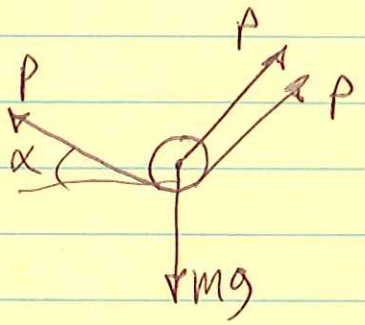
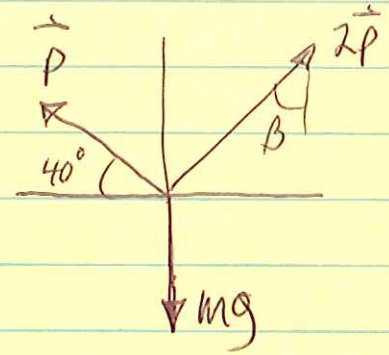
PROB. 2.68





$m = 160^{kg}$

$\alpha = 40°$

FIND $\vec{P}$, β

$$\vec{F}_1 = [2P\cos(90-\beta)]\hat{i} + [2P\sin(90-\beta)]\hat{j}$$

$$\vec{F}_2 = (-P\cos 40°)\hat{i} + (P\sin 40°)\hat{j} = (-0.766P)\hat{i} + (0.643P)\hat{j}^{N}$$

$$\vec{W} = [-(160^{kg})(9.81\ \tfrac{m}{s^2})]\hat{j} = (-1570)\hat{j}^{N}$$

$$\Sigma F_x = 0: \quad 2P\cdot\cos(90-\beta) - 0.766P = 0$$

$$\cos(90-\beta) = \tfrac{1}{2}(0.766)$$

$$90-\beta = \cos^{-1}\left[\tfrac{1}{2}(0.766)\right] = 67.5°$$

$$\underline{\beta = 90 - 67.5° = 22.5°}$$

$$\Sigma F_y = 0: \quad 2P\cdot\sin(90-\beta) + 0.643P - 1570 = 0$$

$$P(2\cdot\sin 67.5° + 0.643) = 1570$$

$$\underline{P = 630^{N}}$$