

## Geometry

**Prerequisites:** Algebra I

**Level:** 10<sup>th</sup> – 12<sup>th</sup> grade

**Credit:** 1.0 – Mathematics

**Additional:** This course is accepted as a math credit for h.s. graduation  
This course is accepted as a math credit for college admission  
This course is accepted as a math credit by the NCAA

### Course Description

This course will serve as an introduction and review of concepts that are key to the study of geometry. Important topics covered include logical reasoning, proof, triangles, ratios, area, vectors and problem solving strategies. Understanding concepts, classroom participation, and completion of all daily assignments will be important keys for success in this class.

### Course Objectives<sup>1</sup>

Students in this course should be able to

- Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about geometric relationships
- Specify locations and describe spatial relationships using coordinate geometry and other representational systems.
- Apply transformations and use symmetry to analyze mathematical situations.
- Use visualization, spatial reasoning, and geometric modeling to solve problems.

### Course Outline

- **Geometry Basics**
  - Basic geometric figures
  - Measuring line segments
  - Measuring angles
  - Special pairs of angles
  - Parallel and Perpendicular lines
  - Constructions
- **Reasoning and Proofs**
  - Inductive reasoning
  - Deductive reasoning
  - Logical reasoning
  - Proof in algebra and geometry
  - Proving theorems about angles
  - Right angles and perpendicular lines
- **Parallel lines and Triangles**
  - Lines in space
  - Parallel lines and transversals
  - Proving lines parallel
  - The triangle sum theorem
  - Inequalities in geometry

## **Congruent Triangles**

- Congruent triangles
- Proving triangles congruent
- Proofs using congruent triangles
- Isosceles and right triangle theorems
- Altitudes, Medians, and Bisectors
- **Polygons**
  - Angles of polygons
  - Quadrilaterals
  - Properties of parallelograms
  - Special parallelograms
  - Trapezoids
- **Similar Triangles**
  - Ratio and proportion
  - Similarity
  - Proportions in similar triangles
  - Proportions in Right triangles
  - The Pythagorean theorem
  - Special right triangles
  - The Tangent ratio
  - Sine and Cosine Ratios
- **Transformational Geometry**
  - Rigid Motion
  - Translations
  - Reflections
  - Rotations
  - Dilations
  - Tessellations
- **Coordinate Geometry**
  - Distance on the coordinate plane
  - Vectors on the coordinate plane
  - The slope formula
  - Linear equations
  - Parallel/Perpendicular Lines
  - Coordinate proof
  - Coordinates in space
- **Area**
  - Quadrilaterals
  - Regular polygons
  - Triangles
  - Geometric probability
- **Circles**
  - Equations of circles
  - Circumference and Area
  - Area of Sector

- Tangents
- Chords and arcs
- Inscribed angles
- Secants and tangents
- **Surface Area and Volume**
  - Prisms and cylinders
  - Pyramids and cones
  - Spheres
- **Probability**
  - Experimental and Theoretical Probability
  - Probability Distributions
  - Permutations and Combinations
  - Probability Models
  - Conditional Probability Formulas

### **Teaching Methods**

This class is taught mainly through lecture, cooperative group activities, and individual practice. Students are given comprehensive overviews of each section, which are followed by in-class practice. Students will often work in cooperative learning groups and communicate their results to their peers. Students will also have various projects to help develop understanding of the concepts. Daily assignments are a major part of the mathematical learning process. Students are expected to complete every assignment and give full participation in class for successful completion of this course.

### **Assessment**

Students will be assessed with the following:

- Assignments
- Projects
- Quizzes
- Chapter and Semester Exams

### **Texts**

Charles, Hall, Kennedy, Bass, Johnson, Murphy, and Wiggins; *Geometry: Common Core*. Pearson Education Inc., 2015.

<sup>1</sup>National Council of Teachers of Mathematics, Principles and Standards for School Mathematics, 2000 p232