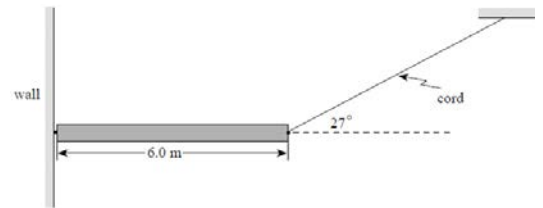


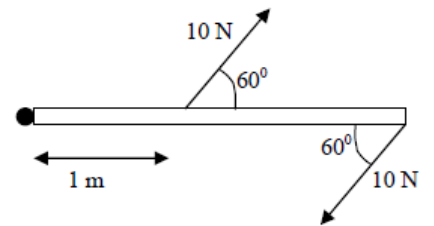
Angled Equilibrium Problems

Assignment

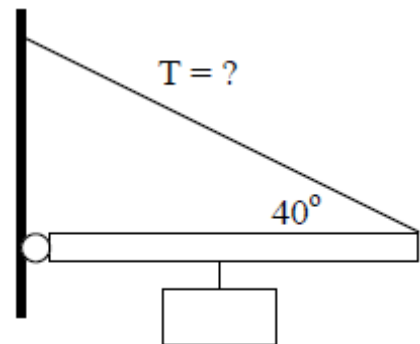
1. A uniform 25 kg bar, 6.0 m long, is suspended by a cord as shown. What is the tension in the cord?



2. The diagram below shows the top view of a door that is 2 m wide. Two forces are applied to the door as indicated in the diagram. What is the net torque on the door with respect to the hinge?

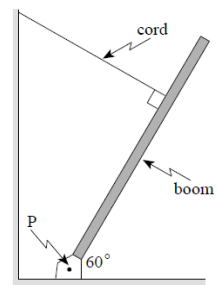


3. A beam of negligible mass is attached to a wall by means of a hinge. Attached to the center of the beam is a 400 N weight. A rope also helps to support this beam as shown in the diagram.
- a) What is the tension in the rope?

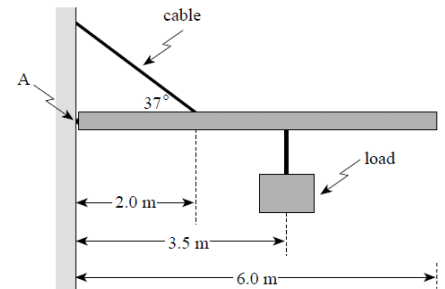


- b) What are the vertical and horizontal forces that the wall exerts on the beam?

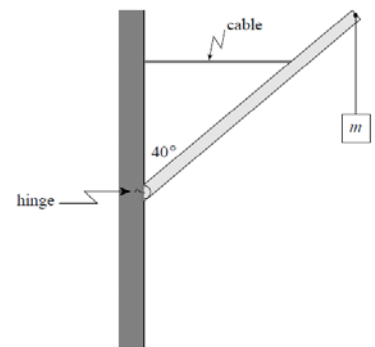
4. A boom hinged at P is held stationary, as shown in the diagram below. If the tension in the supporting cord, attached three-quarters of the way along the boom from P, is 720 N, what is the weight of the boom?



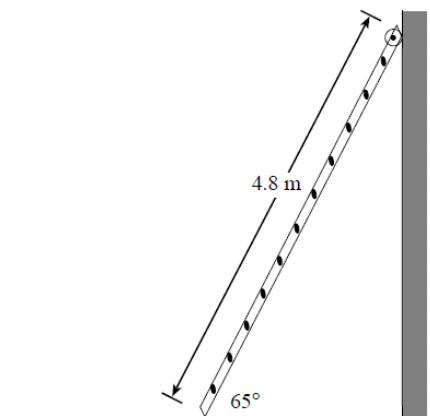
5. A uniform beam 6.0 m long, and with a mass of 75 kg, is hinged at A. The supporting cable keeps the beam horizontal. If the maximum tension the cable can withstand is $2.4 \times 10^3 \text{ N}$, what is the maximum mass of the load?



6. A uniform 350 kg beam of length 4.2 m is held stationary by a horizontal cable. The cable is attached to a point on the beam 3.0 m from the hinge. If the maximum tension the cable can withstand is $1.3 \times 10^4 \text{ N}$, what maximum mass, m , can be suspended from the end of the beam?

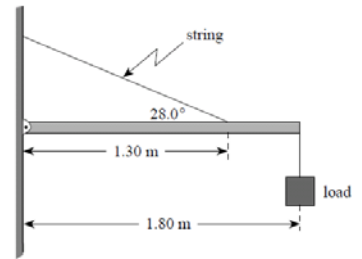


7. A uniform 4.8 m long ladder of mass 16 kg leans against a **frictionless** vertical wall as shown in the diagram below. What minimum force of friction is needed at the base of the ladder to keep it from sliding?

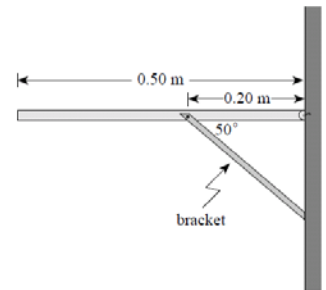


Enrichment

8. The diagram shows a horizontal beam of negligible mass. The wall exerts a 42.0 N horizontal force on the lever. Find the weight of the load.



9. A uniform 3.0 kg shelf of width 0.50 m is supported by a bracket, as shown in the diagram below. What force does the bracket exert on the shelf?



Answers: 1) 270 N, 2) 8.66 Nm clockwise 3a) 311 N b) V: 200 N, H: 238 N 4) 2160 N, 5) 20 kg, 6) 950 kg, 7) 37 N, 8) 16.1 N, 9) 48 N