PVC Pipe Rotational Energy Lab Name:

Materials:

PVC pipe structure, hanging mass, string, pulley, box, metal stand, meter stick, scale, stopwatch

Steps:

1.Calculate rotational inertia for your PVC pipe structure using the addition method:

I: _____ kg*m^2

2. Set up the PVC pipe configuration station similar to the set up for the previous PVC Pipe Rotational Dynamics Lab. Report the mass of the falling object and the vertical distance it will drop:

Hanging Mass: M = _____kg Vertical Drop Distance: h = _____ meters

3. Using g = 9.8 m/s/s and the equation 'mgh' determine the gravitational potential energy of the hanging mass before it begins to drop. _____ J

4. Let the mass fall and rotate your PVC structure. Keep track of the time required for the mass to fall to the ground and the number of times the PVC pipe structure rotates during that time. Conduct five trails and record your data in the table below.

	Seconds		Meters
Trial	time to fall	number of rotations	height
1			
2			
3			
4			
5			
Average			

5. Find the final linear velocity of the hanging mass by taking the height divided by average time, then multiply by two.

Average Velocity = (Vf+Vi)/2 Average Velocity=(Xf-Xi)/t Vi = 0

Set the two Average Velocity equations equal to one another and solve for Vf.

6. Calculate the average angular velocity of the PVC pipe structure. _____ radians/second

Omega = ((# of rotations)*2*pi)/(Average Time)

Then calculate the final angular velocity similar to the way you solved for final linear velocity in #5.

7. Calculate the final kinetic energy of the hanging mass just before it hits the ground. _____ J

8. Based on conservation of energy principles and your answers from steps #7 and #3. What is the rotational energy in Joules of the PVC pipe structure when the hanging mass hit the ground? _____ J

9. Create a conservation of energy equation such that the initial gravitational potential energy of the hanging mass is equal to the final kinetic energy of the hanging mass added to the rotational energy of PVC pipe structure. Create a literal equation for rotational inertia. Then substitute in the necessary numeric values in order to solve for the rotational inertia of your PVC pipe structure.

I: _____ kg*m^2

10. Compare the rotational inertia value from Step 1 with that from Step 9. Find the percent difference:

11. Why might there be a difference between the two calculations of rotational inertia?