

## Junior Year: Geometry/Trigonometry

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- **Textbooks:**

Larson Geometry, Common Core Edition

Houghton Mifflin Harcourt Publishing Company.

ISBN:978-0-547-64708-1

- **Course Description:** The purpose of this course is to give the students a solid foundation in geometry. Skills developed in Algebra I & II are integrated throughout this course, although geometry will constitute the main emphasis and subject matter. This course begins with basic geometric concepts and builds on this. Students will be exposed to logic, geometric reflections utilizing congruency, polygons and symmetry, triangle congruency, indirect and coordinate proofs, direct and indirect reasoning, similarity, and work with circles. Additionally, the coordinate geometry follows from the algebra and the transformation geometry introduces the idea of functions in an applied setting. Applications of new mathematical concepts are included in each chapter through the use of word problems. Students will work with technology, including graphing calculators and the GeoGebra web app, the latter of which they will utilize for constructions, as well as exploring concepts and applications.
- **Calculator Policy:** A TI-84 (any version) is required for this course. During the course, students will use the calculator for investigations and to solve problems. Students will be expected to understand how to solve problem both with the calculator and without the calculator. However, students should not expect to be able to use their calculator on every quiz, test, and homework assignment.
- **Course Goals:**
  1. Students will become proficient in the language and vocabulary of geometry.
  2. Students will develop the ability to logically prove theorems, utilizing properties, definitions and already proved theorems.
  3. Students will develop the ability to visualize, recognize patterns, draw and follow algorithms.
  4. Students will become proficient with the GeoGebra web application.
  5. Students will be able to apply geometric ideas in real world situations.
  6. Students will be able to represent geometric concepts with coordinates or diagrams.
  7. Students will review algebraic concepts from Algebra I and Algebra II.
  8. Students will solve problems both with and without a calculator.
  9. Students will be better prepared for the PSAT, which is usually given in October.
  10. Students will be better prepared for the SAT and ACT.
- **Course Objectives:**

At the end of this course students will be able to:

  1. Identify and apply the definitions, properties and theorems about segments, lines, rays and angles and use them to prove theorems.

2. Identify and apply properties and theorems regarding parallel and perpendicular lines and use them to prove theorems.
3. Analyze and apply angle relationships (linear pairs, vertical, complimentary, supplementary, corresponding and alternate interior angles) in real world and mathematical situations.
4. Understand and use the properties, definitions and concerning congruent and similar triangles and other figures to prove additional theorems and solve problems.
5. Use and understand the basic properties of circles (arcs, chords, central angles, inscribed angles) to prove basic theorems and solve problems.
6. Analyze and apply spatial relationships concerning points, lines and planes - betweenness of points, midpoint, segment length, collinear, coplanar, parallel, perpendicular, and skew.
7. Explore geometry to make and test conjectures using geometric tools and GeoGebra.
8. Use transformations (translations, rotations, reflections, glide reflections and dilations) to gain insight, via sketches, coordinates, vectors, function notation, and technology, into other areas of mathematics and to solve real world problems.
9. Use similarity of figures and scale factors to analyze and solve problems.
10. Model real world problems using visualization, spatial reasoning and geometric relationships.
11. Understand and express the slope of a line, use two coordinates to find the slope, and use slope to express parallelism and perpendicularity.
12. Find the distance between two points using their coordinates and the Pythagorean Formula or the distance formula.
13. Find the equation of a circle given its center and radius.
14. Find the midpoint of a segment with the midpoint formula and the coordinates of the endpoints.

- **Course Sequence:**

- Chapter 1: Essentials of Geometry**

- 1.1 Identify Points, Lines and Planes
    - 1.2 Segments and Congruence
    - 1.3 Midpoint and Distance Formulas
    - 1.4 Classifying Angles
    - 1.5 Angle Pair Relationships
    - 1.6 Classify Polygons

- Chapter 2: Reasoning and Proof**

- 2.1 Using Inductive Reasoning
    - 2.2 Conditional Statements
    - 2.3 Apply Deductive Reasoning
    - 2.4 Using Postulates and Diagrams
    - 2.5 Reason Using Algebraic Properties
    - 2.6 Prove Statements about Segments and Angles
    - 2.7 Prove Angle Pair Relationships

### **Chapter 3: Parallel and Perpendicular Lines**

- 3.1 Identify Pairs of Lines and Angles
- 3.2 Use Parallel Lines and Transversals
- 3.3 Prove Lines are Parallel
- 3.4 Find and Use Slopes of Lines
- 3.5 Write and Graph Equations of Lines
- 3.6 Prove Theorems about Perpendicular Lines

### **Chapter 4: Congruent Triangles**

- 4.1 Apply Triangle Sum Properties
- 4.2 Apply Congruence and Triangles
- 4.3 Relate Transformations and Congruence
- 4.4 Prove Triangles Congruent by SSS
- 4.5 Prove Triangles Congruent by SAS and HL
- 4.6 Prove Triangles Congruent by ASA and AAS
- 4.7 Use Congruent Triangles
- 4.8 Use Isosceles and Equilateral Triangles
- 4.9 Perform Congruence Transformations

### **Chapter 5: Relationships within Triangles**

- 5.1 Midsegment Theorem and Coordinate Proof
- 5.2 Use Perpendicular Bisectors
- 5.3 Use Angle Bisectors of Triangles
- 5.4 Use Medians and Altitudes
- 5.5 Use Inequalities in a Triangle
- 5.6 Inequalities in Two Triangles and Indirect Proof

### **Chapter 6: Similarity**

- 6.1 Use Similar Polygons
- 6.2 Relate Transformations and Similarity
- 6.3 Prove Triangles Similar by AA
- 6.4 Prove Triangles Similar by SSS and SAS
- 6.5 Use Proportionality Theorems
- 6.6 Perform Similarity Transformations

### **Chapter 7: Right Triangles and Trigonometry**

- 7.1 Apply the Pythagorean Theorem
- 7.2 Use the Converse of the Pythagorean Theorem
- 7.3 Use Similar Right Triangles
- 7.4 Special Right Triangles
- 7.5 Apply the Tangent Ratio
- 7.6 Apply the Sine and Cosine Ratios
- 7.7 Solve Right Triangles

### **Chapter 8: Quadrilaterals**

- 8.1 Find Angle Measures in Polygons

- 8.2 Use Properties of Parallelograms
- 8.3 Show that a Quadrilateral is a Parallelogram
- 8.4 Properties of Rhombuses, Rectangles, and Squares
- 8.5 Use Properties of Trapezoids and Kites
- 8.6 Identify Special Quadrilaterals

**Chapters 9: Properties of Transformations**

- 9.1 Translate Figures and Use Vectors
- 9.2 Use Properties of Matrices
- 9.3 Perform Reflections
- 9.4 Perform Rotations
- 9.5 Apply Compositions of Transformations
- 9.6 Identify Symmetry
- 9.7 Identify and Perform Dilations

**Chapter 10: Properties of Circles**

- 10.1 Use Properties of Tangents
- 10.2 Find Arc Measures
- 10.3 Apply Properties of Chords
- 10.4 Use Inscribed Angles and Polygons
- 10.5 Apply Other Angle Relationships in Circles
- 10.6 Find Segment Lengths in Circles
- 10.7 Write and Graph Equations of Circles

**Chapter 11: Measurements of Figures and Solids**

- 11.1 Circumference and Arc Length
- 11.2 Areas of Circles and Sectors
- 11.3 Areas of Regular Polygons
- 11.4 Use Geometric Probability
- 11.5 Explore Solids
- 11.6 Volume of Prisms and Cylinders
- 11.7 Volume of Pyramids and Cones
- 11.8 Surface Area and Volume of Spheres
- 11.9 Explore Similar Solids

**Chapter 12: Probability**

- 12.1 Find Probabilities and Odds
- 12.2 Find Probabilities Using Permutations
- 12.3 Find Probabilities Using Combinations
- 12.4 Find Probabilities of Disjoint and Overlapping Events
- 12.5 Find Probabilities of Independent and Dependent Events

A review of Algebra II material will follow completion of the geometry curriculum to ensure solid preparation for Pre-calculus or AP Calculus AB during senior year. Topics are TBD on a year-to-year basis, but will likely include simplifying expressions, solving equations, graphs & transformations of basic functions, and trigonometry.

**Evaluation:** The evaluation procedures vary by teachers, but typically include a combination of homework, quizzes, and tests.

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