Jefferson County High School
Course Syllabus

A. Course: Geometry

B. Department: Mathematics

C. Course Description: This course includes the state-required basic elements of plane and solid geometry, coordinate geometry, formal proofs, and problem solving. This is a TN Ready Course. TN Ready exam scores are 25% of the second semester grade.

D. Grade Term: Semester

E. Grading Scale

Range		Honors/ Regular	College-Level	A.P.
93-100	A	4.0	4.5	5.0
85-92	B	3.0	3.5	4.0
75-84	C	2.0	2.5	3.0
70-74	D	1.0	1.5	2.0

F. Term Dates

a. 1st 9 Weeks August 5, 2016 – October 7, 2016
b. 2nd 9 Weeks October 8, 2016 – December 16, 2016
c. 3rd 9 Weeks January 5, 2017 – March 15, 2017
d. 4th 9 Weeks March 16, 2017 – May 25, 2017

G. Textbook(s): Glencoe Geometry

H. Other Required Reading: NA

I. Other Resources

a. Odysseyware Computer Learning Program
b. Glencoe Geometry Student Workbook

J. Major Assignments: NA

K. Procedures for Parental Access to Instructional Materials

a. Aspen Parent Portal
b. Instructor's Website
c. Email Instructor
d. Parent Teacher Conference: There are two designated conference dates during the school year. Parents who would like to request additional meetings may make appointments for conferences with the teachers (during their planning periods), counselors, or a principal by telephoning the school office.

L. Field Trips:

Any scheduled fieldtrip(s) will have a definite educational purpose and will reflect careful planning. Signed permission forms will be obtained when an off campus trip is planned.

M. Standards & Objectives

The following practice standards will be used throughout the quarter:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Ongoing Standards Note to Teachers: The following ongoing and fluency standards will be practiced all year long and embedded into your instruction instead of being taught in isolation.

G.WCE.1 I can use correct notation to describe and name all geometric figures.
G.WCE.2 I can correctly interpret geometric diagrams and determines what can and cannot be assumed.
G.WCE.3 I can explain the meaning of the symbols in the formulas.

(See attached Blueprint of TN State Standards and Student Friendly "I Can" Statements for entire course)

***Attachment*: Blueprint of TN State Standards and Student Friendly "I Can" Statements for entire JCHS Geometry course**

2016.17 Geometry	
Big Ideas/Key Concepts: To explore basic elements of plane and solid geometry, coordinate geometry, formal proofs, and problem solving.	***This is a TNReady course- TNReady test objectives marked with (TNReady).***
Tennessee State Standards	**Student Friendly "I Can" Statements**
FIRST NINE WEEKS- **Unit One: Transformations and Congruence** 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. (Distance around a circular arc will be taught in Quarter 4 with Circles.) G.WCE.4 Know the definitions of skew lines.	*I can describe and name the undefined notions of points, lines, and planes. I can precisely define line segments, rays, parallel lines, perpendicular lines, and skew lines and describe their characteristics. * I can precisely define angles, including supplementary, complementary, adjacent, and linear pairs and describe their characteristics.
G.WCE.5 Use the Distance Formula or Pythagorean Theorem to find the length of a segment on the coordinate plane. G.WCE.6 Use the Midpoint formula to find the midpoint of a segment on the coordinate plane.	*I can use the Distance Formula or Pythagorean Theorem to find the length of a segment on the coordinate plane. * I can use the Midpoint Formula to find the midpoint of a segment on the coordinate plane.
G.CO.A–Experiment with transformations in the plane. ***(TNReady)*** G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	*I can draw transformations of reflections, rotations, translations, and combinations of these using graph paper, transparencies, and patty paper, both on and off the coordinate plane. *I can determine the coordinates for the image of a figure when a transformation rule is applied to the pre-image. * I can explain rigid motion as motion that preserves distance and angle measure. * I can distinguish between congruence transformations that are rigid (reflections, rotations, translations) and those that are not (dilations or rigid motions followed by dilations).

G.CO.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	*I can correctly interpret geometric diagrams by identifying what can and cannot be assumed. *I can identify and use the properties of congruence and equality (reflexive, symmetric, transitive) in proofs. *I can explore inductive and deductive reasoning
G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	*I can determine if a figure has rotational symmetry (maps on to itself), and if so, determine the angle of rotation. *I can determine if a figure has line symmetry, and if so, find all the lines of symmetry.
G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	*I can define and describe transformations in terms of angles, circles, lines, and line segments (i.e. reflecting a figure over a line or parallel lines, rotating a figure 180°, etc.). I can use a rule to define reflections, rotations, and translations on the coordinate plane (i.e. (□, □) → (−□, □) when rotating 90° counterclockwise about the origin, etc.)
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.	*I can predict and verify the sequence of transformations (a composition) that will map a figure onto another.
G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	*I can define congruent figures as figures that have the same shape and size and state the composition of rigid motions (reflections, rotations, translations, and combinations of these) that will map one congruent figure onto the other.

G.CO.B–Understand congruence in terms of rigid motion. *(TN Ready)***	*I can determine if two figures are congruent by determining if rigid motions will turn one figure onto the other (preserving distance and angle measure).
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.	*I can explain and prove that in a pair of congruent triangles, corresponding sides are congruent and corresponding angles are congruent.
Unit Two: Lines, Angles and Triangles **G.CO.C–Prove geometric theorems.***(TNReady)*	*I can prove vertical angles are congruent.
G.CO.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	*I can prove and apply theorems about the angles formed by parallel lines and a transversal (corresponding, alternate interior, same-side interior). (*ACT) *I can prove points on a perpendicular bisector of a line segment are exactly equidistant from the segment's endpoints.
G.GPE.4 Use coordinates to prove simple geometric theorems algebraically.	* I can use coordinate geometry to prove theorems algebraically.
G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and uses 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).	* I can use slope to prove lines are parallel or perpendicular. *I can find the equation of a line parallel or perpendicular to a given line that passes through a given point.
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.	* I can use the definition of congruence, based on rigid motion, to explain the triangle congruence criteria (ASA, SAS SSS)

G.CO.D–Make geometric constructions.***(TNReady)*** 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.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	*I can use a variety of tools (i.e. dynamic Geometry software and compass/ straightedge, patty paper, etc.) to perform the following constructions: *I can bisect a segment. *I can bisect an angle. *I can construct perpendicular lines including the perpendicular bisector of a segment. *I can construct a line parallel to a given line through a point not on the line.
G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	* I can define inscribed polygons. *I can construct an equilateral triangle inscribed in a circle. I can construct a square inscribed in a circle. *I can construct a regular hexagon inscribed in a circle.
G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. I can use congruence criteria to solve problems about triangles and prove relationships in geometric figures.	*I can explain the steps to constructing an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
G.WCE.11 Apply congruence theorems of HL and AAS.	* I can prove and apply the AAS and HL congruence theorems.
G.WCE.18 Find sums and angle measures of polygons.	* I can compute the interior and exterior angle sums of convex polygons I can find the measure of both an interior and exterior angle of a regular polygon.

G.CO.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. G.WCE.12 Demonstrate understanding of the Triangle inequality Theorem, the Hinge Theorem, and the Centroid Theorem.	*I can prove the sum of the measures of the interior angles of a triangle is equal to 180^{o}. *I can prove the base angles of isosceles triangles are congruent. * *I can prove the segment joining the midpoints of two sides of a triangle (mid-segment) is parallel to, and half the length of, the third side. *I can prove the medians of a triangle meet at a point called the centroid. I can explore additional properties of the Centroid theorem. *I can identify that a polygon is a triangle given three side measures (Triangle Inequality Theorem).
Unit Three: Quadrilaterals and Coordinate Proof 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.	*I can define and describe the following quadrilaterals: all parallelograms, all trapezoids, and kites. *I can prove the opposite sides of a parallelogram are congruent. *I can prove the opposite angles of a parallelogram are congruent. *I can prove the diagonals of a parallelogram bisect each other. *I can prove rectangles are parallelograms with congruent diagonals.
G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and uses 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).	*I can use slope to prove lines are parallel or perpendicular. *I can find the equation of a line parallel or perpendicular to a given line that passes through a given point.

G.GPE.4 Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2) (Circles will be done in 4th quarter)	*I can represent the vertices of a figure in the coordinate plane using variables. *I can write coordinate proofs. *I can prove or disprove geometric theorems or definitions in relation to the coordinate plane using slope, distance and midpoint formulas (i.e. proving a quadrilateral on the coordinate plane is a rectangle, etc.)
G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	*I can use coordinate geometry and the distance formula to find the area and perimeters of polygons on the coordinate plane.
Unit Four: Similarity G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor. a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	*I can define dilation. *I can perform a dilation with a given center and scale factor on a figure in the coordinate plane. *I can verify that when a side passes through the center of dilation, the side and its image lie on the same line. *I can verify that corresponding sides of the pre-image and images are parallel and proportional.
G.SRT.A–Understand similarity in terms of similarity transformations. *(TNReady)*** G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	*I can define similarity as a composition of rigid motions followed by dilations in which angle measure is preserved and side length is proportional. *I can identify corresponding sides and corresponding angles of similar triangles. *I can determine scale factor between two similar figures and use the scale factor to solve problems. *I can demonstrate that corresponding angles are congruent and corresponding sides are proportional in a pair of similar triangles.

G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	*I can determine that two figures are similar by verifying that angle measure is preserved and corresponding sides are proportional. *I can show and explain that when two angles measures (AA) are known, the third angle measure is also known. (Third Angle Theorem) *I can use triangle similarity theorems such as AA, SSS and SAS to prove two triangles are similar.
G.SRT.B–Prove theorems involving similarity. *(TNReady)*** 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. (Pythagorean Theorem will be proven with trigonometry.)	* I can prove a line parallel to one side of a triangle divides the other two proportionally. *I can prove if a line divides two sides of a triangle proportionally; then it is parallel to the third side
G.WCE.14 Apply the Angle Bisector Proportionality Theorem to triangles.	*I can find missing parts of triangles using the Angle Bisector Proportionality Theorem.
G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	* I can find the point on a line segment, given two endpoints, that divides the segment into a given ratio.
G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	*I can use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

SECOND NINE WEEKS- **Unit Five: Trigonometry** **G.SRT.C–Define trigonometric ratios and solve problems involving right triangles.*(TNReady)*** 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.	*I can calculate sine and cosine ratios for acute angles in a right triangle when two side lengths are given. * I can explain and use the relationship between the sine of an acute angle and the cosine of its complement.
G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.	* I can calculate sine and cosine ratios for acute angles in a right triangle when two side lengths are given. *I can explain and use the relationship between the sine of an acute angle and the cosine of its complement.
G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	*I can use the Pythagorean Theorem to solve for unknown side length of a right triangle. *I can draw right triangles that describe real world problems and label the sides and angles with their given measures. *I can solve application problems involving right triangles, including angle of elevation and depression, navigation and surveying, using the Pythagorean Theorem and trigonometry.
WCE.G.16 Apply the geometric mean to right triangles.	* I can use the geometric mean to find parts of a right triangle with an altitude drawn to the hypotenuse.
WCE.G.17 Prove the Pythagorean Theorem using triangle similarity.	* I can prove the Pythagorean Theorem using triangle similarity.

WCE.G.18 Make use of the converse of the Pythagorean Theorem, Pythagorean triples and special right triangles and use them to solve problems.	*I can use the converse of the Pythagorean Theorem to determine if a triangle is acute, obtuse, or right. I can list the common Pythagorean triples. *I can solve right triangles including special right triangles (such as 30-60-90 and 45-45-90) by finding the measures of all sides and angles in the triangles.
Unit 6: Measurement and Modeling in Two and Three Dimensions 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.	*I can define □ as the ratio of a circle's circumference to its diameter. I can use algebra to demonstrate that because □ is the ratio of a circle's circumference to its diameter that the formula for a circle's circumference must be C = □ · d.
G.GMD.A–Explain volume formulas and use them to solve problems. ***(TNReady)*** G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. WCE.G.21 Use the similarity ratio between two solids to find the volume.	* I can develop formulas to calculate the volumes of 3-D figures including spheres, cones, prisms, and pyramids. *I can use the similarity ratio between two solids to find the volume.
****G.MG.A.1 and G.MG.A.2 and G.MG.A.3–Apply geometric concepts in modeling situations. ***(TNReady)*** G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).	* I can use geometric shapes, their measures and their properties to describe objects.
G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	* I can apply the concept of density when referring to situations involving area and volume.

G.GMD.B–Visualize relationships between two-dimensional and three-dimensional objects***. (TNReady)*** G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	* I can apply geometric methods to solve design problems.
WCE.G. 8 Find the lateral area and surface area of three dimensional figures.	*I can find the surface area of prisms, cylinders, pyramids, spheres and cones. *I can describe the difference between lateral and surface area.
Unit Seven: Properties of Circles G.C.A–Understand and apply theorems about circles. ***(TNReady)*** G.C.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	* I can identify central angles, inscribed angles, circumscribed angles, diameters, radii, chords, and tangents. *I can describe the relationship between a central angle and its intercepted arc. *I can describe the relationship between an inscribed angle and its intercepted arc. I can describe the relationship between a circumscribed angle and its intercepted arcs. *I can describe the relationship between two secants, a secant and a tangent or two tangents in relation to the intercepted circle. *I can verify that inscribed angles on a diameter are right angles. *I can verify that the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	* I can construct the inscribed circle whose center is the point of intersection of the angle bisectors (incenter). *I can prove that the opposite angles in an inscribed quadrilateral are supplementary. *I can construct the circumscribed circle whose center is the point of intersection of the perpendicular bisectors (circumcenter).
G.WCE.22 Explore segment relationships in circles.	* I can find the lengths of segments formed by lines that intersect circles.
G.WCE.20 Revisit area formulas and composite area problems.	* I can compute the area of all 2-dimensional shapes and composite figures including circles, both on and off the coordinate plane.
G.C.1 Prove that all circles are similar.	* I can prove that all circles are similar.
G.C.B–Find arc lengths and areas of sectors of circles. ***(TNReady)*** 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.	* I can define the radian measure of an angle as the ratio of arc length to its radius, and calculate a radian measure when given an arc length and its radius. *I can convert degrees to radians using the constant of proportionality (2 x angle measure/360°). *I can use similarity to derive the formula for the area of a sector. *I can find the area of a sector.
G.WCE.23 Use similarity to calculate the length of an arc.	* I can use similarity to calculate the length of an arc.

G.GPE.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. G.GPE.A–Translate between the geometric description and the equation for a conic section. ***(TNReady)***	* I can use the Pythagorean Theorem to derive the equation of a circle, given the center and radius. *I can complete the square to find the center and radius of a circle when given an equation of a circle.
G.GPE.B–Use coordinates to prove simple geometric theorems algebraically. *(TNReady)*** G.GPE.4 Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that the point (1,√3) lies on the circle centered at the origin and containing the point (0, 2).	* I can prove or disprove whether a point lies on a circle given the center of the circle.