Problemas sobre el teorema de varignon

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En este documento vamos a resolver unos ejercicios sobre el teorema de varignon, y aprenderemos a calcular momentos a través de fuerzas y vectores

Ejercicio # 1

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.

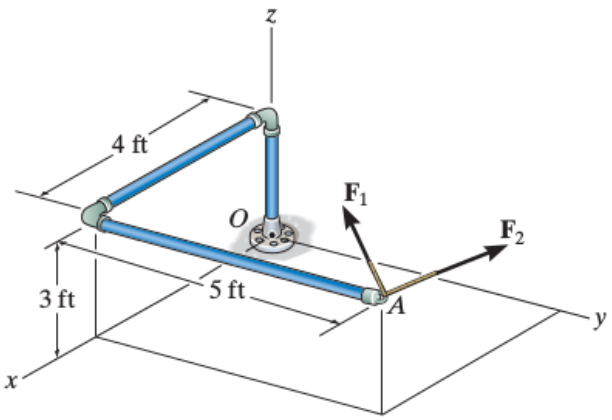

Figure 1: Ejercicio 1

f1=(100-120j+75k)lb f2=(-200i+250j+100k)lb

rA=(0i+0j+0k) rB=(4i+5j+3k)

Mo= M1+M2=rAxF1+rBxF2

rA X F1=

|I J K|

|0 0 0| = 0i+0j+0k

|100 120 75|

rB X F2=

|I J K|

|4 300))j+(520-(-500))k 5 3|=

(875-390)i-(700-(- |-100 130 175|

MOT=485i-1000j+1020k

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

$FAY = FA\sin\theta = \frac{3}{5}FAFBX \ = \ FB\cos\ \theta 60$

$FAY = FB\sin 60$

$\Sigma Fx = 0$

$\Sigma Fbx - Fby = 0$

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

$FA = \frac{5}{4}\left(-30lb\ \cos\ 60\right) = 18.75$ Resultado

Ejercicio #2

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.

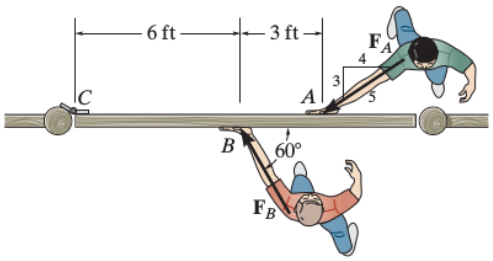

Figure 2: Ejercicio 2

para B Fax =30lb cos 60°

rbx= 6 ft Fay=30lb sin 60°

ray=0 Fbx= $\frac{4}{5}FA$

Fby=$\frac{3}{5}FA$

para A rbx=9

ft rby=0

MA=rax X Fay - ray x Fax

$(9ft)\left(\frac{3}{5}FA\right)-(0)\left(\frac{4}{5}\right)=\frac{27}{5}FA\ lb\ ft$

rbx x Fby- rby x Fb=$(6)(30\sin 60)-(0)(30\cos 60)=155.88\ lb\ ft$

$\Sigma M=0$

$Mb\ -\ Ma\ =0$

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

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

$FA=\left(\frac{27}{5}\right)(155.88\ lb\ ft)$

$FA\ =29.9\ lb\ ft$ Resultado