

SPRINGFIELD PUBLIC SCHOOLS
ALGEBRA I

Course Description

The first formalized course involving continuation of fundamental math deals with abstract ideas (letters in place of numbers), use of patterns, generalizations, solving linear and quadratic equations, graphing, simplifying radicals, and solving word problems. Work includes independent study. This course is a prerequisite for Geometry or Geometry Honors. Prerequisite: Teacher recommendation only.

Course Rationale

The content in algebra provides the foundation for future work in mathematics and science. An understanding of algebra is essential in preparation for careers that utilize or depend upon mathematics. It provides students with tools to represent and solve problems in a variety of ways. Students will better understand the language and abstract symbols of mathematics and how to use that language in real-life applications.

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. Compare and order rational and irrational numbers. (MA5; 3.3)
 - b. Use real numbers to solve problems. (MA1; 3.4)
 - c. Use a variety of representations to demonstrate an understanding of very large and very small numbers. (MA5; 3.6)
 - d. Describe the effects of operations on the magnitude of quantities. (MA4; 3.4, 4.1)
 - e. Apply properties of exponents and radicals to simplify expressions or solve equations. (MA1; MA4; 1.6, 1.10, 3.4)
 - f. Apply operations to real numbers using various methods. (MA1; MA4; MA5; 1.4, 1.10, 3.3, 3.4)
 - g. Judge the reasonableness of numerical computations and their results. (MA1; 3.8)
 - h. Solve problems involving proportions. (MA1; MA4; 3.3)
 - i. Differentiate between approximate and exact answers involving various numerical forms. (MA1; 3.1, 3.7)

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, exponential, and quadratic functions. (MA4; 1.6, 3.6)

- d. Describe the effects of parameter changes on linear, quadratic, and exponential functions. (MA4; 1.6, 4.1)
 - e. Use symbolic algebra to represent and solve problems that involve linear, absolute value and quadratic relationships. (MA4; MA6; 1.6, 3.1)
 - f. Describe and use algebraic manipulations, including factoring and rules of integer exponents. (MA4; 3.1, 4.1)
 - g. Use and solve equivalent forms of equations and inequalities. (MA4; 1.6, 3.4)
 - h. Use and solve systems of linear equations or inequalities 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 linear functions by investigating rates of change and intercepts and analyze quadratic functions by investigating rates of change, intercepts, and zeros. (MA 4; 1.6, 4.1)
3. Apply concepts of **Geometric and Spatial Relationships** including:
 - a. Translate, dilate, and reflect linear, quadratic, and exponential functions. (MA4; 3.1)
 4. Apply concepts of **Measurement** including:
 - a. Identify and justify appropriate units of measure for velocity. (MA1; MA2; 3.1, 4.1)
 - b. Analyze effects of computation on precision. (MA2; 1.7, 3.8)
 - c. Use unit analysis to solve problems involving rates. (MA4; 3.1)
 5. Apply concepts of **Data Analysis and Probability** including:
 - a. Formulate questions, design studies and collect data about a characteristic. (MA3; 1.2)
 - b. Select, create and use appropriate graphical representation of data. (MA6; 1.8, 3.6)
 - c. Apply statistical concepts to solve problems and distinguish between a statistic and a parameter. (MA3; 1.10, 3.4)
 - d. Given one-variable quantitative data, display the distribution and describe its shape.(MA3; 1.8)
 - e. Given a scatterplot, determine an equation for a line of best fit. (MA3, 1.6)
 - f. Display and analyze bivariate data where one variable is categorical and the other is numerical. (MA3; 1.6)
 - g. Make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatterplots of the data and approximate lines of fit. (MA3; 1.2, 3.5)
 - h. Describe how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference. (MA3; 3.5)
 - i. Construct and describe sample space and probability distribution. (MA3; 3.1, 4.1)
 - j. Use and describe the concepts of conditional probability and independent events. (MA6; 1.10, 4.1)