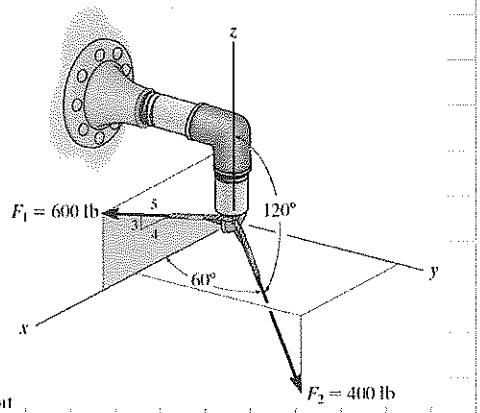
NAME DATE

SOLUTIONS

PROBLEM AP-05

GIVEN: Determine the magnitude and direction of the resultant force acting on the pipe assembly.



Note: review direction cosines, given 2 the third can be determined

REQUIRED:

$\vec{F}_R = ?$

SOLUTION:

F_2 : $(\cos 60)^2 + (\cos 120)^2 + (\cos \theta_y)^2 = 1 \quad \theta_y = 45°, 315°$

BY INSPECTION $\theta_y < 90 \quad \theta_y = 45°$

$\vec{F}_2 = 400 \cos 60\, \hat{i} + 400 \cos 45\, \hat{j} + 400 \cos 120\, \hat{k}$

$= \{+200\, \hat{i} + 283\, \hat{j} - 200\, \hat{k}\}$ LB

F_1 : LIES ON X-Z PLANE, $\theta_y = 90° \quad \cos \theta_y = 0$

$\vec{F}_1 = +\left(\frac{4}{5}\right) 600\, \hat{i} + 0 + \left(\frac{3}{5}\right) 600\, \hat{k}$

$= \{+480\, \hat{i} + 0\, \hat{j} + 360\, \hat{k}\}$ LB

$\vec{F}_R = \vec{F}_1 + \vec{F}_2 = \{680\, \hat{i} + 283\, \hat{j} + 160\, \hat{k}\}$ LB

$$\boxed{\vec{F}_R = \{680\, \hat{i} + 283\, \hat{j} + 160\, \hat{k}\}\ \text{LB}}$$