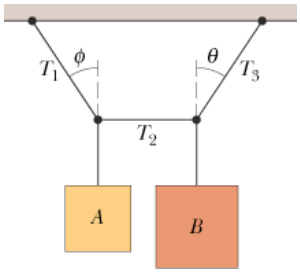
Chapter 12 – Problem Day

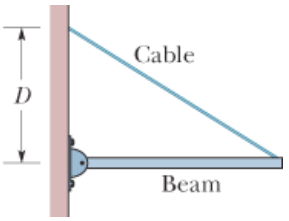
8. A scaffold of mass 60 kg and length 5.0 m is supported in a horizontal position by a vertical cable at each end. A window washer of mass 80 kg stands at a point 1.5 m from one end. What is the tension in (a) the nearer cable and (b) the farther cable?

12. The system in the figure is in equilibrium, with the string in the center exactly horizontal. Block *A* weighs 40 N, block *B* weighs 50 N, and angle ϕ is 35°. Find (a) tension T_1 (b) tension T_2, (c) tension T_3, and (d) angle θ.

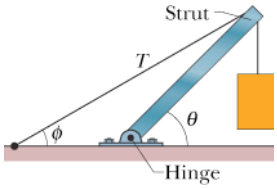


16. A horizontal scaffold, of length 2.00 m and uniform mass 50.0 kg, is suspended from a building by two cables. The scaffold has dozens of paint cans stacked on it at various points. The total mass of the paint cans is 75.0 kg. The tension in the cable at the right is 722 N. How far horizontally from *that* cable is the center of mass of the system of paint cans?

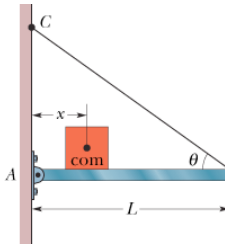
19. In the figure, a uniform beam of weight 500 N and length 3.0 m is suspended horizontally. On the left it is hinged to a wall; on the right it is supported by a cable bolted to the wall at distance *D* above the beam. The least tension that will snap the cable is 1200 N. (a) What value of *D* corresponds to that tension? (b) To prevent the cable from snapping, should *D* be increased or decreased from that value?



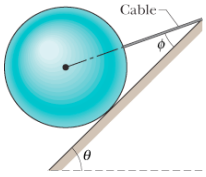
27. The system in the figure is in equilibrium. A concrete block of mass 225 kg hangs from the end of the uniform strut of mass 45.0 kg. For angles $\phi = 30°$ and $\theta = 45°$, find (a) the tension *T* in the cable and the (b) horizontal and (c) vertical components of the force on the strut from the hinge.



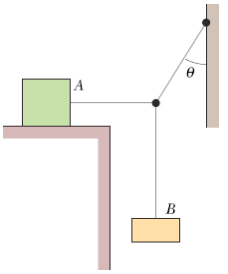
30. In the figure, suppose the length *L* of the uniform bar is 3.00 m and its weight is 200 N. Also, let the block's weight 300 N and the angle $\theta = 30°$. The wire can withstand a maximum tension of 500 N. (a) What is the maximum possible distance *x* before the wire breaks? With the block placed at this maximum *x*, what are the (b) horizontal and (c) vertical components of the force on the bar from the hinge at *A*?



53. In the figure, a 10 kg sphere is supported on a frictionless plane inclined at angle $\theta = 45°$ from the horizontal. Angle φ is 25°. Calculate the tension in the cable.



63. In the figure, block *A* (mass 10 kg) is in equilibrium, but it would slip if block *B* (mass 5.0 kg) were any heavier. For angle $\theta = 30°$, what is the coefficient of static friction between block *A* and the surface below it?



Chapter 12 Answers

8a) 842.8 N
8b) 529.2 N

12a) 48.8 N
12b) 28.0 N
12c) 57.3 N
12d) 29.25°

16) 0.70 m

19a) 0.64 m
19b) increased

27a) 6630 N
27b) 5740 N
27c) 5960 N

30a) 1.5 m
30b) 433 N right
30c) 250 N up

53) 76 N

63) 0.29