Pine Grove Area

SCHOOL DISTRICT

MATHEMATICS

CT GEOMETRY

October 15, 2009

I. PHILOSOPHY

The CT Geometry course reflects the complexity and sophistication that students are expected to demonstrate on the geometry portion of the Grade 11 PSSA. It will reinforce previous learning that enables the students to communicate mathematically, use mathematics as a tool to help organize and understand information from other academic disciplines, and use technology effectively to enhance their learning of mathematics concepts and skill. The course will allow for the accommodation of many learning styles, motivational levels, and academic abilities.

II. CORE CONCEPTS

1. Terms & definitions: points, lines, planes, angles, coordinate plane, midpoint, length, congruence

2. Reasoning & proofs: conjectures, inductive reasoning, if-then statements, postulates, deductive reasoning, verify segment relationships and angle relationships by proof

3. Parallel & perpendicular lines: transversals, angles, slope, distance, proving parallel

4. Congruent triangles: classifying triangles, measuring angles in triangles, constructing and proving congruent triangles, isosceles triangles, right triangles, inequalities for sides and angles

5. Quadrilaterals: parallelograms, rectangles, squares, rhombi, kites, trapezoids, similar polygons, identifying similar triangles, parts of similar triangles

6. Right triangles & trigonometry: Pythagorean Theorem, geometric mean, special right triangles, ratios in right triangles, angles of elevation and depression, Law of Sines, Law of Cosines

7. Circles: angles, arcs, chords, tangents, secants

8. Area: parallelograms, triangles, rhombi, trapezoids, regular polygons, circles

9. Surface area: nets, prisms, cylinders, pyramids, cones, spheres

10. Volumes: prisms, cylinders, pyramids, cones, spheres

III. COURSE OF STUDY

A. Course Name: CT Geometry

B. Grade Level: 9-10

C. Length of Course: one semester

1. Frequency: daily

2. Duration: two periods

D. Academic Level: Career Technical

E. Credits: 1

F. Prerequisites: None

G. Course Description:

This course deals with the logical development of Euclidean geometry through the application of definitions and theorems in completing proofs and in problem solving through analytic geometry in a variety of practical and theoretical situations. Topics include congruent and similar polygons, parallel lines, circles, the Pythagorean Theorem and related right triangles, as well as measurements and constructions of various models and the calculation of perimeter, area, and volume.

IV. CONTENT: CT GEOMETRY

CORE CONCEPT 1: Terms & definitions

MAJOR OBJECTIVE: points, lines, planes, angles, coordinate plane, midpoint, length, congruence

CURRICULUM STANDARD:			
PA State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.5.11.B Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.	Teacher will guide students to: Graph ordered pairs on a coordinate plane. Identify and model points, lines, and planes. Identify collinear points. Identify coplanar points and intersecting lines and planes. Identify and classify angles. Identify and use congruent angles and the bisector of an angle. Identify and use adjacent, vertical, complementary, supplementary, and linear pairs of angles, and perpendicular lines.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 1: Terms & definitions
MAJOR OBJECTIVE: points, lines, planes, angles, coordinate plane, midpoint, length, congruence

CURRICULUM STANDARD:			
PA State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.5.11.A Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.	Teacher will guide students to: Solve problems by using formulas. Find the distance between two points on a number line and between two points in the coordinate plane. Use the Pythagorean Theorem to find the length of the hypotenuse. Find the midpoint of a segment.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 2: Reasoning & proofs
MAJOR OBJECTIVE: conjectures, inductive reasoning, if-then statements, postulates, deductive reasoning, verify segment relationships and angle relationships by proof

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.4.11.A Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.	Teacher will guide students to: Make conjectures based on inductive reasoning. Write a statement in if-then form. Write the converse, inverse, and contrapositive of an if-then statement. Identify and use basic postulates about points, lines, and planes. Use the Law of Detachment and the Law of Syllogism in deductive reasoning. Use indirect reasoning and indirect proof to reach a conclusion.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 2: Reasoning & proofs
MAJOR OBJECTIVE: conjectures, inductive reasoning, if-then statements, postulates, deductive reasoning, verify segment relationships and angle relationships by proof

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.4.11.C Determine the validity of an argument.	Teacher will guide students to: Test the validity of conditional statements that involve mathematical sentences in one variable.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 2: Reasoning & proofs
MAJOR OBJECTIVE: conjectures, inductive reasoning, if-then statements, postulates, deductive reasoning, verify segment relationships and angle relationships by proof

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.4.11.B Construct valid arguments from stated facts.	Teacher will guide students to: Use properties of equality in algebraic and geometric proofs. Complete proofs involving segment theorems. Complete proofs involving angle theorems.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 3: Parallel & perpendicular lines
MAJOR OBJECTIVE: transversals, angles, slope, distance, proving parallel

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.I Model situations geometrically to formulate and solve problems.	Teacher will guide students to: Solve problems by drawing a diagram. Identify points, lines, and planes in spherical geometry. Compare and contrast basic properties of plane and spherical geometry. Identify the relationship between two lines or two planes. Name angles formed by a pair of lines and a transversal. Recognize angle conditions that produce parallel lines. Recognize and use distance relationships among points, lines, and planes.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 3: Parallel & perpendicular lines
MAJOR OBJECTIVE: transversals, angles, slope, distance, proving parallel

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.G Solve problems using analytic geometry.	Teacher will guide students to: Use the properties of parallel lines to determine angle measures. Find the distance between a point and a line. Find the slopes of lines. Use slope to identify parallel and perpendicular lines.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 3: Parallel & perpendicular lines
MAJOR OBJECTIVE: transversals, angles, slope, distance, proving parallel

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.4.11.A Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.	Teacher will guide students to: Prove two lines are parallel based on given angle relationships.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 4: Congruent triangles
MAJOR OBJECTIVE: classifying triangles, measuring angles in triangles, constructing & proving congruent triangles, isosceles triangles, right triangles, inequalities for sides and angles

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.5.11.B Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.	Teacher will guide students to: Identify the parts of triangles and classify triangles by their parts. Apply the Angle Sum Theorem. Apply the Exterior Angle Theorem. Use properties of isosceles and equilateral triangles. Identify and use medians, altitudes, angle bisectors, and perpendicular bisectors in a triangle. Recognize and apply properties of inequalities to the measures of segments and angles. Recognize and apply relationships between sides and angles in a triangle. Apply the Triangle Inequality Theorem. Apply the SAS Inequality and the SSS Inequality Theorems.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 4: Congruent triangles
MAJOR OBJECTIVE: classifying triangles, measuring angles in triangles, constructing & proving congruent triangles, isosceles triangles, right triangles, inequalities for sides and angles

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.D Identify corresponding parts in congruent triangles to solve problems.	Teacher will guide students to: Name and label corresponding parts of congruent triangles. Draw congruent triangles.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 4: Congruent triangles
MAJOR OBJECTIVE: classifying triangles, measuring angles in triangles, constructing & proving congruent triangles, isosceles triangles, right triangles, inequalities for sides and angles

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.B Prove that two triangles or two polygons are congruent or similar using algebraic, coordinate and deductive proofs.	Teacher will guide students to: Use SSS, SAS, and ASA postulates to test for triangle congruence. Use the AAS Theorem to test triangle congruence. Recognize and use tests for congruence of right triangles.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 5: Quadrilaterals
MAJOR OBJECTIVE: parallelograms, rectangles, squares, rhombi, kites, trapezoids, similar polygons, identifying similar triangles, parts of similar triangles

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.C Identify and prove the properties of quadrilaterals involving opposite sides and angles, consecutive sides and angles and diagonals using deductive proofs.	Teacher will guide students to: Recognize and apply the properties of a parallelogram, rectangle, square, rhombus, and trapezoids. Recognize and apply the conditions that ensure a quadrilateral is a parallelogram.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 5: Quadrilaterals
MAJOR OBJECTIVE: parallelograms, rectangles, squares, rhombi, kites, trapezoids, similar polygons, identifying similar triangles, parts of similar triangles

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.B Prove that two triangles or two polygons are congruent or similar using algebraic, coordinate and deductive proofs.	Teacher will guide students to: Identify similar figures. Identify similar triangles.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 5: Quadrilaterals
MAJOR OBJECTIVE: parallelograms, rectangles, squares, rhombi, kites, trapezoids, similar polygons, identifying similar triangles, parts of similar triangles

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.I Model situations geometrically to formulate and solve problems.	Teacher will guide students to: Solve problems involving similar figures. Use similar triangles to solve problems. Use proportional parts of triangles to solve problems. Recognize and use the proportional relationships of corresponding perimeters, altitudes, angle bisectors, and medians of similar triangles.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 6: Right triangles & trigonometry
MAJOR OBJECTIVE: Pythagorean Theorem, geometric mean, special right triangles, ratios in right triangles, angles of elevation and depression, Law of Sines, Law of Cosines

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.5.11.B Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.	Teacher will guide students to: Find the geometric mean between two numbers. Solve problems involving the relationships between parts of a triangle and the altitude to the hypotenuse.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 6: Right triangles & trigonometry
MAJOR OBJECTIVE: Pythagorean Theorem, geometric mean, special right triangles, ratios in right triangles, angles of elevation and depression, Law of Sines, Law of Cosines

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.10.11.B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.	Teacher will guide students to: Use the Pythagorean Theorem and its converse. Use the properties of 45°-45°-90° and 30°-60°-90° triangles. Find trigonometric ratios using right triangles. Solve problems using trigonometric ratios. Use trigonometry to solve problems involving angles of elevation or depression. Use the Law of Sines to solve triangles. Use the Law of Cosines to solve triangles.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 7: Circles
MAJOR OBJECTIVE: angles, arcs, chords, tangents, secants

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.F Use the properties of angles, arcs, chords, tangents and secants to solve problems involving circles.	Teacher will guide students to: Identify and use parts of circles. Solve problems involving the circumference of a circle. Recognize major arcs, minor arcs, semicircles, and central angles. Find measures of arcs and central angles. Recognize and use relationships among arcs, chords, and diameters. Recognize and find measures of inscribed angles. Recognize tangents and use properties of tangents. Find the measure of angles formed by intersecting secants and tangents in relation to intercepted arcs. Use properties of chords, secants, and tangents to solve segment measure problems.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 7: Circles
MAJOR OBJECTIVE: angles, arcs, chords, tangents, secants

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.E Solve problems involving inscribed and circumscribed polygons.	Teacher will guide students to: Apply properties of inscribed figures.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 7: Circles
MAJOR OBJECTIVE: angles, arcs, chords, tangents, secants

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.G Solve problems using analytic geometry.	Teacher will guide students to: Write and use the equation of a circle in the coordinate plane.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 8: Area
MAJOR OBJECTIVE: parallelograms, triangles, rhombi, trapezoids, regular polygons, circles

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.I Model situations geometrically to formulate and solve problems.	Teacher will guide students to: Identify and name polygons. Find the sum of the measures of interior and exterior angles of convex polygons and measures of interior and exterior angles of regular polygons. Solve problems involving angle measures of polygons. Find the areas of parallelograms. Find the areas of triangles, rhombi, and trapezoids. Find areas of regular polygons. Find areas of circles. Use area to solve problems involving geometric probability.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 9: Surface area
MAJOR OBJECTIVE: nets, prisms, cylinders, pyramids, cones, spheres

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.I Model situations geometrically to formulate and solve problems.	Teacher will guide students to: Use top, front, side, and corner views of three-dimensional solids to make models. Describe and draw cross sections and other slices of three-dimensional figures. Make two-dimensional nets for three-dimensional solids. Find the lateral and surface area of a right prism, a right cylinder, a regular pyramid, and a right circular cone. Find the surface area of a sphere.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

CONTENT: CT GEOMETRY
CORE CONCEPT 10: Volumes
MAJOR OBJECTIVE: prisms, cylinders, pyramids, cones, spheres

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
PA Standard 2.9.11.I Model situations geometrically to formulate and solve problems.	Teacher will guide students to: Find the volume of a right prism, a right cylinder, a pyramid, a circular cone, and a sphere.	Teacher evaluation of: Student board work. Student responses. Student homework/class work assignments. Student group work. Student workbooks. Student notebooks/journals. Student quizzes/tests. Student presentations. Student performance on Study Island.	Textbook resources Computer programs/web sites Journal or notebook Supplemental materials Graphing calculators Measurement tools Construction tools

V. EXPECTED LEVELS OF ACHIEVEMENT

A. Students are expected to reach the tenth grade level of achievement in mathematics. These skills include all of those noted in the specific content area of this curriculum.

B. Grading system this course is as follows:

Grading Scale	
A	100%-90%
B	89%-80%
C	79%-70%
D	69%-60%
F	Below 60%

C. A student's grade will be determined at the conclusion of each marking period. Progress reports will be sent home at the mid-point of each marking period for those students achieving below 70%.