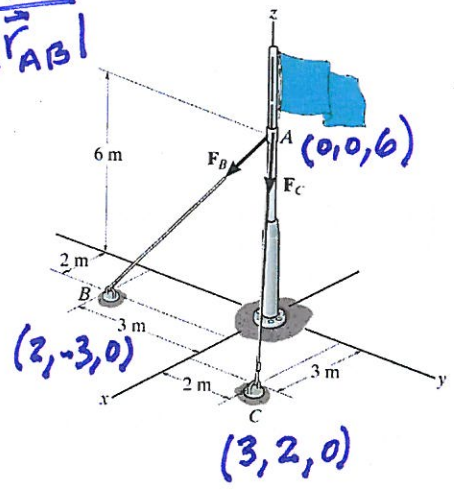
If $F_B = 700$ N, and $F_C = 560$ N, determine the magnitude ~~and coordinate direction angles~~ of the resultant force acting on the flag pole.



$\vec{r}_{AB} = (2\hat{i} - 3\hat{j} - 6\hat{k})$ m

$\hat{u}_{AB} = \dfrac{\vec{r}_{AB}}{|\vec{r}_{AB}|}$

$\hat{u}_{AB} = \dfrac{(2\hat{i} - 3\hat{j} - 6\hat{k})\,\text{m}}{\sqrt{(2)^2 + (-3)^2 + (-6)^2}\,\text{m}}$

$= \dfrac{2\hat{i} - 3\hat{j} - 6\hat{k}}{7}$

$\vec{F}_B = |\vec{F}_B|\,\hat{u}_{AB}$

$= (700\,\text{N})\,\dfrac{(2\hat{i} - 3\hat{j} - 6\hat{k})}{7}$

$\vec{F}_B = (200\hat{i} - 300\hat{j} - 600\hat{k})\,\text{N}$

$\vec{r}_{AC} = (3\hat{i} + 2\hat{j} - 6\hat{k})$ m

$\hat{u}_{AC} = \dfrac{\vec{r}_{AC}}{|\vec{r}_{AC}|} = \dfrac{(3\hat{i} + 2\hat{j} - 6\hat{k})\,\text{m}}{\sqrt{(3)^2 + (2)^2 + (-6)^2}\,\text{m}} = \dfrac{3\hat{i} + 2\hat{j} - 6\hat{k}}{7}$

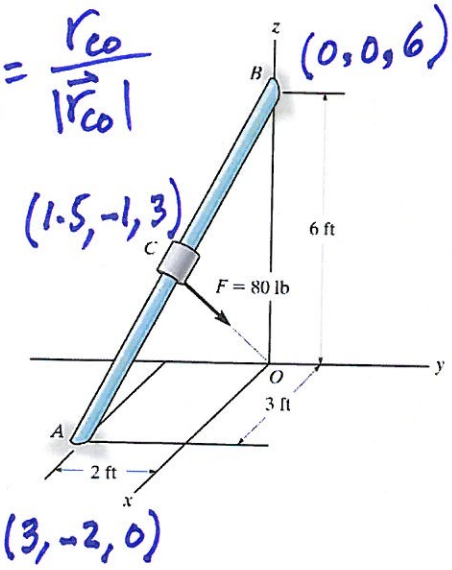
$\vec{F}_C = |\vec{F}_C|\,\hat{u}_{AC} = (560\,\text{N})\,\dfrac{(3\hat{i} + 2\hat{j} - 6\hat{k})}{7}$

$\vec{F}_C = (240\hat{i} + 160\hat{j} - 480\hat{k})\,\text{N}$

$\vec{F}_R = \vec{F}_B + \vec{F}_C = \underline{(440\hat{i} - 140\hat{j} - 1080\hat{k})\,\text{N}}$

$|\vec{F}_R| = \sqrt{(440)^2 + (-140)^2 + (-1080)^2} = 1174.56\,\text{N} = \underline{1.175\,\text{KN}}$

The force **F** has a magnitude of 80 lb and acts at the midpoint *C* of the thin rod. Express the force as a Cartesian vector.



$$\vec{r}_{CO} = (-1.5\,\hat{i} + 1\,\hat{j} - 3\,\hat{k})\ \text{ft}, \quad \hat{u}_{CO} = \frac{\vec{r}_{CO}}{|\vec{r}_{CO}|}$$

$$\hat{u}_{CO} = \frac{(-1.5\,\hat{i} + 1\,\hat{j} - 3\,\hat{k})\ \text{ft}}{\sqrt{(-1.5)^2 + (1)^2 + (-3)^2}\ \text{ft}}$$

$$= \frac{(-1.5\,\hat{i} + 1\,\hat{j} - 3\,\hat{k})}{3.5}$$

$$\vec{F} = |\vec{F}|\,\hat{u}_{CO}$$

$$\vec{F} = (80\ \text{lb})\,\frac{(-1.5\,\hat{i} + 1\,\hat{j} - 3\,\hat{k})}{3.5}$$

$$\vec{F} = (-34.3\,\hat{i} + 22.9\,\hat{j} - 68.6\,\hat{k})\ \text{lb}$$

or $$\vec{F} = [-34.3 \quad 22.9 \quad -68.6]\ \text{lb}$$