Radnor High School
Course Syllabus

Advanced Geometry
433

I. Course Description

This course uses a disciplined approach to traditional Geometry, integrating the concepts and skills previously developed in Advanced Algebra 1. Students in Advanced Geometry apply geometric concepts to solve problems, use two-column proofs to establish relationships among triangles and parts of triangles, apply similarity theorems to geometric figures, relate knowledge of parallel and perpendicular lines to solve practical problems, combine algebraic and geometric skills to solve perimeter, area and volume problems, and apply skills involving trigonometry and transformational geometry. Interactive computer software is integrated throughout the curriculum.

II. Materials & Equipment

- Geometry; Addison-Wesley Publishing Company
- Graphing and/or scientific calculator
- Compass and straight edge

III. Course Goals & Objectives

- To develop the ability to think mathematically.
- To enhance problem solving ability.
- To use technology appropriately.
- To gain an appreciation and understanding of geometry as the full development of an axiomatic mathematical system.
- To see the interrelationship of geometry to both other fields of mathematics and to relevant life situations.
- To heighten creative and intuitive abilities.
- To increase proficiency in computational and algebraic skills.
- To apply definitions, postulates and theorems to geometry figures in order to do proofs and algebraic exercises.
- To understand the use of the language and symbols of geometry.
- To apply area and volume formulas to various plane and solid figures.
- To review the use of the Cartesian coordinate system for plotting points and lines.

IV. Course Topics (Summary Outline)

I. Basic Ideas of Geometry
- Points, Lines, Planes, and Space
- Distance and Segment Measure
- Rays, Angles, and Angle Measure
- Congruent Segments and Angles
- Triangles
- Conditional Statements
- Drawing/Supporting Conclusions
- Deductive Reasoning
- Complementary, Supplementary, and Vertical Angles
- Perpendicular Lines
- Diagram Rules
- Segment, Line, and Angle Theorems

II. Parallel Lines and Planes
- Parallel Planes, Lines, and Transversals
- Properties of Parallel Lines
- Proving Lines Parallel
- Angles of a Triangle
- Angle Sum Theorem for Triangles

III. Transformations
- Reflections and Line Symmetry
- Translations and Translational Symmetry
- Rotations and Rotational Symmetry

IV. Congruent Triangles
- Congruent Triangles
- Congruence Postulates
- Congruency Proofs
- Isosceles Triangles
- Medians, Altitudes, and Perpendicular Bisectors

V. Constructions
- Segments, Angles, and Bisectors
- Perpendicular and Parallel Lines

VI. Using Congruent Triangles and Parallel Lines
- Properties of Parallelograms
- Proving Quadrilaterals are Parallelogram
- Rectangles, Rhombuses, and Squares
- Trapezoids
- The Midsegment Theorem
- Inequalities in One Triangle

VII. Similarity
- Ratio and Proportion
- Properties of Proportion
- Similar Polygons
- AAS, SAS, and SSS Similarity Theorems
- Segments Divided Proportionally

VIII. Right Triangles
- Right Triangle Proportions
- The Pythagorean Theorem
- The Converse of the Pythagorean Theorem
- Special Right Triangles
- The Tangent, Sine, and Cosine Ratios
- Angles of Elevation and Depression

IX. Coordinate Geometry
- Midpoint of a Segment
- Slope of a Line
- Slopes of Perpendicular and Parallel Lines
- Equation of Lines
- The Distance Formula

X. Circles
- Basic Terms
- Tangent Lines
- Common Tangents and Tangent Circles
- Arcs and Chords
- Inscribed Angles
- Other Angles
- The Equations of a Circle

XI. Area and Perimeter of Polygons
- Perimeter and Area of Rectangles
- Areas of Parallelogram and Triangles
- Areas of Trapezoids and Other Quadrilaterals
- Area of Regular Polygons
- Ratios of Areas and Perimeters of Similar Polygons
- Circumference and Arc Lengths
- Areas of Circles, Sectors, and Segments

XII. Surface Area and Volume
- Prisms, Pyramids, Cylinders
- Cones, Spheres
- Similar Solid

V. Assignments & Grading

Assignment sheets will be distributed periodically throughout the school year. Homework will be assigned on a daily basis. Grades will be based on quizzes and tests. In addition, teachers may use homework, group activities, and/or projects for grading purposes. All students will take departmental midyear and final exams. The Radnor High School grading system and scale will be used to determine letter grades.