

Syllabus

Geometry B

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 B, you will review the volume formulas for some common solid figures as you extend your knowledge of two-dimensional shapes to three-dimensional shapes. You will also transition from primarily Euclidean geometry to analytical geometry—a segment of geometry focused on numerical measurements and coordinate algebra. You will use analytical geometry and observations to investigate the properties of circles and constructions related to circles. Geometry B closes with a study of independent and conditional probability and how you can use probability models to represent situations arising in everyday life.

Course Goals

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

- Explain volume formulas and use them to solve problems.
- Visualize relationships between two-dimensional and three-dimensional objects.
- Translate between the geometric description and the equation for a conic section.
- Use coordinates to prove simple geometric theorems algebraically.
- Understand and apply theorems about circles.
- Find arc lengths and areas of sectors of circles.
- Apply geometric concepts in modeling situations.
- Understand independence and conditional probability and use them to interpret data.
- Use the rules of probability to compute probabilities of compound events in a uniform probability model.
- Use probability to evaluate outcomes of decisions.

Math Skills

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

- Mathematically define rotations, reflections, translations, dilations, and slides.
- Prove theorems about lines, angles, triangles, and parallelograms.
- Create formal geometric constructions with a variety of tools and methods.
- Understand the definitions of trigonometric ratios and use them to solve problems.
- Solve quadratic equations by factoring or using the quadratic formula.

- Understand that the probability of a chance event is a number between 0 and 1.

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.
- Understand the basics of spreadsheet software, such as Microsoft Excel or Google Spreadsheets. More advanced skills, such as writing formulas, aren't required.
- 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 B 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
- Microsoft Excel 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: Extending to Three Dimensions

Summary

In this unit, you will review the circumference and area of a circle and the volume of some common solid figures: cylinders, pyramids, cones, and spheres. You will also solve real-world problems that contain one or more of these shapes. Finally, you will explore how two-dimensional and three-dimensional figures are related.

| Day | Activity/Objective | Type |
|------------------|--|--------------------------|
| 1 day: 1 | Syllabus and Plato Student Orientation <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i> | Course Orientation |
| 3 days: 2–4 | Explaining Volume Formulas <i>Give an informal argument for the formulas for the circumference of a circle, the area of a circle, and the volumes of a cylinder, pyramid, and cone.</i> | Lesson |
| 3 days: 5–7 | Using Volume Formulas <i>Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.</i> | Lesson |
| 2 days: 8–9 | Cross Sections of Three-Dimensional Objects <i>Identify the shapes of two-dimensional cross sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.</i> | Lesson |
| 4 days: 10–13 | Unit Activity and Discussion—Unit 1 | Unit Activity Discussion |
| 1 day: 14 | Posttest—Unit 1 | Assessment |

Unit 2: Connecting Algebra and Geometry through Coordinates

Summary

In this unit, you will examine the relationship between algebra and geometry. You will use coordinates and algebra to prove simple geometric theorems and derive equations that describe circles and parabolas. You will also use coordinates to partition a line segment and to compute the perimeter and area of common plane figures.

| Day | Activity/Objective | Type |
|------------------|---|-----------------------------|
| 3 days: 15–17 | Equation of a Circle <i>Derive the equation of a circle of given center and radius, and complete the square to find the center and radius of a circle given by an equation.</i> | Lesson |
| 3 days: 18–20 | Use Coordinates to Prove Geometric Theorems <i>Use coordinates to prove simple geometric theorems algebraically, including proofs involving circles.</i> | Lesson |
| 3 days: 21–23 | Slope Criteria for Parallel and Perpendicular Lines <i>Prove the slope criteria for parallel and perpendicular lines, and use them to solve geometric problems.</i> | Lesson |
| 3 days: 24–26 | Dividing a Line Segment Based on a Ratio <i>Find the point on a directed line segment between two given points that partitions the segment in a given ratio.</i> | Lesson |
| 3 days: 27–29 | Using Coordinates to Compute Perimeters and Areas <i>Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.</i> | Lesson |
| 2 days: 30–31 | Equation of a Parabola Based on Its Focus and Directrix <i>Derive the equation of a parabola given a focus and directrix.</i> | Course Activity |
| 4 days: 32–35 | Unit Activity and Discussion—Unit 2 | Unit Activity Discussion |
| 1 day: 36 | Posttest—Unit 2 | Assessment |

Unit 3: Circles With and Without Coordinates

Summary

In this unit, you will investigate the properties of circles and constructions involving circles. Sometimes you will work with coordinates, but you'll also develop relationships and formulas for circles empirically and use them to solve problems.

| Day | Activity/Objective | Type |
|------------------|--|--------------------------|
| 1 day: 37 | Proving That All Circles Are Similar <i>Prove that all circles are similar.</i> | Course Activity |
| 3 days: 38–40 | Relationships Among Inscribed Angles, Radii, and Chords <i>Identify and describe relationships among inscribed angles, radii, and chords.</i> | Lesson |
| 3 days: 41–43 | Inscribed and Circumscribed Circles <i>Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.</i> | Lesson |
| 1 day: 44 | Constructing a Tangent Line to a Circle <i>Construct a tangent line from a point outside a given circle to the circle.</i> | Course Activity |
| 3 days: 45–47 | Relating Arc Length and Area to Radius <i>Use similarity to derive the fact that the length of the arc intercepted by an angle is proportional to the radius. Derive the formula for the area of a sector.</i> | Lesson |
| 4 days: 48–51 | Unit Activity and Discussion—Unit 3 | Unit Activity Discussion |
| 1 day: 52 | Posttest—Unit 3 | Assessment |

Unit 4: Independent and Conditional Probability

Summary

In this unit, you will apply the addition and multiplication rules of probability to calculate probabilities using a uniform model. You will understand that an event is a set of outcomes that can be related to other events or independent of them. You will also use permutations and combinations to find the probabilities of compound events.

| Day | Activity/Objective | Type |
|------------------|---|-----------------------------|
| 2 days: 53–54 | Sample Space <i>Describe events as subsets of a sample space (the set of outcomes).</i> | Lesson |
| 3 days: 55–57 | Applying the Addition Rule for Probability <i>Apply the addition rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.</i> | Lesson |
| 3 days: 58–60 | Applying the Multiplication Rule for Probability <i>Apply the general Multiplication Rule in a uniform probability model, and interpret the answer in terms of the model.</i> | Lesson |
| 2 days: 61–62 | Independent Events <i>Understand how to determine if two events are independent of each other.</i> | Lesson |
| 3 days: 63–65 | Using Counting Techniques to Determine Probabilities <i>Use permutations and combinations to compute probabilities of compound events and to solve problems.</i> | Lesson |
| 3 days: 66–68 | Conditional Probability <i>Understand the conditional probability of event A given event B, and interpret the independence of events A and B.</i> | Lesson |
| 4 days: 69–72 | Unit Activity and Discussion—Unit 4 | Unit Activity Discussion |
| 1 day: 73 | Posttest—Unit 4 | Assessment |

Unit 5: Applying Probability

Summary

In this unit, you will use probability models to assess situations that arise in the real world. You will apply counting rules to determine probabilities and use them to make fair decisions and analyze strategies. Finally, you will find and interpret the conditional probability of an event as it relates to other events.

| Day | Activity/Objective | Type |
|------------------|---|-----------------------------|
| 2 days: 74–75 | Interpreting Two-Way Frequency Tables <i>Use a two-way table as a sample space to decide whether events are independent and to approximate conditional probabilities.</i> | Lesson |
| 2 days: 76–77 | Using Probability to Make Fair Decisions <i>Apply counting rules to determine probabilities, and use them to make fair decisions.</i> | Lesson |
| 2 days: 78–79 | Using Probability to Analyze Decisions and Strategies <i>Apply counting rules to analyze decisions and strategies using probability concepts.</i> | Lesson |
| 2 days: 80–81 | Applying Conditional Probability and Independence <i>Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.</i> | Lesson |
| 2 days: 82–83 | Interpreting Conditional Probability <i>Find the conditional probability of event A as it relates to event B, and interpret the answer in terms of the model.</i> | Lesson |
| 4 days: 84–87 | Unit Activity and Discussion—Unit 5 | Unit Activity Discussion |
| 1 day: 88 | Posttest—Unit 5 | Assessment |
| 1 day: 89 | Semester Review | |
| 1 day: 90 | End-of-Semester Test | Assessment |