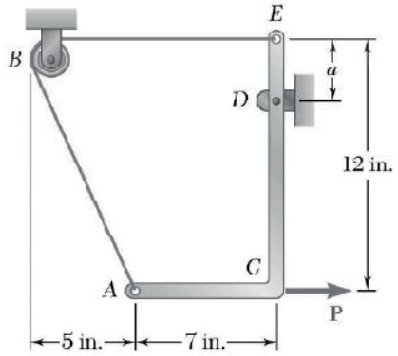


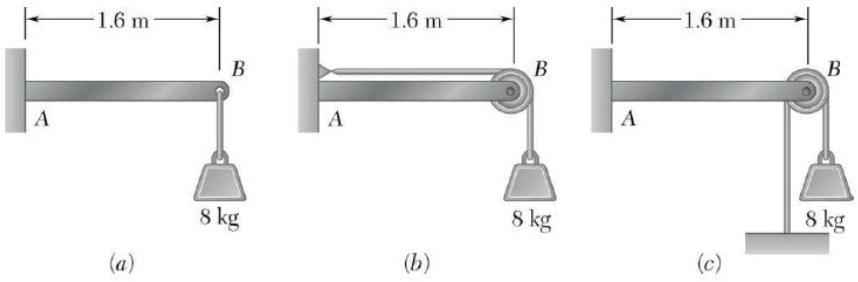
PROBLEM 4.30

Solve Problem 4.29 for $a = 6$ in.

PROBLEM 4.29 A force **P** of magnitude 90 lb is applied to member *ACDE*, which is supported by a frictionless pin at *D* and by the cable *ABE*. Since the cable passes over a small pulley at *B*, the tension may be assumed to be the same in portions *AB* and *BE* of the cable. For the case when $a = 3$ in., determine (*a*) the tension in the cable, (*b*) the reaction at *D*.

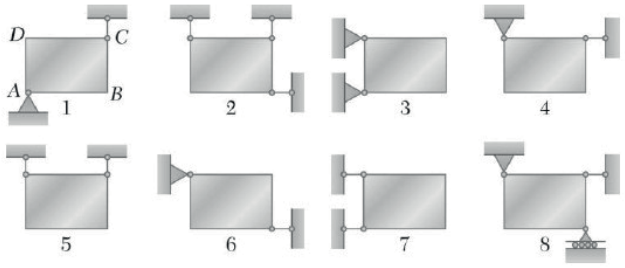
PROBLEM 4.45

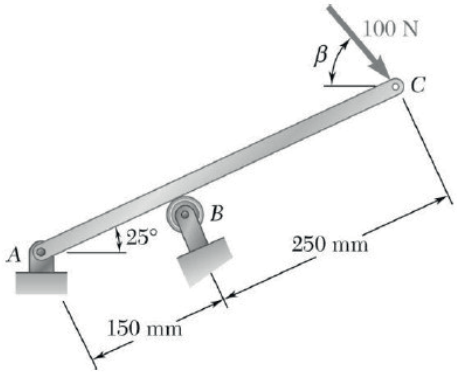
An 8-kg mass can be supported in the three different ways shown. Knowing that the pulleys have a 100-mm radius, determine the reaction at *A* in each case.



PROBLEM 4.59

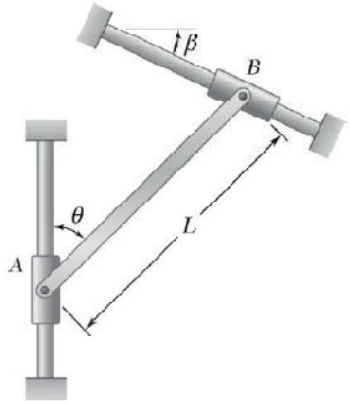
Eight identical 500×750-mm rectangular plates, each of mass $m = 40$ kg, are held in a vertical plane as shown. All connections consist of frictionless pins, rollers, or short links. In each case, determine whether (*a*) the plate is completely, partially, or improperly constrained, (*b*) the reactions are statically determinate or indeterminate, (*c*) the equilibrium of the plate is maintained in the position shown. Also, wherever possible, compute the reactions.





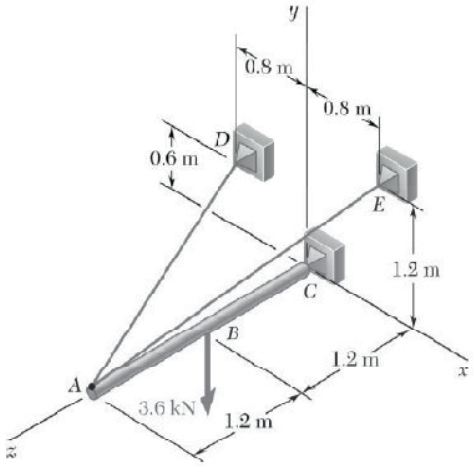
PROBLEM 4.75

Determine the reactions at A and B when $\beta = 50°$.



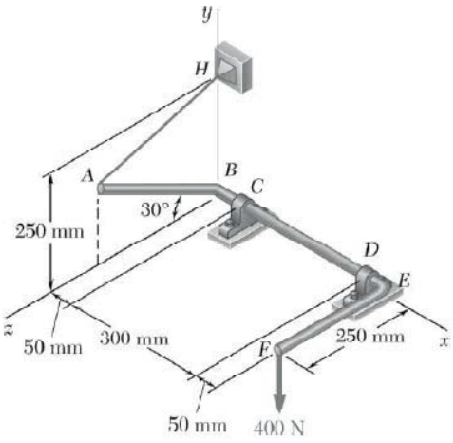
PROBLEM 4.90

An 8-kg slender rod of length L is attached to collars that can slide freely along the guides shown. Knowing that the rod is in equilibrium and that $\beta = 30°$, determine (a) the angle θ that the rod forms with the vertical, (b) the reactions at A and B.



PROBLEM 4.105

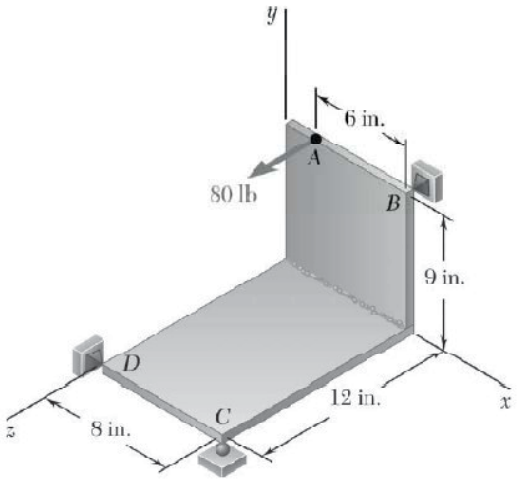
A 2.4-m boom is held by a ball-and-socket joint at C and by two cables AD and AE. Determine the tension in each cable and the reaction at C.



PROBLEM 4.120

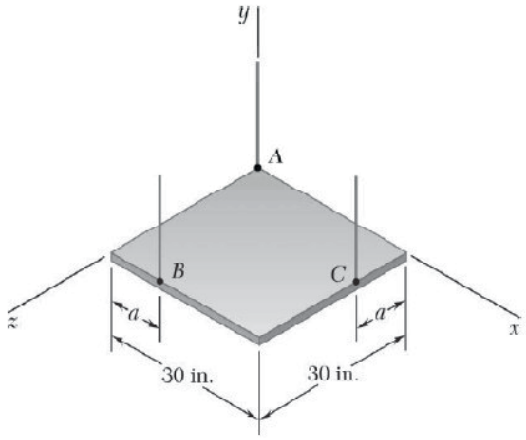
Solve Problem 4.118, assuming that the bearing at D is removed and that the bearing at C can exert couples about axes parallel to the y and z axes.

PROBLEM 4.118 The bent rod $ABEF$ is supported by bearings at C and D and by wire AH. Knowing that portion AB of the rod is 250 mm long, determine (a) the tension in wire AH, (b) the reactions at C and D. Assume that the bearing at D does not exert any axial thrust.



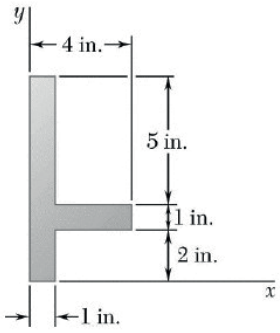
PROBLEM 4.135

Two rectangular plates are welded together to form the assembly shown. The assembly is supported by ball-and-socket joints at B and D and by a ball on a horizontal surface at C. For the loading shown, determine the reaction at C.



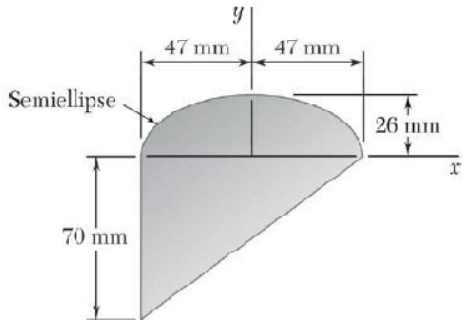
PROBLEM 4.150

The 24-lb square plate shown is supported by three vertical wires. Determine (a) the tension in each wire when $a = 10$ in., (b) the value of a for which the tension in each wire is 8 lb.



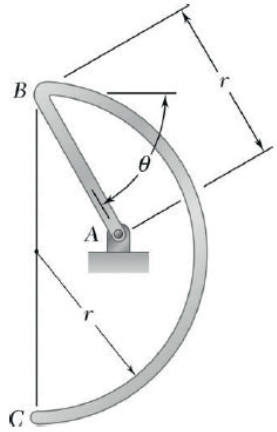
PROBLEM 5.1

Locate the centroid of the plane area shown.



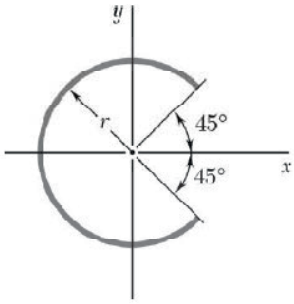
PROBLEM 5.15

Locate the centroid of the plane area shown.



PROBLEM 5.30

The homogeneous wire *ABC* is bent into a semicircular arc and a straight section as shown and is attached to a hinge at *A*. Determine the value of θ for which the wire is in equilibrium for the indicated position.

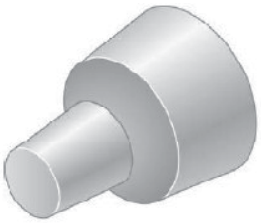


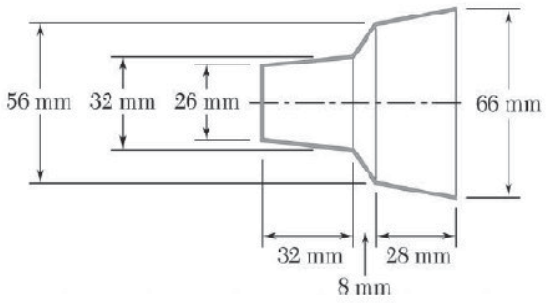
PROBLEM 5.45

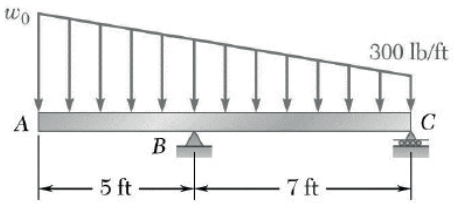
A homogeneous wire is bent into the shape shown. Determine by direct integration the *x* coordinate of its centroid.

PROBLEM 5.60

The aluminum shade for the small high-intensity lamp shown has a uniform thickness of 1 mm. Knowing that the density of aluminum is 2800 kg/m^3, determine the mass of the shade.

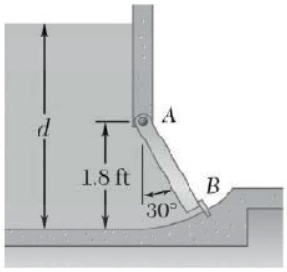






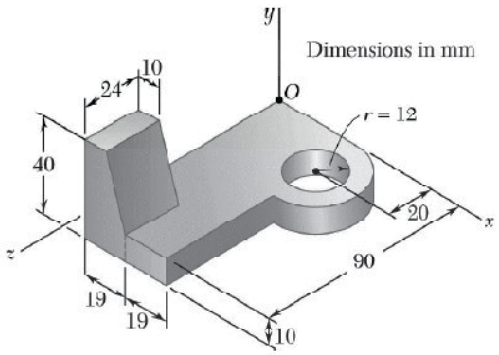
PROBLEM 5.75

Determine (*a*) the distributed load w_O at the end *A* of the beam *ABC* for which the reaction at *C* is zero, (*b*) the corresponding reaction at *B*.



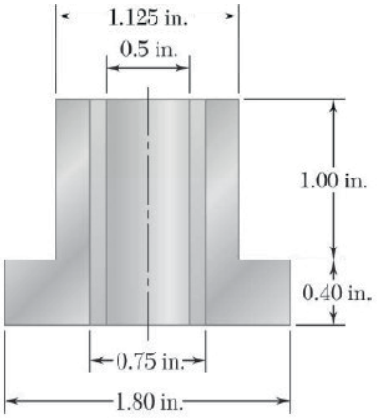
PROBLEM 5.90

The square gate *AB* is held in the position shown by hinges along its top edge *A* and by a shear pin at *B*. For a depth of water $d = 3.5$ ft, determine the force exerted on the gate by the shear pin.



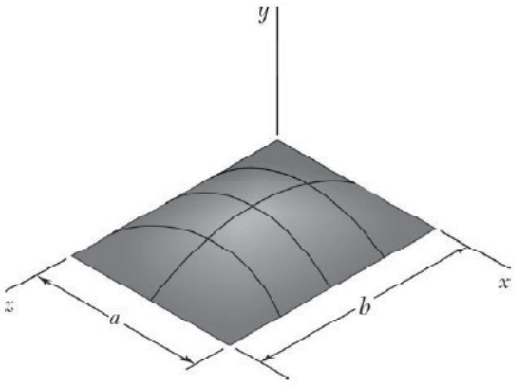
PROBLEM 5.105

For the machine element shown, locate the *z* coordinate of the center of gravity.



PROBLEM 5.120

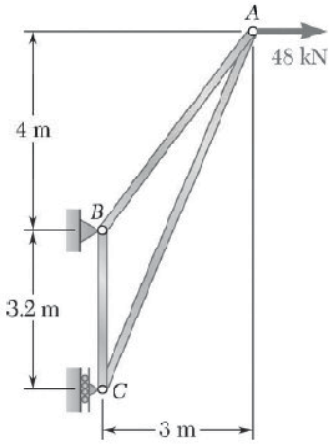
A bronze bushing is mounted inside a steel sleeve. Knowing that the specific weight of bronze is 0.318 lb/in^3 and of steel is 0.284 lb/in^3, determine the location of the center of gravity of the assembly.



PROBLEM 5.136

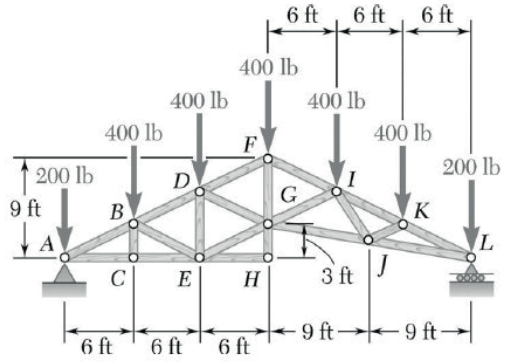
Determine by direct integration the location of the centroid of the volume between the xz plane and the portion shown of the surface $y = 16h(ax - x^2)(bz - z^2)/a^2b^2$.

Analysis of Structures



PROBLEM 6.1

Using the method of joints, determine the force in each member of the truss shown. State whether each member is in tension or compression.

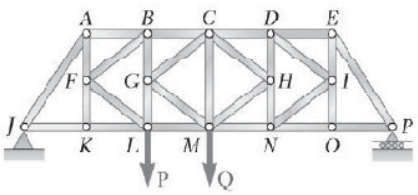


PROBLEM 6.15

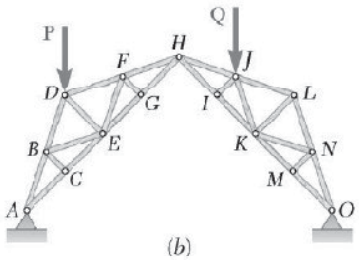
Determine the force in each of the members located to the left of line *FGH* for the studio roof truss shown. State whether each member is in tension or compression.

PROBLEM 6.30

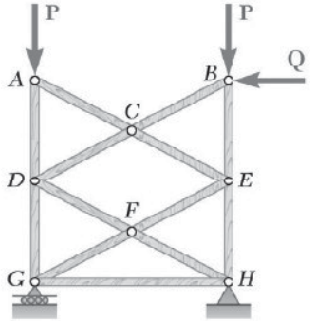
Determine whether the trusses of Problems 6.31*b*, 6.32*b*, and 6.33*b* are simple trusses.



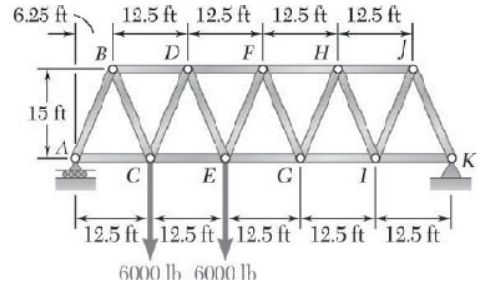
(*b*)



(*b*)

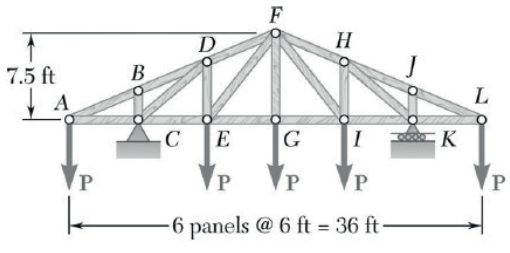


(*b*)



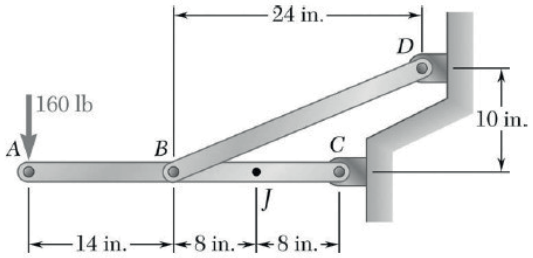
PROBLEM 6.45

A Warren bridge truss is loaded as shown. Determine the force in members *CE*, *DE*, and *DF*.



PROBLEM 6.60

Determine the force in members *EG* and *EF* of the truss shown when $P = 20$ kips.

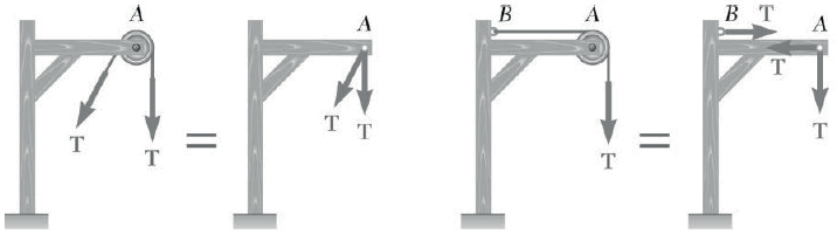


PROBLEM 6.75

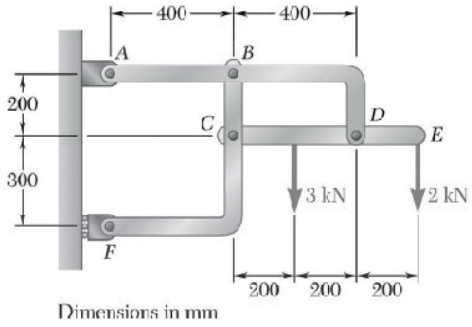
Determine the force in member *BD* and the components of the reaction at *C*.

PROBLEM 6.90

(*a*) Show that when a frame supports a pulley at *A*, an equivalent loading of the frame and of each of its component parts can be obtained by removing the pulley and applying at *A* two forces equal and parallel to the forces that the cable exerted on the pulley. (*b*) Show that if one end of the cable is attached to the frame at a Point *B*, a force of magnitude equal to the tension in the cable should also be applied at *B*.

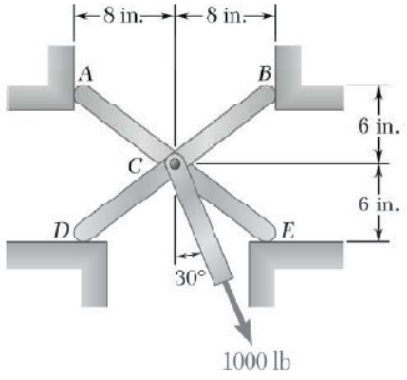


(*a*) (*b*)



PROBLEM 6.105

For the frame and loading shown, determine the components of all forces acting on member *ABD*.



PROBLEM 6.108

For the frame and loading shown, determine the reactions at *A*, *B*, *D*, and *E*. Assume that the surface at each support is frictionless.