Part 1 – Intro Screen

(a) Start using the "cannonball" *object* chosen in the upper right corner and the target at 15m (drag)..

(b) Use the initial speed, height of the cannon and cannon angle to determine TWO combinations that will result in a 3 Star hit on the target. Record your settings here:

Object: **Cannonball**   Initial Speed: _____   Angle: _____   Height: _____   **Air Resistance - OFF**

Object: **Cannonbal**l   Initial Speed: _____   Angle: _____   Height: _____   **Air Resistance - OFF**

(c) Change the *object* you fired to **PIANO** and note any changes in the trajectory/path of the projectile.
New Object: Piano   Observations:

(d) **TURN ON AIR RESISTANCE** and fire the canon again. If you did not hit the target for 3 stars, make any necessary adjustments to your settings. Record your observations below:

Object: Piano   Initial Speed: _____   Angle: _____   Height: _____   **Air Resistance – ON**

Observations:

Part 2 – Vectors Tab

(a)   Determine one combination of settings to hit the target for 3 stars (leave cannon on the ground and target at 15m and TURN OFF AIR RESISTANCE).

Initial Speed: _____   Angle: _____   **Height: 0m Air Resistance – OFF Diameter 0.8 Mass 5kg**

(b)   Run the simulation three more times,   Observations

     (i)   turn on Components and Velocity Vectors only,

     (ii)   turn Components and Acceleration Vectors only

     (iii)   turn on components and Force vectors only

(c)   Turn ON Air Resistance, repeat the three trials and comment on any similarities or differences you observe in the Vectors for each trial; DO NOT change your settings to hit the target.

Part Three – Drag Tab

(a)   Set the **Diameter to 0.8m**, **Mass to 5 kg, initial velocity to 18m/s, 60 degree angle, and 15m target distance.**

(b)   Keep all settings the same for each trial and explore changing just the "*Drag Coefficient*" and the effect it has on the projectile behaviour. Record your observations below reasons for the behaviour below:

(c)   Keep all settings the same and explore changing just the "*Altitude*" and the effect it has on the projectile behaviour. Record your observations below reasons for the behaviour below:

Part Four – Lab Tab (Honesty Test)

(a) Set the height of the cannon to **5m**, the **angle to 60 degrees** and the **initial velocity to 15m/s** and the target location to **14m** from the cannon (drag it).
(b) Fire the cannon with the above settings to establish your baseline.
(c) Change the parameters on the right-hand side menu to adjust the projectile's path. (mass, gravity, etc.)
(d) You only get **THREE** attempts to hit the target, use the tape measure on the top of the screen to measure how close you were.

Trial	Object:	Mass:	Diameter	Gravity	Air Res On/off	Altitude	Distance from target
1.							
2.							
3.							