705 Bocce Ball Lab 100pts

RULES:

1) **No slamming balls**
2) **No throwing balls**
3) **Return all materials to me**
4) **Clean up your mess**

This is an open ended lab. You have till Friday January 25th end of class to complete the Experimental part of the lab. The full lab report is due on Tuesday 1/29/2019 by 6pm. Each group will design an experimental protocol to determine four main objectives:

1) What is the potential energy of the ball at the top of the ramp?
2) What is the kinetic energy of the ball when it leaves the ramp?
3) What is the speed of the ball based on the equation $KE=1/2mv^2$?
4) What is speed of the bocce ball leaving the ramp using landing distance off a table height?
5) How different are the two values for Velocity based on two different methods of calculating?
6) What is the coefficient of static friction of the carpet in the dome?
7) Determine the starting potential energy?
8) Set up a collision experiment, determine the amount of energy lost to the collision?

You have three hypotheses:

1) If you can determine the velocity of the bocce ball when it leaves the ramp, you can determine:
    a. The acceleration of the ball to make it come to a complete stop
    b. The force acting on the bocce ball
    c. The coefficient of static friction by the carpet acting on the bocce ball.
2) If you set up a collision of the bocce ball with another identical ball, then based on the laws of conservation of momentum, you can determine where the second ball would stop rolling; and you can also determine the amount of energy lost to the collision.
3) If we complete 5 trials for each experiment (1-ramp velocity, 2-acceleration ball, 3- collision loss) and the data is within 5% standard deviation, then your experimental protocol and data is valid.

INTRODUCTION:
3-5 paragraphs – explaining equations used
Last paragraph must have

- "In this study …." Synopsis

- Explain the hypothesis and whether you reject or accept it based on your data.
- Also provide real data #s

MATERIALS AND METHODS

Each Bocce ball weights 1.00kg

Construct a diagram of the experimental procedure, label the diagram and explain it in a legend below the figure. You can take a photo of the experimental set up and label it.

Questions to address:

- What would be your controls?
- What would be the independent variable for this experiment?
- What would be the dependent variable for this experiment?

RESULTS:

Introduction paragraph

TABLE 1: Determining the average velocity of the ball leaving the ramp

Trials	Height of table	PE	Velocity based on KE	Landing distance	Velocity based on landing distance*	% difference between velocities$	Velocity Average
1							
2							
3							
4							
5							

*= Velocity is determined by taking the landing distance and dividing it by the time. To determine time, the height of the bench was used with the equation $Dy=1/2\ (9.81m/s^2)t^2$

$= (|(KE velocity – Velocity landing distance)| ÷ KE velocity)*100 =

TABLE 2: Acceleration, Force and Coefficient Static Friction of Bocce Ball.

Trials	Rolling distance from ramp	Acceleration[A]	Force acting on Bocce ball[B]	Coefficient static friction[C]	μ_S average[D]	STD deviation[E]
1						
2						
3						
4						
5						

TABLE 3: Bocce Ball collision data.

Trials	Momentum of bocce ball before Collison (black ball)[A]	Momentum of bocce ball before Collison (red ball)	Distance traveled after collision	Starting Joules = F*d Without collision	Ending Joules =F*d With collision	Loss of energy Joules
1						
2						
3						
4						
5						

[A]= mass * Velocity

CONCLUSION:

- Explain your results.
- Does your hypothesis agree with your results?