Physics 03-05 Moment of Inertia Lab ***Name:*** _____

Objective: Understand the effect of moment of inertia on rolling.

Materials:

- Campbell's cream soup in a can
- Campbell's broth in a can (cans should be same size and mass)
- Ramp (kinematics track with end stop removed)
- Stopwatch

Hypothesis: The cream soup is very thick and will roll with the can. The broth soup is very thin and will not rotate much at all, so that only the can rotates. Write a hypothesis about which soup can will win a race rolling down the ramp. _____

Why? _____

Procedure

1. Set up the ramp at roughly a 30° angle.
2. Record the time it takes for the cream soup can to roll down the ramp. Repeat 3 times and find the average.
3. Record the time it takes for the broth soup can to roll down the ramp. Repeat 3 times and find the average.

Soup	Mass	Radius	Time
Cream			
Broth			

Analysis

4. Was your hypothesis correct? _____
5. The amount of rotation is related to the moment of inertia, I, by $\tau = I\alpha$
   Is the moment of inertia and the angular acceleration directly proportional or inversely proportional? _____
6. Which can has the higher acceleration? _____
7. Which can has the higher moment of inertia? _____
8. Look at a chart of various moments of inertia from the lesson.
   a. Which one (or combination) is best approximation for the cream soup? _____
      Write the formula for the moment of inertia. _____
   b. Which one (or combination) is best approximation for the broth soup? _____
      Write the formula for the moment of inertial. _____
9. Compare the formulas in step 8. If the cans are the same mass and radius, which has the higher moment of inertia?
   _____
10. So which soup should have the higher acceleration? _____
11. Do steps 9 and 10 agree with steps 6 and 7? _____