

Alex Roerty  
*It's Not a Catapult!*

A trebuchet is a specific type of medieval catapult operating similar to the common catapult, but its driving force is a falling counterweight instead of twisted ropes or bent pieces of wood like other types. In medieval times, these were used as siege weapons to hurl heavy projectiles long distances to knock down enemy structures. Recently, as hobbyists and historians become more interested in these devices and hold competitions with them, they want to know how they could calculate the distance their trebuchet will launch with a given projectile and counterweight rather than testing all combinations of counterweights and projectiles. Using these computations, competitors can find the distance their trebuchet will launch quicker than actually testing it. The method I used to attempt to calculate these distances involved several standard high school physics equations to eventually calculate the approximate velocity of the projectile at the time it is launched. I then took that velocity and plugged it into an equation to calculate the horizontal distance the projectile will travel with a given launch angle. After comparing the distances that I calculated to the actual launch distances, I found that my calculation was accurate within about 0.5 meters, but only for counterweight to projectile ratios within a certain range. I concluded that I could roughly estimate the distance the trebuchet would launch if the counterweight to projectile ratio is within that range, but I would need to have incorporated differential equations to create a more precise solution.