LAB 7. THE PENDULUM CHALLENGE

Introduction

You will swing a metal weight attached to a thread so that when the weight reaches the bottom of its swing, a sharp blade cuts the thread. Your challenge is to predict exactly where the weight will land on the floor.

Supplies

Pendulum support, thread, fishing weight, white paper, carbon paper, tape, target, plumb line, measuring tape, utility blade (for the instructor)

Activity

1. You may work in groups. Each group may have no more than four students.
2. Obtain the vertical stand, horizontal bar, thread, fishing weight, white paper, tape, and carbon paper.
3. Tie the thread to the fishing weight. Hang the weight by the thread from the horizontal bar so that the weight is just below the level of the table top. (When the weight is released as a pendulum, a blade fastened to the table top will cut the string right above the weight.)
4. Decide where and how to release the pendulum so that the blade cuts the swinging thread.
5. Using your knowledge of kinematics and energy, calculate where the weight will land after the thread is cut.
6. Tape the target to the floor where you predict the weight will land.
7. Summon the instructor. Allow the instructor to attach the blade to the table top directly under the point where the thread is attached, so that the swinging thread meets the edge of the blade at a glancing angle.
8. Place a piece of carbon paper, carbon side down, atop the target. Place a sheet of waste paper atop the carbon paper to protect the carbon paper.
9. While the instructor watches, position and release the weight so that its thread is cut at the bottom of its swing and the weight lands on the floor at the predicted spot.
10. Allow the instructor to remove the carbon paper and observe the carbon mark left by the landing weight.

Evaluation

1. If the carbon mark is within 4.0 cm of the target, you have completed this lab for full credit!
2. If the mark is more than 4.0 cm distant from the target:
   a. Measure where the weight actually landed.
   b. Determine what went wrong in your calculation or execution.
   c. Explain your findings to the instructor.

d. Try once more.

3. If the second trial lands within 4.0 cm of the target, you have completed this lab for full credit!
4. If the mark is more than 4.0 cm distant from the target, you get one more try.
5. If the third trial lands within 4.0 cm of the target, you get a score of 85% for the lab.
6. If the mark is more than 4.0 cm distant form the target, you get a participation score of 70% for the lab.