Advanced Math Topics: Tanks Project

"Tanks" is an online artillery game where the goal is to destroy all other tanks by shooting at them with various weapons. Points are scored for damaging or destroying the other players. Shots are determined by three variables: power, angle, and wind speed. You will work in teams of three or four students.

Objective

In this project your team's goal is to defeat all other teams by devising a mathematical model for the path of the projectiles and using that model to predict where your shots will land. The winning team is the team with the most **points** at the end of the game.

Method

You must use concepts we studied in class to develop a model for the trajectories of the projectiles. Your model will be parametric with an equation each for *x* and *y* positions depending on time. You may use whatever tools you like to develop your model, however you must use Geogebra as a testing platform for your equations. Take all forces into consideration when defining your parametric functions. You will need to perform some research followed by some mathematics to define your position functions for *x* and *y*.

Rules

The competition will occur over three days in three rounds: Desert, Mountain, and Random. All teams will compete simultaneously. The only weapons allowed are small missiles (no volcano bombs). You may only use the original 8 repair kits with which you start. Once they are exhausted you have no more repair kits. Each day we will play as many games as time allows and point totals will carry over to the next day. The team with the highest point total at the end of the three days will win.

Product

You must turn in a finished product documenting your work. This must be **typed** and must contain the following elements:

1. An explanation of your how you created your mathematical model. Include an explanation of all forces you took into consideration and **all mathematical work** involved in finding position functions for *x* and *y*.
2. An analysis of the accuracy of your model. Describe conditions under which your model performs well and conditions under which it performs poorly (if any) and speculate about what might need to be changed.
3. Your Geogebra file used to test your model.

Rubric for Tanks Project

Content Area	1	2	3	4
Mathematical Calculations	Parametric equations for both horizontal and vertical directions exist.	Parametric equations exist and there is reference to how they originated.	Parametric equations exist and there is work shown as to how they were derived from drag, power, gravity, etc.	"Correct" equations exist with correct work shown for their derivations.
Communication	Goals of the project are given.	Goals of the project are explained. All factors considered in the creation of the model are discussed.	Goals of the project are explained. All factors considered in the creation of the model are discussed. Analysis of the behavior of the model is given with conditions under which the model behaves well/poorly.	Goals of the project are explained. All factors considered in the creation of the model are discussed. Analysis of the conditions under which the model behaves well/poorly is given, and reasons for any errors are discussed with ideas about how to improve the model.
Geogebra	There is a Geogebra file with a tanks picture.	The Geogebra model has a projectile that moves with time.	The model has a projectile that moves accurately in the vertical direction.	The model has a projectile that moves accurately in the vertical and horizontal directions including drag.