# Paulsboro Schools

# Curriculum

**Geometry**

**Grade 9 - 12**

**June 2010**

\* **For adoption by all regular education programs as specified and for adoption or adaptation by all Special Education Programs in accordance with Board of Education Policy.**

**Board Approved: Sept. 2012**

# PAULSBORO SCHOOL DISTRICT

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# **Paulsboro Schools**
## Mission

The mission of the Paulsboro School District is to provide each student the educational opportunities to assist in attaining their full potential in a democratic society. Our instructional programs will take place in a responsive, community based school system that fosters respect among all people. Our expectation is that all students will achieve the New Jersey Core Curriculum Content Standards (NJCCCS) at every grade level.

# INTRODUCTION, PHILOSOPHY OF EDUCATION, AND EDUCATIONAL GOALS

**Introduction/philosophy:   MATHEMATICS**

Paulsboro Schools are committed to providing all students with a quality education resulting in life-long learners who can succeed in a global society.  As students begin their mathematics education in Paulsboro, classroom instruction will reflect the best thinking of the day.  Children will engage in a wide variety of learning activities designed to develop their ability to reason and solve complex problems.  Calculators, computers, manipulatives, technology, and the Internet will be used as tools to enhance learning and assist in problem solving. Group work, projects, literature, and interdisciplinary activities will make mathematics more meaningful and aid understanding.  Classroom instruction will be designed to meet the learning needs of all children and will reflect a variety of learning styles.

Paulsboro Schools are committed to providing all students with the opportunity and the support necessary to learn significant mathematics with depth and understanding.  This curriculum guide is designed to be a resource for staff members and to provide guidance in the planning, delivery, and assessment of mathematics instruction.

**Educational Goals:  MATHEMATICS**

**(1)** Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

**(2)** Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

**(3)** Investigate, research, and synthesize various information from a variety of media sources.

**A note about  Mathematics   Standards and Cumulative Progress Indicators:**

The New Jersey Core Curriculum Content Standards for **<Mathematics>** were revised in **2009**. The Cumulative Progress Indicators (CPI's) referenced in this curriculum guide refer to these new standards and may be found in the Curriculum folder on the district servers.  A complete copy of the new Core Curriculum Content Standards for Mathematics may also be found at:


http://www.nj.gov/education/aps/cccs/

# Geometry

## Scope and Sequence / Curriculum MAP

| Quarter I |
|---|

| **I. Big Idea:  Introduction to Geometry**<br>1.Point, Line, Plane – Definitions and Notation<br>2.Angles<br>3. Triangle -<br>4. Quadrilateral<br>5. Polygon<br>6. Circle-Definition and Circle terms | **II. Big Idea: Geometric Reasoning**<br>1.Deductive  and Inductive Reasoning<br>2. Finding the Rule<br>3. Parallel and Perpendicular Lines<br>4. Angle Relationships<br>5. Geometric Constructions- Bisectors (Angle and Perpendicular) |
|---|---|

| Quarter II | |
|---|---|

| **III. Big Idea: Geometric Constructions**<br>1.Lines<br>2. Angles<br>3. Perpendiculars<br>4. Angle Bisectors<br>5. Parallel lines<br>6.  Points of Concurrency | **IV. Big Idea: Proving Triangle Properties**<br>1.Triangle Sum Conjecture<br>2. Isosceles Triangles<br>3. Triangle Inequalities<br>4. Congruence Shortcuts<br>5. Corresponding Parts of Congruent Triangles |
| **V. Big Idea: Properties of Polygons**<br>1.Angles in Polygons<br>2.Midsegments<br>3.Kites<br>4.Trapezoids<br>5. Parallelograms | |

| Quarter III | |
| --- | --- |
| **VI. Big Idea: Coordinate Geometry**<br>1.Midpoint<br>2.Slope<br>3.Equation of a Line<br>4.Parallel and Perpendicular Lines<br>5.Simplifying Radical Expressions<br>6.Pythagorean Theorem<br>7.Distance | **VII. Big Idea: Proving Circle Properties**<br>1.Radius and Diameter<br>2.Tangent and Secants<br>3.Cords<br>4.Central and Inscribed Angles<br>5.Arcs<br>6.Circumference and Arc Length |
| **VIII. Big Idea: Special Right Triangles**<br>1.45-45-90 triangle<br>2.30-60-90 triangle | |

| Quarter IV | |
| --- | --- |
| **IX. Big Idea: Area of Geometric Figures**<br>1.Irregular figures<br>2.Triangles<br>3.Rectangles and Parallelograms<br>4.Trapezoids<br>5.Kites<br>6.Regular Polygons<br>7.Circles<br>8.Surface Area of Solids | **X. Big Idea: Volume**<br>1.Prisms<br>2.Pyramids<br>3.Cylinders<br>4.Cones<br>5.Spheres<br>6.Displacement and Density |
| **XI. Big Idea: Similarity**<br>1.Triangles<br>2.Polygons<br>3.Corresponding Parts of Similar Triangles<br>4.Area<br>5. Volume | **XII. Big Idea: Trigonometry**<br>1. Ratios and proportions<br>2.Basic trigonometric Ratios- Sine, Cosine, Tangent<br>3.Law of Sine's |

| | Curriculum Management System Subject/Grade Level: **Geometry – 9/10/11/12** | **I.      Big Idea: Introduction to Geometry** | |
|---|---|---|---|
| | | **Topic:** Basic definitions and the ability to visually recognize various basic building blocks of geometry, including; point, line, plane, angles, triangles and common polygons. | |
| | | **Overarching Goals:**<br>(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.<br>(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.<br>(3) Investigate, research, and synthesize various information from a variety of media sources. | |
| | | **Goal 1:** **The student will be able to identify and use parts and types of lines, angles, and planes in problem solving.** | |
| | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)**<br>**The student will be able to:** | **Essential Questions, Enduring Understandings,**<br>**Sample Conceptual Understandings** | **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 15 | G.CO.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.<br><br><br>G-CO.4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. | **Essential Questions:**<br>What are the common geometric shapes that one might expect to encounter in real life, and what are their names and properties?<br>How are these common shapes presented in written form?<br><br><br>**Enduring Understandings:**<br>Learn the terminology and notation associated with geometric objects.<br>Become familiar with the objects that have special characteristics: acute and obtuse angles and triangles, scalene triangles, collinear and coplanar points, congruent figures, equilateral, equiangular, and regular polygons.<br>Translation of descriptions into diagrams and vice versa. Encounter some real world applications of geometry | **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.**<br><br>**Learning Activities: Measuring angles using a protractor or angle ruler, creating a circle using string and students.**<br><br>**Assessment Models:**<br><br><br>**Additional Resources:** |

Suggested days of Instruction

| | Curriculum Management System Subject/Grade Level: **Geometry – 9/10/11/12** | **II.    Big Idea: Geometric Reasoning** |
|---|---|---|
| | | **Topic: Inductive and Deductive reasoning and its applications to mathematical proofs and real world situations and geometric constructions** |
| | | **Overarching Goals:** <br> **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** <br> **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** <br> **(3) Investigate, research, and synthesize various information from a variety of media sources.** |
| | | **Goal 2:  The student will be able to use logical reasoning to solve problems.** |
| | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)** <br> **The student will be able to:** | **Essential Questions, Enduring Understandings, Sample Conceptual Understandings** ‖ **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 15 | G-CO.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. <br><br> G-CO.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). <br><br> G-CO.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle | **Essential Questions:** <br> How can observable patterns in numbers or shapes be used to predict future results? <br> Are there angles and relationship between lines that have real word applications? <br><br><br> **Enduring Understandings:** <br> Using inductive and deductive reasoning to find pattern, as a method to find missing numbers or predict higher values. <br> The meaning of parallel and perpendicular lines, and the angles created by a transversal. <br> Vertical angles and Linear pairs. ‖ **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.** <br><br> **Learning Activities: Handshake Investigation, Patty Paper and compass and straight edge constructions.** <br><br> **Assessment Models:** Patty Paper Constructions <br> **Additional Resources:** <br> • **Discovering Geometry An Investigative Approach: Michael Sierra; 2008** <br> • **Geometry Sketchpad** <br> • **Quarterly Assessments** <br> • **Compass Odyssey Learning Paths** <br> • **Geometry Tools for a Changing World:PrenticeHall;1998** <br> • **Math Matters 3: National Textbook Company; 2001** |

*(Left margin, rotated: Suggested days of Instruction)*

| Suggested days of Instruction | Curriculum Management System Subject/Grade Level: **Geometry – 9/10/11/12** | **III.     Big Idea:** Geometric Constructions |  |
|---|---|---|---|
| | | **Topic:** The duplication of lines and the construction of angles, and parallel and perpendicular lines, using a compass and straight edge and/or patty paper. | |
| | | **Overarching Goals:**<br>(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.<br>(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.<br>(3) Investigate, research, and synthesize various information from a variety of media sources. | |
| | | **Goal 3:** **The student will be able to use angle relationships with parallel and perpendicular lines to solve problems.** | |
| | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)**<br>**The student will be able to:** | **Essential Questions, Enduring Understandings,**<br>**Sample Conceptual Understandings** | **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 15 | G-CO.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.)..<br><br>G-CO.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle<br><br>G-C.4. (+) Construct a tangent line from a point outside a given circle to the circle. | **Essential Questions:**<br>How to find the shortest path between two points?<br>How do angles affect size of objects and distance between points?<br>Are ancient construction methods used today, and are they accurate?<br><br>**Enduring Understandings:**<br>Understanding angles and lines, how to construct them and the applications to construction.<br>Distinguishing constructions from sketches and drawings. | **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.**<br><br>**Learning Activities: Patty Paper and Compass and straight edge Constructions**<br><br>**Assessment Models:** Constructions Project (Section 3.6)<br>**Additional Resources:**<br>• **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**<br>• **Geometry Sketchpad**<br>• **Quarterly Assessments**<br>• **Compass Odyssey Learning Paths**<br>• **Geometry Tools for a Changing World:PrenticeHall;1998**<br>• **Math Matters 3: National Textbook Company; 2001** |

| Suggested days of Instruction | Curriculum Management System Subject/Grade Level: **Geometry – 9/10/11/12** | IV. **Big Idea:** Proving Triangle Properties |
|---|---|---|
| | | Topic: Determining the type of triangle, and if triangles and/or their parts are congruent. |
| | | **Overarching Goals:**<br>(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.<br>(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.<br>(3) Investigate, research, and synthesize various information from a variety of media sources. |
| | | <u>Goal 4:</u> **The student will be able to use triangle classification, the relationship of sides and angles in triangles and congruent triangles to solve problems.** |

| | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)**<br>**The student will be able to:** | **Essential Questions, Enduring Understandings, Sample Conceptual Understandings** | **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
|---|---|---|---|
| 15 | G-CO.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.<br><br>G-CO.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.<br><br>G-CO.9. Prove theorems about lines and angles.<br><br>G-CO.10. Prove theorems about triangles. | **Essential Questions:**<br>What is the relationship of sides to angles in a triangle?<br>How do we know when Triangles are congruent?<br>If triangles are congruent, are all their parts congruent?<br><br>**Enduring Understandings:**<br>Sum of the angles of a triangle =180°<br>Properties of Isosceles Triangles<br>Triangle Sum Conjecture<br>C.P.C.T.C. | **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.**<br><br>**Learning Activities: Tearing the angles of a triangle. Patty paper constructions. Pasta proof of triangle inequality.**<br><br>**Assessment Models:** Triangle proof package<br><br>**Additional Resources:**<br>• **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**<br>• **Geometry Sketchpad**<br>• **Quarterly Assessments**<br>• **Compass Odyssey Learning Paths**<br>• **Geometry Tools for a Changing World:PrenticeHall;1998**<br>• **Math Matters 3: National Textbook Company; 2001** |

| Suggested days of Instruction | Curriculum Management System<br>**Subject/Grade Level:**<br>**Geometry – 9/10/11/12** | **V.      Big Idea:** Properties of Polygons |  |
|---|---|---|---|
|  |  | Topic: Types of polygons, angles and midsegments in polygons, with a focus on the various types of quadrilaterals. |  |
|  |  | **Overarching Goals:**<br>(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.<br>(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.<br>(3) Investigate, research, and synthesize various information from a variety of media sources. |  |
|  |  | **Goal 5:** **The student will be able to use the properties of polygons to solve problems, with a focus on the various types of quadrilaterals.** |  |
|  | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)**<br>**The student will be able to:** | **Essential Questions, Enduring Understandings,**<br>**Sample Conceptual Understandings** | **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 15 | G-CO.11. Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*<br><br>G-CO.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. | **Essential Questions:**<br>How does the number of sides in a polygon affect the size of interior angles?<br>How can I create a regular polygon of any number of sides?<br>Who put the bop in the bop shoo bop shoo bop, that made my baby fall in love with me?<br><br><br>**Enduring Understandings:**<br>**The sum of angles inside and outside of polygons of various sizes.**<br>**Properties of kites, trapezoids, and various parallelograms.**<br>**Definition and properties of midsegments in triangles and trapezoids.** | **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.**<br><br>**Learning Activities: Geometry Sketchpad demo-exterior angles of a polygon, Patty paper constructions, Double edge straight edge construction.**<br>**Assessment Models:**<br><br>**Additional Resources:**<br><ul><li>**Discovering Geometry An Investigative Approach: Michael Sierra; 2008**</li><li>**Geometry Sketchpad**</li><li>**Quarterly Assessments**</li><li>**Compass Odyssey Learning Paths**</li><li>**Geometry Tools for a Changing World:PrenticeHall;1998**</li><li>**Math Matters 3: National Textbook Company; 2001**</li></ul> |

| Suggested days of Instruction | Curriculum Management System Subject/Grade Level: **Geometry – 9/10/11/12** | **VI.    Big Idea:** Coordinate Geometry |
|---|---|---|
| | | **Topic: Finding Midpoint, Slope, Length and the equation of a line (or the side of a geometric figure) to determine parallel, perpendicular or neither, and to classify the given figure.** |
| | | **Overarching Goals:** <br> (1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes. <br> (2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems. <br> (3) Investigate, research, and synthesize various information from a variety of media sources. |
| | | Goal 6: **The student will be able to determine slope and length of line segments, use that information to classify, and compare and contrast geometric figures on a coordinate plane.** |
| | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)** <br> **The student will be able to:** | **Essential Questions, Enduring Understandings, Sample Conceptual Understandings** / **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 15 | G-GPE.4. Use coordinates to prove simple geometric theorems algebraically. G-GPE.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). <br><br> G-GPE.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio. <br><br> G-GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. | **Essential Questions:** <br> How can I find the middle? <br> How can I determine the distance between two points? <br><br><br> **Enduring Understandings:** <br> Midpoint, slope and distance. <br> Determining if lines are parallel, perpendicular. <br> Pythagorean Theorem |

(Right column for row 15:)

**Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.**

**Learning Activities:**

**Assessment Models:** Name the Shape Project.

**Additional Resources:**
- **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**
- **Geometry Sketchpad**
- **Quarterly Assessments**
- **Compass Odyssey Learning Paths**
- **Geometry Tools for a Changing World:PrenticeHall;1998**
- **Math Matters 3: National Textbook Company; 2001**

| Suggested days of Instruction | Curriculum Management System<br>**Subject/Grade Level:**<br>**Geometry – 9/10/11/12** | **VII.    Big Idea: Proving Circle Properties** | |
|---|---|---|---|
| | | **Topic: Parts of circles, and determining circumference arc measure and arc length.** | |
| | | **Overarching Goals:**<br>**(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.**<br>**(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.**<br>**(3) Investigate, research, and synthesize various information from a variety of media sources.** | |
| | | **Goal 7:   The student will be able to use and apply the properties of lines and angles in circles.** | |
| | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)**<br>**The student will be able to:** | **Essential Questions, Enduring Understandings,**<br>**Sample Conceptual Understandings** | **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 15 | G-C.1. Prove that all circles are similar.<br><br>G-C.2. Identify and describe relationships among inscribed angles, radii, and chords<br><br>**G-C.4. (+) Construct a tangent line from a point outside a given circle to the circle.**<br><br>G-C.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. | **Essential Questions:**<br>What is the distance around a circle?<br><br><br>**Enduring Understandings:**<br>What is a circle?<br>The practical applications of circles and tangents.<br>Source of and use of π.<br>Circumference of a circle.<br>Arc length and measure. | **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.**<br><br>**Learning Activities:**<br><br>**Assessment Models:**<br><br>**Additional Resources:**<br>• **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**<br>• **Geometry Sketchpad**<br>• **Quarterly Assessments**<br>• **Compass Odyssey Learning Paths**<br>• **Geometry Tools for a Changing World:PrenticeHall;1998**<br>• **Math Matters 3: National Textbook Company; 2001** |

| Suggested days of Instruction | Curriculum Management System Subject/Grade Level: **Geometry – 9/10/11/12** | **VIII. Big Idea: Special Right Triangles** | |
|---|---|---|---|
| | | **Topic: Ratio of the length of the sides of 45/45/90 and 30/60/90 triangles.** | |
| | | **Overarching Goals:** (1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes. (2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems. (3) Investigate, research, and synthesize various information from a variety of media sources. | |
| | | **Goal 8:** **The student will be able to use the ratio of the length of the sides of special right triangles to solve problems.** | |
| | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)** **The student will be able to:** | **Essential Questions, Enduring Understandings, Sample Conceptual Understandings** | **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 15 | 8.G.6. Explain a proof of the Pythagorean Theorem and its converse.<br><br>8.G.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.<br><br>8.G.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. | **Essential Questions:**<br>Are there set ratios which can be used to determine the length of the sides of specific types of triangles?<br>What is the ratio for 30-60-90 triangles?<br>What is the ratio for 45-45-90 triangles?<br><br>**Enduring Understandings:**<br>Ratio for 45-45-90 triangle – $1/1/\sqrt{2}$<br>Ratio for 30-60-90 triangle – $1/\sqrt{3}/2$ | **Learning Activities: Isosceles Right Triangle investigation**<br><br>**Assessment Models:**<br><br>**Additional Resources:**<br><br>• **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**<br>• **Geometry Sketchpad**<br>• **Quarterly Assessments**<br>• **Compass Odyssey Learning Paths**<br>• **Geometry Tools for a Changing World:PrenticeHall;1998**<br>• **Math Matters 3: National Textbook Company; 2001** |

| | **Curriculum Management System**<br>**Subject/Grade Level:**<br>**Geometry – 9/10/11/12** | **IX.  Big Idea:** Area of Geometric Figures |
|---|---|---|
| | | **Topic: Determining the area of 2 dimensional figures and the surface area of three dimensional objects.** |
| **Suggested days of Instruction** | | **Overarching Goals:**<br>(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.<br>(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.<br>(3) Investigate, research, and synthesize various information from a variety of media sources. |
| | | **Goal 9: The student will be able to find area of regular and irregular figures and the surface area of solid objects.** |
| | **Objectives / Cluster Concepts /  Cumulative Progress Indicators (CPI's)**<br>**The student will be able to:** | **Essential Questions, Enduring Understandings,**<br>**Sample Conceptual Understandings** | **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 15 | G-GMD.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. | **Essential Questions:**<br>**What is Area?**<br>**How is Area determined fro Irregular shapes?**<br>**How is the formula for common shapes determined.**<br>**What are the formulas for Parallelogram, Triangle, Kite, Trapezoid, Regular Polygons, and Circles.**<br>**How is area used in everyday life? (Carpet, Paint, home size, etc)**<br>**What is Surface Area?**<br><br>**Enduring Understandings:**<br>**Formulas for Area:**<br>  **Parallelogram: A=bh**<br>  **Triangle: A=½bh**<br>  **Kite: A=½$d_1d_2$**<br>  **Regular Polygon: A=½asn**<br>  **Trapezoid: A=½($b_1 \cdot b$+)h**<br>  **Circle: A=πr²**<br>**Ability to solve common area problems.** | **Learning Activities:**<br>Development of area formulas thru a series of specific investigations.<br>Identification of shapes in real world situations; Traffic signs, common architectural styles.<br><br>**Assessment Models:**<br>Area Problems Project<br><br><br>**Additional Resources:**<br><br>- **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**<br>- **Geometry Sketchpad**<br>- **Quarterly Assessments**<br>- **Compass Odyssey Learning Paths**<br>- **Geometry Tools for a Changing World:PrenticeHall;1998**<br>- **Math Matters 3: National Textbook Company; 2001** |

| | Curriculum Management System Subject/Grade Level:<br>**Geometry – 9/10/11/12** | **X.     Big Idea: Volume** |  |
|---|---|---|---|
| | | **Topic: Volume of prisms, pyramids, cylinders, cones, and spheres and the concepts of displacement and densiy.** | |
| | | **Overarching Goals:**<br>(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.<br>(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.<br>(3) Investigate, research, and synthesize various information from a variety of media sources. | |
| | | **Goal 10:**   **The student will able to solve problems involving displacement, density, and volume for a variety of reular and irregular objects..** | |
| **Suggested days of Instruction** | **Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)**<br>**The student will be able to:** | **Essential Questions, Enduring Understandings,**<br>**Sample Conceptual Understandings** | **Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model** |
| 11 | G-GMD.1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone..<br><br>G-GMD.2. (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.<br><br>G-GMD.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.<br><br>G-GMD.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. | **Essential Questions:**<br>**What is Volume and how is it determined?**<br>**What is a prism and how is its volume determined?**<br>**What is a pyramid and how is its volume determined ?**<br>**What is a cone and how is its volume determined?**<br>**What is a Cylinder and how is its volume determined?**<br>**What is a sphere and how is its volume determined?**<br>**What are real world examples of these terms.**<br>**What is displacement, and how does it differ from mass?**<br>**Enduring Understandings:**<br>**Volume formulas for prisms, pyramids, cones, cylinders, and spheres.**<br>**Finding the volume of irregular objects thru displacement or density.**<br>**Applications of volume in everyday life situations.** | **Learning Activities:**<br>Development of volume formulas thru a series of specific investigations.<br><br><br>**Assessment Models:**<br>Volume problems project<br><br>**Additional Resources:**<br><br>• **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**<br>• **Geometry Sketchpad**<br>• **Quarterly Assessments**<br>• **Compass Odyssey Learning Paths**<br>• **Geometry Tools for a Changing World:PrenticeHall;1998**<br>• **Math Matters 3: National Textbook Company; 2001** |

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|---|---|---|
| **Suggested days of Instruction** | **Curriculum Management System**<br>**Subject/Grade Level:**<br>**Geometry – 9/10/11/12** | **XI.**  **Big Idea: Similarity** |

**Topic:** What is similarity, how is it determined in triangles and polygons, and what is its application in both area and volume.

**Overarching Goals:**
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.

**Goal 11:**   The student will be able to determine if figures are similar and if so then determine the appropriate ratio for either area or volume.

| 11 | G-SRT.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.<br><br>G-SRT.4. Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*<br><br>G-SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. | **Essential Questions:**<br>**How are ratios and proportions used in real world situations? (recipes, scale drawings, maps)**<br>**What is similarity?**<br>**How can I determine if shapes are similar?**<br>**How can I use similarity in shapes to determine missing dimensions?**<br>**How are areas of similar figure related?**<br>**How are the volumes of similar figures related?**<br><br>**Enduring Understandings:**<br>**Setting up and solving Ratios and Proportions.**<br>**Using the definition of ratios and proportions to solve problems.**<br>**Applications of the Area relationship for similar figures.**<br>**Applications of the Volume relationship for similar figures.** | **Learning Activities:**<br>Development of similarity relationships for area and volume thru a series of specific investigations.<br><br>**Assessment Models:**<br><br><br>**Additional Resources:**<br><br>• **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**<br>• **Geometry Sketchpad**<br>• **Quarterly Assessments**<br>• **Compass Odyssey Learning Paths**<br>• **Geometry Tools for a Changing World:PrenticeHall;1998**<br>• **Math Matters 3: National Textbook Company; 2001** |

| | | **XII.**     **Big Idea: Trigonometry** | |
|---|---|---|---|
| **Suggested days of Instruction** | **Curriculum Management System**<br><br>**Subject/Grade Level:**<br><br>**Geometry – 9/10/11/12** | **Topic: Basic trigonometric ratios and their usage in determining the length of sides or the size of angles** | |
| | | **Overarching Goals:**<br>(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.<br>(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.<br>(3) Investigate, research, and synthesize various information from a variety of media sources. | |
| | | **Goal 12:**     **The student will be able to use trigomometric ratios to solve problems.** | |
| 11 | G-SRT.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.<br><br>G-SRT.7. Explain and use the relationship between the sine and cosine of complementary angles.<br><br>G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. | **Essential Questions:**<br>**When does Right Triangle Trigonometry apply?**<br>**What Sine, Cosine, and Tangent, and how are they determined and applied?**<br>**What is the Law of Sines and how can it be used to find the length of a missing side or the measure of a missing angle?**<br><br>**Enduring Understandings:**<br>**SohCahToa**<br>**How to use a trig Table of values.**<br>**How to use a calculator to find trig ratios and their inverse.**<br>**How to find the unknown length of a side or the measure of an angle.**<br>**Angles of Elevation**<br>**Angles of Depression**<br>**Law of Sines** | **Learning Activities:**<br><br><br>**Assessment Models:**<br>**Problem Solving with Right Angles.**<br>**Problem solving with Trigonometry**<br><br><br>**Additional Resources:**<br><br>• **Discovering Geometry An Investigative Approach: Michael Sierra; 2008**<br>• **Geometry Sketchpad**<br>• **Quarterly Assessments**<br>• **Compass Odyssey Learning Paths**<br>• **Geometry Tools for a Changing World:PrenticeHall;1998**<br>• **Math Matters 3: National Textbook Company; 2001** |

# GEOMETRY

## COURSE BENCHMARKS

1. The student will be able to identify and use parts and types of lines, angles, and planes in problem solving

2. The student will be able to use logic al reasoning to solve problems.

3. The student will be able to use angle relationships with parallel and perpendicular lines to solve problems.

4. The student will be able to use triangle classifications, the relationship of sides and angles in triangles and congruent triangles to solve problems.

5. The student will be able to use the properties of polygons to solve problems, with a focus on the various types of quadrilaterals.

6. The student will be able to determine slope and length of line segments, use that information to classify, and compare and contrast geometric figures on a coordinate plane.

7. The student will be able to use and apply the properties of lines and angles in circles.

8. The student will be able to use the ratio of the length of the sides of special right triangles to solve problems.

9. The student will be able to find area of regular and irregular figures and the surface area of solid objects.

10. The student will be able to determine if figures are similar and if so then determine the appropriate ratio for either area or volume.

11. The student will be able to determine if figures are similar and if so then determine the appropriate ratio for either area or volume.

12. The student will be able to use trigonometric ratios to solve problems