Problemas sobre el teorema de varignon: Humberto Hernandez Ureña , Jessica Gomez Cervantes y Yeni Araceli Reyes Lopez.

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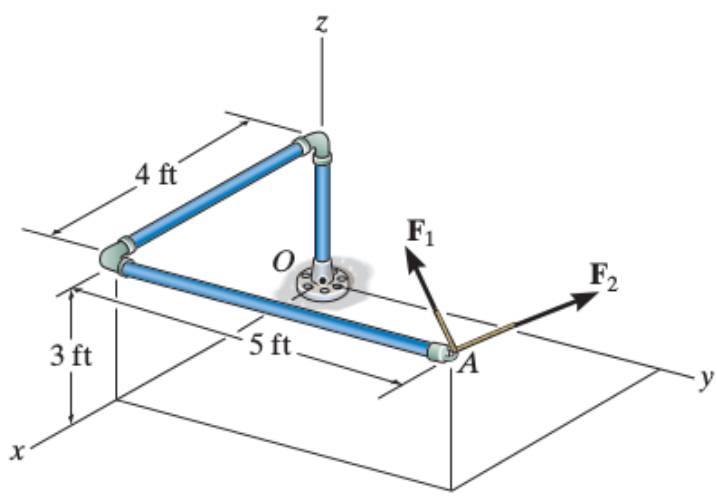
April 24, 2018

F4–12. If $\mathbf{F}_1 = \{100\mathbf{i} - 120\mathbf{j} + 75\mathbf{k}\}$ lb and $\mathbf{F}_2 = \{-200\mathbf{i} + 250\mathbf{j} + 100\mathbf{k}\}$ lb, determine the resultant moment produced by these forces about point O. Express the result as a Cartesian vector.



$FA = 28.86$

$= 100i - 120j + 75Fk$

$F2 = -200i + 250j + 100k$

$Mo = rxf$

$= 0i + 0j + ork1\ r2 = 4i + 5j - 3k$

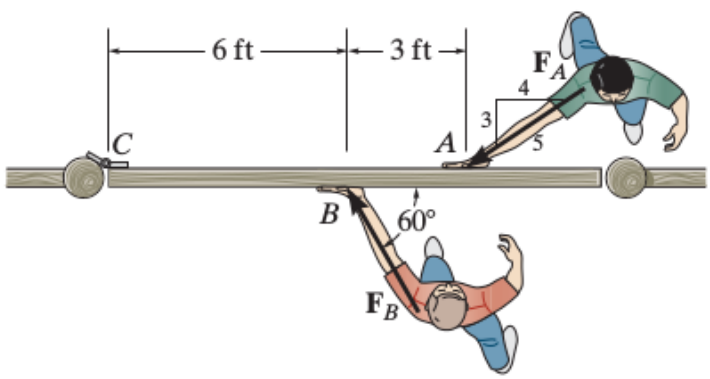
$Fr = -100i + 130j + 175k$

$rA = 0i + 0j + 0krb = 4i + 5j + 3k$

$$rAxf1 = \begin{matrix} \text{i} & \text{j} & \text{k} \\ 0 & 0 & 0 \\ 100 & 120 & 75 \end{matrix} = 0i + 0j + 0k$$

$$RBX\ F2 = \begin{matrix} \text{i} & \text{j} & \text{k} \\ 4 & 5 & 3 \\ -100 & 130 & 175 \end{matrix} = i\,(875 - 390) - j\,(700 - (-300)) + k\,(500 + 520) \quad = 485i - 1000j + 1020k$$

4–14. Two boys push on the gate as shown. If the boy at B exerts a force of $F_B = 30$ lb, determine the magnitude of the force F_A the boy at A must exert in order to prevent the gate from turning. Neglect the thickness of the gate.



$\Sigma F = 0$ $\qquad$ $FB = 30lb$

$\Sigma M = 0$ $\qquad$ $FA =$

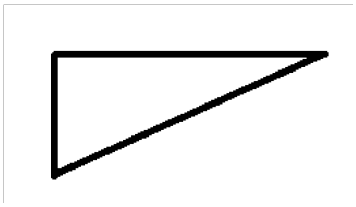


Figure 1:

$\sin\theta = \frac{3}{5}$

$\cos\theta = \frac{4}{5}$

$\tan = \frac{3}{4}$

$FAX = FA\ \cos\theta = \frac{4}{5}FA$

$FAY = FA\ \sin\theta = \frac{3}{5}FA$

$FBX = FB\ \cos 60$

$FBY = FB\ \sin 60$

$\Sigma FX = 0$

$-FBX - FAX = 0$

$-30lb\ \cos\ 60 - \frac{4}{5}FA = 0$

$\frac{4}{5}FA = \ -30lb\ \cos\ 60$

$FA = \frac{4}{5}\left(-30lb\cos 60\right)$

$FA = 18.75$ Valor valido si las fuerzas estuvieran en el mismo punto.

Para B

$rBx = 6ft\ \ FBx = -30lb\cos 60$

$rBy = 0 \quad FBy = 30lb\sin 60$

Para A

$rAx = 9ft \quad FAx = \frac{4}{5}\ FA$

$rAy = 0 \quad FAy = \frac{3}{5}FA$

$MA = rAx\ \ FAy - rAy\ FAx$

$= (9ft)\left(\frac{3}{5}\right) - (0)\left(\frac{4}{5}FA\right)$

$= \frac{27}{5}lb.ft$

$MB = rBx \quad FBy - rBy \quad FBx$

$= (6ft)\,(30lb \sin 60) - (0)\,(30lb \cos 60) \qquad = 155.88lb.ft$

$\Sigma M = 0MB - MA = 0$

$155.88lb.ft - \frac{27}{5}lb.ft$

$\frac{27}{5}FA = 155.88$

$FA = \frac{155.88}{\frac{27}{5}}$

$FA = 28.86$