2.88 For the frame and cable of Prob. 2.87, determine the components of the force exerted by the cable on the support at E.

2.89 Knowing that the tension in cable AB is 1425 N, determine the components of the force exerted on the plate at B.

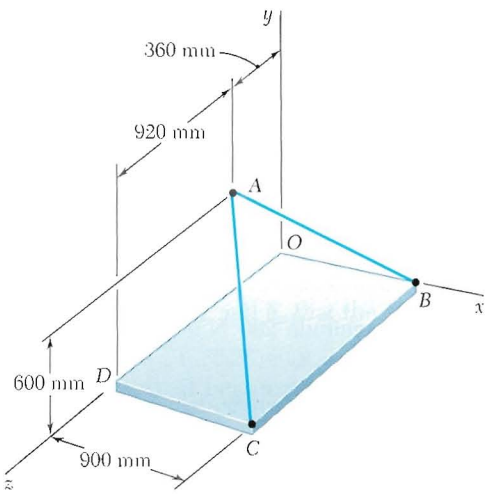

Fig. P2.89 and *P2.90*

2.90 Knowing that the tension in cable AC is 2130 N, determine the components of the force exerted on the plate at C.

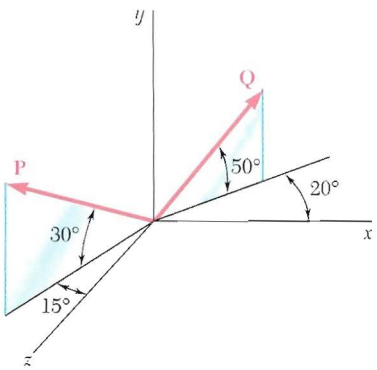

Fig. P2.91 and P2.92

2.91 Find the magnitude and direction of the resultant of the two forces shown knowing that $P = 300$ N and $Q = 400$ N.

2.92 Find the magnitude and direction of the resultant of the two forces shown knowing that $P = 400$ N and $Q = 300$ N.

2.93 Knowing that the tension is 425 lb in cable AB and 510 lb in cable AC, determine the magnitude and direction of the resultant of the forces exerted at A by the two cables.

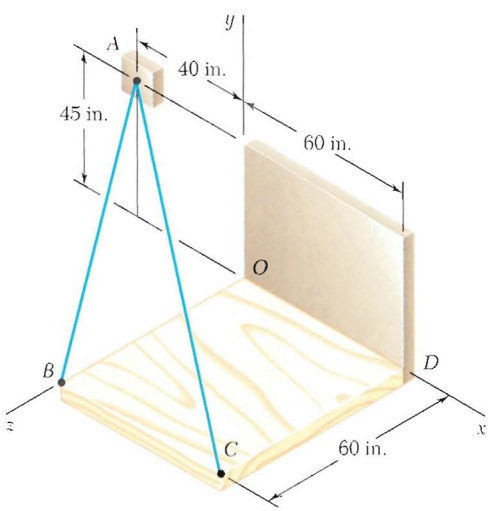

Fig. *P2.93* and P2.94

2.94 Knowing that the tension is 510 lb in cable AB and 425 lb in cable AC, determine the magnitude and direction of the resultant of the forces exerted at A by the two cables.

2.95 For the frame of Prob. 2.87, determine the magnitude and direction of the resultant of the forces exerted by the cable at B knowing that the tension in the cable is 385 N

2.96 For the cables of Prob. 2.89, knowing that the tension is 1425 N in cable AB and 2130 N in cable AC, determine the magnitude and direction of the resultant of the forces exerted at A by the two cables.

PROBLEMS

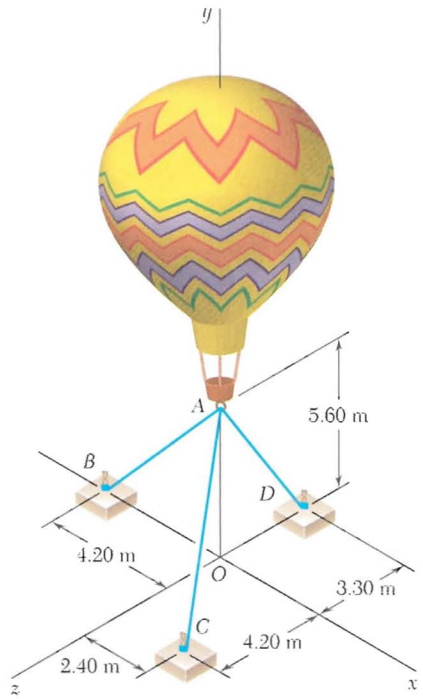

Fig. P2.99, *P2.100*, P2.101, and *P2.102*

2.99 Three cables are used to tether a balloon as shown. Determine the vertical force **P** exerted by the balloon at *A* knowing that the tension in cable *AB* is 259 N

2.100 Three cables are used to tether a balloon as shown. Determine the vertical force **P** exerted by the balloon at *A* knowing that the tension in cable *AC* is 444 N

2.101 Three cables are used to tether a balloon as shown. Determine the vertical force **P** exerted by the balloon at *A* knowing that the tension in cable *AD* is 481 N.

2.102 Three cables are used to tether a balloon as shown. Knowing that the balloon exerts an 800-N vertical force at *A*, determine the tension in each cable.

2.103 A crate is supported by three cables as shown. Determine the weight of the crate knowing that the tension in cable *AB* is 750 lb.

2.104 A crate is supported by three cables as shown. Determine the weight of the crate knowing that the tension in cable *AD* is 616 lb.

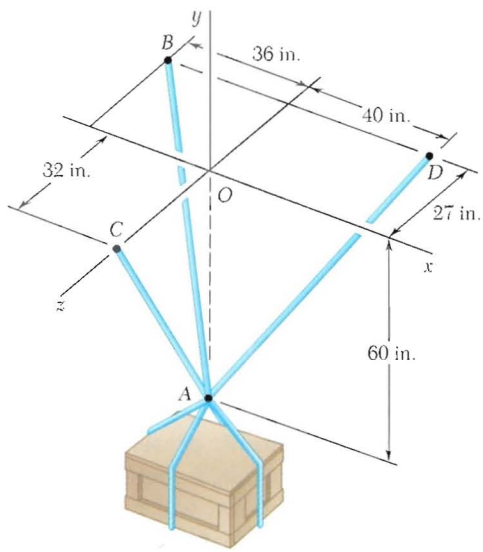

Fig. P2.103, P2.104, P2.105, and *P2.106*

2.105 A crate is supported by three cables as shown. Determine the weight of the crate knowing that the tension in cable *AC* is 544 lb.

2.106 A 1600-lb crate is supported by three cables as shown. Determine the tension in each cable.

PROBLEMS

3.1 A foot valve for a pneumatic system is hinged at B. Knowing that $\alpha = 28°$, determine the moment of the 16-N force about point B by resolving the force into horizontal and vertical components.

3.2 A foot valve for a pneumatic system is hinged at B. Knowing that $\alpha = 28°$, determine the moment of the 16-N force about point B by resolving the force into components along ABC and in a direction perpendicular to ABC.

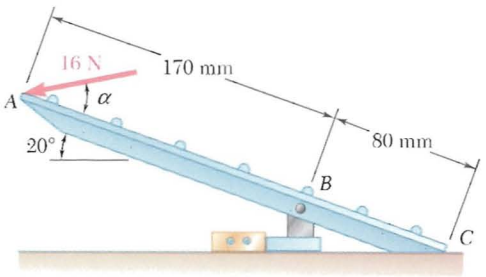

Fig. P3.1 and P3.2

3.3 A 300-N force is applied at A as shown. Determine (*a*) the moment of the 300-N force about D, (*b*) the smallest force applied at B that creates the same moment about D.

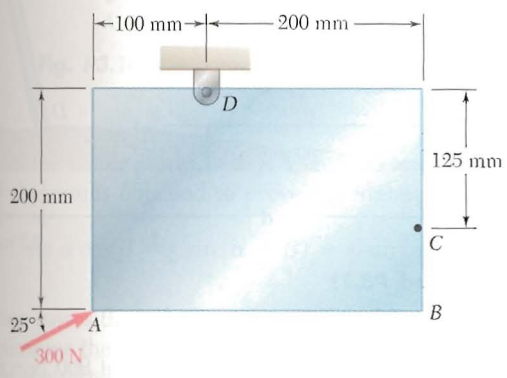

Fig. P3.3 and P3.4

3.4 A 300-N force is applied at A as shown. Determine (*a*) the moment of the 300-N force about D, (*b*) the magnitude and sense of the horizontal force applied at C that creates the same moment about D, (*c*) the smallest force applied at C that creates the same moment about D.

3.5 An 8-lb force **P** is applied to a shift lever. Determine the moment of **P** about B when α is equal to 25°.

3.6 For the shift lever shown, determine the magnitude and the direction of the smallest force **P** that has a 210-lb · in. clockwise moment about B.

3.7 An 11-lb force **P** is applied to a shift lever. The moment of **P** about B is clockwise and has a magnitude of 250 lb · in. Determine the value of α.

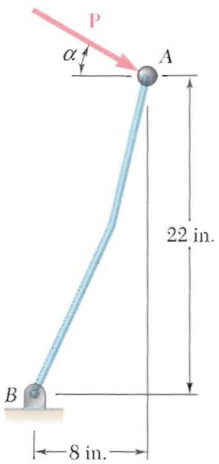

Fig. P3.5, P3.6, and P3.7

3.8 It is known that a vertical force of 200 lb is required to remove the nail at C from the board. As the nail first starts moving, determine (*a*) the moment about B of the force exerted on the nail, (*b*) the magnitude of the force **P** that creates the same moment about B if $\alpha = 10°$, (*c*) the smallest force **P** that creates the same moment about B.

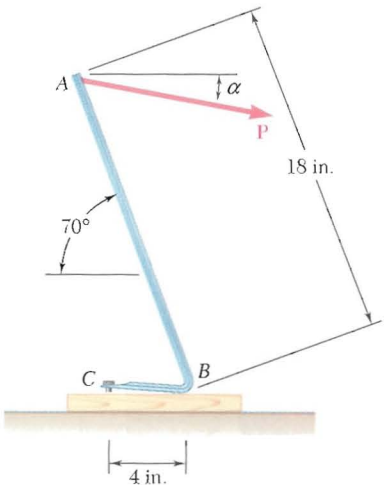

Fig. P3.8

3.22 Before the trunk of a large tree is felled, cables AB and BC are attached as shown. Knowing that the tensions in cables AB and BC are 555 N and 660 N, respectively, determine the moment about O of the resultant force exerted on the tree by the cables at B.

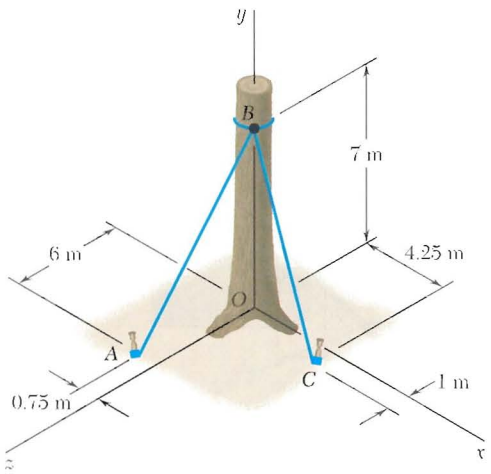

Fig. P3.22

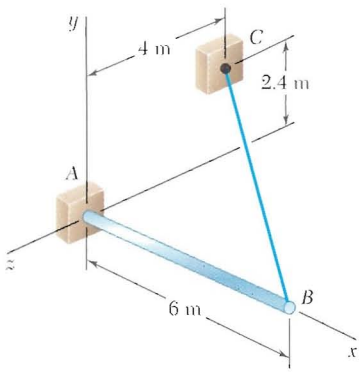

Fig. P3.23

3.23 The 6-m boom AB has a fixed end A. A steel cable is stretched from the free end B of the boom to a point C located on the vertical wall. If the tension in the cable is 2.5 kN, determine the moment about A of the force exerted by the cable at B

3.24 A wooden board AB, which is used as a temporary prop to support a small roof, exerts at point A of the roof a 57-lb force directed along BA. Determine the moment about C of that force.

3.25 The ramp $ABCD$ is supported by cables at corners C and D. The tension in each of the cables is 810 N Determine the moment about A of the force exerted by (*a*) the cable at D, (*b*) the cable at C

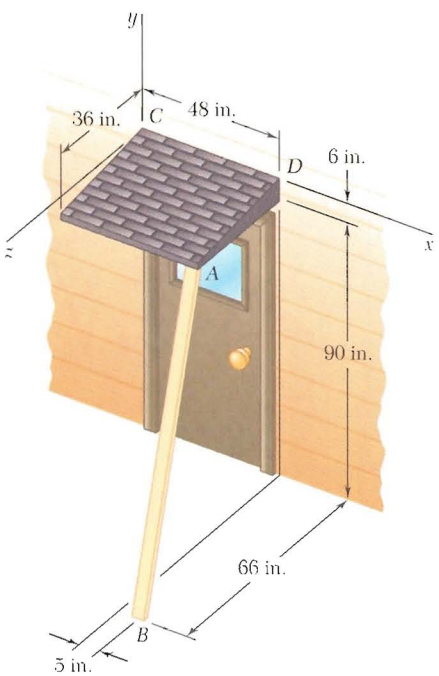

Fig. P3.24

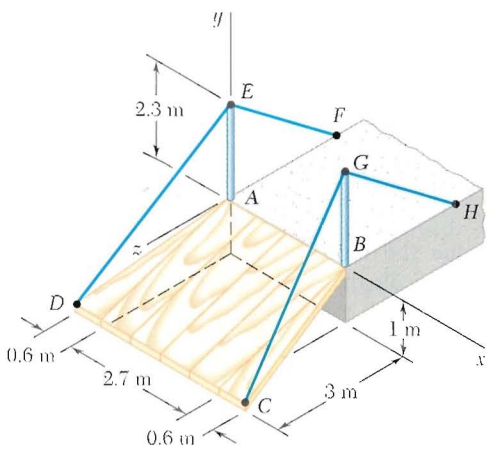

Fig. P3.25

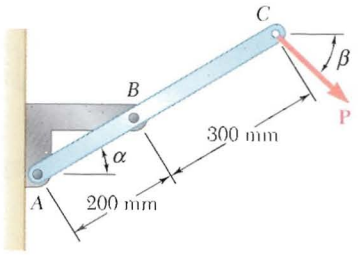

Fig. P3.85

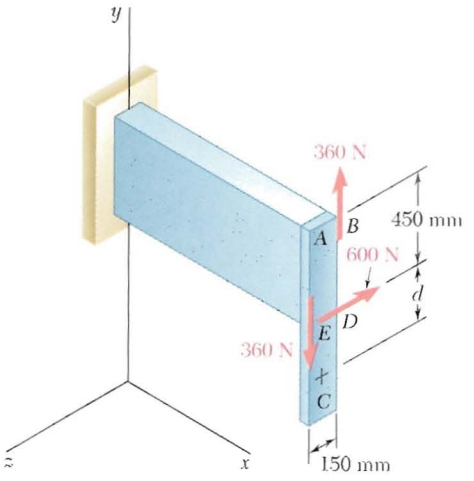

Fig. P3.87

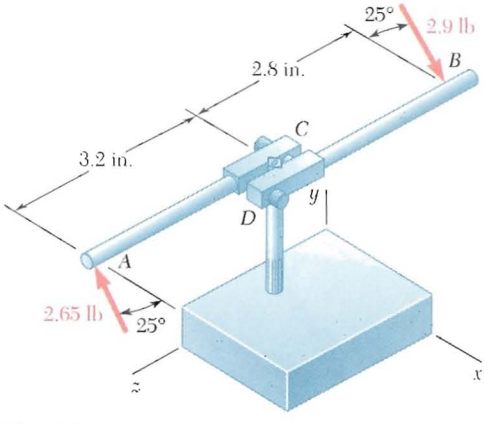

Fig. P3.89

3.85 The force **P** has a magnitude of 250 N and is applied at the end C of a 500-mm rod AC attached to a bracket at A and B. Assuming $\alpha = 30°$ and $\beta = 60°$, replace **P** with (*a*) an equivalent force-couple system at B, (*b*) an equivalent system formed by two parallel forces applied at A and B.

3.86 Solve Prob. 3.85, assuming $\alpha = \beta = 25°$

3.87 A force and a couple are applied as shown to the end of a cantilever beam. (*a*) Replace this system with a single force **F** applied at point C, and determine the distance d from C to a line drawn through points D and E. (*b*) Solve part *a* if the directions of the two 360-N forces are reversed.

3.88 The shearing forces exerted on the cross section of a steel channel can be represented by a 900-N vertical force and two 250-N horizontal forces as shown. Replace this force and couple with a single force **F** applied at point C, and determine the distance x from C to line BD. (Point C is defined as the *shear center* of the section.)

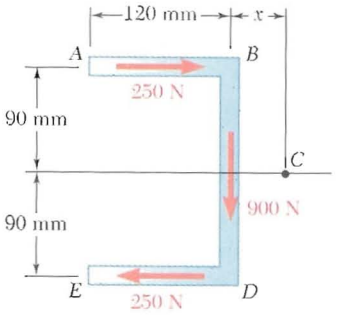

Fig. P3.88

3.89 While tapping a hole, a machinist applies the horizontal forces shown to the handle of the tap wrench. Show that these forces are equivalent to a single force, and specify, if possible, the point of application of the single force on the handle.

3.90 Three control rods attached to a lever ABC exert on it the forces shown. (*a*) Replace the three forces with an equivalent force-couple system at B. (*b*) Determine the single force that is equivalent to the force-couple system obtained in part *a*, and specify its point of application on the lever.

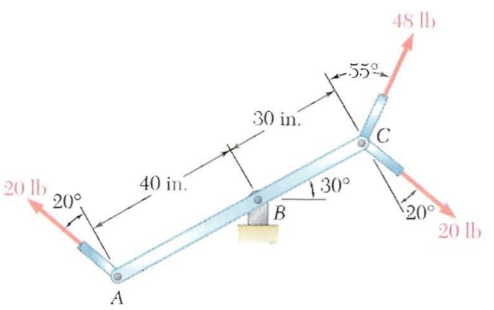

Fig. P3.90