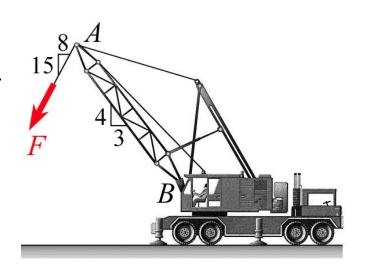
MEEG 2003 Quiz #2.m04

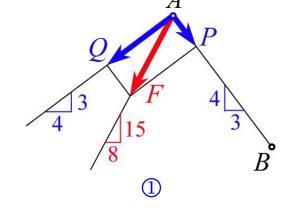
The cable of the motor crane is loaded with a 5.1-kip force **F** as shown. Determine the magnitude of the forces **P** and **Q** which are the components of **F** parallel and normal to the boom *AB*, respectively.



$$\mathbf{P} = P\lambda_P = P\left(\frac{3}{5}\mathbf{i} - \frac{4}{5}\mathbf{j}\right) \tag{2}$$

$$\mathbf{Q} = Q\lambda_Q = Q\left(-\frac{4}{5}\mathbf{i} - \frac{3}{5}\mathbf{j}\right) \qquad 2$$

$$\mathbf{F} = F \,\lambda_F = 5.1 \left(-\frac{8}{17} \mathbf{i} - \frac{15}{17} \mathbf{j} \right) \, \mathbf{2}$$



P + Q = F:

$$\left(\frac{3}{5}P - \frac{4}{5}Q\right)\mathbf{i} + \left(-\frac{4}{5}P - \frac{3}{5}Q\right)\mathbf{j} = 5.1\left(-\frac{8}{17}\mathbf{i} - \frac{15}{17}\mathbf{j}\right) \ \ 2$$

$$\frac{3}{5}P - \frac{4}{5}Q = -2.4 \qquad \qquad -\frac{4}{5}P - \frac{3}{5}Q = -4.5$$

$$P = 2.16 \text{ kips} \qquad Q = 4.62 \text{ kips}$$
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