Lesson Title	Graphing Lines
Length of Lesson	50 minutes
Created By	Emily Burtnett
Subject	High School math (geometry)
Grade Level	9-12
State Standards	2f
DOK Level	2
DOK Application	Use algebraic and graphical methods to solve systems of linear equations and inequalities in mathematical and real-world situations.
National Standards	Build new mathematical knowledge through problem solving. Solve problems that arise in mathematics and in other contexts. Apply and adapt a variety of appropriate strategies to solve problems. Recognize and use connections among mathematical ideas. Recognize and apply mathematics ion contexts outside of mathematics.
Graduate Research Element	In fluid dynamics, the Euler equations are a set of equations governing inviscid flow. Systems of equations are frequently used in computational fluid dynamics and heat transfer. For example, implicit methods are an algorithm requiring the simultaneous solution of a system of algebraic equations.

Student Learning Goal:
Students will learn to solve systems of equations by plotting the equation of a line and applying it to a real-world application. Students will practice using slope-intercept form ($y=mx+b$) as well as point-slope form ($y-y_1=m(x-x_1)$).

Materials Needed (supplies, hand-outs, resources):
Graph paper, calculators, rulers, worksheets (see attached), colored pencils

Lesson Performance Task/Assessment:
Students will read the real-world scenarios of the worksheets describing a situation. They will pretend they are watching airplanes on radar as an air traffic controller, and it is their job to determine if two aircraft will collide. Students are given the equations of two lines and will have to graph them. Once they are graphed students will identify where the lines cross and write as a coordinate point (x, y). Students must then write the equations in slope-intercept form and point-slope form. They will identify the slope and the y-intercept based on their equations or the graph.

Lesson Relevance to Performance Task and Students:
Students will see how flight paths are described as an equation of a line.

Anticipatory Set/Capture Interest:
Pictures or video of actual radar and aircraft flight paths.

Guided Practice:
The instructor will review the ways to express the equation of a line as well as the process of graphing a line. The instructor will work through a few examples together as a warm-up.

Independent Practice:
Students will work independently or in groups (up to the instructor) to complete the worksheet and solve the problems.

Remediation and/or Enrichment:
For remediation, the instructor can reduce the number of problems the students are required to solve. Students should be able to at least graph the lines and write in point-slope and slope-intercept form. Individual IEPs will be supported.

The lesson can be enriched by asking students to write equations of a line that redirects the colliding aircraft to avoid the collision. The lesson could be expanded to an additional lesson about vectors (magnitude and direction) and intersection angles. Student can also be introduced to solving systems of equations with elimination or substitution.

Check(s) for Understanding:
Did the students correctly graph the lines? Were they able to rewrite the equations in the appropriate form and identify the parts of the equation?

Closure:
The teacher will bring the students' attention bck to the front and show more complicated examples of real world cases and pictures of aircraft paths and how they can use math (equations of lines) to ensure that a target is hit or to prevent aircraft from colliding.

Possible Alternate Subject Integrations:
Algebra II, vector math

Teacher Notes:
Give the students plenty of work time. Show examples to get students started if they are struggling.