CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Hale R. Obernolte

Project Number

36749

Project Title

The Relationship between Trajectories with and without Gravity

Abstract

Objectives/Goals

The purpose of this project is to discover a definite relationship between the trajectories of a projectile fired at the same angle and velocity both with and without gravity at any point of the trajectory.

Methods/Materials

This project is purely mathematical/theoretical and requires no materials.

Results

The result of this project is the equation (1-Te/T) * tan(x) * (Dh * Te/T) = Vi * Te + (1/2) * A * Te^2, a mathematically proven equation which displays that at X% (elapsed time) of a trajectory with gravity, the projectile will be at (100%-X%) of the vertical height it would be at if it was not acted upon by gravity.

Conclusions/Discussion

Manipulation and investigation of Projectile Physics equations yielded that at X% (elapsed time) of a trajectory with gravity, the projectile will be at (100%-X%) of the vertical height it would be at if it was not acted upon by gravity. This is a definite relationship between trajectories with and without gravity that not only allows us to easily determine the height a projectile would be at if it was not affected by gravity, but also enhances our general understanding of projectiles and their trajectories.

Summary Statement

By manipulating projectiles equations, I discovered that at X% (elapsed time) of a trajectory with gravity, the projectile will be at (100%-X%) of the vertical height it would be at if it was not acted upon by gravity.

Help Received

Both my High School Physics teacher (Mr. Joe Bradley) and Calculus teacher (Mr. Chris Leong) looked over my final project to confirm that all manipulations of equations were legitimate.

Preliminary