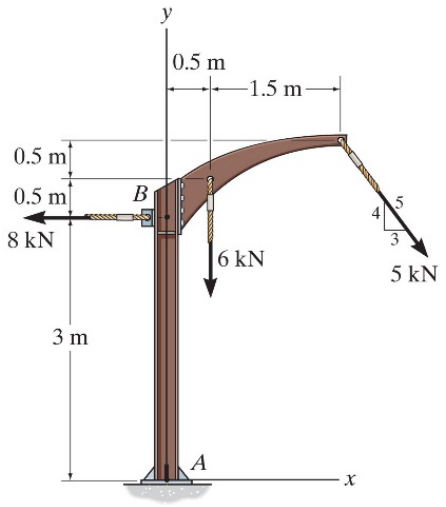
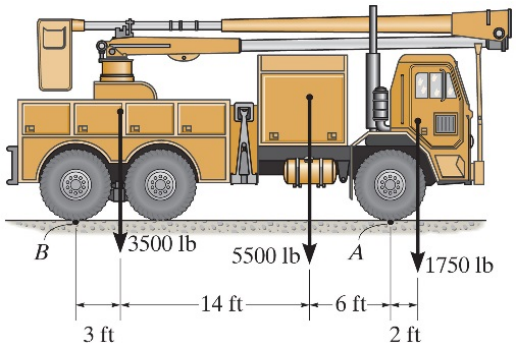
Chapter 4 part 2

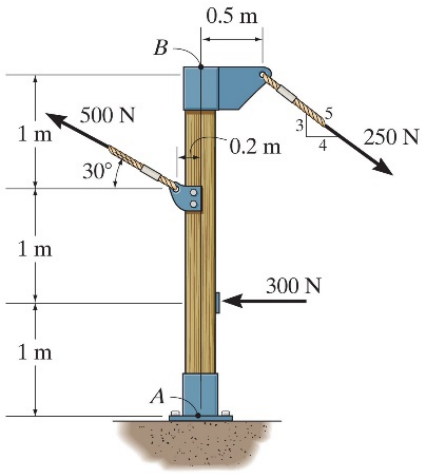
1. A frame is subjected to three forces as shown in the figure.
   a) Replace the loading system by an equivalent resultant force and moment couple at fixed end A.
   b) Replace the loading system by an equivalent resultant force and specify where the location on the column AB measured from A.



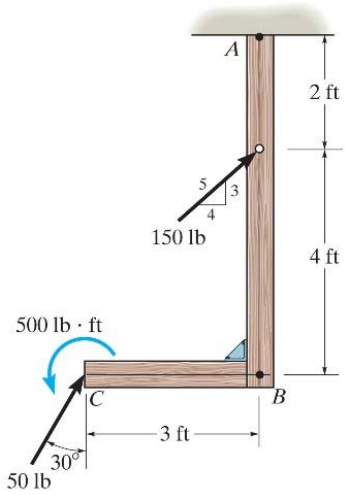
2. The weight of the various components of the truck are shown. Replace this system of forces by an equivalent resultant force and specify its location measured from front wheel A. (note: the location is the center of gravity of the truck)



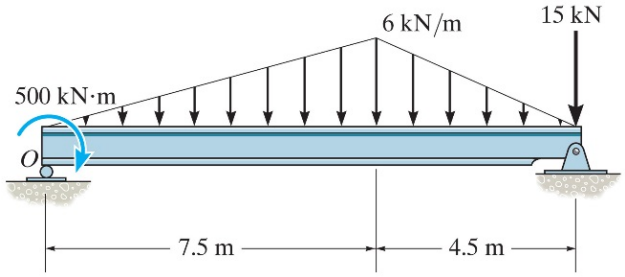
3. A post is subjected to three forces as shown in the figure. Replace the force system acting on the post by a resultant force and specify where the location on the post AB measured from point A.



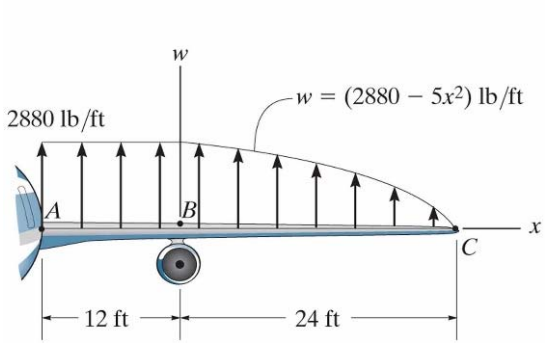
4. Replace the force and couple loading system acting on the frame by an equivalent resultant force and specify a) where the location on member BC measured from B; b) where the location on member AB measured from B.



5. Replace the loading by a single resultant force and specify the location measured from point O.



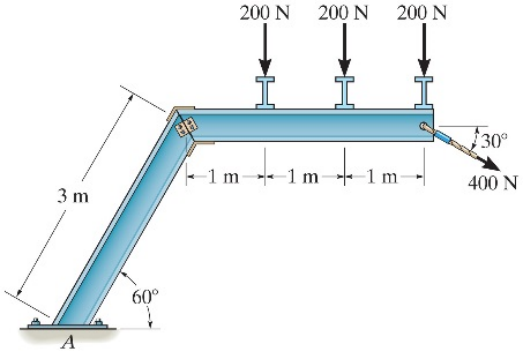
6. The lifting force along the wing of a jet aircraft consists of a uniform distributed force along AB and a semi-parabolic distributed force along BC with origin at B. Replace this loading by a single resultant force and specify its location measured from point A.



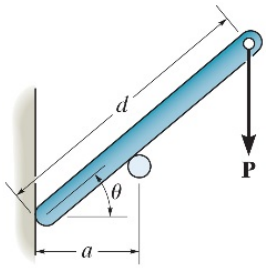
Chapter 5

1. Draw **detail** free-body diagrams (with numbers and variables names) of the following systems:

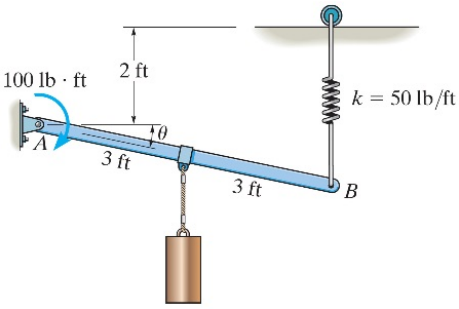
a) bended beam



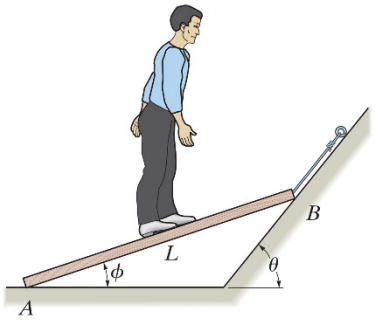
b) weightless bar with friction on wall



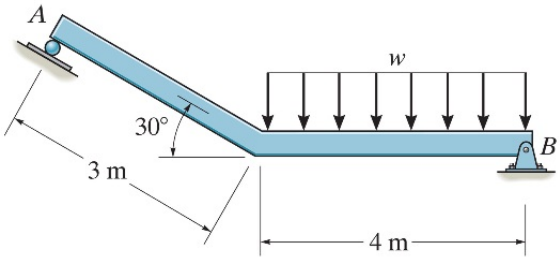
c) weightless rod AB



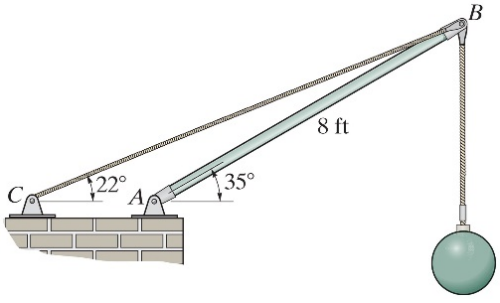
d) plank AB and neglect the friction forces



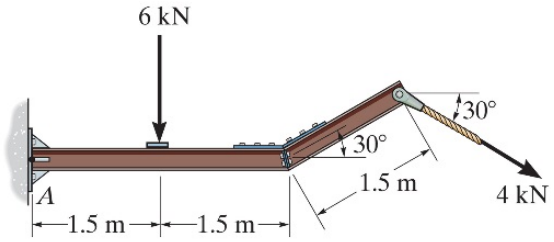
2. In the intensity of the distributed load acting on the beam is w = 3 kN/m, determine the reactions at the roller A and pin B.



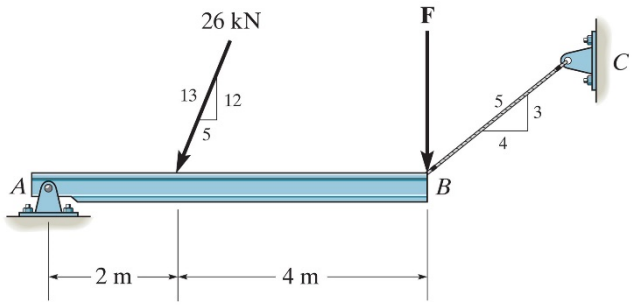
3. Determine the support force at pin A and on the cable BC needed to support the 500 lb load. Assume the weight of boom AB is uniform 100 lb.



4. Determine the support reactions at fixed support A on the cantilevered beam.



5. If the rope BC will fail when the tension becomes 50 kN, determine the greatest vertical load F to the beam at point B. What is the magnitude of the reaction at pin A for this loading? Neglect the weight and thickness of the beam.



6. Due to an unequal distribution of fuel in the wing tanks, the center of gravity for the airplane fuselage A and wings B and C are located as shown. If the components have weights W_A = 4.5 kips, W_B = 8 kips and W_C = 6 kips, determine the normal reactions of the wheel D, E, and F on the ground.