Projectile Motion Simulation Lab Part 2

- Go to https://phet.colorado.edu/
- Go to Search and type in "Projectile Motion"
- Click on Projectile Motion (HTML5)
- Click the Play button on the Simulation Graphic
- Click on Lab

Full Projectile Motion Problem (Investigating the Angle and the Distance Traveled)

1. Keep the cannon at a height of 0 meters.
2. Click on the cannon and lower it until the angle is 30 degrees.
3. Click below the cannon and change the initial speed to 16 m/s.
4. Using your initial speed of 16 m/s and your angle of 30 degrees, calculate and record your:
   Initial horizontal velocity: _____ Initial vertical velocity: _____
5. Using your initial vertical velocity, calculate the time it will take the cannonball to reach the highest point (half of the time) and record it here: _____ seconds.
6. Using your time it took to reach the highest point (half of the time), calculate the time it will take the cannonball to be launched and reach the ground (the full time) and record it here: _____ seconds.
7. Using your full time and your initial horizontal speed, calculate the approximate distance you should place the target and record it here: _____ meters.
8. Did you hit your target? Circle your answer: Yes or No

Doubling the Angle of the Cannon

9. Keep the cannon at a height of 0 meters.
10. Click on the cannon and raise it until the angle is 60 degrees.
11. Keep the initial speed at 16 m/s.
12. Using your initial speed of 16 m/s and your angle of 60 degrees, calculate and record your:
    Initial horizontal velocity: _____ Initial vertical velocity: _____
13. Using your initial vertical velocity, calculate the time it will take the cannonball to reach the highest point (half of the time) and record it here: _____ seconds.
14. Using your time it took to reach the highest point (half of the time), calculate the time it will take the cannonball to be launched and reach the ground (the full time) and record it here: _____ seconds.
15. Using your full time and your initial horizontal speed, calculate the approximate distance you should place the target and record it here: _____ meters.
16. Did you hit your target? Circle your answer: Yes or No
17. Was the path of the cannonball the same for 30 degrees as in 60 degrees? Circle your answer: Yes or No
18. Did the cannonball reach the same distance for 30 degrees as in 60 degrees? Explain why or why not.
    _____

Changing the Angle of the Cannon One More Time

19. Keep the cannon at a height of 0 meters.
20. Click on the cannon and lower it until the angle is 45 degrees.
21. Keep the initial speed at 16 m/s.
22. Using your initial speed of 16 m/s and your angle of 45 degrees, calculate and record your:
    Initial horizontal velocity: _____ Initial vertical velocity: _____
23. Using your initial vertical velocity, calculate the time it will take the cannonball to reach the highest point (half of the time) and record it here: _____ seconds.
24. Using your time it took to reach the highest point (half of the time), calculate the time it will take the cannonball to be launched and reach the ground (the full time) and record it here: _____ seconds.
25. Using your full time and your initial horizontal speed, calculate the approximate distance you should place the target and record it here: _____ meters.
26. Did you hit your target? Circle your answer: Yes or No
27. Was the path of the cannonball the same for 30 degrees as in 45 degrees? Circle your answer: Yes or No
28. Did the cannonball reach the same distance for 30 degrees as in 45 degrees? Yes or No
29. Which angle gave you the longest distance traveled by the cannonball? _____ degrees
30. If you shot another cannonball at 25 degrees, what angle would you need to shoot another cannonball in order to reach the same distance? _____ degrees
31. Try your two angles, 25 degrees and your guess. Did both angles hit the same target? Yes or No

Graphing:

On the axes below, sketch the graphs of the horizontal and vertical components of the cannonball's velocity *v* as a function of time *t* between *t* = 0, when the cannonball is launched and *t* = T, when the cannonball hits the target. Label *t* = T for the horizontal component of the cannonball's velocity and the vertical component of the cannonball's velocity.

Horizontal Component of Sphere's Velocity	Vertical Component of Sphere's Velocity