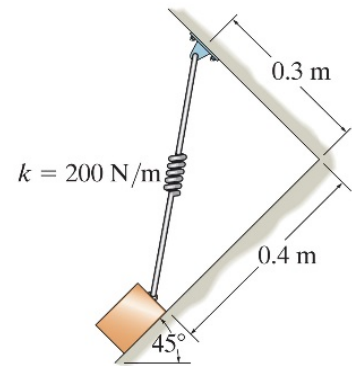
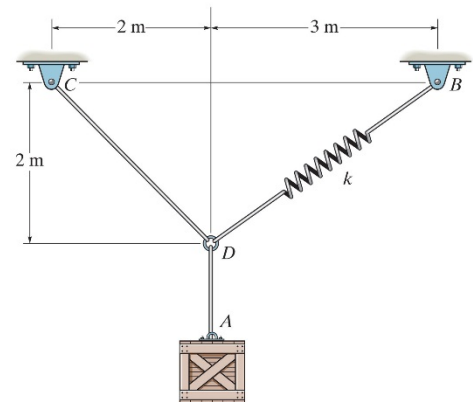


### Chapter 3

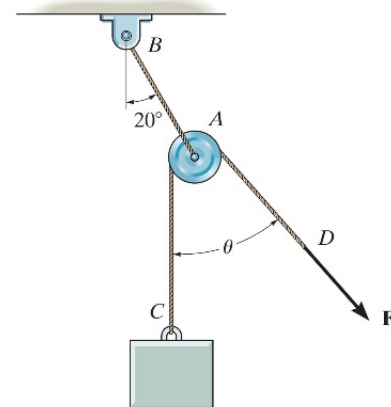
1. The block has a mass of 5 kg and rest on the smooth plane as shown in the figure.
  - a) Draw a free-body diagram of the block and find the normal force from the plane and the force on the spring.
  - b) If the spring constant  $k = 200 \text{ N/m}$ , what will be the un-stretched length of the spring?



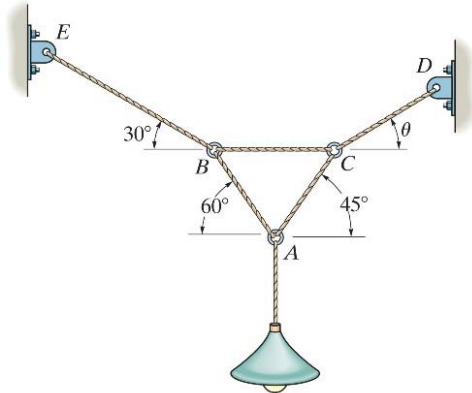
2. An object with mass 40 kg is supported by two cables AD, CD and a spring BD as shown in the figure. If the spring BD has un-stretched length of 2 m, determine the spring constant  $k$ .



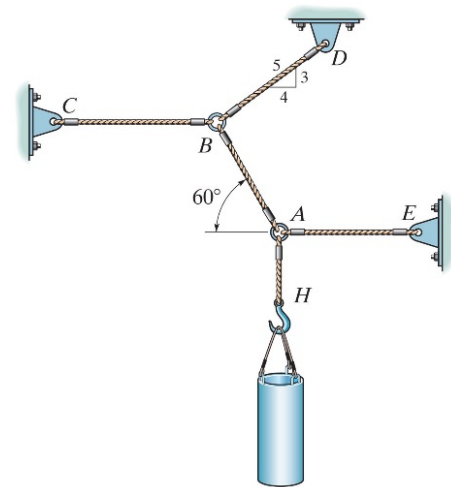
3. A block is supported by a cable system as shown in the figure. If the maximum tension force of the cables is limited to 80 lb. Determine the maximum weight  $W$  of the block that can be supported and the angle  $\theta$  for equilibrium.



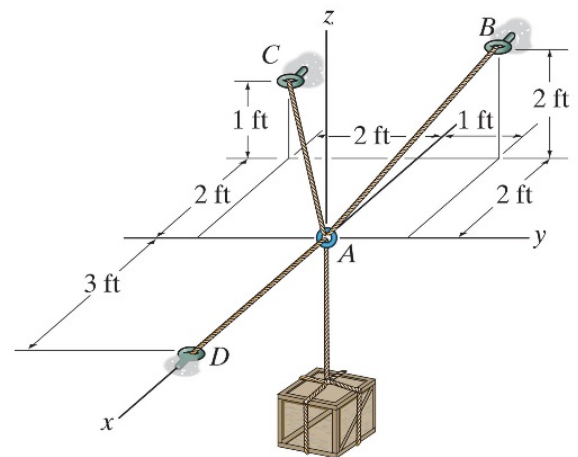
4. A lamp of 10 lb is supported by cables as shown in the figure.
- Draw a free-body diagram at ring A and determine the forces on the cables AB and AC.
  - Draw a free-body diagram at ring B and determine the forces on the cables BE and BC.
  - Draw a free-body diagram at ring C and determine the forces on the cable CD and its angle  $\theta$ .



5. Five cables are used to hang the pipe weight  $W$  at hook  $H$  as shown in the figure.
- If the weight of pipe  $W$ , calculate the forces on each cable AH, AE, AB, BC, and BD in terms of  $W$ . Which cable will subject to the largest force? (hint: draw free-body diagrams separately at rings A and B)
  - Which cable is subjected to the max tension force? If each cable can sustain a maximum tension force of 500 N, will be the largest weight of  $W$ ?

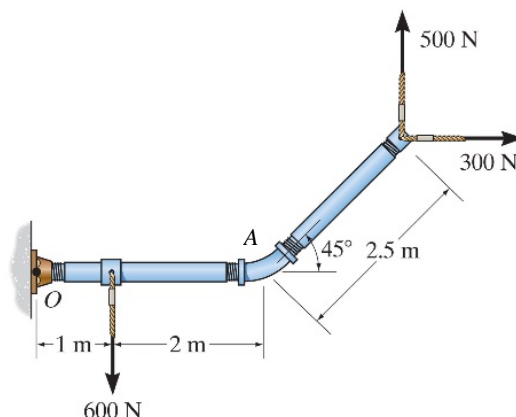


6. Determine the tension forces developed in cables AB, AC and AD required for equilibrium of the 300 lb crate.

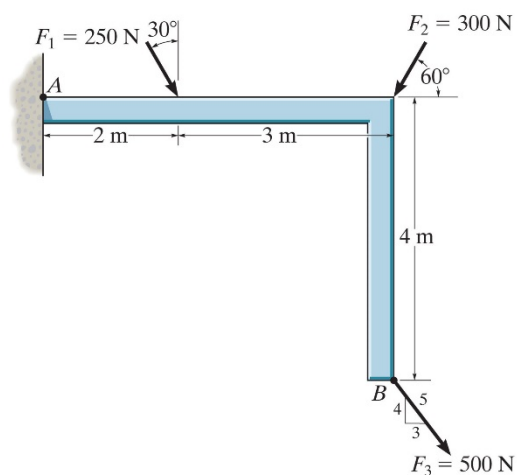


Chapter 4 part 1

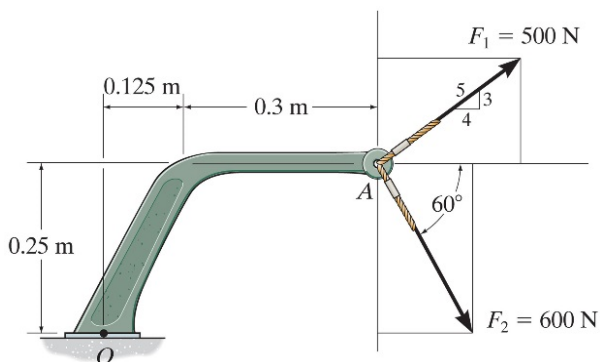
1. a) Determine the resultant moment of force about point O.  
 b) Determine the resultant moment of force about point A.



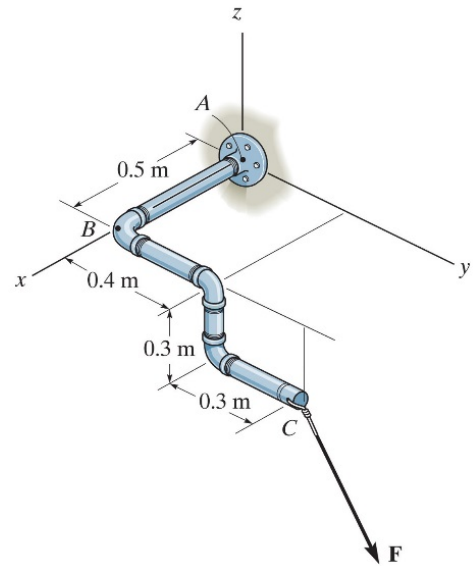
2. a) Determine the moment of **Each** of the three forces about point A. What is the resultant moment about point A?  
 b) Determine the moment of **Each** of the three forces about point B. What is the resultant moment about point B?



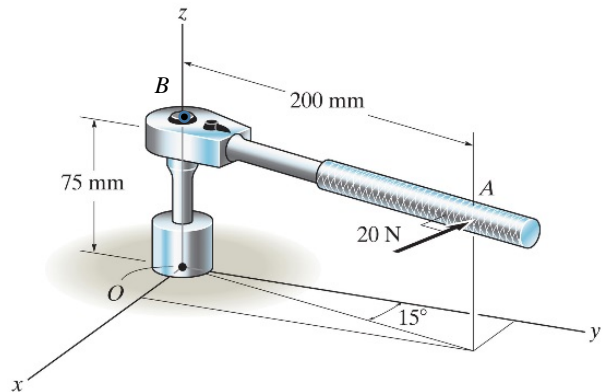
3. Determine the moment of force due to **Each** force about point O. What is the total moment at point O?



4. The pipe assembly is subjected to the force of  $\mathbf{F} = [600, 800, -500]$  N.
- Determine the moment of force about point A in x, y and z components.
  - Determine the magnitude of moment at point A and its directional angles.



5. A 20 N horizontal force is applied perpendicular to the handle of the socket wrench.
- Determine the moment of force at point O.
  - Determine the magnitude of moment at point O and its directional angles.
  - Determine the moment of force at point B.
  - Determine the magnitude of moment at point B and its directional angles.



6. Four forces act on a wood frame as shown in the figure. Set  $d = 4$  ft.
- Can we consider these four forces two moment of couples? Why?
  - Compute the resultant moment of four forces at point A.
  - Compute the resultant moment of four forces at point B. Are the answer same in b)?
  - Do you think if any one of these four forces changed either in magnitude or direction, the answers in b) and c) the same? Why? No calculations needed, just explain it.

