Name _____ Date _____

AP Physics Lab Activity #9 (40 pts)

Period _____ Mrs. Nadworny

Partners: Due Date _____

Rotational Motion

NO Lab Write-Up Required
must be neatly written in pencil

Purpose

To calculate the moment of inertia for a solid disk having four pulley arrangements.

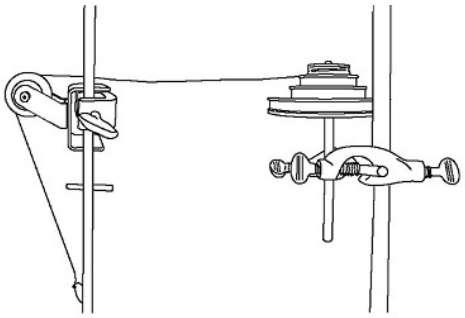
Materials

Include other necessary equipment.

- Balance
- Pulley with clamp
- Pulley cord
- Stopwatch
- 10 g mass
- 2 Ring stands
- Tape measure
- 4 Pulley Wheel and Axle

Diagram (2)

Include other necessary labels on the diagram.



Procedure

1. Measure the radius of each pulley wheel. Record.
2. Measure the distance from the tabletop to the floor using a tape measure. Record.
3. Cut four pieces of thread that are twice as long as the distance from the tabletop to the floor.
4. Tie the thread around the smallest pulley of the wheel and axle.
5. Attach the wheel and axle to the support stand and rod using the clamp holders. NOTE: The wheel should be parallel to the tabletop.
6. Attach the free pulley to the second support stand and support block.
7. Align the free pulley with the wheel and axle so that the thread, when placed in the pulley, is parallel to the tabletop and is 90^{o} to the occupied wheel.
8. Tie a loop on the free end of the pulley cord for the mass to hang from.
9. Hang the 10 g mass from the loop, then wind the thread clockwise around the first wheel until the line is taut and the bottom of the mass is at the top edge of the table.
10. Release the 10 g mass. Measure and record the time it takes to strike the floor.
11. Repeat steps 9 – 10 for two more trials.
12. Remove the thread from the first pulley and attach a new thread around the second wheel.
13. Repeat steps 5 – 10 three times for the second pulley.
14. Continue the procedure for the remaining two wheels.

Data Collection (18)

Hanging mass = _____ ± _____

Fall Distance = _____ ± _____

Wheel #	Radius (cm)	Radius (m)	Time Trial 1 (s)	Time Trial 2 (s)	Time Trial 3 (s)	Average Time (s)
	± _____	± _____	± _____	± _____	± _____	

Data Processing (20)

Calculate the following quantities for each wheel. Show your sample calculations on separate paper and attach to this lab.

Acceleration of hanging mass (m/s^2)	Angular Acceleration (rad/s^2)	Momentum of Inertia ($kg \bullet m^2$)	Angular velocity (rad/s)	Angular Momentum ($kg \bullet m^2/s$)	Angular Displacement (rad)