

Rotational Motions

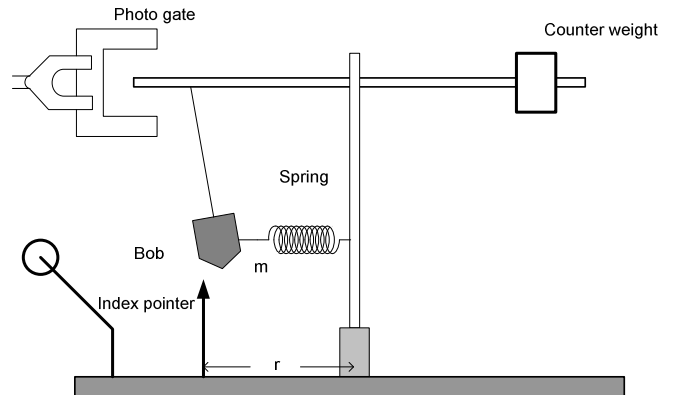
Name _____ TA _____

Partners _____

Section# _____ Date _____

1. Qualitative Measurement of Centripetal Force

- Question before the experiment:**
 What are the period, tangential speed, and centripetal force? Please explain them in your own words.



g (Gravitational accel.) = _____ (m/s^2) m (Mass of bob) = _____ (kg)

	r radius of orbit	T period	$v = 2\pi r/T$ tangential speed	$F_c = mv^2/r$ centripetal force
1				
2				
3				
4				
5				

⊗ Change the radius each time.

Question 1: What is the relationship between the radius, period, tangential speed, and centripetal force? Discuss this qualitatively.

Question 2: Imagine that you are driving a car and going into a curve at a constant velocity. Is the above experiment similar to this situation or different? Discuss this with your lab partners, and make sure with your TA.

2. Moment of Inertia

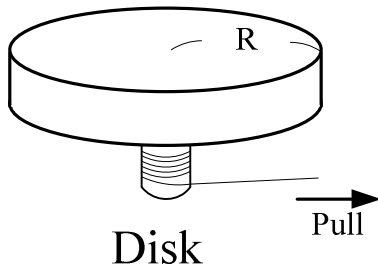
- **Question before the experiment:**

Explain inertia and moment of inertia in your own words.

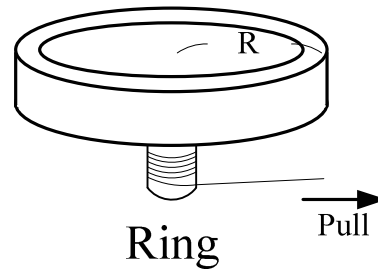
Try this:

There are two objects, which have the same mass and same radius. By pulling the string, rotate the objects.

mass = M



mass = M

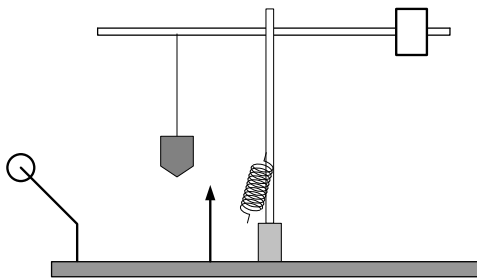


Question:

Which one is harder to accelerate, ring or disk? Why does this happen even though both have the same mass? Explain the reason in terms of moment of inertia. Discuss this with your lab partners, and make sure with your TA.

Lab Procedure for the 1st Part of Rotational Motions

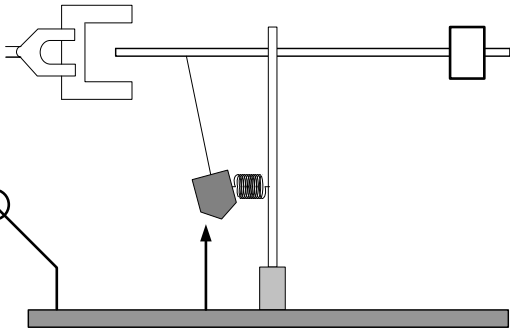
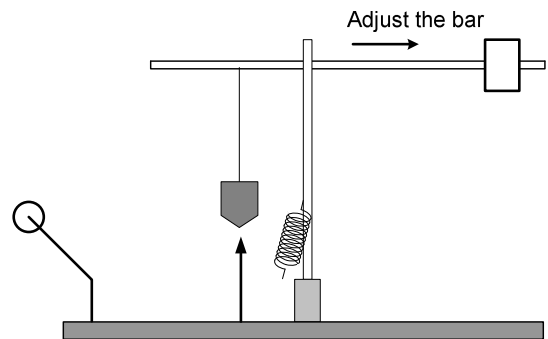
1. Set up the position of index point.



⇐ Take the spring off from the bob. Determine the radius of rotation with the index pointer.

2. Adjust the horizontal bar.

The bar has to be adjusted before rotation so that the pointed tip on the bottom of the bob is just over the index pointer as shown. The counter weight may be placed for a stable rotation, too. ⇒



3. Hook up the spring.

⇐ After hooking the spring, set up the photo gate as shown. Then, rotate the vertical bar.

4. Spin the bar and measure the period.

After the pointer and tip of the bob are lined up, make sure that the recorded period is stable. If needed, calculate the average with a few data. ⇒

