of the 6 units, students write 50-100 words summarizing their discussion group research and feedback. The teacher grades these assignments and provides feedback.

- **18 Quizzes, 6 Evaluations, and 1 Final Exam** – At the end of each of the 18 lessons, there is a quiz. There is also an evaluation at the end of each of the six units. At the conclusion of the course, students are given one opportunity to complete a comprehensive final exam. All of these assessments are computer-graded and provide students with instant feedback on their work.