Projectile Motion Lab Part 1 **NAME**_____

Objective: To observe the relationship between gravity, velocity, projectile angle, and distance

Pre-Lab questions:

A 0.15 kg baseball is thrown into the air at a 40^o angle above the surface of the earth from a height of 1.5 meters. The initial velocity is 5.0 m/s, and the air resistance is negligible. Based on these parameters, answer the following questions, and show your work:

a. What is the time in flight for the ball?
b. What is the total vertical distance that the ball will travel?
c. What is the total horizontal distance that the ball will travel?

Equipment

Projectile Launcher Meter Stick Tape Measure Camera Masking Tape Steel Ball

Procedure

1. Set up the projectile launcher and the meter stick so that the projectile's path can be observed passing the meter stick.
2. Set up your cell phone camera so that a video of the projectile passing the meter stick can be recorded.
3. Measure the launch height (point that the projectile leaves the launcher).
4. Set the projectile launcher angle at 25^o.
5. Fire the projectile launcher and measure the landing distance.
6. Repeat firing for four trials at this angle.
7. Using angles 30^o, 35^o, 40^o, and 45^o, repeat steps 5 and 6.

Data

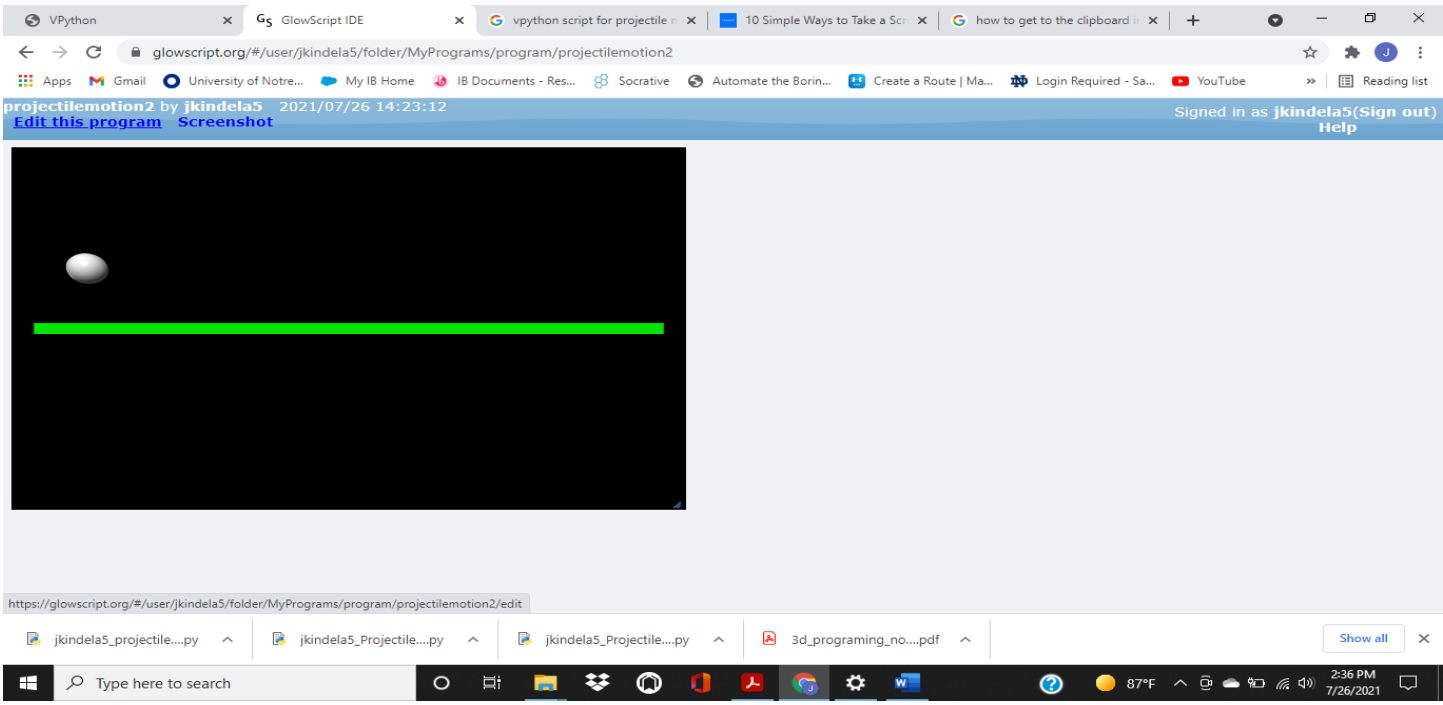
Firing Angle	Trials				Average Distance (m)	Initial Velocity (m/s)	Average Height (m)
	1	2	3	4			
25^o							
30^o							
35^o							
40^o							
45^o							

Vpython

Open your GlowScript account and run the Vpython projectile motion simulation to compare your results. Make sure that the program has the same v_o and angle. Use your kinematic equations to explain any discrepancies.

Basic Projectile Motion using GlowScript 3.1 VPython

```
from visual import *
from visual.graph import *

ball=sphere (pos=vector(-4.5,1.2,0), radius=0.3, color=color.white)
ground = box(pos=vector(0,0,0), size = vector(10, 0.2, 1), color=color.green)

g=vector(0,-9.8,0)
vO=5
theta=40*pi/180
#cos(theta)
#sin(theta)

ball.m=0.5
ball.v=vector(vO*cos(theta),vO*sin(theta),0)
t=0
dt=0.1

trail = curve(color=color.red)

attach_trail(ball)

posgraph = gcurve(color=color.red)

while ball.pos.y>0:

    rate(1)
    F=ball.m*g
    ball.v=ball.v+(F/ball.m)*dt
    ball.pos=ball.pos+ball.v*dt/ball.m
    t=t+dt
    posgraph.plot(pos=(t, ball.pos.y))

print("Time of flight = ",t," s")
```


VPython
GlowScript IDE
glowscript.org/#/user/jkindela5/folder/MyPrograms/program/projectilemotion2
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VPython
GlowScript IDE
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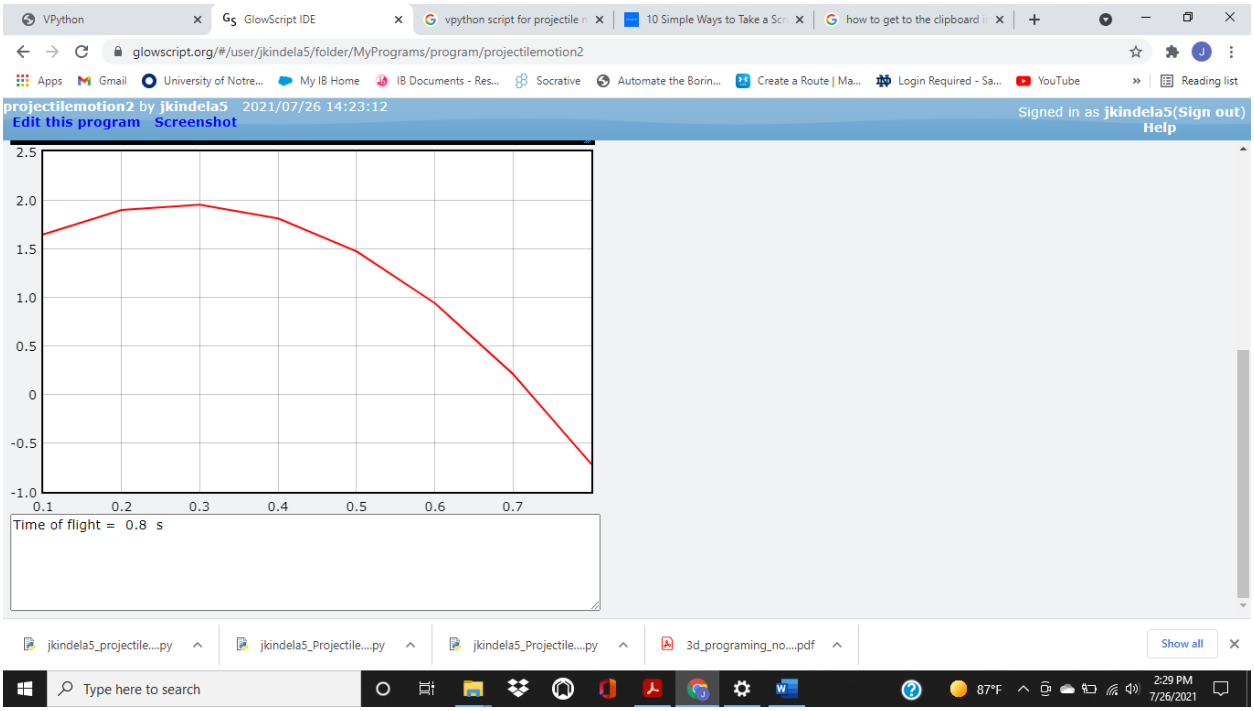
VPython
GlowScript IDE
vpython script for projectile
10 Simple Ways to Take a Scr
how to get to the clipboard
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Apps
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Reading list
projectilemotion2 by jkindela5 2021/07/26 14:23:12
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Help
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0.1
0.2
0.3
0.4
0.5
0.6
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Time of flight = 0.8 s
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