# East Penn School District
## Secondary Curriculum

A Planned Course Statement
for

**GEOMETRY CP**

Course #   **312**                                     Grade(s)  9 -12

Department:                    Mathematics

Length of Period (mins.)         41     Total Clock Hours:         123

Periods per Cycle:        6                   Length of Course (yrs.)   1

Type of Offering:         _____ required        √  elective

Credit:        1

Adopted:      6/28/10

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**Description of Course 312:**


**Course Title:** Geometry CP


**Description:** This course is designed to give considerable attention to developing an understanding of the nature of deductive proof, the role of definitions, and the meanings and use of assumptions in writing proofs. Students are encouraged to think of geometry as opposed to a less precise system based only upon observation and measurement. This course includes the study of both plane and solid figures.

**Goals:**
- To understand geometry as a mathematical system and to be able to think logically, analyze situations, and form substantiated conclusions.

 **Requirements:**
- Must have at least a 74% in Algebra 1.

**Text:** Charles, R. I., Hall, B., Kennedy, D., Bass, L.E., Johnson, A., Haenisch, S., Murphy, S.J., & Wiggins, G. (2011).
Prentice Hall Geometry. Boston, MA: Pearson.


*** _**A graded project will be completed during each semester in this course.**_

*** _**Careers that utilize the mathematics taught in this course will be discussed during the first semester.**_


### Key to Levels of Achievement (Listed with each learning objective)

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|---|---|
| Awareness (A): | Students are introduced to concepts, forms, and patterns. |
| Learning (L): | Students are involved in a sequence of steps and practice activities that involved further development and allow evaluation of process. |
| Understanding (U): | Students demonstrate ability to apply acquired concepts and skills to individual assignments and projects on an independent level. |
| Reinforcement (R): | Students maintain and broaden understanding of concepts and skills to accomplish tasks at a greater level of sophistication. |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|---|---|---|---|---|---|---|
| **Tools of Geometry** | 1 | Students will define, identify, and correctly label points, lines and planes. | A | • Define point, line, and plane. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 G<br>2.9.8 B<br>2.9.11 A<br>(M11.C.3.1) |
| | 2 | Students will define and identify lines, segments and rays.<br><br>Students will differentiate between acute, right, obtuse, and straight angles.<br><br>Students will use the angle and segment measurement postulates.<br><br>Students will use the perpendicular and angle bisector theorem | U<br><br>R<br><br><br>R<br><br>U | • Define line, segment, ray.<br>• Explain the difference between angle types<br>• Solve problems segment addition and angle addition postulates<br>• Solve problems using perpendicular and angle bisectors | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 3 | Students will calculate distances and midpoint using the distance and midpoint formulas. | R | • Use the distance formula to calculate the distance between 2 points.<br>• Use the midpoint formula to determine the midpoint of two coordinates | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| **Reasoning and Proof** | 4 | Students will identify the hypothesis and conclusion in conditional statements and then write the converses of the statements. | U | • Determine hypothesis and conclusion of a conditional statement<br>• Write the converse of a conditional statement | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 G<br>2.9.11 B<br>(M11.C.3.1) |
| | 5 | Students will relate geometry to algebra by writing elementary mathematical proofs. | U | • Write algebraic proofs | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 6 | Students will use the laws of logic with conditional statements. | U | • Form conclusions using the Law of Syllogism and the Law of Detachment. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|---|---|---|---|---|---|---|
| **Parallel and Perpendicular Lines** | 7 | Students will use the properties of parallel lines and transversal to make conclusions about angles and to prove lines parallel. | U | • Explain the difference between alternate interior, same side interior, and corresponding angles.<br>• Solve problems that have parallel lines that are cut by a transversal. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 G<br>2.9.8.E<br>(M11.C.3.1) |
| | 8 | Students will classify triangles according to their sides and angles. | U | • Identify specific triangle types and explain the properties those triangles possess. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 9 | Students will define and classify polygons according to the terms convex and concave. | U | • Explain the difference between concave and convex polygons. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 10 | Students will classify polygons by sides. | R | • Identify polygons based on sides<br>• Use angle sum theorem | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 11 | Students will define the term regular polygon and calculate the measures of their interior and exterior angles. | U | • Solve problems involving interior and exterior angles of regular polygons | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessment | |
| **Congruent Triangles** | 12 | Students will write proofs using various styles of proofs. | U | • Construct two column proofs | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 B<br>(M11.C.1.3) |
| | 13 | Students will prove two right triangles are congruent. | U | • Use the HL theorem in proofs | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|---|---|---|---|---|---|---|
| | 14 | Students will identify corresponding parts of congruent triangles. | U | • Explain why triangles are congruent. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 15 | Students will use the congruence postulates SSS, SAS, ASA, and AAS congruence theorem. | R | • Discover SSS, SAS, ASA, and AAS and explain why they can be used to prove triangles are congruent. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 16 | Students will define and use CPCTC. | U | • Prove corresponding parts of congruent triangles are congruent. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 17 | Students will identify properties of isosceles and right triangles. | U | • Use isosceles triangle theorem and its converse to complete proof and solve problems. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| **Relationships within triangles-** | 18 | Students will recognize and differentiate between median, angle bisector, altitude, and perpendicular bisector. | U | • Define median, angle bisector, altitude, and perpendicular bisector.<br>• Solve problems that involve median, angle bisector, altitude, and perpendicular bisector. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 C<br>2.9.11 D<br>(M11.C.1.2) |
| | 19 | Students will define centroid. | U | • Explain the properties of the intersection of the median, angle bisector, altitude, and perpendicular bisector in a triangle | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 20 | Students will use the midsegment theorem. | U | • Solve problems that use the midsegment theorem | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|---|---|---|---|---|---|---|
| | 21 | Students will compare the measure of triangle and use the triangle inequality theorem as well as the SAS inequality theorem. | U | • Explain the measure of triangle and use the triangle inequality theorem as well as the SAS inequality | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 22 | Students will read and write indirect proofs. | U | • Form conclusions using indirect reasoning. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| **Quadrilaterals** | 23 | Students will define a parallelogram and identify its properties. | U | • Define each type of quadrilateral.<br>• Identify the properties that each quadrilateral possesses. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 C<br>2.9.11 G<br>2.9.8 C<br>(M11.C.1.2.2) |
| | 24 | Students will prove that a parallelogram is a quadrilateral. | R | • Explain why a parallelogram is a quadrilateral | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 25 | Students will identify and differentiate between special parallelograms. | R | • Explain the difference between each type of parallelogram. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 26 | Students will identify trapezoids and its properties including the midsegment theorem of a trapezoid. | U | • Solve problems that involve the midsegment theorem for trapezoids. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| **Area** | 27 | Students will use the Pythagorean theorem and its converse. | R | • Explain the origin of the Pythagorean Theorem.<br>• Solve problems that use the Pythagorean Theorem. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.10.11 B<br>2.9.11 G<br>2.9.11 I<br>(M11.C.1.4) |
| | 28 | Students will determine the type of triangle when given the measures of the three angles. | R | • Classify 30-60-90 and 45-45-90 triangles and their properties. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|---|---|---|---|---|---|---|
| | 29 | Students will apply ratio involved when finding the sides of 30-60-90 and 45-45-90 triangles. | R | • Calculate unknown sides of 30-60-90 and 45-45-90 triangles. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 30 | Students will calculate the perimeter of polygons. | U | • Calculate Perimeter and Area of Polygons | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 31 | Students will find the area of triangles and special quadrilaterals. | R | • Calculate the area of a triangle<br>• Calculate the area of a special polygon | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 32 | Students will use the formula to find the area of regular polygons. | U | • Calculate the area of regular polygons | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 33 | Students will calculate the area of circles and regions of circles. | R | • Calculate the area of a circle<br>• Calculate the area of a sector in a circle | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 34 | Students will find the geometric probability of a specific event. | U | • Apply techniques of solving for the area of a geometric figure to determine probability of events. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| **Similarity** | 35 | Students will define ratios and proportions and use its properties such as the geometric mean. | U | • Define ratio and proportions<br>• Calculate geometric mean | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 B<br>2.9.8 F<br>(M.11.C.1.3) |
| | 36 | Students will use a problem-solving plan to solve word problems involving proportions. | R | • Solve word problems that involve proportions<br>• Explain the steps used to solve word problems involving proportions | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|------|-----|-----------|-------|---------|------------|----------|
| | 37 | Students will define, identify and prove triangles similar. | U | • Define similar triangles<br>• Provide evidence that proves triangles are similar<br>• Explain why triangles are similar | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 38 | Students will develop and apply the similarity theorems for triangles. | U | • Develop proofs that prove similarity theorems.<br>• Use the similarity theorems to prove two triangles are similar | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 39 | Students will use the properties of right triangles involving geometric means to find a missing side in right triangles. | U | • Calculate unknown sides of right triangles that are formed by an altitude drawn inside a right triangle. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| **Right Triangle Trigonometry** | 40 | Students will use trig ratios to find missing sides or angles in right triangles. | U | • Use trig ratios to calculate unknown sides in right triangles<br>• Use inverse trig ratios to determine unknown angles in right triangles | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.10.11 B |
| **Circles** | 41 | Students will define the basic terms related to circles such as diameter, radius, chord, secant, tangent, arc, etc. | U | • Define diameter, radius, chord, secant, tangent, arc, intercepted arc.<br>• Explain what makes a chord a diameter<br>• Explain the difference between a chord and a secant | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 F<br>2.9.11 E<br>(M.11.C.1.1) |
| | 42 | Students will use theorems related to circles and lines. | U | • Explain why a line is tangent to a circle.<br>• Find unknown lengths of intersecting segments that are tangent to the same circle | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |
| | 43 | Students will use theorems related to arc/angles measurements. | U | • Prove congruent arcs have congruent central angles<br>• Prove congruent central angles have congruent chords<br>• Prove congruent chords are equidistant from the center of congruent circles | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|---|---|---|---|---|---|---|
| | | | | • Prove that inscribed angles are half the measure of its intercepted arc<br>• Prove that the measure of an angle formed by a chord and a tangent line is half the measure of the intercepted arc.<br>• Solve problems that use the theorems that were proved above. | | |
| **Surface Area and Volume** | 44 | Students will find the surface area of prisms, cylinders, pyramids, cones, and spheres. | U | • Use formulas to calculate the surface area of 3-dimensional figures | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | 2.9.11 I<br>2.9.8 D<br>(M.11.C.1.3.1) |
| | 45 | Students will calculate the volumes of prisms, cylinders, pyramids, cones, and spheres. | U | • Use formulas to calculate the volume of 3- dimensional figures. | • Teacher Observation<br>• Assignments<br>• Quizzes<br>• Tests<br>• Alternative Assessments | |