

PHet Lab #2 Projectile motion

http://phet.colorado.edu/sims/projectile-motion/projectile-motion_en.html



Do not answer the lettered questions (just think about them.) Record table and solve only the application ?s.

1. Click on the above link.
2. Try using some of the different objects in the pull down menu **without** air resistance.
3. Now try the different objects **with** air resistance
 - a. What does air resistance do to a projectile? Why?
 - b. Why does a bowling ball go farther than a golf ball even though a golf ball has a smaller drag?
 - c. Why does a human go so much farther than a Buick when they have the same drag coefficient?
4. Physics frictionless environment; so turn drag off. Move the target to 20 meters from cannon by pulling the "x" away from the tape measure and try to fire the golf ball with these parameters, record your results:

Angle (degrees)	75°	45°	15°	89.4°	9.3°
Initial Speed (m/sec)	20 m/sec	14 m/sec	18 m/sec	98 m/sec	24.8 m/sec
Hit or Miss					
Time in the air					
Vertex Height (m)					
Range (m)					

- e. Which angle requires the fastest speed in order to hit the target? Why?
- f. Which angle requires the slowest speed to hit the target? Why?
- g. How did the shots with the smallest angles go just as far as the shots that were in the air the longest?
- h. Why do the X's get closer together as you get to the top of the parabola?
- i. What happens to the speed of the golf ball as you get closer to the top of the parabola? Does the horizontal speed change or only the vertical speed?

APPLICATION PROBLEMS:

1. **CLIFF PROBLEM:** Pull the cannon up to 18 meters vertical. Place the target at 34 meters horizontal and level with ground. Solve for the V_r of a horizontal shot. Once you have calculated the range, you may use the computer. Plug in your solution and fire to see if you truly understand how to calculate this.

2. **DUDE PERFECT PROBLEM:** Pull the cannon down to level. Place the target at 34 meters horizontal and 34 meters vertical. Solve for the V_r and the angle required for firing the golfball through this elevated target. Once you have calculated the V_r and the angle, you may use the computer. Plug in your solution and fire to see if you truly understand how to calculate this.

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