Syllabus

Geometry A

Course Overview

Geometry is a branch of mathematics that uses logic and formal thinking to establish mathematical relationships between points, lines, surfaces, and solids. In Geometry A, you will explore rigid and non-rigid transformations of figures in the coordinate plane and use them to establish congruence and similarity of triangles and other shapes. You will also prove theorems about lines, angles, triangles, and parallelograms, and build geometric constructions using both basic tools and modern technology. In conclusion, you will apply your knowledge of triangles as you investigate the mathematics of trigonometry.

Course Goals

By the end of this course, you will be able to do the following:

- Experiment with transformations in the coordinate plane.
- Understand congruence in terms of rigid motions.
- Prove geometric theorems.
- Make geometric constructions.
- Understand similarity in terms of similarity transformations.
- Prove theorems involving similarity.
- Define trigonometric ratios and solve problems involving right triangles.
- Apply trigonometry to general triangles.

Math Skills

Two semesters of Algebra is a prerequisite for Geometry A. Before beginning this course, you should be able to do the following:

- Identify $|x|$ as the distance from x to 0 on a number line.
- Work with whole number exponents and the laws of exponents.
- Perform arithmetic with polynomials, including factoring.
- Solve linear equations and inequalities in one variable.
- Use coordinate plane terminology.
- Represent linear relationships graphically and with equations.
- Graph functions using basic calculator skills.

General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word processing software, such as Microsoft Word or Google Docs.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.

Credit Value

Geometry A is a 0.5-credit course.

Course Materials

- Notebook
- Compass
- Ruler or straight edge
- Scientific calculator
- Computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent

Course Pacing Guide

This course description and pacing guide is intended to help you keep on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

Unit 1: Introduction to Geometry and Transformations

Summary

In this unit, you will learn about the origins of geometry and review some basic geometric concepts from earlier math courses. Then you will study rigid and non-rigid transformations of two-dimensional figures in the coordinate plane.

Day	**Activity/***Objective*	Type
1 day: 1	**Syllabus and Plato Student Orientation** *Review the Plato Student Orientation and Course Syllabus at the beginning of this course.*	Course Orientation
2 days: 2–3	**Introduction to Geometry** *Become acquainted with the history, career applications, and logical structure and development of geometry.*	Lesson
2 days: 4–5	**Basic Geometric Concepts** *Know precise definitions for the concepts of angle, circle, perpendicular line, parallel line, and line segment.*	Lesson
3 days: 6–8	**Representing Transformations in a Plane** *Represent transformations in a plane and compare transformations that preserve distance and angle to those that do not.*	Lesson
3 days: 9–11	**Returning a Polygon to Its Original Position** *Describe the rotations and reflections that carry a given rectangle, parallelogram, trapezoid, or regular polygon onto itself.*	Lesson
3 days: 12–14	**Defining Rigid Transformations** *Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.*	Lesson
3 days: 15–17	**Predicting Results of Rigid Transformations** *Predict the result of a rigid transformation and specify a sequence of transformations to carry a given figure onto another.*	Lesson
4 days: 18–21	**Unit Activity and Discussion—Unit 1**	Unit Activity Discussion
1 day: 22	**Posttest—Unit 1**	Assessment

Unit 2: Congruence, Proof, and Constructions

Summary
In this unit, you will learn the criteria necessary to determine whether two or more plane figures are congruent. You will also study how to write formal mathematical proofs to prove simple geometric relationships. Finally, you will create geometric constructions of plane figures using a variety of tools, including technology.

Day	**Activity/***Objective*	Type
2 days: 23–24	**Transformations and Congruence** *Use geometric descriptions of rigid motions to transform figures and use the definition of congruence in terms of rigid motions to decide if two figures are congruent.*	Lesson
2 days: 25–26	**Sides and Angles of Congruent Triangles** *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.*	Course Activity
3 days: 27–29	**ASA, SAS, and SSS Criteria for Congruent Triangles** *Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.*	Lesson
4 days: 30–33	**Lines, Angles, and Mathematical Proofs** *Learn to write mathematical proofs, and apply that knowledge to simple geometric relationships.* **Proving Theorems about Lines and Angles** *Prove theorems about lines and angles.*	Lessons
3 days: 34–36	**Proving Theorems about Triangles** *Prove theorems about triangles.*	Lesson
3 days: 37–39	**Proving Theorems about Parallelograms** *Prove theorems about parallelograms.*	Lesson
3 days: 40–42	**Geometric Constructions with Lines and Angles** *Make formal geometric constructions with a variety of tools and methods.*	Lesson
4 days: 43–46	**Unit Activity and Discussion—Unit 2**	Unit Activity Discussion
1 day: 47	**Posttest—Unit 2**	Assessment

Unit 3: Similarity and Proof

Summary
In this unit, you will see how dilations play a role in establishing similarity relationships, and you will learn how transformations can help you decide whether two or more plane figures are similar. Using similarity, you will also prove theorems about triangles, the simplest of all polygons. Finally, you will apply what you know about similarity and congruence of triangles to solve practical problems.

Day	**Activity/***Objective*	Type
3 days: 48–50	**Properties of Dilations** *Verify experimentally the properties of dilations given by a center and a scale factor.*	Lesson
3 days: 51–53	**Similarity and Similarity Transformations** *Use the definition of similarity in terms of similarity transformations to decide whether two given figures are similar.*	Lesson
2 days: 54–55	**AA, SAS, and SSS Criteria for Similar Triangles** *Use the properties of similarity transformations to establish the AA, SAS, and SSS criteria for two triangles to be similar.*	Course Activity
3 days: 56–58	**Similarity, Proportion, and Triangle Proofs** *Prove theorems about triangles using similarity relationships.*	Lesson
3 days: 59–61	**Using Congruence and Similarity with Triangles** *Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.*	Lesson
4 days: 62–65	**Unit Activity and Discussion—Unit 3**	Unit Activity Discussion
1 day: 66	**Posttest—Unit 3**	Assessment

Unit 4: Trigonometry and Geometric Modeling

Summary
In this unit, you will study trigonometry—a branch of mathematics that explores the measurements and relationships between the sides and angles of a triangle. You will use the Pythagorean Theorem and the definitions of sine, cosine, and tangent, to solve real-world problems involving triangles. You will also prove and apply the Laws of Sines and Cosines.

Day	**Activity/***Objective*	Type
3 days: 67–69	**Trigonometric Ratios** *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.*	Lesson
3 days: 70–72	**Sine and Cosine of Complementary Angles** *Explain and use the relationship between the sine and cosine of complementary angles.*	Lesson
3 days: 73–75	**Solving Problems with Right Triangles** *Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*	Lesson
2 days: 76–77	**Trigonometry and the Area of a Triangle** *Derive the formula* A = *1/2* ab *sin(*C*) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.*	Course Activity
3 days: 78–80	**Proving the Laws of Sines and Cosines** *Prove the Laws of Sines and Cosines, and use them to solve problems.*	Lesson
3 days: 81–83	**Applying the Laws of Sines and Cosines** *Understand and apply the Laws of Sines and Cosines to find unknown measurements in right and non-right triangles.*	Lesson
4 days: 84–87	**Unit Activity and Discussion—Unit 4**	Unit Activity Discussion
1 day: 88	**Posttest—Unit 4**	Assessment
1 day: 89	**Semester Review**	
1 day: 90	**End-of-Semester Test**	Assessment