COURSE DESCRIPTIONS

Operational Systems (Bk 0-Ch 1)

This book covers operational systems and their properties. It starts with finite modular number systems in traditional arithmetic operations and expands to natural and whole numbers. It also includes some non-numerical systems involving permutations and geometry mappings. Each system is analyzed carefully for the properties: commutative, associative, neutral element (identity element) and invertibility. Equations are solved in every system.

The Integers (Bk 0-Ch 2)

The number systems introduced in Chapter 1 are expanded to include the negative whole numbers. The system is analyzed for the same properties studied in Chapter 1. Much attention is given to the solution of equations, equations which may not be solved in this system, and inequalities are introduced and solved using the integer number line.

Sets, Subsets, and Operations with Sets (BK 0-Ch 3)

The formal idea of set is introduced in this chapter. Venn Diagrams are used to solve problems. The operations union, intersection, set difference and symmetric set difference are studied. The ideas of ground set and complement are introduced. Equations are solved.

Ordered n-Tuples (Bk 0-Ch 4)

This book introduces the idea of ordered pairs and triples, leading to the solution of equations in more than one variable. Several operations on ordered n-tuples and sets of numbers are included.

Mappings (BK 0-Ch 5)

This chapter introduces the notion of mapping or function (central to all mathematics), and the properties of functions (onto, one-to-one, permutation). The first functions introduced are applied to sets involving measures of length, weight, time, volume, etc. Composition of functions leads to the introduction of rational numbers. The idea of exponent is introduced here also.

The Rational Numbers (Bk 0-Ch 6)

In this chapter we expand our number system to include the rational numbers. We continue the study of functions and use them to solve extremely complicated equations involving fractions. This chapter also introduces the concept of denseness in sets of numbers.

Decimals and an Application of the Rational Numbers (Bk 0-Ch 7)

This chapter introduces the set of decimal numbers as a subset of the rationals. It includes extensive work on applying what we've learned to real world situations involving money.

Intro to Probability (Bk 0-Ch 8)

Students are introduced to the study of probability. Students learn to identify the set of outcomes for a given trial with multiple steps and calculate the probabilities for each outcome and for each subset of outcomes, using trees and the product rule.

Intro to Number Theory (Bk 0-Ch 9)

This chapter introduces several topics in number theory including primes and composites.

COURSE DESCRIPTIONS

Algebra in Operational Systems (Bk 0-Ch 10)
This book cover the development of traditional algebra topics based on group, ring, and field theory.

Geometry: Incidence and Isometries (Bk 0-Ch 12)
Students are introduced to formal geometry concepts including the basic concepts of point, line, space, sets of points; plane and three dimensional figures; closed and open figures; interior, exterior, and boundary points; basic topology; geometric mappings including reflection, translation, rotation, and magnification; properties of triangles and quadrilaterals; notions of area and volume; etc.

Geometry: Similitudes, Coordinates and Trigonometry (Bk 0-Ch 13)
The formal study of geometry is continued in this chapter. It includes work with ratio and proportion resulting from magnification mappings, similarity, Pythagorean Theorem, trigonometry (including basic functions, graphing, and identities).

Intro to Logic (Bk 1-Ch 1)
The propositional calculus is introduced. The language includes propositional variables representing sentences with discernible truth values and connectives representing "not", "and", "or" (inclusive), "implies", and the bi-conditional. The truth values of formulas built using variables and connectives are discerned through the use of truth tables. Students are introduced to the idea of contradiction and tautology and substitution. They also learn to recognize complex instances of simple tautologies as tautologies, without the use of truth tables.

Intro to Logic: Modus Ponens, Deduction Theorem and Indirect Inference (Bk 1-Ch 2)
Students learn direct proofs based on Modus Ponens and subroutines derived from Modus Ponens. Students then learn to do proofs based on the Deduction Theorem and Indirect Inference.

Intro to Logic: Quantification (Bk 1-Ch 3)
This chapter introduces the use of universal and existential quantifiers for use with sentences not covered by the use of simple propositional variables. Much time is spent on exploring the negations of sentences involving quantification.

Logic and Sets (Bk 2)
This book covers the study of the predicate calculus as applied to set theory.

Introduction to Fields, Semester 1 (Bk 3)
Students develop the concept of field in a formal way and learn to prove that many of the basic concepts learned informally in algebra apply in any field. Extensive work is done with iteration of operations (multiples and powers), proof by mathematical induction is introduced, extensive work with equation solving including systems of equations and Cramer's Rule.

Accelerated Algebra
All algebra concepts are reviewed and strengthened using traditional notation to ease the transition to high school mathematics. Extensive work is done in the solution of word problems. Graphing calculators are used extensively.