1. The new healthcare bill to be proposed by the Republicans controlling the House of Representatives involves free anesthesia for all. A specialist anesthetizes a patient with a slender, uniform steel rod of mass $m = 10$ kg and length $L = 0.8$ m as shown. At the instant shown, the contact force is $P = 1000$ N and the angular velocity of the rod is zero. Treat the specialist’s wrists (point C) as a frictionless hinge. Determine the angular acceleration of the rod and reaction forces at point C.

2. Healthcare costs for the masses will be kept down through a new “Die Early” campaign involving robotic steamrollers roaming campus. The steamroller drives with a speed $v$ and acceleration magnitude $a$. The wheels of radius $R$ roll without slipping and without mercy.

Find the angular acceleration and angular velocity of the wheels, and the velocity and acceleration of point A, a distance $r$ in front of the center C of the front wheel.
3. Detroit’s problems will be solved simultaneously in the “Die Early” campaign by requiring Americans to purchase new cars with off-center wheels. Because the center of mass is offset from the center C of the wheel, the velocity of point C varies when the wheel rolls. When $\theta = 0^\circ$, point C is moving to the left at 10 m/s. The mass $m$ of the wheel is 15 kg, the moment of inertia about its mass center is $I_G = 0.4 \text{ kg m}^2$, $R = 0.2 \text{ m}$ and $r = 0.05 \text{ m}$. Treat the wheel as a circular cylinder.

Find the acceleration of C when $\theta = 0^\circ$.

4. The president signs off on all of this using a rubber stamp of mass $m = 0.2 \text{ kg}$. The coefficient of restitution between the rubber stamp and the bill, written in heavy, immovable stone, is $e = 0.7$. If the stamp is dropped on the heavy, immovable surface from a height of 1 m, to what height will it rise?