

PHYSICS 190: MECHANICS and HEAT; Lab 8: Conservation of energy

1. Set up

- a. Materials needed: Loop de Loop apparatus and (2) meter sticks

2. Measurements

- a. Measure the launch angle of the apparatus
- b. Measure the height of the ball above the tabletop when it is at launch position
- c. Release the ball so that it will roll around the loop and then be launched off of the end of the apparatus finally impacting the tabletop (the ball should be released from 1 meter above the tabletop)
- d. Measure the horizontal distance from the end of the apparatus to the impact point

3. Analysis

- a. Use conservation of energy to find the launch speed of the ball (let the change in rotational kinetic energy and the work done by friction be zero)
- b. Predict the horizontal distance from the end of the apparatus to the impact point using the kinematics equations for projectile motion
- c. Calculate the percent difference between the predicted and measured values
- d. Repeat steps (3.a through 3.c) but let only the work done by friction be zero
- e. Do an experiment that will find the approximate value for the work done by friction
 1. Do not use the measured value for the distance and work backward
 2. Do not use the coefficient of friction or the normal force
- f. Repeat steps (3.a through 3.c) but using the approximate value for the work done by friction that you found in step (3.e)

4. Questions

- a. What is the percent difference between your prediction and the measured value for each of your predictions?
- b. Peter and Paul are riding bikes along a path at the same speed. The wheels of Paul's bike are larger than those of Peter's bike. If they have the same mass, whose wheels have the greater angular speed?
- c. Whose wheels have the greater translational kinetic energy?
- d. Whose wheels have the greater rotational kinetic energy?
- e. A solid sphere and a hollow one have the same radius and the same mass. How could you tell which is which without destroying them?