

Geometry Honors

Course Outline

Number: 301

Level: Honors

Textbook: Geometry: Integration, Applications, Connections, Burrill, et. Al., Glencoe, 2001

Credits: 5 credits

Revised: August 2008

I. Prerequisite:

This course is open to those students who have successfully completed the first year of college mathematics, Algebra I, either through the 8th Grade Algebra I program (meeting established standards on a locally prepared exam) or through the 9th grade Academic Algebra I class. Students from the 9th grade Algebra I (A) class must be recommended by their Algebra I teacher. Ninth grade students entering from outside our district who have had Algebra I in eighth grade, must take the locally prepared Algebra I exam and score at least 75%.

II. Course description:

III.

This course is the second year of college preparatory mathematics at an honors level. It is designed for students who have exceptional mathematical ability and motivation and will prepare them for college sequences requiring an extensive mathematical background.

In this course students will study the concept of mathematical proof, which is basic to the student's understanding of a mathematical system. Other topics studied are angle relationships, parallel and perpendicular lines, congruent triangles, similar polygons, right triangles, trigonometric ratios, fractals, vectors, circles, area and volume, coordinate geometry and the application of these concepts. Problem solving and critical thinking skills will be emphasized.

High Point Regional High School's curriculum and instruction are aligned to the State's Core Curriculum Content Standards and address the elimination of discrimination by narrowing the achievement gap, by providing equity in educational programs and by providing opportunities for students to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

III. Description of instruction:

Students are expected to be active participants in the learning process. The teacher will involve them in the introduction and development of material through questioning and class discussions.

Understanding of concepts is stressed rather than rote memorization of skills. When appropriate, students are guided in discovering the concepts themselves through a study of patterns and by relating the new work to their prior knowledge. Students will be expected to apply the concepts they learn to new situations.

Homework will be given almost every and is an important part of the course, providing students the opportunity to apply skills learned in class, strengthen their understanding of the concepts and identify areas they don't understand. It is imperative that students do homework regularly and conscientiously. Homework will be reviewed in class and it is the student's responsibility during that time to ask questions about problems he/she doesn't understand, to identify specific mistakes and to take notes

on any further explanations concerning these problems. Some of the homework will be based on the sample problems done in class and students are expected to study these examples and use them as a guide when doing their homework. Other problems will require students to extend the concepts learned in class to new situations. Students may also be given reading assignments either to preview material that will be taught the next day or to learn new concepts and procedures independently.

IV. District Policy: Academic Integrity

Pupils are expected to be honest in all of their academic work. This means that the students in this course will not engage in any of the following acts:

- Cheating on examinations or other school assignments, including but not limited to, the non-authorized use of books or notes, the use of crib sheets, copying from other students' papers, exchanging information with other students orally, in writing, or by signals, obtaining copies of the examination illegally and other similar activities. Cheating through the use of technology to exchange information on any school assignment, examination, etc. is prohibited. Technology is defined as, but not limited to, computers, telephones, text messaging, palm pilots, calculators, cameras or any other hand held device.
- Plagiarism is not permitted in term papers, themes, essays, reports, images, take-home examinations, and other academic work. Plagiarism is defined as stealing or use without acknowledgment of the ideas, words, formulas, textual materials, on-line services, computer programs, etc. of another person, or in any way presenting the work of another person as one's own.
- Falsifications, including forging signatures, altering answers after they have been graded, inserting answers after the fact, erasing of grader's markings, and other acts that allow for falsely taking credit.

A pupil found guilty of academic dishonesty may be subjected to a full range of penalties including, but not limited to reprimand and loss of credit for all of the work that is plagiarized. Disciplinary action may also be a consequence of such behavior. Additional consequences may apply as defined in specific department policies and guidelines.

A teacher who believes that a pupil has been academically dishonest in his/her class should resolve the matter in the following manner:

- Reprimand the student orally and/or in writing. The teacher is also authorized to withhold credit in the work due to academic dishonesty.
- If warranted, the teacher shall file a written complaint against the student with the Administration, requesting a more stringent form of discipline. The complaint must describe in detail the academic dishonesty that is alleged to have taken place, and must request that the matter be reviewed by the Administration.
- The Administration will determine if further discipline of the pupil is appropriate, and will determine the nature of the discipline on a case-by-case basis.
- If the pupil is not in agreement with the disciplinary action of the Administration, he/she may appeal the action first to the Principal and secondly to the Superintendent. If the pupil is dissatisfied with the Superintendent's disposition of the case, he/she may grieve the action in accordance with Policy No. 5710, Pupil Grievance.

V. Student Projects

Each student will complete two teacher assigned projects. One project will be to investigate Non-Euclidean Geometry and write a report. The other project will be to read one chapter of the book "Five Equations that Changed the World" and report on a famous Mathematician.

VI. Student evaluation:

One to three quizzes based on the course proficiencies will be given during a unit and a chapter test will be given at the end of each unit. An exam will be given at the end of each semester, covering all the work of that semester.

Homework will be checked daily. It will usually not be graded, but will be considered satisfactory if the work show indicates the student has made a conscientious effort to complete the assignment. If the student was unable to complete the assignment because he/she didn't understand the work, he/she may be asked to redo the homework to get credit. Sometimes an assignment given for homework may be collected and graded as a quiz. Students will be informed ahead of time about these assignments.

Grades will be calculated according to the school grading policy and the following guidelines:

A. Marking Period

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| 1. Tests and Quizzes | 90 – 95 % |
| 2. Homework
(Each teacher will explain
his/her policy to the class.) | 5 – 10 % |
| 3. Class Participation | 0 – 5 % |
| 4. Two projects are required; each
will be graded as a quiz or test. | |

B. Final Grade

- | | |
|------------------------|------|
| 1. Each Marking Period | 20 % |
| 2. Midterm Exam | 10 % |
| 3. Final Exam | 10 % |

Unit 1: Discovering Points, Lines, Planes, and Angles

Students will be able to:

1. Identify and model points, lines, and planes. Identify coplanar points and intersecting lines and planes.
2. Solve problems using formulas: Find maximum area using perimeter.
3. Find the distance between two points on the number line and the coordinate plane.
4. Apply the Pythagorean theorem to find the lengths of sides of a triangle.
5. Use the midpoint formula and theorems.
6. Identify and classify angles. (angle addition postulate, congruent angles, and bisectors)
7. Identify and use angle relationships: adjacent, vertical, complementary, supplementary, linear pairs, and perpendicular lines)

Unit 2: Connecting Reasoning and Proof

Students will be able to:

1. Make conjectures based on inductive reasoning.
2. Write the converse, inverse, and contrapositive of a statement.
3. Identify and use basic postulates about points, lines, and planes.
4. Use conditional statements.
5. Use the Law of Detachment and Law of Syllogism in deductive reasoning.
6. Use the properties of equality in algebra and geometric proofs.
7. Complete proofs involving segment and angle theorems

Unit 3: Using Perpendicular and Parallel Lines

Students will be able to:

1. Solve problems by drawing diagrams.
2. Identify relationships between lines, planes, and transversals.
3. Find angle measures determined by parallel lines and use properties of parallel lines. Problem solving techniques.
4. Find the slope of lines and use slope to identify parallel and perpendicular lines.
5. Recognize and prove lines parallel based on given angle relationships.
6. Recognize and use distance relationships among points, lines and planes.
7. Find the distance between a point and a line.
8. Identify points, lines, and planes in spherical geometry.
9. Compare and contrast basic properties of plane and Non-Euclidean geometries.

Unit 4: Identifying Congruent triangles

Students will be able to:

1. Identify the parts of triangles and classify triangles by their parts.
2. Investigate the relationship of the angles of a triangle. (angle sum and exterior angle theorem)
3. Name and label corresponding parts of congruent triangles. Problem solving techniques.
4. Use SSS, SAS, ASA postulates to test for congruence.
5. Use the AAS congruence postulate.
6. Use the properties of isosceles and equilateral triangles.

Unit 5: Applying Congruent triangles

Students will be able to:

1. Identify and use medians, altitudes, angle bisectors, and perpendicular bisectors in a triangle.
2. Recognize and use tests for congruence of right triangles.
3. Use indirect reasoning and indirect proof to reach a conclusion.
4. Recognize and apply properties of inequalities.
5. Solve problems by working backwards.
6. Recognize and apply relationships between sides and angles in a triangle.
7. Use a graphing calculator to investigate the relationship among the measures of the sides of a triangle.
8. Apply the Triangle Inequality Theorem.
9. Apply the SAS inequality and the SSS Inequality.

Unit 6: Exploring Quadrilaterals

Students will be able to:

1. Recognize and apply the properties of a parallelogram. Geometric modeling.
2. Recognize and apply the properties and theorems of parallelograms, rectangles, rhombi, squares, and trapezoids.

Unit 7: Connecting Proportion and Similarity

Students will be able to:

1. Recognize and use the properties of ratio and proportion.
2. Identify similar figures.
3. Use proportional parts of a triangle to solve problems.
4. Divide a segment into congruent parts.
5. Recognize and use the proportional relationships of corresponding perimeters, altitudes, angle bisectors, and medians of similar triangles.
6. Recognize and describe characteristics of fractals.
7. Create Pascal's Triangle and describe patterns in it.
8. Solve problems by solving a simpler problem.

Unit 8: Applying Right Triangles and Trigonometry

Students will be able to:

1. Find the geometric mean between two numbers.
2. Use the Pythagorean Theorem and its converse.
3. Use the properties of 45-45-90 and 30-60-90 triangles
4. Find trigonometric ratios using right triangles. (sine, cosine, and tangent)
5. Use trigonometry to solve word problems including angles of elevation and angles of depression.

Unit 9: Analyzing Circles

Students will be able to:

1. Identify and use parts of circles.
2. Recognize major arcs, minor arcs, semicircles, and central angles.
3. Recognize and use relationships among arcs chords and diameters.
4. Recognize and apply properties and theorems of inscribed angles.
5. Recognize tangents and use properties of tangents.
6. Find the measures of angles formed by intersecting secants and tangents in relation to intercepted arcs.
7. Use properties of chords, secants, and tangents to solve word problems.
8. Write and use the equation of a circle in the coordinate plane.

Unit 10: Exploring Polygons and Area

Students will be able to:

1. Identify and name polygons.
2. Find the sum of interior and exterior angles of convex polygons and regular polygons.
3. Create tessellations using translations and rotations.
4. Identify regular and uniform tessellations.
5. Find the area of polygons using the formulas for parallelogram, triangle, rhombi, square, and trapezoid.
6. Find the area under a curve using inscribed rectangles
7. Find the area of circles and regular polygons.
8. Use area to solve problems involving patterns and geometric probability.
9. Recognize nodes and edges as used in graph theory.
10. Determine if a network is traceable
11. Recognize and draw reflection images, rotation images, lines of symmetry, and points of symmetry.
12. Perform dilations on a geometric figure.

Unit 11: Investigating Surface Area and Volume

Students will:

1. Use top, front, side, and corner views of three-dimensional solids to make models.
2. Find the lateral area and surface area of a right prism, and a right cylinder.
3. Find the lateral area and surface area of a regular pyramid and a right circular cone.
4. Find the volume of a right prism, and a right cylinder.
5. Find the volume of a pyramid and a right circular cone.
6. Find the surface area and volume of a sphere.
7. Identify congruent or similar solids.

