

**SPRINGFIELD PUBLIC SCHOOLS
EIGHTH GRADE**

Course Description

Students will be involved in learning how to collect information, communicate information mathematically, solve problems from a real-world context and justify the solutions to the problems. This course will integrate the abstract ideas of algebra, including use of patterns, generalizations, analyzing linear equations and relationships, graphing, and the application of geometric ideas and concepts.

Course Rationale

Eighth Grade Mathematics prepares students to become critical thinkers. Through mathematics, students not only need to develop skills with numbers, but develop the ability to set up problems, approach problems with a variety of techniques, and understand the underlying mathematical features of such problems. Problem solving must be a central theme of our mathematics. Students can explore, create and reason while developing the ability to work with others to arrive at a solution. Students are encouraged to communicate and reason mathematically and to believe in the utility and value of their mathematics.

Major Instructional Goals

The intent of Springfield R-12 Middle 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. Compare and order rationals and percents, including finding their approximate locations on a number line. (MA5; 3.3)
 - b. Use fractions, decimals, and percents to problem solve. (MA1; 3.4)
 - c. Recognize equivalent representations for the same number and generate them by decomposing and composing numbers, including scientific notation. (MA1; 3.6)
 - d. Use factors and multiples to describe relationships between and among numbers and justify characteristics of numbers. (MA5; 1.10)
 - e. Describe the effects of multiplication/division on integers. (MA1; 3.4, 4.1)
 - f. Apply order of operations and mathematical properties to rational numbers, including inverse operations. (MA5; 1.6, 1.10)
 - g. Apply the relationship between squares and square roots, cubes and cube roots to solve a problem. (MA5; 1.6, 3.4)
 - h. Apply all operations on rational numbers. (MA1; 1.10, 3.3)
 - i. Estimate and justify the results of all operations on rational numbers. (MA1; 3.3, 4.1)
 - j. Solve problems involving proportions and ratios. (MA1; 3.3)

2. Apply concepts of **Algebraic Relationships** including:
 - a. Generalize patterns represented graphically or numerically, using words or symbolic rules. (MA4; 1.6, 3.6)
 - b. Compare and contrast various forms of representations of patterns (MA4; 1.6)
 - c. Compare properties of linear functions between or among tables, graphs, and equations. (MA4; 1.6, 3.6)
 - d. Use symbolic algebra to represent and solve problems that involve linear relationships. (MA4; 1.6, 3.1)
 - e. Generate equivalent forms for linear expressions. (MA4; 3.6)
 - f. Model and solve problems using multiple representations such as tables, graphs, equations or inequalities. (MA4; 1.6, 3.6)
 - g. Analyze the nature of changes of linear relationships, including slope and intercepts. (MA 2; MA4; 1.6, 4.1)

3. Apply concepts of **Geometric and Spatial Relationships** including:
 - a. Describe, classify, and generalize relationships between and among types of 2 and 3 dimensional objects using the Pythagorean Theorem and cross-sections. (MA2; 1.6, 3.6)
 - b. Apply relationships between corresponding sides and areas of similar polygons to solve problems. (MA2; 1.6, 3.6)
 - c. Use coordinate geometry to analyze properties of right triangles and quadrilaterals. (MA2; 3.6)
 - d. Reposition shapes under formal transformations. (MA2; 3.6)
 - e. Describe the relationship between the scale factor and the area of the image, using a dilation. (MA2; 3.6)
 - f. Identify the number of rotational symmetries of regular polygons. (MA2; 1.6)
 - g. Create isometric drawings from a given mat plan. (MA2; 3.3)
 - h. Draw or use visual models to represent and solve problems. (MA2; 3.1)

4. Apply concepts of **Measurement** including:
 - a. Identify the equivalent volume measures within a system of measurement. (MA2; 1.6)
 - b. Use tools to determine the measure of reflex angles to the nearest degree. (MA2; 1.4, 3.2)
 - c. Describe how to solve problems involving surface area and/or volume of a rectangular or triangular prism or cylinder. (MA2; 3.4, 4.1)
 - d. Analyze precision and accuracy in measurement situations and determine number of significant digits. (MA2; 1.7, 3.8)
 - e. Convert square or cubic units to equivalent units in the same system of measurement. (MA2; 1.6, 1.10)

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, including scatter plots. (MA3; 1.8,3.6)
- c. Find, use, and interpret measures of center, outliers, and spread, including range and interquartile range. (MA3; 3.4)
- d. Compare different representations of the same data and evaluate how well each representation shows important aspects of the data. (MA3; 3.6)
- e. Make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatter plots of the data and approximate line of fit. (MA3; 3.5)
- f. Make conjectures about the results of experiments based on theoretical probability. (MA3; 3.5)