Math 107A : Fundamental Mathematical Concepts I

California State University, Sacramento · Department of Mathematics & Statistics

The focus of this course is the students' mastery of specific mathematical content which is substantially more than that contained in the K-8 curriculum. The students will examine the structure and basic properties of the real number system and its subsystems. They will also examine fundamental concepts and proper ties in geometry and measurement.

Various methods of instruction will be used, with a problem-solving approach providing the general basis. Historical and multi-cultural perspectives will be interwoven through the course. Appropriate materials and calculators will be used as often as possible.

May not be taken for credit toward a math major or minor.

Catalog Description

First half of a one-year course in the structure of the real number system and its sub-systems and in the basic properties and concepts of geometry. Topics will include: definitions and properties of set theory and their use in the development of the natural and whole number systems, definitions and properties of the arithmetic relations and operations for the natural numbers, whole numbers, integers. Note: May not be taken for credit toward a mathematics major or minor. **Graded**: Graded Student. **Units**: 3.0.

Prerequisites

Math 17 and passing score on the Intermediate Diagnostic exam within one semester of enrollment in Math 107A.

Math 107A topics

Logic

Logical statements, connectives, converse, contrapositive, methods of proof

Pre-Number Concepts

Attributes, classification, sets, ordering, patterns, relations, and functions

Natural Number System

Development of numbres from counting sets, development of addition and multiplication

Whole Number System

Extension of $\mathbb{N}$ to $\mathbb{W}$, historical role of number systems, base ten, place value, its relations to grouping in operation, properties of the basic operation, estimation calculator use, geometric representation of whole numbers (number line)

Integers

Extension of $\mathbb{W}$ to $\mathbb{Z}$, models for integers, extension of operations, properties, divisability, greatest common divisor, least common multiple, division algorithm, Euclidean algorithm, primes, composites, unique factorization, divisibility criteria

Explorations in Elementary Geometry

Basic concepts and properties of two and three-dimensional Euclidan space (including alternate interior angles, vertical angles, angles inscribed in a semicircle, angle sums of plygons, similar triangles, congruent triangles, Pythagorean theorem) using paper folding, geoboards, mirrors, tiles, models

Measurement

Process of measurement (selection of a unit, covering with the unit, counting the number of units used, etc.); application of measuring using standard and non-standard units of length, area, volume, capacity, mass and their relationships; estimation of measures; perimeter, area and volume of standard geometric figures; indirect measurement (similar figures, Pythagorean theorem, etc.).