Physics 11

**Projectile Motion Simulation – Activity Bonus Worksheet**

30 marks

This activity worksheet on projectile motion will help you understand the basic concepts of velocity, acceleration, effects of wind resistance by using the projectile motion simulation found at:

http://phet.colorado.edu/en/simulation/projectile-motion

Open the above program and run it. Fill in the answers to the questions below by using the simulation. Hand in your answers along with a screen shot of the program in action to obtain the bonus marks.

1. Fire the cannon and observe the flight of the ball. What is the name given to the curved path of the cannon ball?
2. Change the angle (do not change anything else). What effect on the flight of the ball does changing this angle have? How can you make the ball fly straight up into the air? How can you make the ball fly along the ground? Determine the angle that allows for maximum range (horizontal distance) of the cannon ball?
3. Choose one angle of your choice (say 30°) and try different initial speeds. What happens to the path of the projectile when the initial speed is changed?
4. Set the angle for maximum range and the speed at 18 m/s. Erase all traces by using the erase button. Fire the cannon and note the path. Add air resistance by clicking on the button. Fire the cannon. What happens to the flight of the projectile compare to when there is no air friction? (Note 2 changes!) Increase the drag coefficient and fire the cannon once again. What happens this time?
5. Turn air resistance back off again. Erase all the paths. Fire the cannon ball one more time. Change the object. Fire different objects with no air resistance. What do notice about the paths of the projectiles? Try this again with air resistance back on. Do you get the same results? Explain.
6. Erase all traces and turn off the air resistance one more time. Set the object back to the cannon. Fire the cannon one more time to establish a path. Grab the cannon and drag it straight upwards. This mimic’s firing the cannon from some cliff. Fire the cannon ball and state any differences in the path from previous.
7. Change the angle to 0°. Erase the paths. Fire the cannon. What do you observe? Note the time of flight at the top of the screen. Change the speed (keep the angle at 0o) and fire the cannon each time. What do you notice about the time even though the speed is changed?
8. Set the speed at 18 m/s. Erase the paths. Fire the cannon one more time. Change the height of the cliff. What do you notice about the path and the time of flight of the ball?
9. Play with the sim one more time. Find something that has not been asked of as above. Describe what you did and what effect this had on the path of the projectile.