CMFall02B

A uniform thin plank of mass M and length $2L$ is resting on a frictionless floor and leaning against a frictionless vertical wall. It is held steady by a massless string connecting the lower end of the plank to the base of the wall. The angle between the floor and the plank is θ_0. Let g denote the acceleration due to gravity.

(a) Calculate the tension in the string.

(b) Calculate the moment of inertia of the plank about a rotation axis which is perpendicular to the length of the plank and passing through the center of the plank. Ignore the thickness and width of the plank in this calculation.

For parts (c) and (d), assume that the string is cut at time $t = 0$, and the lower end of the plank is constrained to remain in contact with the floor at all times during the fall.

(c) Calculate the acceleration of the upper end of the plank immediately after the string is cut.

(d) Calculate the angle θ at which the upper end of the plank first separates from the wall.