Geometry H Unit 9: Analytic Geometry

Unit #:	APSDO-00018282	Duration:	2.0 Week(s)	Date(s):	

Team:
Jaclyn Lawlor (Author), Tracy Andreana, Sally deGozzaldi, Jennifer Greene, Jeanine LaBrosse, Jaclyn Lawlor, Melinda Litke, Ben Lukowicz, Jennifer Miller, Matthew Mooney, James Murray, Marlaina Napoli, Andrew Riddle, Steven Rivoira, Kimberly Moretti

Grades:
9, 10

Subjects:
Mathematics

Unit Focus

In this unit, students explore the relationship between algebra and geometry called analytic geometry. Students will develop formulas for the length of a line segment, the midpoint of a line segment, and the slope of a line. They will also complete analytic proofs by representing shapes on a coordinate plane. Summative assessments may include projects, labs, and tests. Primary instructional materials for this unit include Elementary Geometry for College Students, D. Alexander and G. Koeberlein, 2011.

Stage 1: Desired Results - Key Understandings

Established Goals

Common Core
Mathematics: 9

- Use coordinates to prove simple geometric theorems algebraically.
  CCSS.MATH.CONTENT.HSG.GPE.B.4
- Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
  CCSS.MATH.CONTENT.HSG.GPE.B.5
- Use coordinates to compute perimeters of polygons and areas of triangles and

Transfer

T1 (T50) Based on an understanding of any problem, initiate a plan, execute it and evaluate the reasonableness of the solution.
T2 (T53) Articulate how mathematical concepts relate to one another in the context of a problem or in the theoretical sense.
T3 (T51) Examine alternate methods to accurately and efficiently solve problems.
T4 (T52) Use appropriate tools strategically to deepen understanding of mathematical concepts.
T5 (T40) Describe, classify, and compare objects by their attributes.
T6 (T42) Infer properties of an object from its shape, location and measurements.
T7 (T44) Apply appropriate theorems and formulas to determine the unknown.

Meaning

Understandings	Essential Questions

rectangles, e.g., using the distance formula. *CCSS.MATH.CONTENT.HSG.GPE.B.7* • Prove theorems about triangles. *CCSS.MATH.CONTENT.HSG.CO.C.10* • Construct viable arguments and critique the reasoning of others. *CCSS.MATH.MP.3* • Look for and make use of structure. *CCSS.MATH.MP.7* • Reason abstractly and quantitatively. *CCSS.MATH.MP.2*	**U1** (U405) Shapes can be described synthetically or analytically. **U2** (U406) Every geometric theorem or formula is an established relationship that can be applied to a specific set of figures. **U3** (U407) Analytic geometry allows you to visualize algebraic relationships. **U4** (U512) Mathematicians use diagrams, symbols, and terms to describe problems or situations **U5** (U520) Effective arguments are based on logical mathematical thinking. **U6** (U560) Patterns and structures are characterized by consistent relationships.	**Q1** (Q404) How do I justify my argument analytically? (Gr. 8-12) **Q2** (Q402) What shape(s) can I create? How do I show its attributes? **Q3** (Q405) How do I use measurements about the shape to calculate additional information about it? **Q4** (Q511) What characteristics/attributes define this type of problem? **Q5** (Q520) Does the argument/thought process/logic make sense? **Q6** (Q561) How does understanding the pattern/structure help me solve the problem?

Acquisition of Knowledge and Skill

Knowledge	Skills
	S1 Understand how to plot points on the coordinate plane and be able to find the distance between points and the midpoint of a line segment with given endpoints **S2** Graphing linear equations and determining if lines are parallel/perpendicular by analyzing slope **S3** Doing an analytic proofs by representing shapes on a coordinate plane **S4** Write equations of lines and solve systems of generic equations with solutions that are ordered expressions

Stage 3: Learning Plan

Coding	Code	Description of Learning Activity