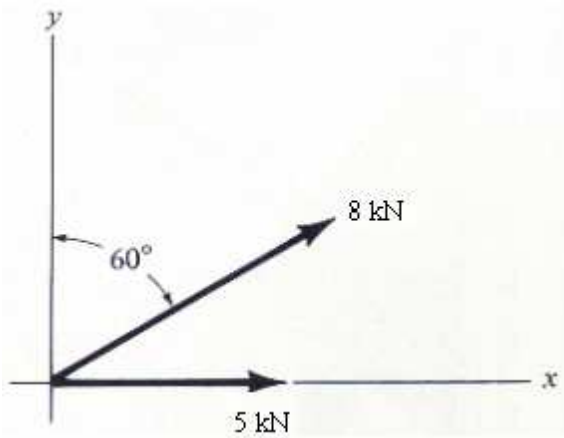


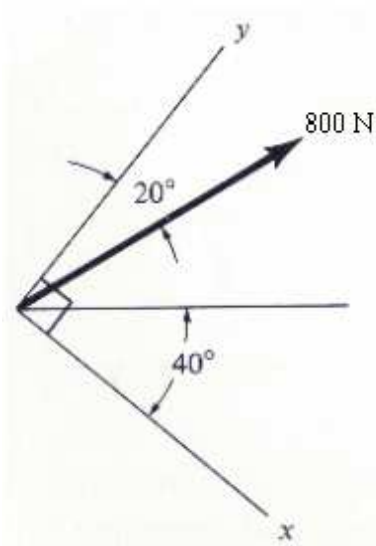
**Engineering Statics**  
**Homework 1**

1. Determine the magnitude of the resultant force and its direction measured from the positive  $x$  axis.



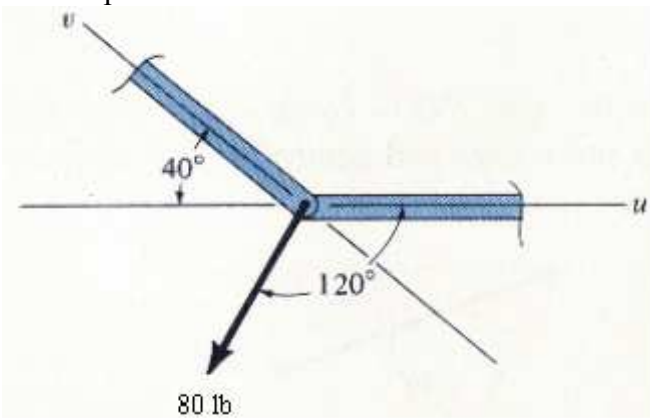
- (a) What is the magnitude of the resultant force? \_\_\_\_\_
- (b) What is the angle  $\alpha$ , in degrees, between the resultant force and the positive  $x$  axis?

2. Determine the  $x$  and  $y$  components of the 800-N force.



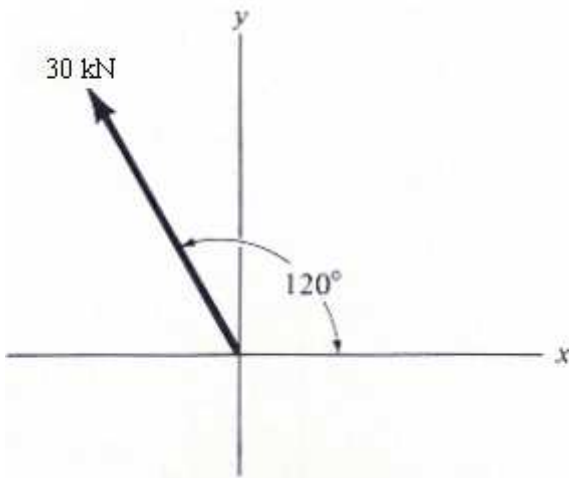
- (a) What is the  $x$  component of the force?
- (b) What is the  $y$  component of the force?

3. Resolve the 80-lb force into components acting along the  $u$  and  $v$  axes and determine the magnitudes of the components.



- (a) What is the  $u$  component of the force?  
(b) What is the  $v$  component of the force?

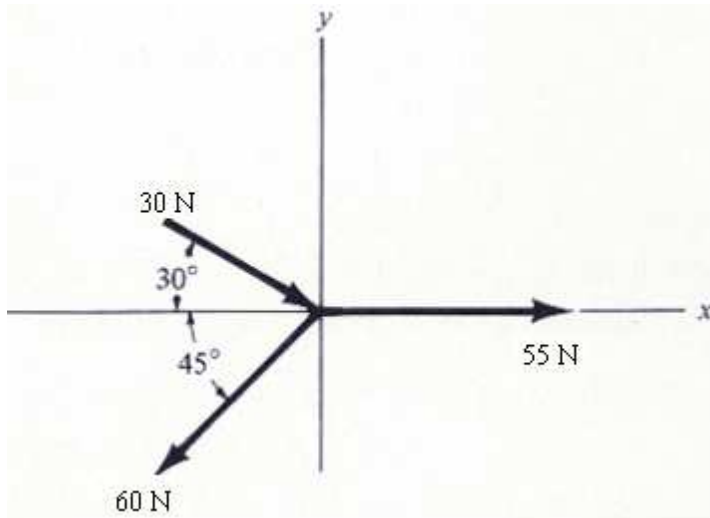
4. Determine the  $x$  and  $y$  components of the 30-kN force.



- (a) What is the  $x$  component of the force?  
(b) What is the  $y$  component of the force?

5.

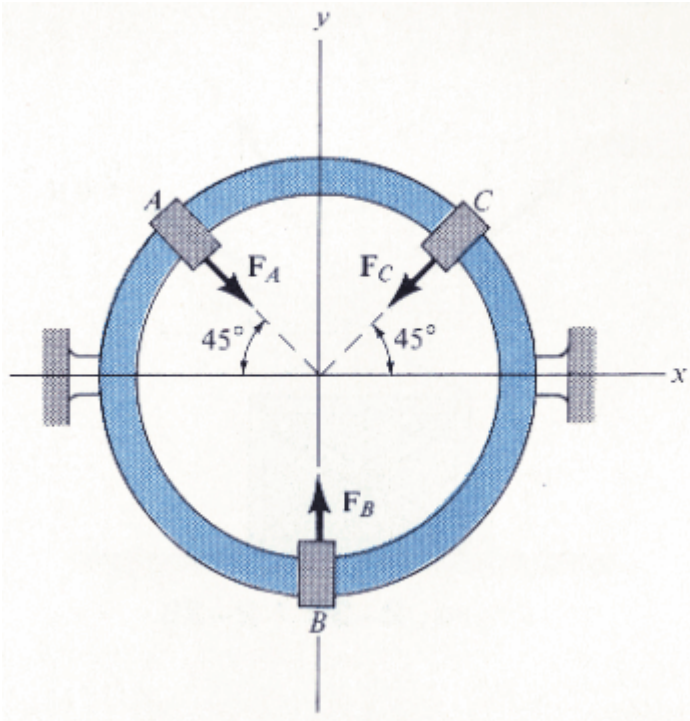
Determine the magnitude of the resultant force and its direction measured from the positive  $x$  axis.



- (a) What is the magnitude of the resultant force?
- (b) What is the angle, in degrees, between the resultant force and the positive  $x$  axis?

6.

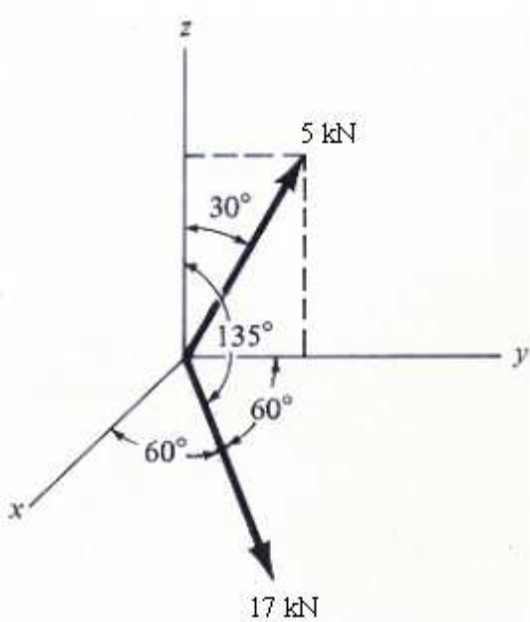
Three concurrent forces act on the ring as shown. If each has a magnitude of 65N, find the resultant force.



- (a) What is the magnitude of the resultant force?
- (b) What is the direction of the resultant force? (select one)
- pointing downward along the y axis
  - pointing outward perpendicular to the x - y plane
  - pointing inward perpendicular to the x - y plane
  - pointing upward along the y axis

7.

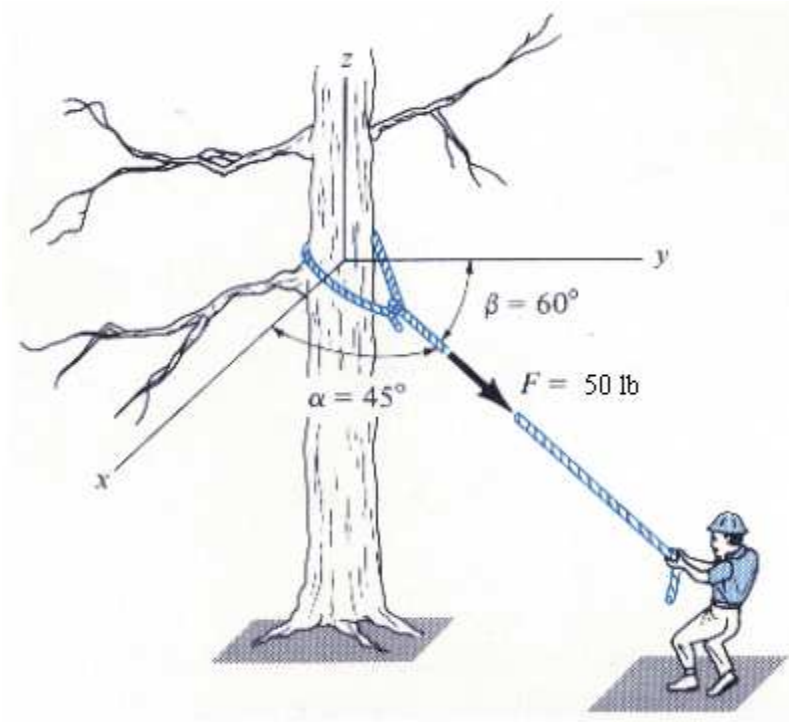
Determine the magnitude and coordinate direction angles of the resultant force.



- (a) What is the magnitude of the resultant force?
- (b) What is the angle  $\alpha$ , in degrees, between the resultant force and the  $x$  axis?
- (c) What is the angle  $\beta$ , in degrees, between the resultant force and the  $y$  axis?
- (d) What is the angle  $\gamma$ , in degrees, between the resultant force and the  $z$  axis?

8.

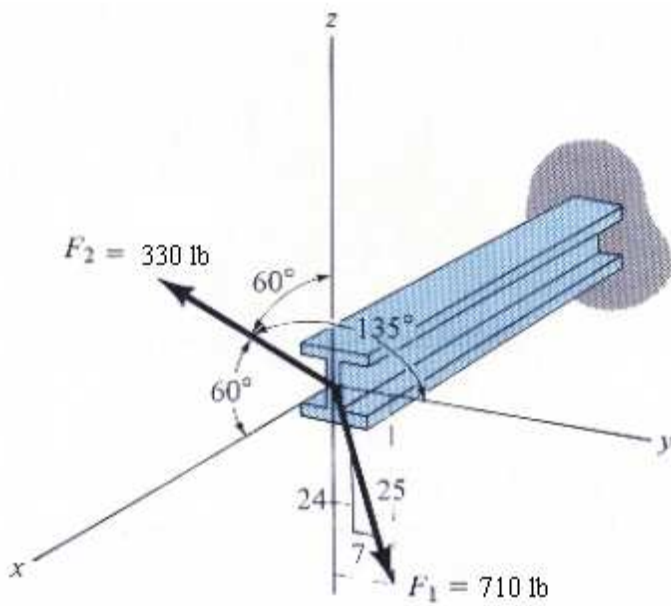
The man pulls on the rope with a force of 50 lb. If  $F$  acts within the octant shown, such that  $\alpha = 45^\circ$ ,  $\beta = 60^\circ$ , determine the  $x$ ,  $y$ ,  $z$  components of  $F$ .



- (a) What is the  $x$  component of  $F$ ?
- (b) What is the  $y$  component of  $F$ ?
- (c) What is the  $z$  component of  $F$ ?

9.

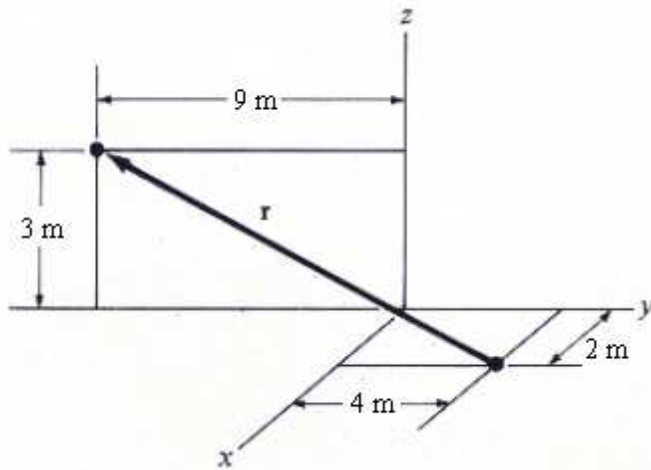
The beam is subjected to the two forces shown. Express each force in Cartesian vector form and determine the magnitude and coordinate direction angles of the resultant force.



- (a) What is  $F_1$  in Cartesian vector form?
- (b) What is  $F_2$  in Cartesian vector form?
- (c) What is the magnitude of the resultant force?
- (d) What is the angle, in degrees, between the resultant force and the  $x$  axis?
- (e) What is the angle, in degrees, between the resultant force and the  $y$  axis?
- (f) What is the angle, in degrees, between the resultant force and the  $z$  axis?

10.

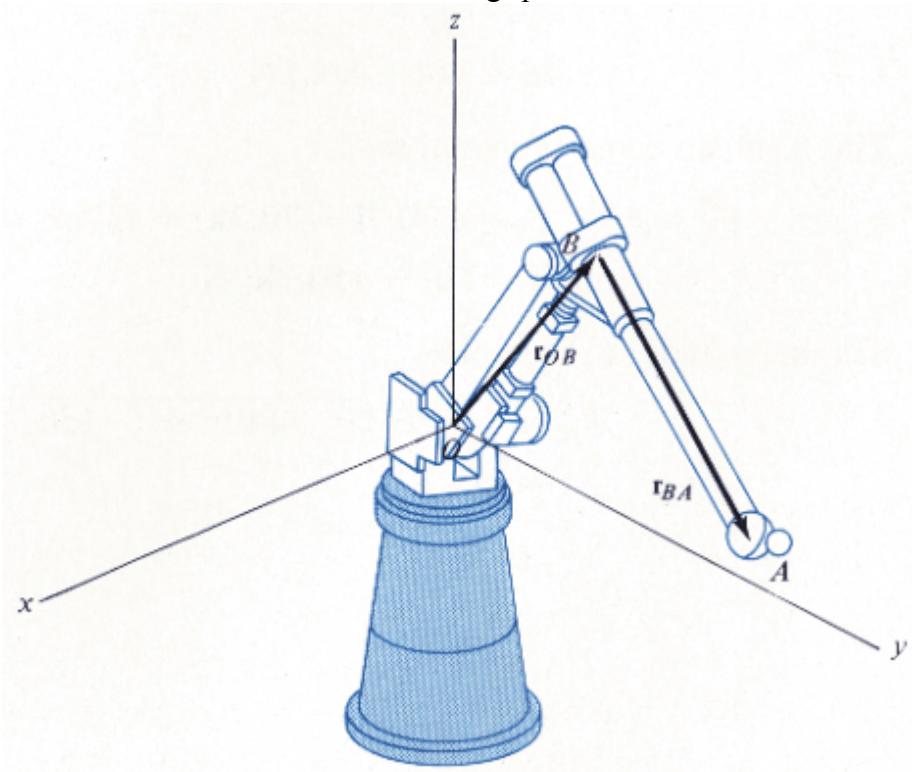
Express the position vector  $r$  in Cartesian vector form; then determine its magnitude and coordinate direction angles.



- (a) What is the position vector  $r$ , in meters?
- (b) What is the magnitude of  $r$ , in meters? \_\_\_\_\_ m
- (c) What is the angle between  $r$  and the  $x$  axis? \_\_\_\_\_
- (d) What is the angle between  $r$  and the  $y$  axis? \_\_\_\_\_
- (e) What is the angle between  $r$  and the  $z$  axis? \_\_\_\_\_

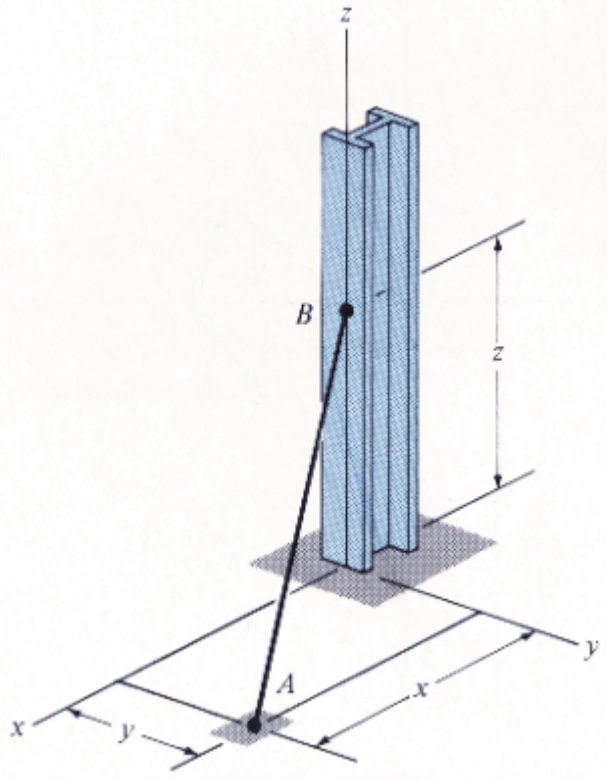
11.

At the instant shown, position vectors along the robotic arm from  $O$  to  $B$  and  $B$  to  $A$  are  $\mathbf{r}_{OB} = \{85\mathbf{i} + 315\mathbf{j} + 400\mathbf{k}\}$  mm and  $\mathbf{r}_{BA} = \{350\mathbf{i} + 225\mathbf{j} - 640\mathbf{k}\}$  mm, respectively. Determine the distance from  $O$  to the grip at  $A$ .



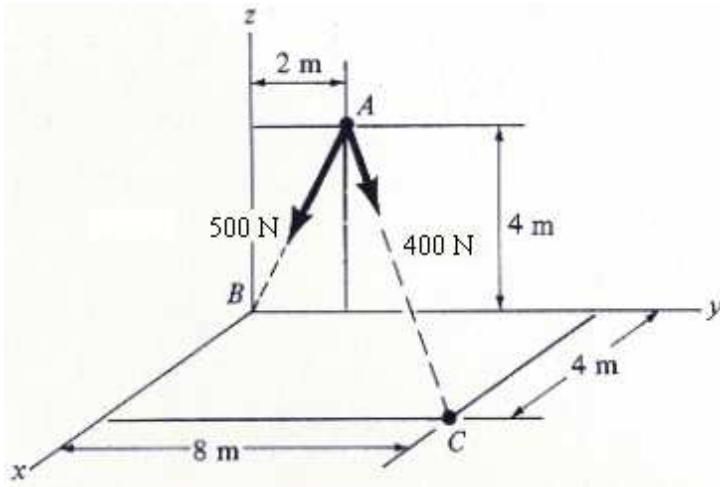
12.

The 14-m-long cable is anchored to the ground at  $A$ . If  $x = 6$  m and  $y = 4$  m, determine the coordinate  $z$  to the highest point of attachment along the column.



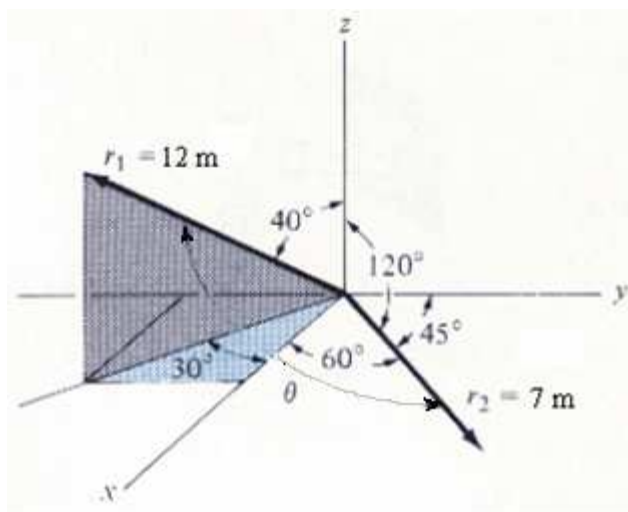
13.

Determine the magnitude and coordinate direction angles of the resultant force.



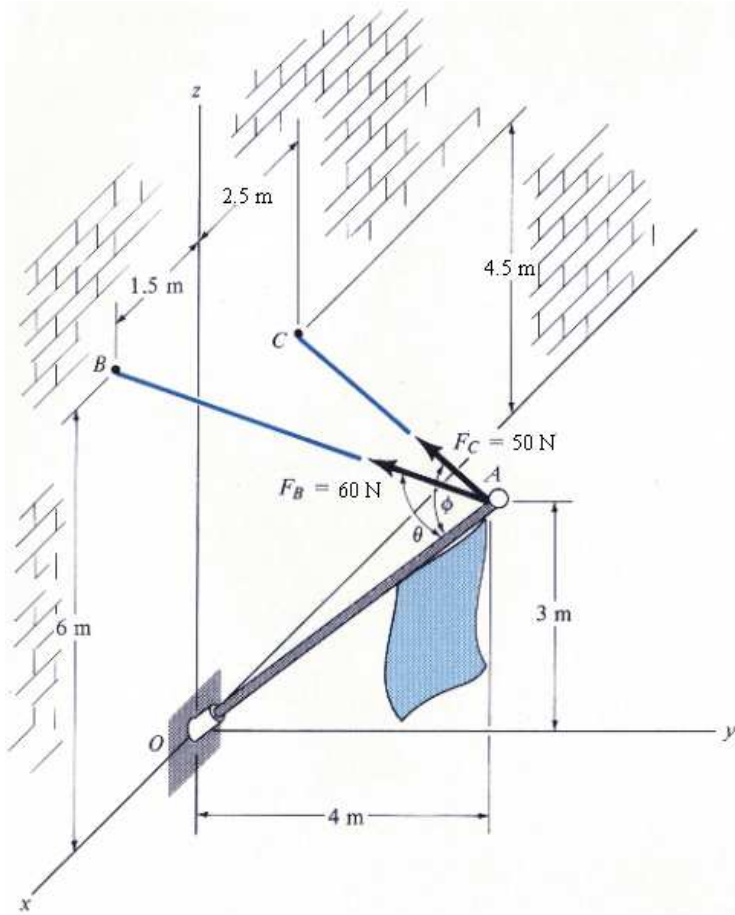
- (a) What is the magnitude of the resultant force?
- (b) What is the angle, in degrees, between the resultant force and the  $x$  axis?
- (c) What is the angle, in degrees, between the resultant force and the  $y$  axis?
- (d) What is the angle, in degrees, between the resultant force and the  $z$  axis?

14.  
Determine the angle  $\theta$ , in degrees, between the tails of the two vectors.



15.

Determine the angles  $\theta$  and  $\phi$  made between the axis  $OA$  of the flag pole and each cable,  $AB$  and  $AC$ .



- (a) What is  $\theta$ , in degrees?
- (b) What is  $\phi$ , in degrees?