PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Concepts of Geometry

Curriculum writing committee:

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Grade Level: 11,12

Date of Board Approval: _____2020_____

Concepts of Geometry Grading Policy Target Points

Gradebook for Concepts of Geometry

Marking Period	Quiz	Test	Homework + Class Participation	Projects
MP1	10%	40%	10%	40%
MP 2	10%	40%	10%	40%
MP 3	10%	40%	10%	40%
MP 4	10%	40%	10%	40%
Total Percents	10%	40%	10%	40%

Curriculum Map

Overview:

This course follows Algebra 2. The course of study focuses on the major topics of Euclidean Geometry, including segments and angles, polygons and congruence/similarity, parallel lines and angle relationships, right triangle relationships, circles, and measurements in multi-dimensional figures. Students enrolled will receive practice and hands-on exploration necessary for them to succeed in further studies and important standardized tests.

Time/Credit for the Course: 2 semesters 1 credit, 180 days, meeting 1 period per day

Goals:

1. Students will learn data analysis techniques as well as apply probability rules to tables and Venn diagrams.
2. Students will apply algebraic processes to determine segment lengths, congruence, and angles measures.
3. Students will develop an initial understanding of logical reasoning and proof.
4. Students will prove and apply geometric theorems involving congruent triangles.
5. Students will prove theorems involving parallel lines cut by a transversal.
6. Students will apply theorems involving parallel lines.
7. Students will identify, prove, and apply properties of parallelograms.
8. Students will apply geometric theorems involving special relationships within triangles algebraically.
9. Students will prove and apply theorems involving similar triangles.
10. Students will use the Pythagorean Theorem, special right triangles, or trigonometry to "solve" right triangles.
11. Students will determine the measurements of angles, arcs and segments within circles.
12. Students will calculate the perimeter, area, surface area, and volume of two and three-dimensional objects

Curriculum Map

Unit #1:
- Basic geometric terms and concepts: points, lines and planes
- Congruence (segments and angles)
- Midpoint and distance formulas
- Measuring and classifying angles, including special angle pair relationships
- Inductive versus deductive reasoning
- Logically equivalent statements (conditional, converse, inverse, contrapositive)
- Postulates versus theorems
- Parallel and perpendicular lines and angles

Unit #2:
- Recognizing properties of Congruent triangles
- Identifying triangles that are congruent.
- Isosceles and equilateral triangles
- Special segments within triangles
- Triangle inequality theorem
- Similar polygons, focusing on similar triangles
- Applications involving similarity

Unit #3:
- Right triangles and the Pythagorean Theorem
- Special right triangles
- Trigonometric ratios (sine, cosine, and tangent ratios)
- Applications involving trigonometry
- Properties of polygons
- Properties of parallelograms
- Properties of special parallelograms (rectangles, rhombuses, squares)
- Coordinate geometry applications of parallelograms
- Properties of trapezoids

Unit #4:
- Circles (Specific terms, special segments, special angles)
- Area versus perimeter of polygons
- Area and circumference of circles, including arc length and area of sectors
- Area of regular polygons
- Surface area of solids
- Volume of solids

Big Ideas:
- Big Idea #1: There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.

- Big Idea #2: Mathematical statements can be justified through deductive and inductive reason and proof.
- Big Idea #3: Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools
- Big Idea #4: Euclid's fifth postulate, known as the parallel postulate, is an essential axiom in Euclidean Geometry. Angle measurements are derived from the relationships of parallel and perpendicular lines. The parallel postulate allows these fundamental relationships to hold true.
- Big Idea #5: Patterns exhibit relationships that can be extended, described, and generalized.
- Big Idea #6: Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization

Textbook and Supplemental Resources:

Glencoe Geometry, 2018, McGraw-Hill Education, 978-0-07-903994-1
Kuta Software: Geometry
Geometer Sketchpad
GeoGebra
Desmos

Curriculum Plan

Unit #1   **Time/Days: 45**

- **Standards (by number):** http://static.pdesas.org/content/documents/CF-Math_Geo_2016.pdf
  CC.2.3.HS.A.2, CC.2.3.HS.A.3, CC.2.3.HS.A.6, CC.2.3.HS.A.11,CC.2.2.HS.D.1,
  CC.2.2.HS.D.8, CC.2.2.HS.D.9, 2.3.G.C, 2.4.G.A, 2.8.G.B, 2.2.A1.C, CC.2.4.HS.B,
  CC.2.4.HS.B.6 , C.2.4.HS.B.4

- **Anchors:** A1.1.1.3.1, A1.1.1.5.1, G.1.2.1.1, G.1.2.1.4, G.1.3.1.1, G.1.3.2.1, G.2.1.2.1,
  G.2.1.2.3, G.2.2.1.1, G.2.2.1.2

- **Eligible Content:**
  Basic geometric terms and concepts: points, lines and planes
  Congruence (segments and angles)
  Midpoint and distance formulas
  Measuring and classifying angles, including special angle pair relationships
  Inductive versus deductive reasoning
  Logically equivalent statements (conditional, converse, inverse, contrapositive)
  Postulates versus theorems

Objectives:

1. Students will be able to use segment postulates to identify congruent segments and find lengths of segments in the coordinate plane. (DOK – Level one)
2. Students will be able to use special angle relationships (vertical angles, linear pairs, complementary angles, supplementary angles) to determine angle measures. (DOK – Level One)
3. Students will be able to use inductive reasoning to discern and describe patterns. (DOK – Level Three)
4. Students will be able to re-write statements as conditional statements as well as transform statements to the converse, inverse and contrapositive, recognizing which statements are logically equivalent. (DOK – Level one)
5. Students will be able to use deductive reasoning to construct a logical argument, including algebraic properties when appropriate. (DOK – Level Three)
6. Students will be able to use postulates involving points, lines, and planes. (DOK – Level Three)
7. Students will be able to apply properties of special pairs of angles. (DOK – Level Four) Students will be able to identify angle pairs formed by two lines cut by a transversal. (DOK – Level One)
8. Students will be able to use angles formed by parallel lines and transversals. (DOK – Level Two)

9. Students will be able to use angle relationships to demonstrate whether lines are parallel. (DOK – Level Four)
10. Students will be able to apply theorems involving perpendicular lines. (DOK – Level Two)

Core Activities and Corresponding Instructional Methods: (be specific, list activities related to materials/resources, include hot links, article titles etc.)

1. Students will perform various logic puzzles to learn higher order thinking/reasoning skills to draw a specific conclusion
2. Students will use geometer's sketchpad to identify properties of points, lines, and planes and discover theorems on terms such as complementary, supplementary, vertical angles, and linear pairs.
3. Use Geometer's Sketchpad to show the idea of betweenness of points or segment addition postulate. That only A, B, and C are collinear does AB + BC = AC
4. Students will derive the distance formula from the Pythagorean Theorem.
5. Prove how angle relationships involving alternate interior, alternate exterior, same side interior, and same side exterior angles imply parallel.
6. Algebra applications with parallel and perpendicular lines, including ratios, systems of equations, and linear equations.

Assessments:

- o **Diagnostic:**
    Glencoe Geometry Support File Chapter 1, 2, and 12
    Teacher prepared pre-test/diagnostic test
    Teacher questioning and observation
    Keystone Benchmark Assessment

- o **Formative:**
    Teacher observations, questions, discussions
    Teacher assigned homework
    Teacher prepared assessments (quizzes and graded assignments)
    Warm Ups

- o **Summative:**
    Probability Unit Common Assessment (Chapter 12 Sections 12.2, 12.5-12.8)
    Tools of Geometry Common Assessment (Chapter 1 Sections 1.1-1.5)
    Logic Common Assessment (Chapter 2 Sections 2.1-2.5)

Unit #2   **Time/Days: 45**

- **Standards (by number):**
  http://static.pdesas.org/content/documents/CF-Math_Geo_2016.pdf
  CC.2.3.HS.A.1, CC.2.3.HS.A.2, CC.2.3.HS.A.3, CC.2.3.HS.A.4, CC.2.3.HS.A.5, CC.2.3.HS.A.6,
  CC.2.3.HS.A.11, CC.2.3.HS.A.13, CC.2.2.HS.D.1, CC.2.2.HS.D.7, CC.2.2.HS.D.8,
  CC.2.2.HS.D.9, CC.2.2.HS.D.10, 2.3.G.C, 2.4.G.A, 2.8.G.B, 2.9.G.A, 2.9.G.B, 2.9.G.C,
  2.2.A1.C

- **Anchors:** A1.1.1.3.1, A1.1.1.5.1, G.1.2.1.1, G.1.2.1.3, G.1.3.1.1, G.1.3.1.2, G.1.3.2.1,
  G.2.1.2.1, G.2.1.2.2, G.2.1.2.3, G.2.2.1.1

- **Eligible Content:**
  Congruent triangles
  Identifying congruent triangles
  Isosceles and equilateral triangles
  Special segments within triangles
  Triangle inequality theorem
  Similar polygons, focusing on similar triangles
  Applications involving similarity

Objectives:

1. Students will be able to classify triangles and find measures of their angles. (DOK – Level Two)
2. Students will be able to identify congruent figures, accurately stating the congruence relationship. (DOK – Level Three)
3. Students will be able to use sides and angles to show triangles are congruent. (DOK – Level Four)
4. Students will be able to use congruent triangles to identify whether corresponding parts are congruent. (DOK – Level Four)
5. Students will be able to use properties of isosceles and equilateral triangles to find missing sides and angles. (DOK – Level Four)
6. Students will be able to use properties of midsegments and write coordinate geometry proofs. (DOK – Level Four)
7. Students will be able to use perpendicular bisectors, angle bisectors, medians and altitudes to solve problems. (DOK – Level Three)
8. Students will be able to find possible side lengths of a triangle (Triangle Inequality Theorem). (DOK – Level Three)
9. Students will be able to identify similar polygons. (DOK – Level Three)
10. Students will be able to prove that triangles are similar. (DOK – Level Three)
11. Students will be able to use proportions to solve geometry problems (applications of similarity). (DOK – Level Three)

Core Activities and Corresponding Instructional Methods: (be specific, list activities related to materials/resources, include hot links, article titles etc.)

1. Students will investigate What We Know Problems to identify conclusions from knowing the given information.
2. Prove that the sum of the interior angles in a triangle are 180 degrees by having the students "rip" the angles of a triangle and making the angles adjacent
3. Students will solve algebra applications with triangle properties, including ratio, systems, and linear equations.
4. Discover methods to prove polygons similar via Geometer's Sketchpad
5. Applications with Angle-Angle similarity to use with similar triangles.
6. Algebra applications with similarity.

Assessments:

- o **Diagnostic:**
  Glencoe Geometry Support File Chapter 2 and 4
  Teacher prepared pre-test/diagnostic test
  Teacher questioning and observation
  Keystone Benchmark Assessment

- o **Formative:**
  Teacher observations, questions, discussions
  Teacher assigned homework
  Teacher prepared assessments (quizzes and graded assignments))
  Warm Ups

- o **Summative:**
  Congruent Triangles Common Assessment (Chapter 4 Sections 4.1-4.7)
  Parallel Lines Common Assessment (Chapter 2 Sections 2.6-2.9)

Unit #3   **Time/Days: 45**

- **Standards (by number):** http://static.pdesas.org/content/documents/CF-Math_Geo_2016.pdf
  CC.2.3.HS.A.1, CC.2.3.HS.A.3, CC.2.3.HS.A.4, CC.2.3.HS.A.7, CC.2.3.HS.A.11,
  CC.2.3.HS.A.13, CC.2.2.HS.D.1, CC.2.2.HS.D.7, CC.2.2.HS.D.8, CC.2.2.HS.D.,
  CC.2.2.HS.D.10, 2.3.G.C, 2.4.G.A, 2.8.G.B, 2.9.G.A, 2.9.G.B, 2.9.G.C, 2.10.G.A, 2.11.G.A,
  2.2.A1.C

- **Anchors:** A1.1.1.3.1, A1.1.1.5.1, G.1.2.1.1, G.1.2.1.2, G.1.2.1.3, G.1.3.2.1, G.2.1.1.1,
  G.2.1.1.2, G.2.2.1.1, G.2.2.1.2

- **Eligible Content:**
  Right triangles and the Pythagorean Theorem
  Special right triangles
  Trigonometric ratios (sine, cosine, and tangent ratios)
  Applications involving trigonometry
  Properties of polygons
  Properties of parallelograms
  Properties of special parallelograms (rectangles, rhombuses, squares)
  Properties of trapezoids

Objectives:

1. Students will be able to apply the Pythagorean Theorem to find side lengths in right triangles. (DOK – Level Four)
2. Students will be able to classify a triangle by applying the converse of the Pythagorean Theorem. (DOK – Level Four)
3. Students will be able to use the relationships between the sides of special right triangles. (DOK – Level Two)
4. Students will be able to apply the sine, cosine, and tangent ratios to find the side lengths in right triangles. (DOK – Level Four)
5. Students will be able to apply the inverse sine, cosine, and tangent ratios to find angle measures. (DOK – Level Four)
6. Students will be able to calculate interior and exterior angle measures in polygons, including angles in regular polygons. (DOK – Level One)
7. Students will be able to identify, prove, and then apply properties of parallelograms to determine angle and side measures. (DOK – Level One)
8. Students will be able to use properties to identify special parallelograms. (DOK – Level Two)
9. Students will be able to identify, prove, and then apply properties of rhombuses, rectangles, and squares. (DOK – Level Four)

10. Students will be able to identify and apply properties of trapezoids. (DOK – Level Four)
11. Students will be able to identify special quadrilaterals, given specific properties. (DOK – Level Two)

Core Activities and Corresponding Instructional Methods: (be specific, list activities related to materials/resources, include hot links, article titles etc.)

1. Investigate the rules for special right triangles. Use the Pythagorean theorem to show that for similar triangles the relationship between angles and sides are always the same.
2. Tell the story of Soh-Cah-Toa to build the trigonometric ratios in right triangles. Build off previous knowledge of special right triangles.
3. Apply trigonometric functions to real-world scenarios that require the calculation of a specific distance or angle measure.
4. Discover the formulas for polygons (number of diagonals, interior, and exterior angles) through examples and deductive reasoning.
5. Problem solving activities with polygons that challenge students to apply the formulas to solve.
6. Students discover the relationships of quadrilaterals via Geometer's Sketchpad
7. Students will work in teams to prove the relationships they discovered about quadrilaterals and present them to the class.
8. Algebra applications with quadrilaterals including ratio and systems of equations.
9. Using slope and distance formula explain why the given quadrilateral is or is not a parallelogram, rhombus, rectangle, or square.

Assessments:

o **Diagnostic:**
   Glencoe Geometry Support File Chapter 5, 6, 7, and 8
   Teacher prepared pre-test/diagnostic test
   Teacher questioning and observation
   Keystone Benchmark Assessment

o **Formative:**
   Teacher observations, questions, discussions
   Teacher assigned homework
   Teacher prepared assessments (quizzes and graded assignments))
   Warm Ups
o **Summative:**
   Quadrilaterals Common Assessment (Chapter 6 Sections 6.1-6.6)
   Relationships in Triangles Common Assessment (Chapter 5 Sections 5.1-5.3, 5.5-5.6)
   Similarity Common Assessment (Chapter 7 Sections 7.2-7.6)
   Right Triangle Common Assessment (Chapter 8 Sections 8.2-8.5)

Unit #4   **Time/Days: 45**

- **Standards (by number): mber):** http://static.pdesas.org/content/documents/CF-Math_Geo_2016.pdf
  CC.2.3.HS.A.3, CC.2.3.HS.A.7, CC.2.3.HS.A.8, CC.2.3.HS.A.9, CC.2.3.HS.A.13, CC.2.3.HS.A.14, CC.2.2.HS.D.1, CC.2.2.HS.D.7, CC.2.2.HS.D.8, CC.2.2.HS.D.9, CC.2.2.HS.D.10, 2.3.G.C, 2.3.G.E, 2.4.G.A, 2.7.G.A, 2.8.G.B, 2.9.G.A, 2.9.G.B, 2.9.G.C, 2.10.G.A, 2.11.G.A, 2.11.G.C, 2.2.A1.C

- **Anchors:** A1.1.1.3.1, A1.1.1.5.1, G.1.1.1.1, G.1.1.1.2, G.1.1.1.3, G.1.1.1.4, G.1.2.1.1, G.1.2.1.2, G.1.2.1.3, G.1.2.1.4, G.1.2.1.5, G.1.3.2.1, G.2.1.1.1, G.2.1.1.2, G.2.2.1.1, G.2.2.1.2, G.2.2.2.1, G.2.2.2.2, G.2.2.2.3, G.2.2.2.24, G.2.2.2.5, G.2.3.1.1, G.2.3.1.2, G.2.3.1.3

- **Eligible Content:**
  Circles (Specific terms, special segments, special angles)
  Proofs involving circles
  Area versus perimeter of polygons
  Area and circumference of circles, including arc length and area of sectors
  Area of regular polygons
  Surface area of solids
  Volume of solids

Objectives:

1. Students will be able to apply the properties of a tangent within a circle. (DOK – Level Four)
2. Students will be able to use the measures of central angles to calculate arc measures. (DOK – Level One)
3. Students will be able to apply the relationships between arcs and chords in a circle. (DOK – Level Four)
4. Students will be able to calculate the measure of an arc or an angle using inscribed angles of a circle. (DOK – Level One)
5. Students will be able to calculate segment length in circles. (DOK – Level One)
6. Students will be able to calculate the area of triangles and parallelograms. (DOK – Level One)
7. Students will be able to calculate the areas of other types of quadrilaterals. (DOK – Level Two)
8. Students will be able to calculate the arc lengths and circumference of a circle. (DOK – Level Two)
9. Students will be able to calculate the area of circles and sectors. (DOK – Level Two)
10. Students will be able to calculate the area of regular polygons inscribed in circles. (DOK – Level Four)

11. Students will be able to identify solids. (DOK – Level Two)
12. Students will be able to calculate the surface areas of prisms, cylinders, pyramids, cones, and spheres. (DOK – Level One)
13. Students will be able to calculate the volume of prisms, cylinders, pyramids, cones, and spheres. (DOK – Level One)

Core Activities and Corresponding Instructional Methods: (be specific, list activities related to materials/resources, include hot links, article titles etc.)

1. Use Geometer's Sketchpad to discover relationships between angles and segments in circles.
2. Algebra applications with circles including writing the equation of a circle.
3. Use Geometer's Sketchpad to show how regular polygons get closer to a circle as the number of sides increases. Make the connection to limits for the future.
4. Discover the formulas for regular polygons area and perimeter.
5. Discover formulas for arc length, area of a sector, and segment of a circle.
6. Discover formulas for volume and surface area of solids
7. Real world applications with solids.

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Assessments:

- o **Diagnostic:**
    Glencoe Geometry Support File Chapter 1, 9, 10, and 11
    Teacher prepared pre-test/diagnostic test
    Teacher questioning and observation
    Keystone Benchmark Assessment

- o **Formative:**
    Teacher observations, questions, discussions
    Teacher assigned homework
    Teacher prepared assessments (quizzes and chapter tests)
    Warm Ups

- o **Summative:**
    Circle Common Assessment (Chapter 9 Sections 9.2 – 9.1)
    Area and Perimeter Common Assessment (Sections 1.6, 9.1, 10.1-10.5)
    Surface Area and Volume Common Assessment (Sections 1.8-1.9, 10.6, 11.2-11.4)
    Final Exam Common Assessment

Please Go to Human Resources page on the Delaware Valley School District website for updated Payment form to be submitted.

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