COMMON CORE GEOMETRY R – 3215 **Full year - 1 credit**
Grades 9 or 10
Prerequisite: Completion of Common Core Algebra R/H

This high school mathematics course aligns with both the New York State Common Core Mathematics Performance and Content Strands. Geometry is the second course within the NYS curriculum and is bound between Algebra 1 and Algebra 2. This course builds upon the previous year's learning, as students continue exploring the geometry strand with increased depth and breadth. Students in Geometry learn all of the required mathematics for the NYS Common Core Geometry Regents Examination.

Within the Geometry course, students will:

- use visualization and spatial reasoning to analyze characteristics and properties of geometric shapes;
- identify and justify geometric relationships, formally and informally;
- apply transformations and symmetry to analyze problem solving situations;
- apply coordinate geometry to analyze problem solving situations.

General Departmental Philosophy

The Garden City Mathematics Department presents courses that align with either the New York State Common Core curriculum or the College Board's Advanced Placement curriculum. In either case, the course material prepared by the Department (Grades 6 – 12) is fully consistent with these standards. In particular, our Advanced Placement syllabi have been approved by the College Board. Our Regents courses address the five NYS common core content strands as well as the five process strands. Our instructional activities are created to promote written and verbal mathematical communication and critical thinking skills that employ accurate mathematical ideas. The Department develops student assessments that are also consistent with the New York State and/or College Board assessment in both style and content. The scoring rubrics employed by the Department are modeled after the particular associated scoring guides. Additional information about the NYS Common Core Mathematics program can be found at https://www.engageny.org/resource/high-school-geometry and Advanced Placement program at http://apcentral.collegeboard.com.

Members of the Department encourage their students to explore, discover and question the many fundamental concepts developed within each courses. The primary objective is to engage our students in lessons that are meaningful, inspiring and enjoyable and promote a greater interest in mathematics – at the post secondary level and beyond. Technology applications, such as calculator usage, are incorporated as developmentally appropriate and as specified by the NYS and/or College Board curriculum. The Department wants each student to realize that they can make a contribution to their class and that others can benefit from their input. The Department wants all students to maximize their mathematical potential as we move through the challenging curriculum and prepare to master all course requirements.

Common Core Geometry R – Content and Skills

1. **Essentials of Geometry**
    a. Undefined terms, real numbers and properties
    b. Definitions: Lines, Line Segments, Midpoints, Bisectors, Rays, Angles and Triangles.

2. **Angle Relationships**
    a. Supplementary, complementary, and vertical angles
    b. Parallel lines, auxiliary line, angle names and relationships
    c. Angles in triangles, sum of interior angles and exterior angles
    d. Classifying triangles: Isosceles, right, equilateral, scalene
    e. Triangle segments: Median, bisector, angle bisectors
    f. Regular Polygons: Interior and exterior angles
    g. Angle Proofs

3. **Constructions**
    a. Copying and Bisecting segments and angles
    b. Constructing perpendicular and parallel lines
    c. Constructing triangles and squares
    d. Constructing inscribed triangles, hexagons, and squares
    e. Triangle concurrences & Constructions – centroid, incenter, circumcenter, and orthocenter
    f. Triangle concurrences – numerical applications

4. **Transformations - Part I**
    a. Line and Point Reflections
    b. Translations and Dilations
    c. Rotations
    d. Point Symmetry and Lines of reflection
    e. Composition of Transformations
    f. Isometries – Direct/Opposite
    g. Glide reflections

5. **Transformations and Rigid Motion- Part II**
    a. Rotations – angle of rotation and center of rotation
    b. Reflections – constructing the line of reflection and reflecting over a line
    c. Translations – translation vector
    d. Symmetry, Rotational Symmetry, and Composition
    e. Sequence of Rigid Motion

6. **Proving Geometry**
    a. Deductive reasoning
    b. Substitution vs. transitive, equality vs. congruence
    c. Addition, subtraction, multiplication and division postulates
    d. Theorems: Linear pairs, congruent supplements, etc.
    e. Pre-proofs (non-triangle, 2-3 steps)

7. **Triangle Proofs**
    a. Congruent triangles and corresponding parts
    b. Triangle Proof Theorems – SSS, SAS, ASA, AAS, HL
    c. CPCTC

8. **Quadrilaterals**
    a. Properties of quadrilaterals
    b. Quadrilateral Proofs – parallelograms, rectangles, squares, rhombus', trapezoids
    c. Proving parallelograms, rectangles, and rhombus'

9. **Similarity and Dilations**
    a. Dilations and Constructions
    b. Similar Polygons – proportionality
    c. Mid-segment of a triangle
    d. Right Triangle Proportions
    e. Pythagorean Theorem and Special Right Triangles
    f. Triangle Inequality and Side-Angle Relationship
    g. Similar Triangle Proofs

10. **Trigonometry**
    a. Basic Trigonometry: Sine, Cosine, Tangent, finding missing sides/angles
    b. Trigonometry Word Problems – angle of elevation/depression
    c. Cofunctions

11. **Coordinate Geometry**
    a. Slope
    b. Equation of a Line
    c. Parallel and Perpendicular Lines
    d. Distance and Midpoint
    e. Coordinate geometry proofs
    f. Parallel/Perpendicular Proofs
    g. Area/Perimeter in the Coordinate Plane
    h. Partitioning a Line Segment
    i. Quadratic/Linear Systems of Equations

12. Circle Geometry and Proving Circles

a. Arcs and angles, Arcs and chords
b. Inscribed and central angles
c. Tangents and Secants
d. Angles formed by tangent and secant segments
e. Measures of tangent segments, chords, and secant segments
f. Congruence – circles
g. Similarity – triangles
h. Similarity – triangles in circles
i. Equations of circles and Completing the Square
j. Graphing circles
k. Similar Circles – Translation Vector/Scale Factor
l. Circle Proofs
m. Degrees and Radians
n. Area of a Sector/Length of an Arc

13. **3-Dimensional Geometry**

a. Review: points, lines, planes, parallel and perpendicular lines
b. Volume, surface area, lateral area of:
   1. Prisms and cubes
   2. Cylinders
   3. Pyramids
   4. Cones
   5. Spheres
c. Cross Sections and Revolutions
d. Planes – parallel, perpendicular, etc.