East Stroudsburg Area School District
Mathematics – Keystone Algebra I

Description:

The East Stroudsburg Area School District's High School Mathematics Planned Course reflects the Common Core Standards, Teachers of Mathematics *Principals and Standards for Mathematics Education,* the Pennsylvania State Standards for Mathematics Education and the Pennsylvania Department of Education Assessment Anchors and Eligible Content. It provides a research-based, sequential framework of content designed to maximize successful mastery of mathematics, use and application of the Standards for Mathematical Practices, as well as the Habits of Mind.

Standards for Mathematical Practices	Habits of Mind
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	1. Persisting 2. Managing Impulsivity 3. Listening to Others with Empathy and Understanding 4. Thinking Flexibly 5. Metacognition 6. Striving for Accuracy and Precision 7. Questioning and Posing Problems 8. Applying Past Knowledge to New Situations 9. Thinking and Communicating with Clarity and Precision 10. Gathering Data through all Senses 11. Creating, Imagining, and Innovating 12. Responding with Wonderment and Awe 13. Taking Responsible Risks 14. Finding Humor

The Mathematics Curriculum is designed to address the needs of a diverse population of learners. The content builds upon student learning styles and provides for differentiated instruction. Each grade level includes opportunities for enrichment and remediation of concepts, as well as activities for English Language Learners.

Resources are provided to enhance mastery of mathematics vocabulary, basic skills, and problem solving strategies. Technology and career applications of mathematical skills are infused throughout the curriculum. As a result, learners will be offered opportunities to reason, communicate and connect mathematically in the real world.

Mathematics Standards for High School:

The Algebra I course outlined in this scope and sequence document begins with connections back to earlier work, efficiently reviewing algebraic and statistical concepts that students have already studied while at the same time moving students forward into the new ideas described in the high school Common Core Standards.

The units are sequenced in a way that connects the mathematical content described in the Common Core State Standards for Mathematics; however, the order of the standards included in any unit does not imply a sequence of content within that unit. Some standards may be revisited several times during the course; others may be only partially addressed in different units, depending on the mathematical focus of the unit.

Algebra I Overview

Description: Topics to be studied are writing, solving, and graphing linear equations, functions, and inequalities in one and two variables, writing, solving, and graphing systems of linear equations and inequalities, simplifying exponential and radical expressions, equations, and functions, simplifying, factoring, and solving quadratic expressions and equations, and interpreting, analyzing, and displaying data.

Scope & Sequence

- **Unit 1: Solving Linear Equations**
  - Write, solve, and/or apply a linear equation (including problem situations).
  - Use and/or identify an algebraic property to justify any step in an equation-solving process. Note: Linear equations only.
  - Interpret solutions to problems in the context of the problem situation. Note: Linear equations only.
  - Write ratios and proportions.
  - Solve proportions using cross products.
  - Rewrite equations and formulas.

o Solve percent problems

- **Unit 2: Solving and Graphing Linear Inequalities**
  o Write or solve compound inequalities and/or graph their solution sets on a number line (including absolute value equations/inequalities).
  o Identify or graph the solution set to a linear inequality on a number line.
  o Interpret solutions to problems in the context of the problem situation. Note: Limit to linear inequalities.

- **Unit 3: Linear Equations, Functions, and Inequalities in Two Variables**
  o Write, solve, and/or apply a linear equation (including problem situations).
  o Interpret solutions to problems in the context of the problem situation. Note: Limit to linear inequalities.
  o Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.
  o Determine whether a relation is a function, given a set of points or a graph.
  o Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table).
  o Create, interpret, and/or use the equation, graph, or table of a linear function.
  o Translate from one representation of a linear function to another (i.e., graph, table, and equation).
  o Identify, describe, and/or use constant rates of change.
  o Apply the concept of linear rate of change (slope) to solve problems.
  o Write or identify a linear equation when given
    ▪ the graph of the line,
    ▪ two points on the line, or
    ▪ the slope and a point on the line.
    Note: Linear equation may be in point-slope, standard, and/or slope-intercept form.
  o Determine the slope and/or y-intercept represented by a linear equation or graph.
  o Draw, identify, find, and/or write an equation for a line of best fit for a scatter plot.

- **Unit 4: Solve and Graph Systems of Linear Equations and Inequalities**
  o Write and/or solve a system of linear equations (including problem situations) using graphing, substitution, and/or elimination. Note: Limit systems to two linear equations.
  o Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear equations.
  o Write and/or solve a system of linear inequalities using graphing. Note: Limit systems to two linear inequalities.
  o Identify and explain when a system of linear equations has 1 solution, no solutions, or infinitely many solutions.

- **Unit 5: Exponents and Exponential Functions**
  - Compare and/or order any real numbers. Note: Rational and irrational may be mixed.
  - Simplify square roots (e.g., $\sqrt{24} = 2\sqrt{6}$).
  - Simplify/evaluate expressions involving properties/laws of exponents, roots, and/or absolute values to solve problems. Note: Exponents should be integers from -10 to 10.
  - Use estimation to solve problems.
  - Convert numbers from standard form to scientific notation (and scientific notation to standard form).

- **Unit 6: Polynomials and Factoring**
  - Find the Greatest Common Factor (GCF) and/or the Least Common Multiple (LCM) for a set of monomials.
  - Describe and/or name polynomials based standard form and degree.
  - Add and subtract monomials/ polynomials.
  - Multiply polynomials (e.g. monomial and a polynomial, two binomials, & a binomial and trinomial.
  - Solve area and volume problems involving monomials, binomials, and trinomials.
  - Factor quadratic expressions.
  - Factor algebraic expressions, including difference of squares and trinomials. (including trinomials in the form $ax^2 + bx + c$, where $a \geq 1$.
  - Solve quadratic equations by factoring & completing the square.
  - Use factoring/ polynomials to find the zeros, extreme values, the symmetry of the graph, & to solve problems.

- **Unit 7: Radicals**
  - Evaluate square roots given a value for the variable.
  - Add, subtract, and multiply radicals.
  - Simplify radicals.
  - Write radicals as rational exponents.
  - Solve radical equations by using inverse operations (e.g., squaring a square root).

- **Unit 8: Rational Expressions and Equations**
  - Simplify rational expressions by factoring.
  - Simplify rational expressions by finding the GCF and then factoring.
  - Multiply and divide rational expressions.
  - Use long division and/or square roots to factor polynomials
  - Calculate the sum and difference of rational expressions with like and unlike denominators.

- o Solve rational equations using cross-products and least common denominators.
- **Unit 9: Data Analysis – Embed Throughout Course**
  - o Calculate and analyze the shape of data in terms of mean, median, mode, and outliers.
  - o Create and interpret a frequency table, stem-and-leaf plot, box-and-whisker plot, and scatter plot.
  - o Draw, identify, find, and/or write an equation for a line of best fit for a scatter plot.
  - o Calculate and/or interpret the range, quartiles, and interquartile range of data.
  - o Estimate or calculate to make predictions based on a circle, line, bar graph, measures of central tendency, or other representations.
  - o Analyze data, make predictions, and/or answer questions based on displayed data (box-and-whisker plots, stem-and-leaf plots, scatter plots, measures of central tendency, or other representations).
  - o Make predictions using the equations or graphs of best-fit lines of scatter plots.
  - o Find probabilities for compound events (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal, or percent.

Appendices:

A: Pennsylvania Common Core Standards Mathematics

B: National Common Core Standards for Mathematics

C: Mathematics Assessment Anchors and Eligible Content: Keystone Algebra I, Keystone Algebra II, Geometry

D: Formula Sheets: Keystone Algebra I, Keystone Algebra II, Geometry

E: Keystone Eligible Content Checklists: Keystone Algebra I, Keystone Algebra II, Keystone Geometry

F: Career Education and Work Standards

G: ISTE Standards