

## PH 212 Lab 2: Rotational Motion

### I. Observation Experiment:

You are given a flywheel, a silver strip to mark the location of one point on the wheel, and a stop watch. Design an experiment to determine the average angular acceleration due to friction and air resistance in a flywheel. Determine if this value is dependent or independent of the initial angular velocity of the flywheel.

Any lettered section can be graded. Items which include a letter and a number in parentheses refer to a rubric ability. For example, (O3) refers to the observation experiment rubric ability 3. Items without such designation are given as additional guidance.

- a. (O2) Design a reliable experiment that will investigate the phenomenon.
- b. Draw a clearly labeled diagram of the experimental set-up. Make sure you represent all of the important aspects of the experiment.
- c. (O3) Decide what is to be measured and identify independent and dependent variables.
- d. (O4) Briefly describe how you will use the equipment to make the measurements.

Perform the experiment and record the data in a table.

- e. (O5) Describe what was observed during the experiment in words.
- f. (O7) Using the data, draw a graph of angular velocity (on the vertical axis) vs. time (on the horizontal axis).
- g. Explain specifically how the acceleration will be determined from the graph of angular velocity vs. time.
- h. Determine the average angular acceleration of the flywheel.
- i. What is the relationship, if any, between the initial angular velocity and the angular acceleration of the flywheel.
- j. (O8) Devise an explanation for the relationship, or lack thereof, you determined in step i.
- k. (O9) Identify any assumptions made in devising the explanation for the relationship, or lack thereof, between the initial angular velocity and the angular acceleration.
- l. How could you test the relationship you determined? Give a brief description of an experiment that would test the relationship. You do not need to conduct the test.
- m. (O6) Identify shortcomings of the experimental design by listing the sources of experimental uncertainty. Describe improvements you could and/or did make to minimize them.