

Name: _____

Period: _____

LAB: Rolling Without Slipping (Moment of Inertia by Inquiry)

Objective:

Your goal in this lab activity is to experimentally determine the moment of inertia of six different objects (2 solid spheres, 2 solid discs, and 2 rings) by rolling them down a ramp. Compare the experimentally determined moment of inertia to the theoretical moment of inertia, which you must research and find for yourself.

Equipment:

2 solid spheres, 2 solid discs, and 2 rings (shared across lab groups)
stopwatch
meter stick
protractor
string
computer with Internet access



Procedure:

You are to develop your own procedure for this lab. Think through what moment of inertia means, and the different relationships with which it is involved. Before beginning your experimental work, determine what measurements you must make, what data must be collected, and what calculations will be required.

Analysis & Conclusions:

1. Rank the six objects (large and small solid sphere, large and small solid disc, and large and small rings) you analyzed from smallest to largest moment of inertia.
2. Compare the experimentally determined moment of inertia for each object with the theoretically determined moment of inertia for each object. For each object, calculate a percent error. Explain potential causes for error of each object.
3. Determine the angular momentum of each object at its maximum velocity. How do the angular momenta of the objects compare? Is this what you expected? Why or why not?
4. Can you think of any other methods to determine the moment of inertia of the objects? Describe and explain.

Deliverables:

Each individual is responsible for submitting their own lab report. This report should include an abstract with key results, a detailed procedure (including sample calculations), all collected data organized neatly in tables, an analysis which answers the required questions in a neatly organized manner, and a conclusion which discusses sources of error, possible remediation, and opportunities for improvement. If appropriate, you may combine your analysis and conclusion section. Lab reports may be NEATLY handwritten, or typed. Lab reports are due one week following completion of the lab.