

# Elements of Mathematics Foundations

## Year One EMF Course Descriptions

### **EMF01: Operational Systems**

This course introduces students to modular arithmetic; operational systems and their properties (commutativity, associativity, neutral elements, invertibility); several non-numeric operations; least common multiple and greatest common divisor; and the geometric concepts of midpoint and reflection.

### **EMF02: The Integers**

This course introduces students to integers; arithmetic operations on integers using the number line and number plane; additive inverses; inequalities; integer-based operational systems and their properties, including the distributive property of multiplication over addition; and two-fold operational systems.

### **EMF03: Sets, Subsets and Set Operations**

This course introduces students to sets and membership in a set; roster names; the empty set; singleton sets; Venn diagrams; subsets and power sets; set operations including intersection, union, set difference and complement; counting the  $k$ -element subsets of an  $n$ -element set; and the Pascal Formula.

### **EMF04: Ordered $n$ -Tuples**

This course introduces students to ordered pairs and other ordered collections of objects; Cartesian products; taxicab geometry; equations in one and two variables; characteristics of the geometric plane; graphing the solution set of an open sentence; componentwise operations; and operations on subsets.

### **EMF05: Mappings**

This course introduces students to mappings to and onto sets; one-to-one mappings; counting mappings; permutations; composite mappings; and applications with magnifications, fractions and percentages.

### **EMF06: The Rationals**

This course introduces students to the rational numbers and their properties; operations on rational numbers; solving equations of rational numbers through mappings; the absolute value function; and ratio and proportion.

### **EMF07: The Decimals**

This course introduces decimal numbers and arithmetic operations on decimals; decimal approximations of rational numbers; positional notation for decimals; percentages; statistical measures of central tendency; and statistical measures of variation.