Assignment 11

PHY1001

NO LATE SUBMISSION IS ACCEPTED

4 In Fig. 12-17, suppose the length L of the uniform bar is 2.75 m and its weight is 185 N. Also, let the block's weight $W = 300$ N and the angle $\theta = 30.0°$. The wire can withstand a maximum tension of 500 N. (a) What is the maximum possible distance x before the wire breaks? With the block placed at this maximum x, what are the (b) horizontal and (c) vertical components of the force on the bar from the hinge at A?

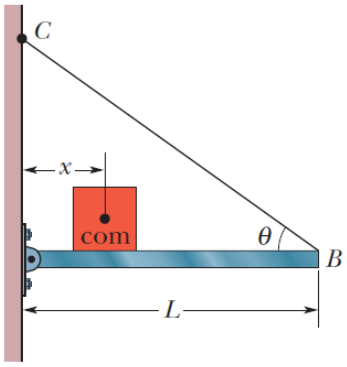

Figure 12-17
Problems 4 and 21.

10 In Fig. 12-21, a nonuniform bar is suspended at rest in a horizontal position by two massless cords. One cord makes the angle $\theta = 30.0°$ with the vertical; the other makes the angle $\phi = 60.0°$ with the vertical. If the length L of the bar is 9.50 m, compute the distance x from the left end of the bar to its center of mass.

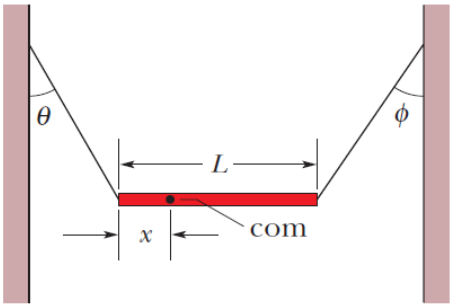

Figure 12-21 Problem 10.

24 In Fig. 12-31, a climber with a weight of 533.8 N is held by a belay rope connected to her climbing harness and belay device; the force of the rope on her has a line of action through her center of mass. The indicated angles are $\theta = 38.0°$ and $\phi = 30.0°$. If her feet are on the verge of sliding on the vertical wall, what is the coefficient of static friction between her climbing shoes and the wall?

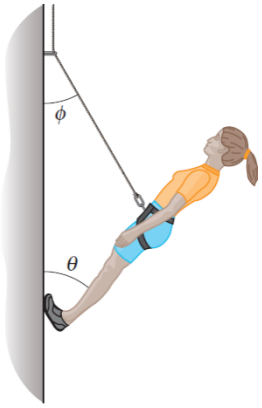

Figure 12-31 Problem 24.

25 In Fig. 12-32, a lead brick rests horizontally on cylinders A and B. The areas of the top faces of the cylinders are related by $A_A = 2.2A_B$; the Young's moduli of the cylinders are related by $E_A = 2.2E_B$. The cylinders had identical lengths before the brick was placed on them. What fraction of the brick's mass is supported (a) by cylinder A and (b) by cylinder B? The horizontal distances between the center of mass of the brick and the centerlines of the cylinders are d_A for cylinder A and d_B for cylinder B. (c) What is the ratio d_A/d_B?

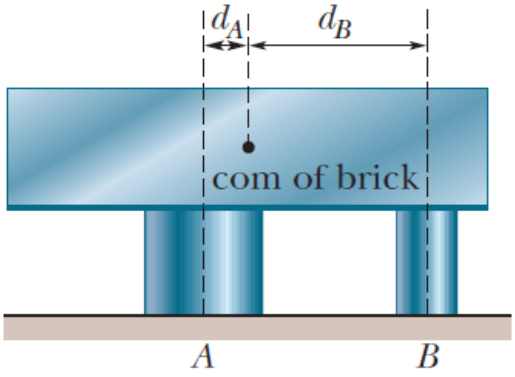

Figure 12-32 Problem 25.

38 In Fig. 12-41, a uniform plank, with a length L of 10.5 m and a weight of 445 N, rests on the ground and against a frictionless roller at the top of a wall of height $h = 3.05$ m. The plank remains in equilibrium for any value of $\theta \geq 70°$ but slips if $\theta < 70°$. Find the coefficient of static friction between the plank and the ground.

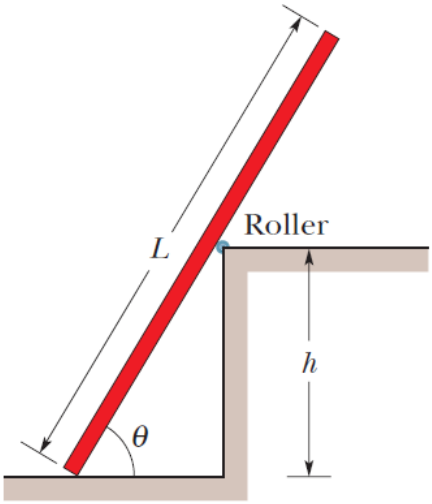

Figure 12-41 Problem 38.

40 Because g varies so little over the extent of most structures, any structure's center of gravity effectively coincides with its center of mass. Here is a fictitious example where g varies more significantly. Figure 12-43 shows an array of six particles, each with mass m, fixed to the edge of a rigid structure of negligible mass. The distance between adjacent particles along the edge is 4.00 m. The following table gives the value of g (m/s^2) at each particle's location. Using the coordinate system shown, find (a) the x coordinate x_{com} and (b) the y coordinate y_{com} of the center of mass of the six-particle system. Then find (c) the x coordinate x_{cog} and (d) the y coordinate y_{cog} of the center of gravity of the six-particle system.

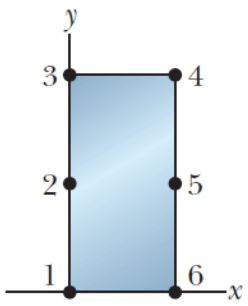

Figure 12-43 Problem 40.

Particle	g	Particle	g
1	8.00	4	7.40
2	7.80	5	7.60
3	7.60	6	7.80