

Spectrum Program **Session 1** **Course Title: IP Geometry Honors**

Course Description

Individually paced Geometry Honors is a self-paced, honors-level high school mathematics course in two- and three-dimensional geometry. Topics include deductive reasoning, formal proof, parallel and perpendicular lines, congruence, similarity, surface area, volume, and the relationships within triangles, circles, and quadrilaterals. Students will complete constructions to increase geometric reasoning. Individually paced math courses are not intended to remediate deficiencies. This course is three weeks long, with five hours of in-class work for five days a week (75 hours total class time). Daily outside homework is required.

Essential Questions

The following questions are meant to engage the students throughout the three weeks and serve as underlying themes for the course.

- What characteristics are inherent in any 2-dimensional figure or 3-dimensional object? Which characteristics can differentiate one figure or object from another? How does one efficiently communicate figural reasoning?
- How does the process of deductive reasoning help to logically solve a problem?
- In order to mathematically model a real world situation, what questions must be generated and answered? What are the steps in the problem solving process?

Outcomes

Upon successful completion of this course, students will:

- Be able to formally prove
 - a. lines are parallel
 - b. triangles are congruent
 - c. triangles are similar
 - d. quadrilaterals are parallelograms or other special quadrilaterals
- Know how to
 - a. solve triangles using proportions and right triangle trigonometry
 - b. find the area of special quadrilaterals, circles, and regular polygons
 - c. find the surface area and volume of solids
- Apply the relationships within triangles, quadrilaterals, and circles
- Understand the vocabulary of geometry: points, lines, planes, angles, congruence, similarity
- Describe and find unknown quantities in figures using algebraic symbols and reasoning
- Use mathematical models to represent relationships

Instructional Strategies

A variety of instructional strategies and techniques will be used throughout the three weeks to actively engage students and aid in their learning. The most prevalent method in the course is independent study. Students will be expected to work through the assigned material at their own pace, asking questions as needed. Although mini-lectures may be provided to students as needed, a majority of the learning will take place individually. Group work is also encouraged throughout this course; there will be many times when several students will be working on the same material, and it may be beneficial to work through some of the problems together to gain a more

thorough understanding. Acceleration and compacting will also be used in this course. Due to the short time frame, students will be working through the course at a much faster pace than normally expected in a year-long course. Hence students will only be expected to work through as many problems as needed for their own understanding rather than completing repetitive assignments.

Resources and Materials

- **Textbook**
 - a. Larson, Boswell, Kanold and Stiff, *Geometry* (McDougal Littell), 2007. ISBN: 978-0-618-59540-2.
- **Materials**
 - a. Students are required to have a calculator, however no specific manufacturer and model is favored.
 - b. Students are required to have a notebook or binder in which to take notes and work through homework and practice problems. The only way to learn math successfully is to actively do math.
- **Web sites**
 - a. Wolfram Alpha (www.wolframalpha.com) Wolfram is a computational engine (in contrast to an internet search engine). Type in an equation and the site will compute a variety of facts and information. It should be used only as a supplement to practice and the textbook.
 - b. Khan Academy (www.khanacademy.org) This website has a wide range of short videos, many on math topics. The videos, by themselves, are often not enough to thoroughly learn a concept but can help make difficult concepts easier.

Student Assessment

- **Pre-Assessment:** Students will be pre-assessed on the first day of class using released questions from the California Standards Test for Geometry. The pre-assessment will not affect the grade of the student.
- **CTD Grading Scale**

A+	100-97%	A	96-93%	A-	92-90%
B+	89-87%	B	86-83%	B-	82-80%
C+	79-77%	C	76-73%	C-	72-70%
D+	69-67%	D	66-63%	D-	62-60%
F	below 60%				
- **Breakdown of Final Grade**
 - Chapter Quizzes* (5 / 6 each semester): Quizzes are worth 20% of the final semester grade
 - Unit tests* (2 / 3 each semester): Tests are worth 60% of the final semester grade
 - Final Exam (cumulative)*: 20 % of the final semester grade
- **Post-Assessment:** The Released Questions from the California Standards Test for Geometry will be used to post-assess the students on the last day of class. The post-assessment will serve as a portion of the final exam for the students.

Schedule

Mathematics is an area that one cannot merely participate in from the sidelines. One must actively work through a variety of problems in order to fully understand the material. The number of problems that one must work varies for understanding from student to student, and the instructor and TA will work closely with the student to ensure full mastery is obtained before moving onto the next material.

The course content will be split into 5 units. Each unit consists of several chapter quizzes together with a unit test. Students will usually take a pretest for each chapter to determine prior knowledge. The student will begin studying the material from the book and working suggested problems until he/she is ready for the chapter quiz.

Chapter Quizzes:

- Each quiz will be pass/fail and students will have 3 chances to pass the quiz (there will be three versions

of the quiz). There will be a time limit of either 30 or 45 minutes depending upon the material on the quiz, and each quiz will list its time limit.

- To take the quiz for the first time, the student must have evidence of studying the chapter and he/she must obtain permission from the instructor to take the quiz. If he/she passes on the first attempt with a High Pass, he/she will receive 100% for the quiz; if he/she passes on the first attempt with a Low Pass, he/she will receive 90%; otherwise the student will be expected to study more.
- To take the quiz a second time, the student will need to submit solutions to the suggested problems for the instructor/TA to verify. The student will then receive permission upon satisfactory completion of the problems. Passing the quiz on the second try will result in either an 80% or 70% for the quiz score; if a student fails the quiz a second time, he/she will be expected to study more.
- To take the quiz a third time, the student will complete a second set of problems assigned by the instructor based off of the misunderstandings from the first and second attempts at the quiz. The solutions will be graded by the instructor/TA and permission will then be granted with satisfactory work. Passing the quiz on the third try will result in either a 60% or 50% for the quiz. Failure to pass the quiz on the third attempt will result in a 0% and the instructor will work closely with the student to ensure they are prepared to move onto the next chapter.
- Once completing the chapter quiz, the student will take the pre-test for the next chapter and then repeat the cycle, until he/she is ready for the unit test.

Unit Tests:

- Each unit test will consist of 2-3 chapters depending upon the content. Each test will range from 90-120 minutes and the time limit will be listed on the test.
- Students will be expected to have completed all the chapter quizzes, recommended problems, and additional review problems before taking the unit test.
- There will be only one opportunity to take each unit test, and the selected problems will require a higher level understanding of the material. This will include more word problems and advanced applications.

The goal is to challenge every student and provide a rigorous yet comfortable environment.

This is a *suggested* schedule for pacing. Please note that some sections may require less time than suggested, and some may require more time; this will vary by student.

Date(s)	Topic(s)	In-class Activities	Graded Assignments and/or Assessment
Monday, June 27, 2011	Basics of Geometry <ul style="list-style-type: none"> • Points, lines, and planes • Segments and congruence • Midpoint and distance formulas • Angles and angle pairs • Classify polygons • Find perimeter, circumference, area 	Pre-test Self-study Skills Read and Work on Chapter 1	
Tuesday, June 28, 2011	Reasoning and Proof <ul style="list-style-type: none"> • Conditional statements • Deductive reasoning • Reason with algebraic properties • Prove statements about segments and angles • Prove angle pair relationships 	Read and Work on Chapter 2	Chapter 1 Quiz
Wednesday, June 29, 2011	Parallel and Perpendicular Lines <ul style="list-style-type: none"> • Use parallel lines and transversals • Prove lines are parallel • Find and use slopes of lines • Write and graph equations of lines • Prove theorems about perpendicular lines 	Read and Work on Chapter 3	Chapter 2 Quiz

Thursday, June 30, 2011	Congruent Triangles <ul style="list-style-type: none"> • Apply triangle sum properties • Apply congruence and triangles • Prove triangles congruent by SSS • Prove triangles congruent by SAS and HL • Prove triangles congruent by ASA and AAS • Use congruent, isosceles, and equilateral triangles 	Read and Start working on Chapter 4	Chapter 3 Quiz Unit 1 Test
Friday, July 1, 2011		Finish working on chapter 4	Chapter 4 Quiz
Monday, July 4, 2011	Relationships within Triangles <ul style="list-style-type: none"> • Midsegment Theorem and coordinate proof • Use perpendicular bisectors • Use angle bisectors of triangles • Use medians and altitudes • Use inequalities in a triangle • Inequalities in two triangles and indirect proof 	Read and Work on Chapter 5	Chapter 5 Quiz
Tuesday, July 5, 2011	Similarity <ul style="list-style-type: none"> • Ratios, proportions and geometric mean • Use proportions to solve geometric problems • Use similar polygons • Prove triangles similar by AA • Prove triangles similar by SSS and SAS • Use proportionality theorems • Perform similarity transformations 	Read and Work on Chapter 6	Unit 2 Test
Wednesday, July 6, 2011	Right triangles and Trigonometry <ul style="list-style-type: none"> • Apply the Pythagorean Theorem • Use the converse of the Pythagorean Theorem • Use similar right triangles • Special right triangles • Apply the tangent ratio • Apply the sine and cosine ratios • Solve right triangles 	Read and Work on Chapter 7	Chapter 6 Quiz
Thursday, July 7, 2011	Quadrilaterals <ul style="list-style-type: none"> • Find angle measures in polygons • Use properties of parallelograms • Show that a quadrilateral is a parallelogram • Properties of rhombuses, rectangles, and squares • Use properties of trapezoids and kites • Identify special quadrilaterals 	Read and Start working on Chapter 8	Chapter 7 Quiz Unit 3 Test
Friday, July 8, 2011		Finish working on chapter 8	Chapter 8 Quiz
Monday, July 11, 2011	Properties of Circles <ul style="list-style-type: none"> • Use properties of tangents • Find arc measures • Apply properties of chords • Use inscribed angles and polygons • Apply other angle relationships in circles • Find segment lengths in circles • Write and graph equations of circles 	Read and Work on Chapter 10	
Tuesday, July 12, 2011	Measuring length and area <ul style="list-style-type: none"> • Area of triangles and parallelograms • Areas of trapezoids, rhombuses, and kites • Perimeter and area of similar figures • Circumference and arc length • Areas of circles and sectors • Areas of regular polygons • Use geometric probability 	Read and Work on Chapter 11	Chapter 10 Quiz Unit 4 Test
Wednesday, July 13, 2011	Surface Area and Volume of Solids <ul style="list-style-type: none"> • Explore solids • Surface area of prisms and cylinders • Surface area of pyramids and cones • Volume of prisms and cylinders 	Read and Work on Chapter 12	Chapter 11 Quiz

	<ul style="list-style-type: none"> • Volume of pyramids and cones • Surface area and volume of solids • Explore similar solids 		
Thursday, July 14, 2011	Optional: Properties of Transformations Optional: Reading <i>Conned Again, Watson!</i> <i>Cautionary Tales of Logic, Math, and Probability</i>	Study for Final Exam	Chapter 12 Quiz Unit 5 Test
Friday, July 15, 2011		Post Test: Final Exam	Final Exam

CTD Statement on Third-Party Web Sites

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility for any of the content contained on third-party web sites used in course materials. If you become aware of anything that may be inappropriate, please notify CTD staff immediately.

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