



## Eggs-Over-Easy Slingshot Competition

Every year at the start of summer, two small towns in Illinois named Engelbrechtville and Olivertown send their best teams to the annual Eggs-Over-Easy Slingshot Competition. In this competition, each team has to launch an egg from a slingshot and try and get their egg to fly the highest in the air. It's a very intense competition, since Engelbrechtville and Olivertown are arch-rivals, their bitter rivalry going back for decades. Teams are required to shoot their egg from a home-made slingshot up in the air, making it take on the shape of an upside-down "V." In order to win, the egg has to be at its highest at the top of the upside-down V, and the winning team has to eggsplain why their egg was the highest using both math and science. (Engelbrechtville is full of science nerds and Olivertown is full of math geeks, you see.)

Last year, there was a huge commotion over this contest, because two teams (one from Engelbrechtville and one from Olivertown, of course) had their eggs reach the exact same height in the air—and it all came down to who could better support their results with math and science. Both teams did a fabulous job deriving the equation for the shape of their egg's flight path ( $-2x^2 + 6x + 3 = 0$ ), and even graphed it for the judges. However, the two almost-winning teams argued vehemently about the scientific reasons for the egg's flight path.

The first team said their egg reached its maximum height because it converted enough potential energy into kinetic energy when the egg launched out of the surgical tubing to overcome gravity, but then it lost kinetic energy at its vertex and dropped back to the ground. The second team claimed their egg reached the same maximum height as the first team because the force applied to the egg by the rubber bands of their slingshot caused the egg to have inertia and velocity, thereby increasing its acceleration away from the Earth; however, the egg fell back to earth because gravity made it accelerate downwards. Both teams did not use the equations for kinetic energy, potential energy, velocity, acceleration, or force to back up their scientific explanations. Newton would have been very upset.

Speaking of upset, so were the judges. They shook their heads, and declared that neither team was the winner. As you can imagine, this led to an eggremely aggressive response from both teams, and the judges were more than a little afraid. But, fortunately, violence was avoided, and peace was restored to nerdy and geeky towns of Engelbrechtville and Olivertown, respectively.

But it's that time of year again! Your team is entering the Eggs-Over-Easy Slingshot Competition this year, and it is your job to win--you're in it to win it, baby. You need to answer this question:

### How could you design a slingshot to maximize the height of an egg in the air?

Requirements:

- Build a slingshot that will launch an egg into the air so that it makes an upside-down "V" shape AND goes AT LEAST 15 feet high.
- Design the slingshot in such a way as to make your egg reach the highest maximum height
- Write up your project and findings in a lab write-up
- Back up your findings using the appropriate math and science concepts that explain your data.

YOUR TEAM NEEDS TO COLLABORATE OUTSIDE OF CLASS IN GOOGLE DOCS and agree on your slingshot design. Then, **each member of the team** needs to build a slingshot and bring it to class on Wednesday.

