Physical Pendulum Lab
Period

Purpose: To verify the validity of the equation $T = 2\pi\sqrt{\frac{I}{mgh}}$ for a physical pendulum.

Materials: meterstick (of other thin rod)
Lever clamp
Pendulum clamp
Lab standard
EduForce module
Remote that is paired to the module
tape

Procedure:

1. Attach the lab standard to the table and the pendulum clamp to the lab standard.
2. Attach the lever clamp to the end of the meterstick. Then attach the lever clamp to the pendulum clamp.
3. Determine and record the mass and length of the meterstick (rod).

   $m_{meterstick}$ = _____ $l_{meeterstick}$ = _____

4. Determine and record the mass of the module.

   m_{module} = _____

5. Program the module for the Pendulum Lab.
6. Tape the module to the end of the meterstick.
7. Start collecting data using the remote.
8. Lift the end of the meterstick to which the module is attached. Hold steady for 1 second and release from rest.
9. Allow the meterstick to complete several oscillations.
10. Stop collecting data using the remote.
11. Repeat steps 7-10 as many times as directed by your instructor.
12. Determine the distance from the center of mass of the module to the axis of rotation of the meterstick. Record this distance below.

    r = _____

13. Remove the module from the meterstick. Attach it to the computer and download the data. Record the period from the computer.

    T = _____

Calculations:

1. Assuming the module behaves as a point mass, determine the moment of inertia of the meterstick and module together. Show your work below.

2. Determine the location of the center of mass of the meterstick and module system relative to the axis of rotation. Show your work below.

3. Using the two values determined in Calculation #1 and #2, determine the period of the pendulum. Show your work below.

4. Determine the percent error between the period calculated above (actual) and the period obtained by the computer (experimental). Show your work below.

Analysis:

1. Part of the lever clamp rotates with the meterstick and this was not taken into consideration in the lab. If that was included in Calculation #3, would that increase or decrease the obtained period? Why?

2. Give other reasons for the error you obtained and explain how each would affect your results.