East Stroudsburg Area School District
Mathematics – Geometry

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.

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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 high school standards specify the mathematics that all students should study in order to be college and career ready. Additional mathematics that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics is indicated by (+), as in this example: (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers). All standards without a (+) symbol should be in the common mathematics curriculum for all college and career ready students. Standards with a (+) symbol may also appear in courses intended for all students.

The high school standards are listed in conceptual categories:

- Number and Quantity
- Algebra
- Functions
- Modeling
- Geometry
- Statistics and Probability

Conceptual categories portray a coherent view of high school mathematics; a student's work with functions, for example, crosses a number of traditional course boundaries, potentially up through and including calculus. Modeling is best interpreted not as a collection of isolated topics but in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards.

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Geometry Overview

Description: Topics include drawing, analyzing, and notating basic geometric figures, applying theorems and postulates for parallel and perpendicular lines, triangles, right triangles, quadrilaterals, and circles. Additionally students will use trigonometric functions to find measures in triangles. Students will find the perimeter, area, volume, and surface area of various geometric figures. Students will transforms various geometric in a two-dimensional plane, and calculate independent and dependent compound probability.

Scope & Sequence

- **Unit 1: Basics of Geometry**
  - Define and draw the basic geometric figures
  - Write the meaning of various geometric symbols
  - Calculate the length of various segments and midpoints
  - Calculate the distance and/or midpoint between two points on a number line, on a coordinate plane, or when given the endpoints
  - Construct various geometric figures using a straight edge and protractor
  - Compare and contrast complementary and supplementary angles
  - Calculate the complement or supplement of an angle
  - Classify angles using characteristics
  - Estimate the measure of an angle as acute, right, obtuse, or straight
  - Verify angle measures with a protractor
  - Solve real world problems involving geometric figures
  - Complete numerical patterns
  - Compare and contrast inductive and deductive reasoning
  - Determine the type of reasoning used to solve a problem
  - Populate and generate truth tables

- **Unit 2: Parallel and Perpendicular Lines**
  - Construct parallel and perpendicular lines
  - Construct lines cut by a transversal
  - Find the measure of angles formed by lines cut by a transversal
  - Identify skew lines
  - Use vertical angles to find missing measures
  - Identify parallel and perpendicular planes
  - Identify angle pairs in figures containing transversals
  - Find the measure of angles using algebraic expressions
  - Identifying congruent angles in figures containing transversals
  - Use geometric theorems to prove lines are parallel

- **Unit 3: Triangles**
  - Classify the various types of triangles
  - Use triangle inequalities to classify triangles
  - Define and construct medians, altitudes, bisectors, and mid-segments
  - Label congruent parts of triangles with tick marks
  - Prove parts of triangles congruent using CPCTC
  - Prove triangles are congruent by SSS, SAS, AAS, ASA, and HL
  - Use theorems about isosceles and equilateral triangles
  - Solve proportions
  - Contrast inductive and deductive reasoning
  - Determine the type of reasoning used to solve a problem

- **Unit 4: Right Triangles and Trigonometry**
  - Simplify and rationalize radicals
  - Identify the parts of a right triangle
  - Apply the Pythagorean Theorem to solve for a missing side in a right triangle.
  - Apply the theorems for 45-45-90 triangles to solve for a missing side in a triangle.
  - Apply the theorems for 30-60-90 triangles to solve for a missing side in a triangle.
  - Identify and draw the median of a triangle
  - Write the trigonometric ratios of right triangles.
  - Use the trigonometric ratios to find the missing side in a right triangle

- **Unit 5: Quadrilaterals and Polygons**
  - Define types of polygons by number of sides
  - Identify real world examples of polygons
  - Determine the measures of interior and exterior angles of polygons
  - Compare and contrast quadrilaterals
  - Solve problems using properties of quadrilaterals
  - Calculate the sides, diagonals, angles, and medians of quadrilaterals
  - Use coordinate geometry to prove quadrilaterals.
  - Prove similarity of geometric figures

- **Unit 6: Circles**
  - Identify the parts of a circle (center, diameter, radius, chord, secant, tangent, and point of tangency).
  - Find the measures of central angles and inscribes angles.
  - Find the measure of major and minor arcs.
  - Find the area and circumference of a circle
  - Find the area of the sector of a circle
  - Find the length of the arc of a circle
  - Use properties of tangents to find lengths outside a circle
  - Use properties of chords to find measures of segments
  - Use properties of inscribed quadrilaterals to find missing measures
  - Graph a circle using the equation.
  - Write the equation of a circle given the center and radius
  - Write the equation of a circle given the center and a point on the circle

- **Unit 7: Perimeter, Area, Surface Area, and Volume**
  - Find arc lengths and other measures of a circle
  - Determine areas of circles and sectors
  - Determine areas of regular polygons inscribed in circles
  - Use lengths and areas to find geometric probabilities
  - Identify solids
  - Find volumes of prisms and cylinders
  - Find volumes of pyramids and cones
  - Find surface areas and volumes of spheres
  - Use properties of similar solids

- **Unit 8: Transformations**
  - Describe transformations as functions
  - Describe the rotations and reflections
  - Draw the transformed figures
  - Specify a sequence of transformations
  - Identify lines of symmetry
  - Identify and draw dilations

- **Unit 9: Probability**
  - Describe events as subsets of a sample space
  - Find theoretical and experimental probability
  - Find permutations and combinations
  - Understand conditional probability
  - Construct and interpret two-way frequency tables
  - Recognize and explain the concepts of conditional probability
  - Apply the Addition Rule
  - Apply the General Multiplication Rule

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