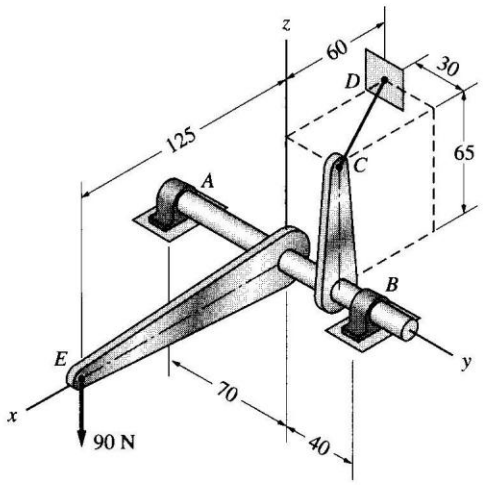
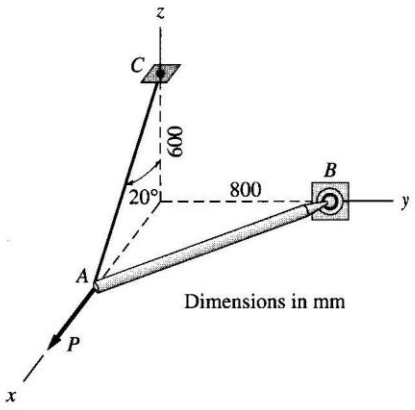
5.36 The shaft AB is supported by a thrust bearing at A and a slider bearing at B. Determine the force in cable CD, and the bearing reactions at A and B caused by the 90-N vertical force applied at E. Neglect weights.



Dimensions in mm

Fig. P5.36



Dimensions in mm

Fig. P5.37

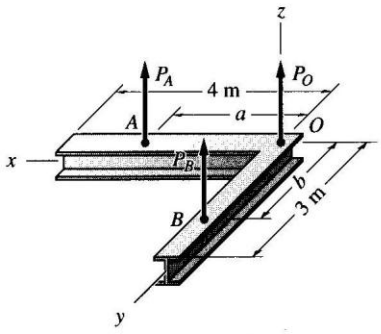


Fig. P5.38

5.37 The uniform bar of weight W is supported by a wire at A and a ball-and-socket joint at B. The bar is held in the position shown by the horizontal force P. Determine P, the force in the wire, and the reactions at B in terms of W.

5.38 The total mass of the L-shaped beam of constant cross section is 1470 kg. The beam is hoisted by three vertical cables attached at O, A, and B. Determine the distances a and b for which the tensions in the cables are equal.

5.39 The crank is supported by a thrust bearing at A, a slider bearing at B, and a frictionless surface at D. Calculate the reactions at A, B, and D if $P = 200$ lb and $C = 800$ lb · ft. The weight of the crank may be neglected.

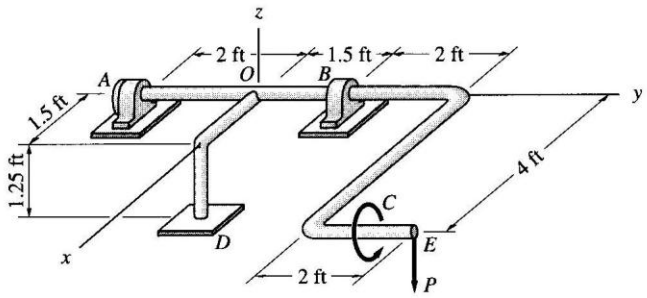
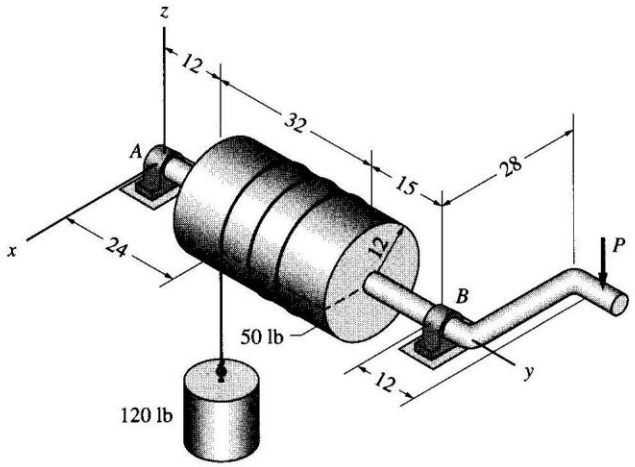


Fig. P5.39

5.40 A 120-lb weight is attached to the cable that is wrapped around the 50-lb homogeneous drum. The shaft attached to the drum is supported by a thrust bearing at A and a slider bearing at B. The drum is kept in equilibrium by the vertical force P acting on the handle of the crank. Determine P and the reactions at A and B. Neglect the weights of the crank and the shaft.



Dimensions in inches

Fig. P5.40

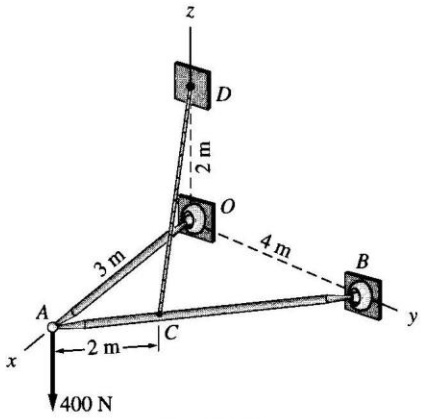


Fig. P5.41

5.41 Calculate the force in cable CD and the reaction at O. Assume that O, A, and B are ball-and-socket joints, and neglect the weights of the members.

5.42 The homogeneous rectangular panel weighs 64 lb and is attached to the floor by hinges at A and B. The panel is held in the vertical position by the light bar CD, which is pinned to the panel at D and is resting on a friction surface at C. Determine all forces acting on the panel if it is subjected to the uniform wind pressure of 1.2 lb/ft^2.

5.43 The arm ADE of the boring machine is attached to a rigid support by pins at A and A'. The arm is also supported by the hydraulic cylinder BD, which has a ball-and-socket joint at each end. The applied loading consists of a wrench acting at the boring tool E. Neglecting the weights of the members, find the force in the cylinder BD if $P = 1400$ lb and $C = 3600$ lb · ft.

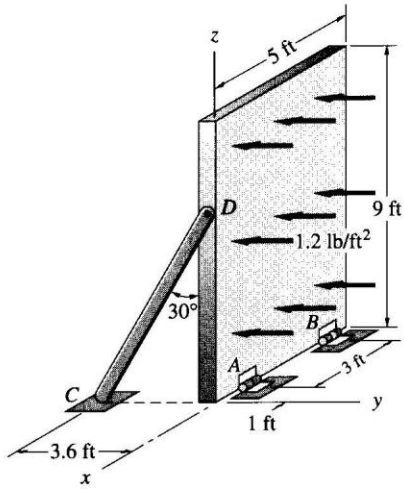


Fig. P5.42

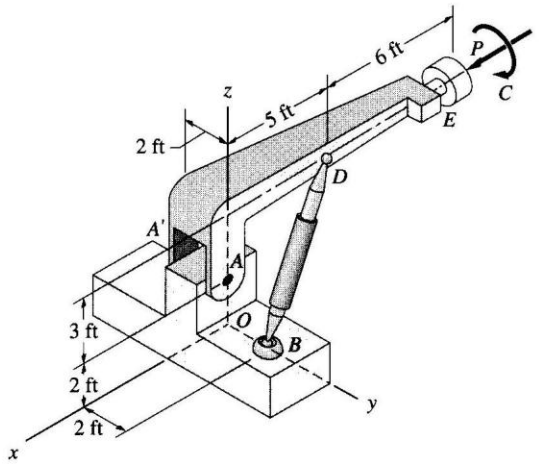


Fig. P5.43

5.44 A hoist is formed by connecting bars BD and BE to member ABC. Neglecting the weights of the members and assuming that all connections are ball-and-socket joints, determine the magnitudes of the forces in bars BD and BE in terms of the applied load P.

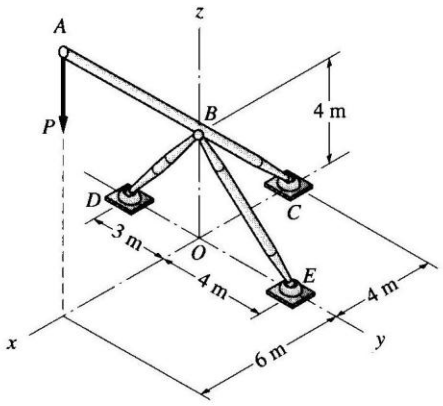


Fig. P5.44

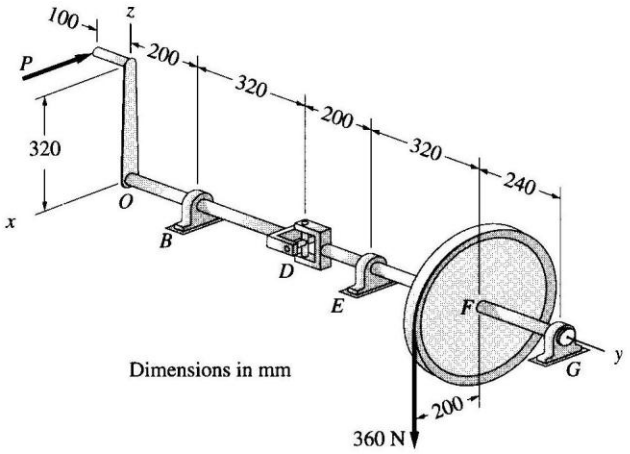


Fig. P5.45

5.45 The crank arm OD of the winch is connected by a universal joint at D to the shaft-pulley assembly. The winch is supported by slider bearings at B and E, and by a thrust bearing at G. Determine the force P that will hold the winch at rest, and calculate the magnitudes of the corresponding bearing reactions. Neglect the weights of the members.

5.46 The cart weighs 80 lb; its center of gravity is at G. The roller at A is supported by a vertical surface, and the grooved rollers at B and C run along the horizontal rail. Neglecting friction, find the magnitudes of the reactions at the rollers.

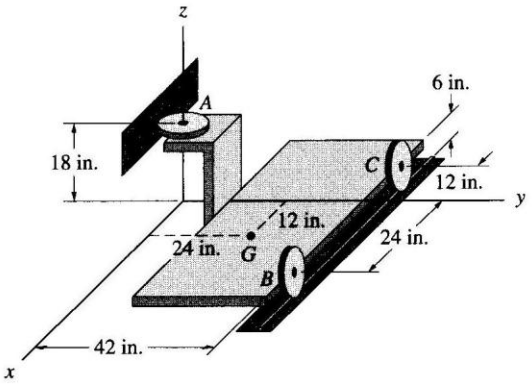


Fig. P5.46

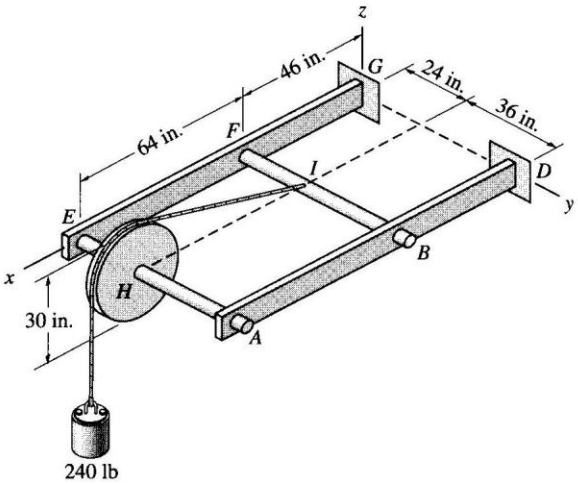


Fig P5.47

5.47 The frame is built into the wall at D and G. The cross-members AE and BF pass through frictionless holes at A, B, E, and F. The weights of the members are negligible. Determine the reactions at D.

5.48 All connections of the structure are ball-and-socket joints, except for the slider bearings at A and O. The weights of the members may be neglected. Calculate the forces in members BE and CF.

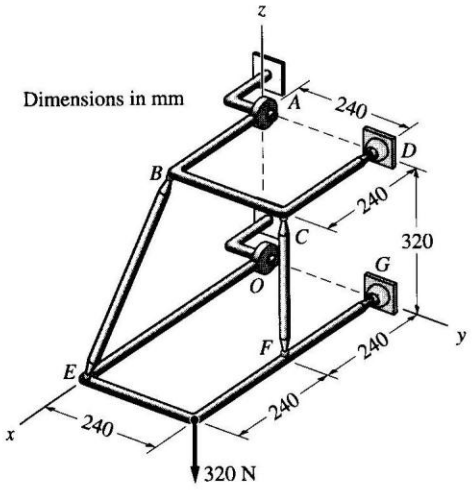


Fig. P5.48

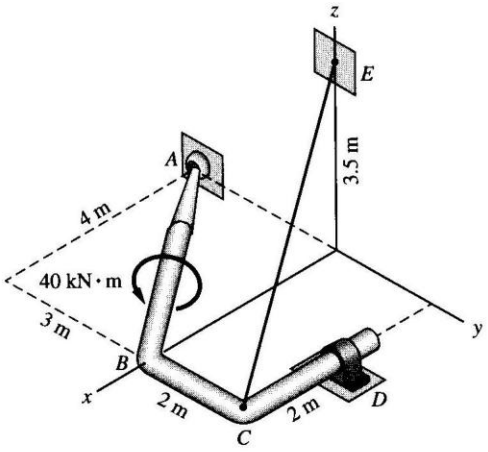


Fig. P5.49

5.49 The bent bar is supported by a ball-and-socket joint at A, a cable at C, and a slider bearing at D. Determine the force in the cable due to the 40-kN · m couple acting on the bar (the couple-vector is directed along AB). Neglect the weight of the bar.

Review Problems

5.50 Three vertical cables are attached to the uniform, quarter circular plate. Determine the weight of the heaviest plate that can be supported if the tensile strength of each cable is 500 lb.

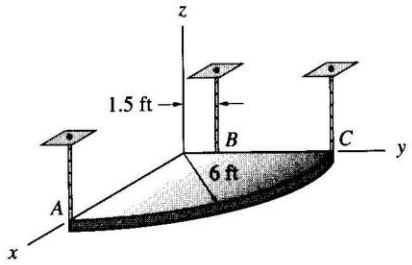


Fig. P5.50

5.51 The bent rod is supported by a ball-and-socket joint at O, a cable at B, and a slider bearing at D. Neglecting the weight of the rod, calculate the tension in the cable and the magnitude of the bearing reaction at D.

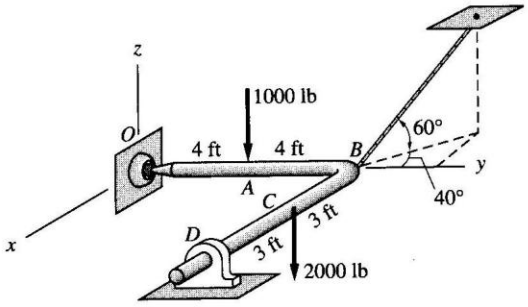


Fig. P5.51