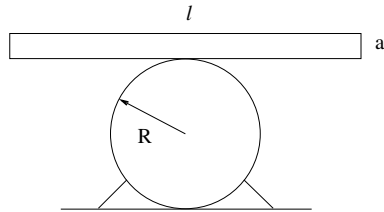## [mex75] Balancing act of board on cylinder

A homogeneous rigid board of thickness a, width w, and length ℓ is placed symmetrically atop a rigid and fixed cylinder of radius R and horizontal axis. (a) Show that the condition for stable equilibrium of the board in its horizontal position is $a < 2R$. (b) Show that the angular frequency of small oscillations of the board about this stable equilibrium as obtained from the linearized equation of motion is $\omega_0^2 = [6g(2R - a)]/[4a^2 + \ell^2]$, where g is the acceleration due to gravity. The assumption is that the board rolls back and forth without slipping.

Solution: