Name: _____

Ball Bearings on a ramp Lab

The purpose of this lab is to test the relationship between rotational kinetic energy and translational kinetic energy of a sphere rolling down an incline, where it is assumed to be rolling without slipping.

The materials needed: meter stick(s), ball bearings of varying masses and sizes (2-3), a stand (to prop up ramp), and masking tape (to secure apparatus).

The set up should be a rigid ramp with a groove to direct the path of the ball bearing. This can be made out of two meter sticks taped together in a "v" shape, or a meter stick secured to the back of another ramp, to make the ramp rigid. The ball bearing will roll down the ramp, onto the table for a short horizontal distance, and then off the table. The horizontal distance traveled off the edge of the table will be measured, and can be used to determine the translational velocity of the ball bearing at the bottom of the ramp.

Mass of first ball bearing: _____ Radius of first ball bearing: _____

Mass of second ball bearing: _____ Radius of second ball bearing: _____

Mass of third ball bearing: _____ Radius of third ball bearing: _____

Collect data, conducting multiple trials for each ball bearing, and making sure to drop from same height

Ball bearing	Horizontal distance traveled (m)
First	
Second	
Third	

Calculations:

Height of ramp: _____ Height to fall off table: _____ Time to fall of table: _____

Ball bearing	Velocity at bottom (m/s)	PE- at top of ramp (J)	KE_{trams} (J)	$PE-KE_{trams}= KE_{rot}$ (J)
First				
Second				
Third				

The moment of inertia of a solid, uniform sphere can be calculated by using the equation $I = \frac{2}{5}MR^2$

Remember that velocity equals angular velocity multiplied by the radius.

Ball bearing	Calculated moment of inertia from data (kgm^2)	Calculated Moment of inertia from equation (kgm^2)
First		
Second		
Third		

How do these values compare?

Ball bearing	Percent difference
First	
Second	
Third	

What is the ratio between the Kinetic Energies of the Balls? (Rotational and Translational)

Use the Graph to describe it: