

# SPRINGFIELD PUBLIC SCHOOLS

## MATHEMATICAL FUNCTIONS

### Course Description

Mathematical Functions students will study, extend upon, and explore real-life applications for the concepts of sequences, series, matrices, determinants, functions, composition of functions, exponential functions, logarithmic functions, and conic sections. Prerequisite: C or better in Algebra II, Integrated Algebra II, or Integrated Math III.

### Course Rational

Mathematical Functions is recommended for students who plan to take Math Analysis/Trigonometry. In Mathematical Functions, students will be involved in learning how to collect information, communicate information mathematically, solve problems from a real-world context and justify the solutions.

### Major Instructional Goals

The intent of the Springfield R-12 Secondary Mathematics Program is to explore, investigate and understand the importance of mathematics through real-world experiences. In mathematics, students will acquire the knowledge and skills to problem solve, communicate, reason, create models and make connections. Students will:

1. Apply concepts of **Number and Operations** including:
  - a. Apply properties of logarithms and functions to simplify expressions or solve equations. (MA4; MA5; 1.6, 1.10)
  - b. Apply operations to matrices and complex numbers using various methods. (MA1; MA4; MA5; 1.4, 3.4)
  - c. Judge the reasonableness of numerical computations and their results. (MA1; 3.8)
  - d. Solve and analyze problems using matrices and determinants. (MA4; 1.4, 3.4)
  
2. Apply concepts of **Algebraic Relationships** including:
  - a. Generalize patterns using explicitly or recursively defined functions. (MA4; 1.6, 3.5)
  - b. Compare and contrast various forms of representations of patterns. (MA4; 1.6)
  - c. Understand and compare the properties of linear, absolute value, quadratic, exponential, logarithmic, polynomial, and rational functions. (MA4; 1.6, 3.6)
  - d. Describe the effects of parameter changes on exponential, logarithmic and polynomial functions. (MA4; 1.6, 4.1)
  - e. Use symbolic algebra to represent and solve problems that involve exponential and logarithmic relationships. (MA4; MA6; 1.6, 3.1)
  - f. Describe and use algebraic manipulations, including inverse of functions, composition of functions and rules of exponents. (MA4; 3.1, 4.1)
  - g. Use and solve equivalent forms of equations. (MA4; 1.6, 3.4)
  - h. Use and solve systems of linear and quadratic equations with two variables. (MA4; 1.6)

- i. Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem. (MA4; 1.6, 3.6)
  - j. Analyze exponential, logarithmic, polynomial, and rational functions by investigating rates of change, intercepts, and asymptotes. (MA4; 4.1)
3. Apply concepts of **Geometric and Spatial Relationships** including:
- a. Perform simple transformations and their compositions on linear, quadratic, logarithmic and exponential functions.(MA4; 3.1)
  - b. Demonstrate and accurately present the conics and their graphs. (MA2; 1.6)
4. Apply concepts of **Measurement** including:
- a. Compare and contrast intensity levels within a system of measure (decibels, pH) (MA1; 3.1)
  - b. Use unit analysis to solve problems involving rates, such as population density, growth and decay. (MA4; 3.1)