

Tute-1 Engineering Mechanics (MEA1120)

1. A 70-kg cylinder is supported by two cables AC and BC , which are attached to the top of vertical posts. A horizontal force \mathbf{P} , perpendicular to the plane containing the posts, holds the cylinder in the position shown. Determine the magnitude of \mathbf{P} and the force in each cable. (Fig.1).
2. A 100-kg container is suspended from ring A , to which cables AC and AE are attached. A force P is applied to end F of a third cable that passes over a pulley at B and through ring A and then is attached to a support at D . Determine the magnitude of P . (Fig.2).
3. 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. (Fig.3). Ans: 201N, 372N, 416N
4. A rectangular plate is supported by three cables as shown. Knowing that the tension in cable AC is 60 N, determine the weight of the plate. (Fig.4). Ans: 845N

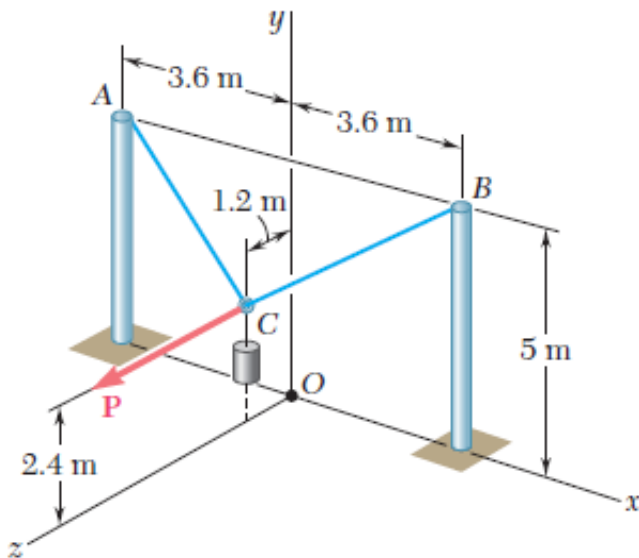


Fig.1

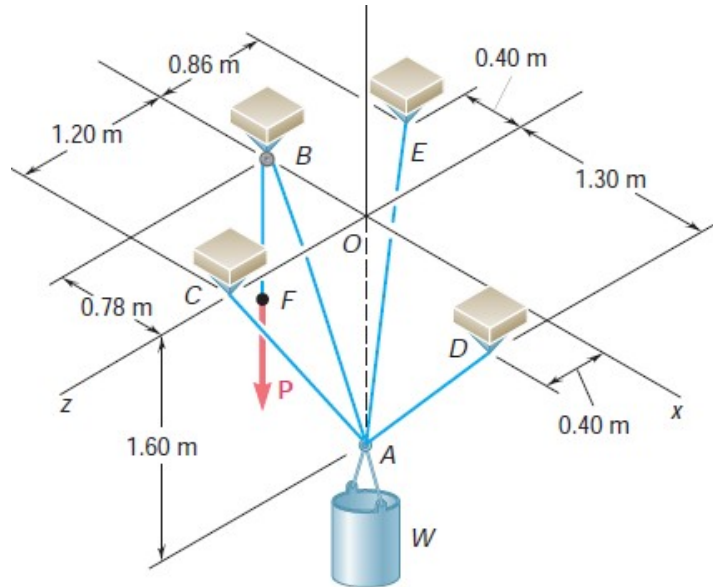


Fig. 2

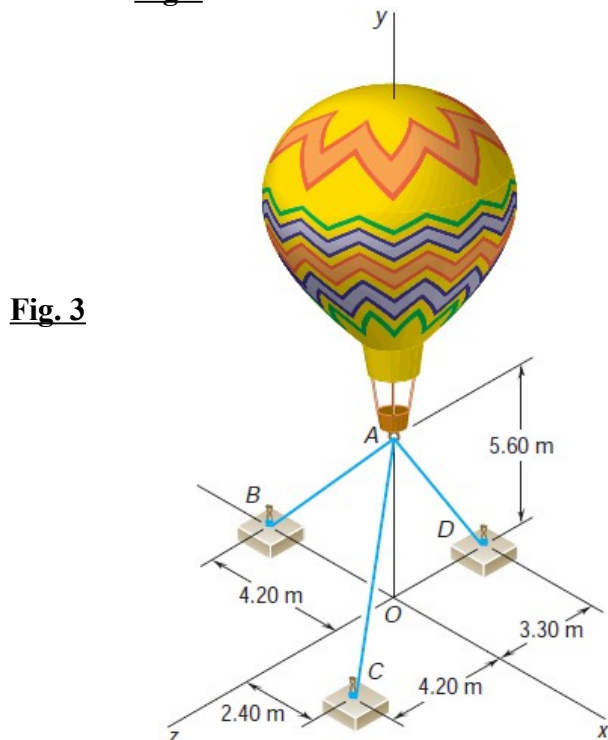


Fig. 3

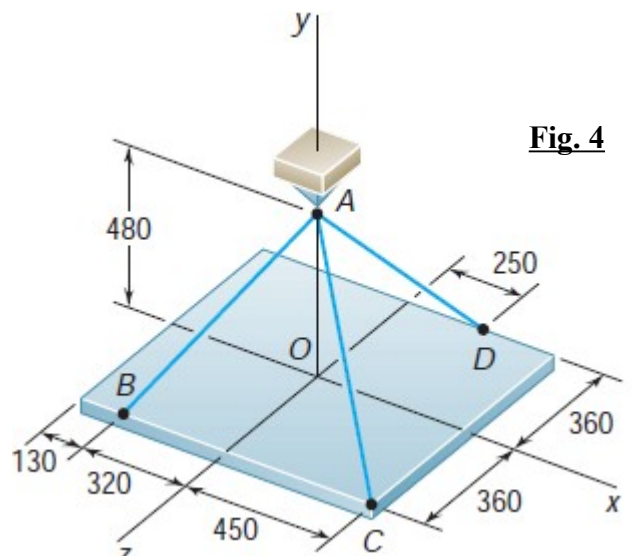


Fig. 4

5. A transmission tower is held by three guy wires attached to a pin at A and anchored by bolts at B , C , and D . If the tension in wire AB is 630 N, determine the vertical force \mathbf{P} exerted by the tower on the pin at A . (Fig.5) Ans: 1572 N
6. The wire AE is stretched between the corners A and E of a bent plate. Knowing that the tension in the wire is 435 N, determine the moment about O of the force exerted by the wire (a) on corner A , (b) on corner E . (Fig.6)
 Ans: $(28.8 \text{ N}\cdot\text{m})\mathbf{i} + (16.20 \text{ N}\cdot\text{m})\mathbf{j} - (28.8 \text{ N}\cdot\text{m})\mathbf{k}$, $-(28.8 \text{ N}\cdot\text{m})\mathbf{i} - (16.20 \text{ N}\cdot\text{m})\mathbf{j} + (28.8 \text{ N}\cdot\text{m})\mathbf{k}$
7. A cube of side a is acted upon by a force \mathbf{P} as shown. Determine the moment of \mathbf{P} (a) about A , (b) about the edge AB , (c) about the diagonal AG of the cube, (d). Using the result of part c, determine the perpendicular distance between AG and FC . (Fig.7)
 Ans: $(aP/12)(\mathbf{i} + \mathbf{j} + \mathbf{k})$, $aP/12$, $-aP/16$, $a/16$
8. The frame ACD is hinged at A and D and is supported by a cable that passes through a ring at B and is attached to hooks at G and H . Knowing that the tension in the cable is 450 N, determine the moment about the diagonal AD of the force exerted on the frame by portion BH of the cable. (Fig.8) Ans: -90 N-m

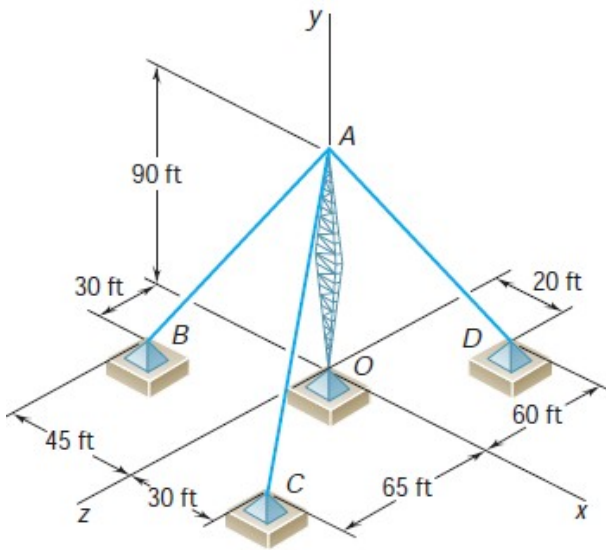


Fig. 5

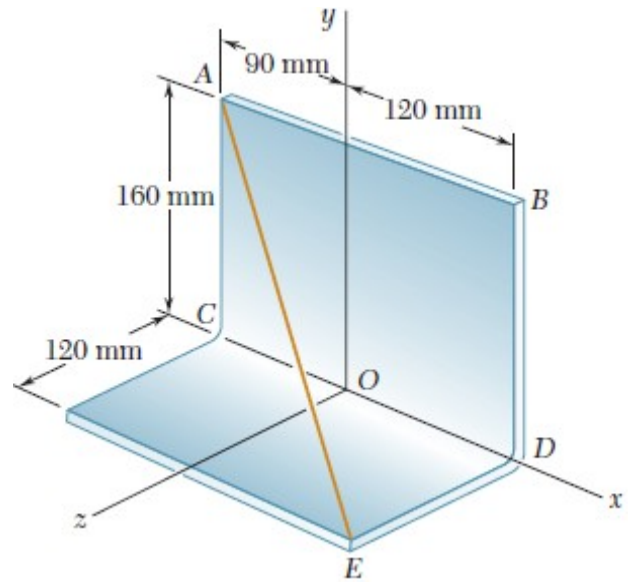


Fig. 6

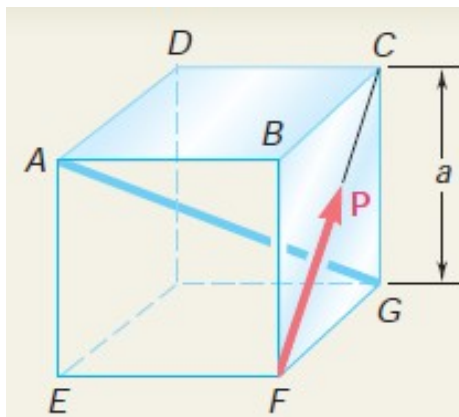


Fig. 7

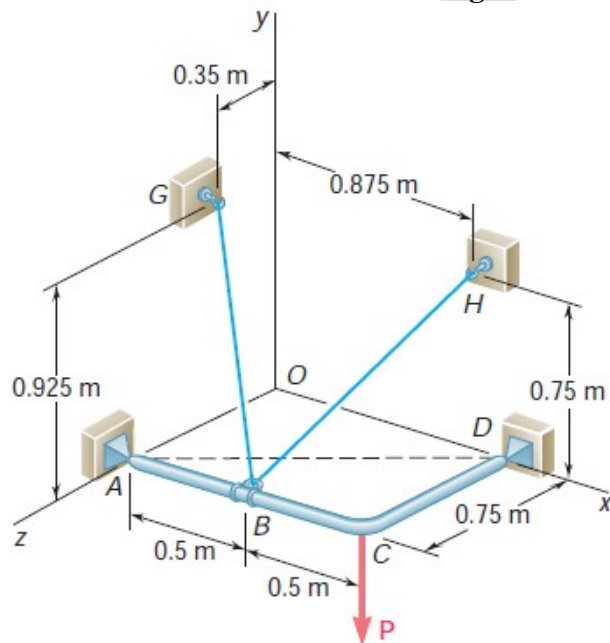


Fig. 8