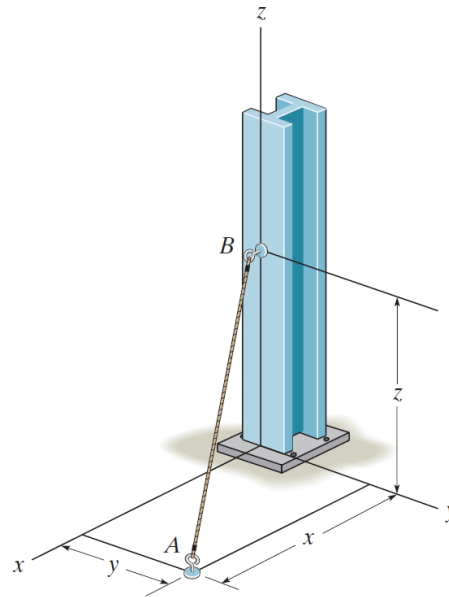


Problem 2-91

The 8-m-long cable is anchored to the ground at A . If $z = 5$ m, determine the location $+x$, $+y$ of point A . Choose a value such that $x = y$.



Probs. 2-90/91

Solution

Write the position vectors to points A and B in component form.

$$\mathbf{r}_A = \langle x, y, 0 \rangle$$

$$\mathbf{r}_B = \langle 0, 0, z \rangle$$

The position vector from A to B is then

$$\begin{aligned}\mathbf{r}_{AB} &= \mathbf{r}_B - \mathbf{r}_A \\ &= \langle -x, -y, z \rangle.\end{aligned}$$

Use the fact that the magnitude is 8 meters to find z .

$$\begin{aligned}|\mathbf{r}_{AB}| &= \sqrt{(-x)^2 + (-y)^2 + (z)^2} \\ 8 \text{ m} &= \sqrt{x^2 + y^2 + z^2} \\ &= \sqrt{x^2 + x^2 + (5 \text{ m})^2}.\end{aligned}$$

Solve for x .

$$(8 \text{ m})^2 = 2x^2 + (5 \text{ m})^2$$

$$x^2 = \frac{8^2 - 5^2}{2} \text{ m}^2$$

$$x = \sqrt{\frac{39}{2}} \text{ m} \approx 4.42 \text{ m}$$

And since $x = y$,

$$y = \sqrt{\frac{39}{2}} \text{ m} \approx 4.42 \text{ m}.$$