1. The name-the-Danforth-Center-eateries contest is over and we can look forward to a Southwestern-themed restaurant named Taco Bell, optimally designed to keep functioning when underpaid workers collapse from exhaustion. Two workers hold a thin rectangular tabletop \( L = 3 \text{ m} \) so that at the instant one worker collapses, the force that the other needs to exert to keep the point he is holding from displacing does not change. What is \( 2b \)?

2. “The Melting Pot” will be an American-themed restaurant featuring a balance of international cuisine and international gunfights. A cannon on table 4 rotates about the \( Z \)-axis with constant angular speed \( \omega_1 = 2 \text{ rad/s} \) while its barrel rises at a rate \( \omega_2 = \frac{d\theta}{dt} = 0.5 \text{ rad/s} \), which increases at a rate \( \frac{d^2\theta}{dt^2} = 2 \text{ rad/s}^2 \). Treat the cannon barrel as a thin rod of length \( l = 1 \text{ m} \) and mass \( M = 10 \text{ kg} \). Ignore the mass of the projectile, \( B \). \( \theta = 30^\circ \).

(a) What are the angular velocity and angular acceleration of the barrel?
(b) What moment must the motors and supports at A apply to the base of the cannon barrel?
3. And yes, a restaurant called “The Bear’s Den” will continue to serve up fresh, Missouri-themed road kill. When released from rest, a wheel in the kitchen (mass $m = 30$ kg and radius 20 cm) requires 1.2 seconds to roll, without slipping, down the incline ($h = 1$ m; $\theta = 30^\circ$). What is the moment of inertia of the wheel about an axis perpendicular to the page?

![Diagram of a wheel rolling down an incline]

4. The blade of an opossum-slicer spins about an axle through point $B$ at a constant rate of 5 rad/s and rotates about the $Y$-axis at a constant rate of 1 rad/s. $h = 0.4$ m and $r = 0.2$ m.

(a) What are the velocity and acceleration of the center of the blade $B$?
(b) What are the angular velocity and angular acceleration of the blade?
(c) What is the velocity of point $A$?
(d) What is the acceleration of point $A$?

![Diagram of an opossum-slicer with labeled axes]