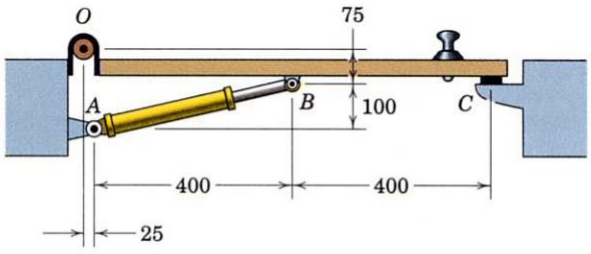
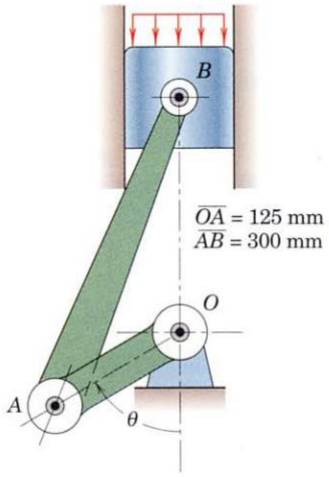
The force exerted by the plunger of cylinder AB on the door is 40 N directed along the line AB, and this force tends to keep the door closed. Compute the moment of this force about the hinge O. What force F_C normal to the plane of the door must the door stop at C exert on the door so that the combined moment about O of the two forces is zero?

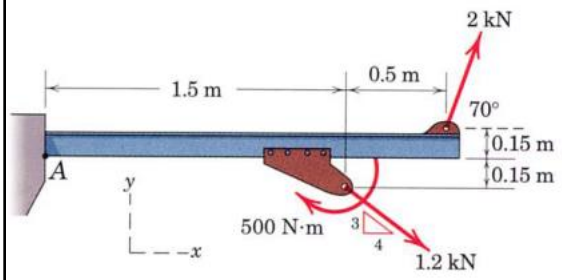


Dimensions in millimeters

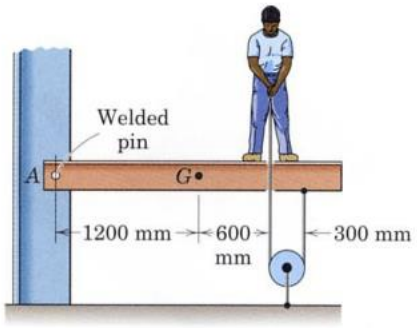
For the angular position $\theta = 60°$ of the crank OA, the gas pressure on the piston induces a compressive force P in the connecting rod along its centerline AB. If this force produces a moment of 720 N·m about the crank axis O, calculate P.



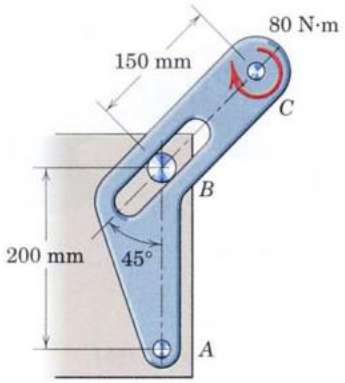
The flanged steel cantilever beam with riveted bracket is subjected to the couple and two forces shown, and their effect on the design of the attachment at A must be determined. Replace the two forces and couple by an equivalent couple M and resultant force $\mathbf{R}$ at A.



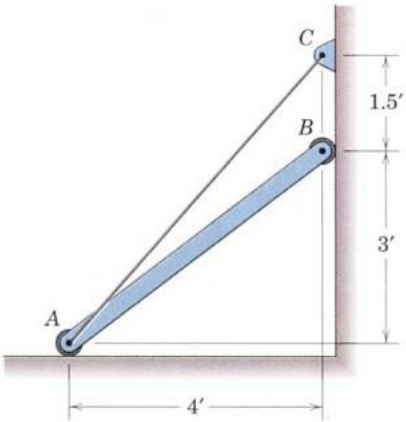
The pin A, which connects the 200-kg steel beam with center of gravity at G to the vertical column, is welded both to the beam and to the column. To test the weld, the 80-kg man loads the beam by exerting a 300-N force on the rope which passes through a hole in the beam as shown. Calculate the torque (couple) M supported by the pin.



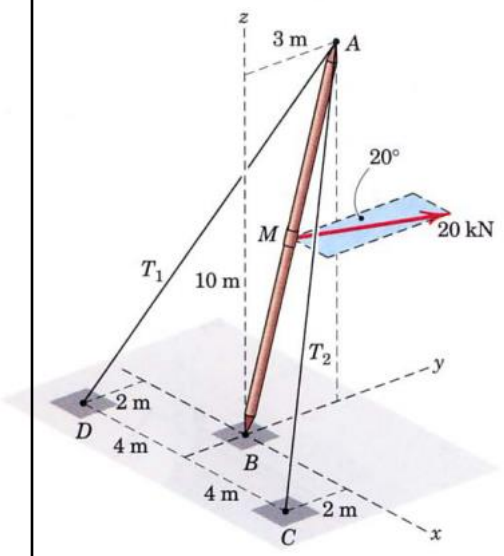
The light bracket ABC is freely hinged at A and is constrained by the fixed pin in the smooth slot at B. Calculate the magnitude R of the force supported by the pin at A under the action of the 80-N·m applied couple.



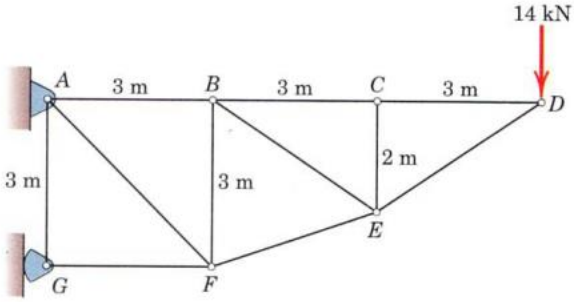
The uniform bar with end rollers weighs 60 lb and is supported by the horizontal and vertical surfaces and by the wire AC. Calculate the tension T in the wire and the reactions against the rollers at A and at B.



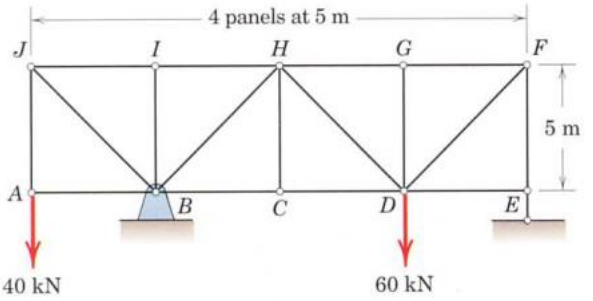
The boom AB lies in the vertical y-z plane and is supported by a ball-and-socket joint at B and by the two cables at A. Calculate the tension in each cable resulting from the 20-kN force acting in the horizontal plane and applied at the midpoint M of the boom. Neglect the weight of the boom.



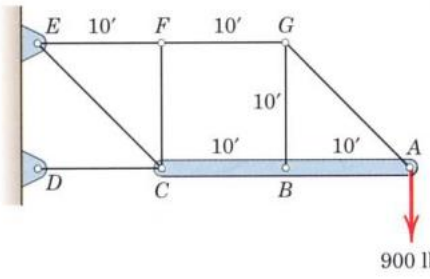
Calculate the forces in members BC, BE, and EF. Solve for each force from an equilibrium equation which contains that force as the only unknown.



Calculate the forces in members BH, HI, and BC for the truss loaded by the 40- and 60-kN forces.



Calculate the force in member BG using a free-body diagram of the rigid member ABC.



The horizontal boom is supported by the cables AB and CD and by a ball-and-socket joint at O. To determine the influence on the reaction at O of the position of the vertical load L along the boom, we may neglect the weight of the boom. If R represents the magnitude of the total force at O, determine by calculus the minimum ratio R/L and the corresponding value of x. Then write a computer program for R/L and plot the results for $0 < x < 6$ m as a check on your calculations.