



Mechanics

Rotation

Can Race Lab

Purpose

- Experimentally determine the moment of inertia of canned food.
- Race cans down an inclined surface to determine the fastest and slowest can.

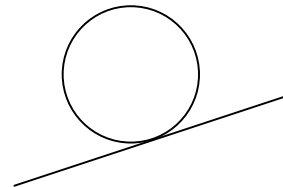
Directions Bring two cans to race day. Bring one can to compete in the fastest can race and one can to compete in the slowest can race. The following conditions must be met:

- There are NO RESTRICTIONS on the height, radius or mass of the can.
- There are three ROLLING REQUIREMENTS.
 - The can must roll in a straight line along an inclined surface.
 - The can must begin rolling solely due to the influence of gravity.
 - The can must roll the entire length of the track.
 - The can must begin rolling on its own and maintain rolling along a track inclined at 2.5 degrees.
- There are two CONTENT RESTRICTION.
 - The contents of the can must fill the can. No large air pockets such as in a can of peanuts, pretzels, potato stick, or potato chips.
 - NO soda cans
 - NO paste or jellied foods (must be heterogeneous mixtures)
 - Examples of what is NOT ALLOWED: tomato paste, tomato soup, broth, condensed milk, cream of “anything”, cranberry sauce.

Questions – come ask.
- There is only one TEMPERATURE RESTRICTION. The contents must be at room temperature.

Can Performance

Draw the FBD for the can while rolling down the incline.



Write the equations for the summation of torques and forces acting on the can.

$\Sigma\tau = I\alpha$	$\Sigma F_{\parallel} = ma$ (parallel to the incline)	$\Sigma F_{\perp} = ma$ (perpendicular to the incline)

Derive an equation for the moment of inertia of the can.