

Objective

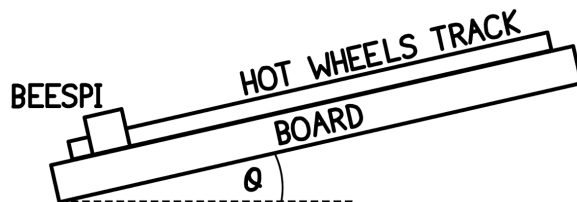
Determine the equation for the rotational inertia of a solid sphere

Introduction

1. The rotational inertia for a solid sphere, along with many other common shapes, can be modelled by the equation $I = kMR^2$ where k is a dimensionless constant. What is k for a solid uniform sphere?
2. Describe the energy transfers involved with a sphere rolling without slipping down a ramp
3. Determine the velocity as a function of height for a uniform solid sphere rolling down a ramp.

Experimental Method

Set up the following apparatus by securing approximately 1 m of Hot Wheels track and a BeeSpi to a wooden board.



Using a BeeSpi photogate timer, determine the value of the constant k in the equation for the rotational inertia $I = kMR^2$ for a uniform solid sphere. Be sure to address how experimental uncertainty could be reduced.

Data

Include a table of the raw data. Include all calculated data for the linearized plot.

Analysis and Discussion

Determine the constant equation for the rotational inertia of a solid sphere. Your report should include the following:

- A plot of the original data
- A linearized plot
- The equation of your best fit line
- The slope of your best fit line (include units)
- The equation for the rotational inertia of a uniform solid sphere including the value of the constant k as determined from the slope of your best fit line
- The theoretical constant k and percent error

Component	Criterion	Weight	Mark
General	<i>Complete word-processed lab report with proper structure and formatting</i>	1	
Experimental Method	<i>Experimental method which implements a method to reduce uncertainty</i>	1	
Data	<i>Data quality and presentation</i>	2	
Analysis and Discussion	<i>Plot of the original data</i>	1	
	<i>Linearized plot</i>	1	
	<i>Slope of the linearized plot with correct units</i>	1	
	<i>Equation for the rotational inertia of a uniform solid sphere including the experimental value of the constant k</i>	1	
	<i>Theoretical value of the constant k and percent error</i>	1	
Conclusion	<i>At least two <u>significant</u> sources of error</i>	1	
TOTAL		10	