

SPRINGFIELD PUBLIC SCHOOLS

INTEGRATED MATH 4

Course Description

Integrated Math 4 continues to build on the development of concepts introduced in the integrated series. This course will emphasize skills necessary for problem-solving and continued growth in mathematics. Students will apply concepts of number and operations, algebraic relationships, geometric and spatial relationships, measurement, and data analysis and probability. This course is designed to prepare students for post-secondary experiences, both academic and workforce related. Prerequisite: Integrated Math 3, Integrated Algebra II, or Algebra II.

Course Rationale

The Integrated Math program is an alternate approach to achieve mathematical understanding. The content provides the foundation for future work in mathematics and science. An understanding of integrated mathematics 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 Springfield R-12 High School 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. Use vectors and matrices as systems and compare their properties to the real-number system. (MA5)
 - b. Apply properties of functions to simplify expressions or solve equations. (MA4; MA5; 1.6, 110)
 - c. Apply operations to vectors, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases. (MA1; MA4; MA5; 1.4, 3.4)
 - d. Judge the reasonableness of numerical computations and their results. (MA1; MA4; 5.8)
 - e. Solve problems involving proportions. (MA1; MA4; 3.3)
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 exponential, polynomial, rational, logarithmic and periodic functions. (MA4; 1.6, 3.6)

- d. Describe the effects of parameter changes on polynomial and periodic function. (MA4; 1.6, 4.1)
 - e. Use symbolic algebra to represent and solve problems that involve periodic relationships, including recursive and parametric relationships. (MA4; MA6; 1.6, 3.1)
 - f. Describe and use algebraic manipulations, including inverse of functions and composition of functions. (MA4; 3.1, 4.1)
 - g. Use and solve equivalent forms of equations and inequalities (polynomial and trigonometric). (MA4; 1.6, 3.4)
 - h. Use and solve systems of equations or inequalities. (MA4; 1.6)
 - i. Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem (including recursive forms). (MA4; 1.6, 3.6)
 - j. Analyze rational, polynomial, and periodic functions by investigating rates of change, intercepts, and asymptotes. (MA4; 1.6, 4.1)
3. Apply concepts of **Geometric and Spatial Relationships** including:
- a. Use trigonometric relationships to determine lengths and angle measure in all types of triangles. (MA2; 1.6, 1.10)
 - b. Use Cartesian coordinates and other coordinate systems to analyze geometric situations, such as navigational, polar or spherical systems. (MA2; 3.6, 4.1)
 - c. Determine the final outcome of successive transformations using various methods (e.g. sketches, constructions and matrices). (MA2; 3.6)
 - d. Perform simple transformations and their compositions on linear, quadratic, logarithmic, exponential, rational and periodic functions. (MA4; 3.1)
 - e. Recognize 3-dimensional objects and spaces from different perspectives and analyze their cross sections. (MA2; 3.6)
 - f. Draw or use visual models to represent and solve problems. (MA2; 3.1)
4. Apply concepts of **Measurement** including:
- a. Compare and contrast between angle and radian measure. (MA2; 3.1)
 - b. Apply concepts of successive approximation, upper and lower bounds and limit in measurement situations. (MA2; 1.6, 3.4)
 - c. Use unit analysis to solve problems involving rates, such as circular velocity, acceleration, or flow 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. Describe differences among various studies and which types of inferences can legitimately be drawn from each. (MA3; 1.5)
 - c. Apply statistical concepts to solve problems and distinguish between a statistic and a parameter. (MA3; 1.10, 3.4)
 - d. Recognize how linear transformations of single-variable data affect shape, center, and spread. (MA3; 3.1)
 - e. Create scatterplot, describe its shape, determine and analyze regression equations using technological tools. (MA3; 1.4, 1.6)
 - f. Evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions. (MA3; 1.5)

- g. Describe how basic statistical techniques are used in the workplace. (MA3; 1.4)
- h. Use simulations to construct empirical probability distributions. (MA3; 1.2)