Date_____

Rotational Inertia Constants

Introduction: In a paragraph, **a)** discuss: the energy changes that occur when an object rolls down an incline. **b)** forces on the rolling object **c)** Rotational inertia - define and explain what 2 factors affect it, how it affects the translational acceleration down a ramp **d)** The typical general formula for many rotating objects **(5 pts)**

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Purpose: To experimentally determine the moment of inertia constants for a sphere, pipe, and cylinder.

Materials _____   **(2 pts)**

Procedure:**(3 pts)**

    1. _____

    2. _____

    3. _____

    4. _____

Formula to find the Moment of Inertia Constants from the Acceleration

Ramp Angle - Clinometer _____ Ramp Angle - Trigonometry - _____ **(4 pts)**

General Equation K =   **(6 pts)**

Cylinder **(5 pts)**

Sphere **(5 pts)**

Pipe **(5 pts)**

If the moment of inertia of each object is $K[MR^2]$, derive an equation for k in terms of a. **(5 pts)**

τ_{net} = $\qquad\qquad$ F_{net} =

| |
| |
| |

Data **(45 pts)**

Object	Accepted Rotational Inertia Formula	a (m/s²)	Experimental Constant (k)	Actual Constant	Percent Error
Cylinder					
Sphere					
Pipe					

Conclusions Discuss moment of inertia again, factors that determine it, how it affects the acceleration down a ramp.

Summarize your results Rank the moment of inertia of the objects. Discuss sources of error. **(15 pts)**