Riverside Middle School

Mrs. Haynes **ahaynes@greenvilleschools.us**
Room G-110 phone 355-7939 **Geometry Honors**

2017-2018 Course Syllabus

Course Description

Geometry has long been considered the course in which students learn to reason and to see the structure of mathematics. In general, a Geometry course formalizes and extends students' geometric experiences from the middle grades. Students will continue to study the characteristics of geometric shapes and their relationships and will learn to use deductive reasoning to solve problems and to prove their conjectures. They will discover the properties of transformations and will use coordinate systems to analyze geometric situations. They will also build and explore the characteristics of 3-dimensional objects. Finally it is hoped that they will develop an appreciation of the importance of geometry in art, architecture, and other fields.

- The SC State curriculum for Geometry is available here.
- The SC College and Career Ready Standards for Mathematics are available here.
- Course Text: http://connected.mcgraw-hill.com/connected/login.do

Course Objectives

The objectives are based on the standards found in the South Carolina Mathematics Curriculum Standards and the Common Core State Standards for Mathematics. Students who successfully complete Geometry with a passing grade of 70% or higher will have demonstrated the ability, concepts, knowledge, and skills required to:

Use technology to apply basic concepts and skills to real-life models and situations
Integrate other sciences and disciplines
Discover concepts and rules to solve higher-order problem solving skills
Develop technical communication skills, both oral and written

Grading Procedures:

Coursework
10%.....Practice
30%.....Quizzes
60%.....Tests/Projects
Semester Exam.....20% of 1st Semester Grade
Final Exam.....20% of 2nd Semester Grade

Greenville County Scale
90 ≤ A ≤ 100
80 ≤ B ≤ 89
70 ≤ C ≤ 79
60 ≤ D ≤ 69
50 ≤ F ≤ 59

Required Materials:

1. Notebook: A loose-leaf 3-ring binder with dividers is suggested.
2. Pencils and erasers: Mechanical pencils work best. Work must be done in pencil.
3. Colored pen for checking work
4. Calculator: We will use TI83 or TI84 graphing calculators – It is strongly suggested that the student own one.
5. Quadrille Graph Paper (four squares per inch)
6. Compass (purchase this in our school store)
7. Geometry template (purchase this in our school store) must be kept in the 3-ring-binder
8. Ear buds (for computer lab/Chromebooks/iPads)

Make Up Work:

Before students return to school from an absence, they are expected to visit the Google classroom and my website for addressing missed information. Also when students return to school from an absence, it is their responsibility to check in with me and submit missing tasks in a timely manner. Generally, tests and quizzes that need to be made up will not be done during class time. Please arrange to make-up quizzes or tests at 7:45am. All make-up work must be completed within five (5) days of the return to school.

Late Work

It is the general policy not to accept unexcused late work. This includes forgetting it at home or in the locker. Each student is expected to have what is needed for class each day, including the assignment due that day.

Classroom Procedures:

1. Students are expected to enter class quietly and complete the starter activity.
2. Homework is assigned on a daily basis. Students are responsible for each day's work, present or not. Homework must be complete, in pencil, and neat, with problem copied.
3. Sharpen pencils and throw away trash before class begins.
4. During teacher led activities, listen actively.
5. During group work or pair share, contribute wisely.
6. Copy assignments and make sure directions are understood before leaving the class.

Behavior Guidelines:	***Consequences:***
Any behavior that interferes with the learning of self or others cannot be allowed and will be dealt with accordingly and consistently. All rules and policies in the handbook will be upheld. *1. Cooperate with your teacher and peers.* *2. Respect the rights and property of others.* *3. Carry out your student responsibilities.*	*Any infraction of the rules stated above or in the student handbook must be confronted. A warning will be given. If any further action is necessary, it will usually occur in the following order:* *1. Warning* *2. Parent Contact/Detention* *3. Detention* *4. Referral*

Communication:

Contact will be made on a regular basis through phone calls, e-mail, and optional text messages. The online gradebook, which is available via the parent portal, is a wonderful tool for monitoring course progress. Please make sure you have the passcode and are able to access this valuable information. The syllabus, weekly planner, and other important information will be posted on my website. Or you may link to it through the school website.

***Extra help is available before school by appointment. Students will need to get a note from me the day before to be allowed to come to my room.*

Here are the units of study with lesson expectations for each included.

Unit 1. *Transformations in the Coordinate Plane (5 weeks)*

a) Determine the definitions of angle, perpendicular line, parallel line, line segment, ray, circle, and skew lines using the terms of point, line, and plane.
b) Extend the definition of geometric figures to represent and describe real-world objects.
c) Develop the definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
d) Represent translations, reflections, rotations, and dilation of objects in the plane using paper folding, sketches, coordinates, function notation and dynamic geometry software.
e) Verify experimentally the properties of dilations given by a center and a scale factor.
f) Show that 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.
g) Analyze the effects of simple transformations and compositions of transformations on objects.
h) Analyze rotations and reflections that carry a regular polygon onto itself.
i) Identify types of symmetry in polygons.
j) Utilize symmetry to analyze mathematical situations.
k) Predict and describe a sequence of transformations that map a figure onto its image.
l) Develop the definition of Congruence using a sequence of transformations that map a figure onto its image or itself.

Unit 2. *Congruence and Proofs (7 weeks)*

a) Demonstrate triangle and quadrilateral congruence by combining translations, rotations, and reflections that move one figure onto the other.
b) Prove that two triangles are congruent by applying Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, and Hypotenuse-Leg conditions.
c) Prove and apply that vertical angles are congruent
d) Prove and apply that when a transversal crosses parallel lines, alternate interior, alternate exterior, and corresponding angles are congruent.
e) Prove and apply that when a transversal crosses parallel lines, consecutive interior angles are supplementary.
f) Prove and apply that any point on a perpendicular bisector of a line segment is equidistant from the endpoints of the segment.
g) Prove and apply that perpendicular lines form four right angles.
h) Prove and apply that the measures of interior angles of a triangle sum to 180 degrees.
i) Prove and apply that the base angles of an isosceles triangle are congruent.
j) Prove and apply that the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length.
k) Prove and apply that the medians of a triangle meet at a point.
l) Prove and apply that the opposite sides of a parallelogram are congruent.
m) Prove and apply that the opposite angles of a parallelogram are congruent.
n) Prove and apply that the diagonals of a parallelogram bisect each other.
o) Prove and apply that rectangles are parallelograms with congruent diagonals.
p) Prove and apply that a parallelogram is a rhombus if and only if the diagonals are perpendicular.
q) Draw a line on a coordinate plane and translate that line to produce its image, then show that these two lines are parallel because translations preserve angle.
r) Prove and apply that if two lines are parallel their slopes are equal.
s) Draw a line on a coordinate plane and rotate that line 90 degrees to produce a perpendicular image.
t) Prove and apply that if two lines are perpendicular their slopes are negative reciprocals of each other.
u) Prove that polygons are congruent by applying the distance and slopes formulas.
v) Derive and apply the distance formula using the Pythagorean Theorem.
w) Derive and apply the midpoint formula by constructing a segment bisector or using the Ruler Postulate.
x) Write the equation for a line that is parallel to a given line that passes through a given point (e.g. midsegment of triangle or trapezoid).
y) Write the equation for a line that is perpendicular to a given line that passes through a given point (e.g. perpendicular bisector and altitude of a triangle).
z) ***Find the distance between a point and a line. HONORS***
aa) ***Find the distance between two lines. HONORS***
bb) Calculate the area of given triangles and rectangles on the coordinate plane using the distance formula and the appropriate area formula.
cc) Model real world objects using properties of two-dimensional geometric figures. Use these models to solve problems involving real world situations.

Unit 3. *Similarity and Right Triangle Trigonometry (6 weeks)*

a) *Use the definition of similarity to decide if figures are similar and justify the decision.*
b) *Demonstrate that two figures are similar by identifying a combination of translations, rotations, reflections, and dilations in various representations that move one figure onto the other.*
c) *Prove that two triangles are similar using the Angle-Angle criterion.*
d) *Apply the proportionality of corresponding sides of similar figures to solve problems and justify the results.*
e) *Prove and apply that a line drawn parallel to one side of a triangle divides the other two sides into parts of equal proportion.*
f) *Prove and apply that if a line divides two sides of a triangle proportionality, then it is parallel to the third side*
g) *Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures in mathematical and real-world contexts.*
h) *Illustrate that points on a directed line segment whose endpoints are (x_1, y_1) and (x_2, y_2) can be partitioned into a given ratio $r_1{:}r_2$ using the formula $x = (r_2x_1 + r_1x_2)/(r_1 + r_2)$ and $y = (r_2y_1 + r_1y_2)/(r_1 + r_2)$.*
i) ***Solve problems involving relationships between parts of a right triangle and the altitude to the hypotenuse. HONORS***
j) *Derive and apply the relationships found in 45-45-90 and 30-60-90 triangles.*
k) *Derive the trigonometric ratios (sine, cosine, tangent) for right triangles using the properties of the side ratios and the angles in the triangle.*
l) *Define the trigonometric ratios (sine, cosine, tangent) of acute angles for right triangles.*
m) *Identify complementary angles in a given right triangles.*
n) *Calculate the trigonometric ratios (sine, cosine, tangent) for acute angles in a given right triangle.*
o) *Analyze and prove the equality relationship between Sine and Cosine for complementary angles.*
p) *Estimate the side and angle measures of a given triangle using the provided side lengths.*
q) *Organize and list in order the approximated measures of side lengths and angle measures for a given triangle.*
r) *Prove that the square of the hypotenuse of a right triangle is equal to the sum of squares of the other two sides with and without trigonometric ratios.*
s) *Apply the Pythagorean Theorem to find the missing side of a right triangle.*
t) *Utilize the converse of the Pythagorean Theorem to classify triangles by its angles.*
u) *Calculate the exact measures of sides and angles for a given right triangle using the trigonometric ratios (sine, cosine, tangent).*
v) *Illustrate and solve real-world scenarios involving angles of depression and angles of elevation using right triangles and the trigonometric ratios (sine, cosine, tangent) and the Pythagorean Theorem when applicable.*
w) ***Apply the Law of Sines and Law of Cosines to solve triangles. HONORS***

Unit 4. *Geometric Measurement (7 weeks)*

a) *Inscribe a regular polygon in a circle and partition it into congruent triangles to find its area using the formula for the area of a triangle.*
b) *Derive the formula for the sum of the interior angles of a regular polygon and the formula for an interior angle of a regular polygon*
c) *Derive and apply the area formula for a regular polygon by showing that dissection on regular polygons can generate the area formula (Area = (1/2)*apothem*perimeter).*
d) *Use trigonometry to find the apothem of a regular polygon*
e) *Derive and apply the area formula for quadrilaterals: kite, trapezoid, and parallelograms.*
f) *Derive and apply the formula for the surface area of a prism (SA = 2B + LA, where LA = ph, B is the area of the base of the polygon, p is the perimeter of the base and h is the height of the prism) and volume of a prism (V=B*h).*
g) *Investigate the relationship between the volume of a prism and the volume of a pyramid with the same base and height (volume of a pyramid is 1/3 the volume of a prism with the same base area and height).*
h) *Derive and apply the formula for the surface area of a pyramid (SA = B + LA, where LA = 1/2*p*s and s is the slant height).*
i) *Derive and apply the formula for the surface area of a cylinder ($SA = 2\pi r^2 + 2\pi rh$) and volume of a cylinder ($V = Bh$ where B is the area of the base circle [$B = \pi r^2$] or alternatively, $V = \pi r^2 h$).*
j) *Investigate the relationship between the volume of a cylinder and the volume of a cone with the same base and height (volume of a cone is 1/3 the volume of a cylinder with the same base area and height).*
k) *Derive and apply the formula for the surface area of a cone ($SA = \pi r^2 + \pi rs$).*
l) *Derive and apply the formula for the surface area of a sphere ($SA = 4\pi r^2$) and volume of a sphere ($V = 4/3 \pi r^3$).*
m) ***Determine the proportional relationship between the scale factor of two similar figures or solids and the perimeter, area, surface area and volume of the figures or solids. HONORS***
n) *Apply the area and volume formulas to composite figures in two or three dimensions.*
o) *Apply area, surface area and volume to problems involving algebraic expressions, geometric probability and real-world applications*
p) *Give an informal argument for limits using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.*
q) *Describe the shape of two-dimensional cross-sections of three-dimensional objects and use them to solve problems*

r) *Model real-world objects using geometric shapes and their properties.*
s) *Model real-world situations by applying the concepts of density based on area and volume.*

Unit 5. *Circles (5 weeks)*

a) *Prove the similarity of circles by way of central angles.*
b) *Identify radii, diameters, central angles, inscribed angles, chords, circumscribed angles, tangent lines, arcs, segments, and sectors.*
c) *Prove and apply the following theorem and its converse: if two chords in a circle are congruent, then they determine two central angles that are congruent.*
d) *Prove and apply the following theorem and its converse: if two chords in a circle are congruent, then their intercepted arcs are congruent.*
e) *Prove and apply the following theorem and its converse: if a radius is perpendicular to a chord, then it bisects that chord.*
f) *Prove and apply the following theorem: the measure of an angle inscribed in a circle is equal to one-half the measure of the intercepted arc.*
g) *Construct inscribed and circumscribed circles of triangles*
h) ***Construct centers of triangles (centroid, circumcenter, orthocenter and incenter) HONORS.***
i) *Prove properties of angles in quadrilaterals inscribed in circles (opposite angles supplementary)*
j) *Prove and apply the following theorem and its converse: if a line is tangent to a circle, then it is perpendicular to a radius of the circle.*
k) *Apply the following theorem: if two secants, a secant and a tangent, or two tangents intersect in the exterior of a circle, then the measure of an angle formed is one-half the difference of the measures of the intercepted arcs.*
l) *Apply the following theorem: if two segments from the same exterior point are tangent to a circle, then they are congruent. Construct a tangent line from a point outside a given circle to the circle.*
m) ***Discover and implement the relationships among intersecting tangents, secants and chords. HONORS***
n) *Derive and apply the formula for the length of an arc*
o) *Derive and apply the formula for the area of a sector of a circle*
p) *Derive and apply the equation of a circle using the Pythagorean Theorem.*
q) *Given an equation, illustrate how to complete the square to find the center and radius of a circle.*

Unit 6. *Describing Data (5 weeks)*

a) *Choose the most appropriate graphical display for a given set of data.*
b) *Label and scale the axes of a graph appropriately.*
c) *Describe the center of a data distribution (mean, median).*
d) *Describe the shape of a data distribution (skewed, normal, uniform).*
e) *Describe the spread of a data distribution (range, interquartile range, standard deviation).*
f) *Determine if a data value is an outlier (less than Q1-1.5*IQR or more than Q3 + 1.5*IQR).*
g) *Determine the effect of an outlier on center, shape and spread.*
h) *Compare the center, shape and spread of two or more distributions in context.*

ASSIGNING HIGH SCHOOL CREDIT

- *This course is an honors level course. Therefore all students passing this course will be awarded the Honors grade point.*
- *Students who meet the required final grade and MAPS score will be recommended for placement in Honors Algebra Two in ninth grade.*
- *Students who do not meet the required final grade and MAPS score will be recommended for placement in College Prep Algebra Two in ninth grade. Students may retake the Honors Geometry in ninth grade. In this case, only the ninth grade retake grade will be used in figuring the student's GPR and only the ninth grade attempt will show in the transcript.*
- *Students with a final average of 50 – 79 will be strongly recommended to repeat Honors Geometry or take College Prep Geometry in ninth grade. In this case, only the ninth grade retake grade for Geometry will be used in figuring the student's GPR and only the ninth grade attempt will show in the transcript.*
- *Students with a final average of 50 – 59 will not be awarded any credit and will be recommended to repeat Honors Geometry or take College Prep Geometry in ninth grade.*