Geometry Level 1 - Unit H - Advanced Coordinate Geometry

Unit Focus

In this final unit, students link what they have learned in Algebra I about graphing equations to the concepts they have learned throughout this Geometry course. The work in this unit will create a smooth bridge to the work done in Algebra II.

Stage 1: Desired Results - Key Understandings

Standard(s)

Common Core
Mathematics: 9-12

- Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (CCSS.MATH.CONTENT.HSA.CED.A.2)
- Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. (CCSS.MATH.CONTENT.HSA.CED.A.3)
- Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. (CCSS.MATH.CONTENT.HSA.REI.C.5)
- Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. (CCSS.MATH.CONTENT.HSA.REI.C.6)
- Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$. (CCSS.MATH.CONTENT.HSA.REI.C.7)
- Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). (CCSS.MATH.CONTENT.HSA.REI.D.10)
- Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. (CCSS.MATH.CONTENT.HSA.REI.D.12)
- 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

Transfer

Students will be able to independently use their learning to...
T1 draw conclusions about graphs, shapes, equations, or objects.
T2 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution.
T3 apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem.

Meaning

Understanding(s)	Essential Question(s)
Students will understand that... **U1** Effective problem solvers work to make sense of the problem before trying to solve it. **U2** Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions.	*Students will keep considering...* **Q1** What does the solution tell me? **Q2** What is the most efficient way to solve this problem?

Acquisition of Knowledge and Skill

Knowledge	Skill(s)
Students will know... **K1** Slope intercept, point slope and general linear form of lines and how to fluently use the form to get information about the line **K2** A system of equations has either one, no or an infinite number of solutions	*Students will be skilled at...* **S1** Verifying if a point is a solution to an equation **S2** Graphing an equation, inequality or a system of equations or inequalities **S3** Using geometric properties learned throughout the course to solve problems on

Stage 1: Desired Results - Key Understandings		
perpendicular to a given line that passes through a given point). (CCSS.MATH.CONTENT.HSG.GPE.B.5) • Make sense of problems and persevere in solving them. (CCSS.MATH.MP.1) • Reason abstractly and quantitatively. (CCSS.MATH.MP.2) • Look for and make use of structure. (CCSS.MATH.MP.7) **Madison Public Schools Profile of a Graduate** • Inquiry: Posing, pursuing, and refining significant questions to deepen understanding about a topic or issue. (POG.1.1) • Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)	**K3** That the graph of a system of inequalities represents the points that are a solution to all the inequalities in the system **K4** Vocabulary: system	the coordinate plane including those involving slope, distance, area **S4** Writing equations of lines from given information **S5** Solving a system of equations by substitution, addition algorithm, graphing **S6** Identifying the center and radius of a circle given in standard form and graph it **S7** Writing the equation of the graph of a circle