Comprehensive Pre-Algebra

COURSE DESCRIPTION: In this course, students take a broader look at computational and problem-solving skills while learning the language of algebra. Students translate word phrases and sentences into mathematical expressions; analyze geometric figures; solve problems involving percentages, ratios, and proportions; graph different kinds of equations and inequalities; calculate statistical measures and probabilities; apply the Pythagorean theorem; and explain strategies for solving real-world problems. Online lessons provide demonstrations of key concepts, as well as interactive problems with contextual feedback. A textbook supplements the online material. Compared to MTH112, this course has a more rigorous pace as well as more challenging assignments and assessments. It also covers additional topics such as scientific notation, geometric congruence, systems of linear equations, and trigonometric ratios that are not covered in MTH112.

PREREQUISITES: Middle school Fundamentals of Geometry and Algebra (or equivalent)

COURSE LENGTH: Two Semesters

REQUIRED TEXT: Pre-Algebra: A Reference Guide and Problem Sets

MATERIALS LIST: No required materials for this course

COURSE OUTLINE:

Semester 1

Unit 1: The Basics

- Semester Introduction
- Order of Operations
- Variable Expressions
- Writing Expressions for Word Phrases
- Comparing Expressions
- Replacement Sets
- Related Equations
- Solving Problems

Unit 2: Addition and Subtraction

- Integers on a Number Line
- Adding Integers
- Subtracting Integers
- Discuss: Integers
- Decimals on a Number Line
- Adding Decimals
- Subtracting Decimals
- Addition and Subtraction Properties
- Equations Involving Addition and Subtraction
- Addition and Subtraction Applications

Unit 3: Multiplication and Division
- Multiplying Integers and Decimals
- Dividing Integers and Decimals
- Multiplication and Division Properties
- Rounding and Estimation
- Equations Involving Multiplication and Division
- Multiplication and Division Applications

Unit 4: Fractions
- Equivalent Fractions
- Multiplying Fractions
- Dividing Fractions
- Discuss: Fractions
- Common Denominators
- Adding and Subtracting Fractions
- Working with Mixed Numbers
- Multiplying and Dividing Mixed Numbers
- Equations with Fractions

Unit 5: Combined Operations
- The Distributive Property
- Like Terms
- Expressions with Mixed Operations

- Equations with Mixed Operations
- Error Analysis
- Inequalities

Unit 6: Number Properties
- Positive Exponents
- Factors and Primes
- GCF and Relative Primes
- Negative Exponents
- Powers of Ten
- Scientific Notation

Unit 7: Geometry Basics
- Points, Lines, and Planes
- Rays and Angles
- Parallel Lines and Transversals
- Discuss: Shapes
- Triangles
- Polygons
- Circles
- Transformations
- Congruence

Unit 8: Semester Review and Test
- Semester Review
- Semester Test

Semester 2
Unit 1: Ratio, Proportion, and Percent
- Semester Introduction
- Ratio
- Proportion
- Discuss: Ratio and Proportion
- Percents, Fractions, and Decimals

- Similarity and Scale
- Working with Percent
- Percent of Increase or Decrease
- Simple Interest

Unit 2: Analytic Geometry

- Points on the Plane
- Two-Variable Equations
- Linear Equations and Intercepts
- Slope, Part 1
- Slope, Part 2
- Problem Solving
- Functions, Part 1
- Functions, Part 2
- Systems of Linear Equations

Unit 3: Perimeter and Area

- Types of Polygons
- Perimeter
- Areas of Rectangles and Triangles
- Discuss: Measurement
- Special Quadrilaterals
- Areas of Special Quadrilaterals
- Circumference
- Areas of Circles

Unit 4: Square Roots and Right Triangles

- Rational Square Roots
- Irrational Square Roots
- The Pythagorean Theorem
- The Distance Formula
- Special Types of Triangles
- Trigonomic Ratios

Unit 5: Solid Figures

- Volume and Capacity
- Volumes of Prisms and Cylinders
- Discuss: Volume
- Volumes of Pyramids and Cones
- Surface Area
- Surface Areas of Prisms and Cylinders

Unit 6: Counting and Probability

- Counting Principles
- Permutations
- Combinations
- Probability
- Mutually Exclusive Events
- Samples and Prediction

Unit 7: Statistics

- Graphs
- Measures of Center
- Stem-and-Leaf Plots
- Box-and-Whisker Plots
- Frequency Tables and Histograms

Unit 8: Semester Review and Test

- Semester Review
- Semester Test