PHYSICS **Reiner, Hutchison, Vourgourakis**

Lab 4-2: The Ball in Cup, Revisited

Can you get the ball in the cup again? The situation is a little different this time: you will load a steel ball into a small PVC "seat" that swings at the end of a pendulum. When the pendulum is released, it will swing until it strikes the wooden bar, at which point the ball will be launched into projectile motion.

Your task is to determine from where to release the pendulum so that the ball will fly through the air and land inside a cup placed at a specified distance from the edge of the lab bench. You will have to use your knowledge of projectile motion as well as the principle of conservation of energy. Keeping track of small details will be important in this experiment – a carefully drawn diagram is highly encouraged!

METHOD:

- You will have at your disposal a pendulum apparatus, a steel ball, a ruler, meter sticks, a protractor, and a cup. You don't necessarily need to use all of these things, and different groups may come up with very different ways of determining their release point for the pendulum.

- It is reasonable to assume that the pendulum swings with very little friction and that the vast majority of the pendulum's energy resides in the ball itself (i.e. the mass of the "arm" + "seat" are negligible).

- You may need to practice releasing the ball a couple of times, so that it clears the "seat" without hitting your fingers. After you're satisfied that you can do this, you'll give your instructor the ball and he or she will assign you a distance where to put the cup. The calculations may then commence.

  ASSIGNED DISTANCE FROM THE EDGE OF THE TABLE TO THE CUP: _____

- Make your measurements carefully and check your calculations with your instructor before testing your prediction. Whether or not the ball lands in the cup (or at least close) will be considered as part of your grade for this report.

The report for this assignment should include:

- A detailed description of your method, including a labeled diagram.

- A data section listing ***all*** of the measurements you made for this experiment. The assigned distance to the cup should also go into the data section.

- A neatly labeled, complete step-by-step of your calculations with the final result boxed.

- A conclusion in which you explain how well your method ending up working out and discuss what you see as the main sources of error that might have factored into your results.