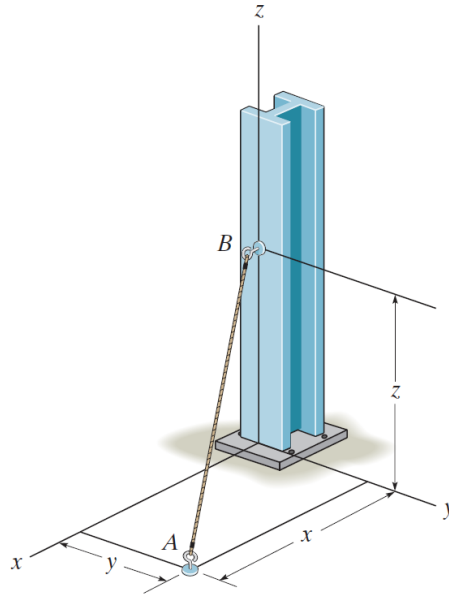


Problem 2-90

The 8-m-long cable is anchored to the ground at A . If $x = 4$ m and $y = 2$ m, determine the coordinate z to the highest point of attachment along the column.



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 .

$$\begin{aligned} |\mathbf{r}_{AB}| &= \sqrt{(-x)^2 + (-y)^2 + (z)^2} \\ 8 \text{ m} &= \sqrt{x^2 + y^2 + z^2} \\ &= \sqrt{(4 \text{ m})^2 + (2 \text{ m})^2 + z^2} \end{aligned}$$

Solve for z .

$$\begin{aligned} (8 \text{ m})^2 &= (4 \text{ m})^2 + (2 \text{ m})^2 + z^2 \\ z^2 &= 44 \text{ m}^2 \\ z &= 2\sqrt{11} \text{ m} \approx 6.63 \text{ m} \end{aligned}$$