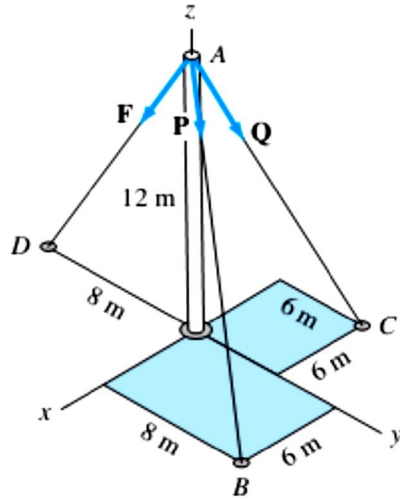


The vertical post is secured by three cables. The cables are pre-tensioned so that the resultant of F, Q and P is directed along the z-axis if F=120N, find P, Q and R



$$\text{Force_dir}(x, y, z) := \text{stack} \left(\frac{x}{\sqrt{x^2 + y^2 + z^2}}, \frac{y}{\sqrt{x^2 + y^2 + z^2}}, \frac{z}{\sqrt{x^2 + y^2 + z^2}} \right)$$

$$F \quad \text{Force_dir}(0, -8, -12) = \begin{pmatrix} 0 \\ -0.5547 \\ -0.8321 \end{pmatrix} \quad P \quad \text{Force_dir}(6, 8, -12) = \begin{pmatrix} 0.3841 \\ 0.5121 \\ -0.7682 \end{pmatrix}$$

$$Q \quad \text{Force_dir}(-6, 6, -12) = \begin{pmatrix} -0.4082 \\ 0.4082 \\ -0.8165 \end{pmatrix} \quad R \quad \text{Force_dir}(0, 0, 1) = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

$$F := 120\text{N} \quad P := 1\text{N} \quad Q := 1\text{N} \quad R := 1\text{N}$$

Given

$$F \cdot \text{Force_dir}(0, -8, -12) + P \cdot \text{Force_dir}(6, 8, -12) + Q \cdot \text{Force_dir}(-6, 6, -12) + R \cdot \text{Force_dir}(0, 0, 1) = 0$$

$$\begin{pmatrix} P \\ Q \\ R \end{pmatrix} := \text{Find} \left(\begin{pmatrix} P \\ Q \\ R \end{pmatrix} \right) \quad \begin{pmatrix} P \\ Q \\ R \end{pmatrix} = \begin{pmatrix} 74.269 \\ 69.878 \\ 213.956 \end{pmatrix} \cdot \text{N}$$