

Problemas sobre el teorema de Varignon

JAIR ¹

¹Instituto Tecnológico Superior Zacatecas Occidente

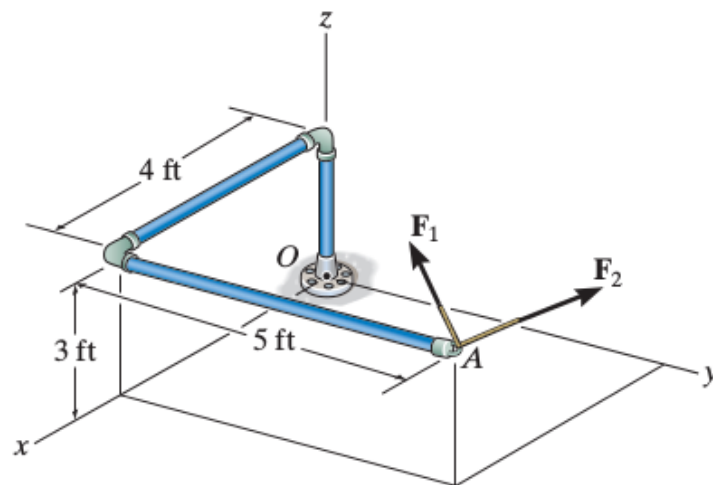
26 de marzo de 2019

Resumen

En el presente trabajo se muestran dos problemas sobre vectores donde tenemos que resolverlos sacando sus fuerzas para poder determinar y expresar el momento resultante que producen esas fuerzas desde un punto.

Problema 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.



Definir $\vec{r}$ y $\vec{f}$

$$F1 = 100i - 120j + 75k$$

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

$$R_A = 4i + 5j + 3k$$

$$F1 \times R_B$$

$$R_B = 4i + 5j + 3k$$

$$F2 \times R_A$$

Realizar productos cruz

$$\begin{vmatrix} i & j & k \\ 4 & 5 & 3 \\ 100 & -120 & 75 \end{vmatrix}$$

$$\begin{vmatrix} i & j & k \\ 4 & 5 & 3 \\ 100 & -120 & 75 \end{vmatrix}$$

$$\begin{vmatrix} i & j & k \\ 4 & 5 & 3 \\ 100 & -120 & 75 \end{vmatrix}$$

$$i(5(75) - (-120)3) - j(4(75) - (100)3) + k(4(-120) - (100)5)$$

$$= i(375 + 360) - j(300 - 300) + k(-480 - 500) = 735i - 980k$$

$$\begin{vmatrix} i & j & k \\ 4 & 5 & 3 \\ -200 & 250 & 100 \end{vmatrix}$$

$$\begin{vmatrix} i & j & k \\ 4 & 5 & 3 \\ -200 & 250 & 100 \end{vmatrix}$$

$$\begin{vmatrix} i & j & k \\ 4 & 5 & 3 \\ -200 & 250 & 100 \end{vmatrix}$$

$$i(5(100) - (250)3) - j(4(100) - (-200)3) + k(4(250) - (200)5)$$

$$= i(500 - 750) - j(400 + 600) + k(1000 + 1000) = -250i - 1000j + 2000k$$

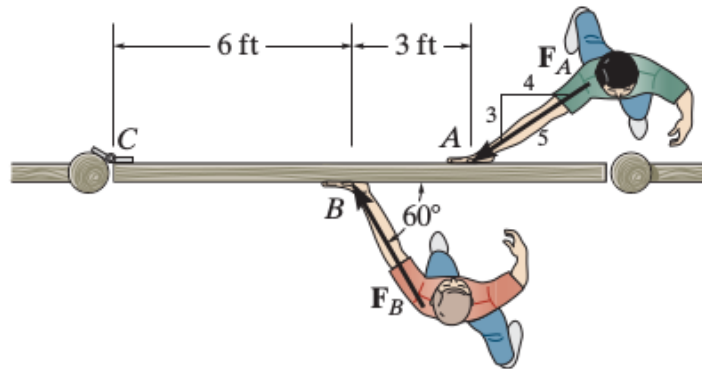
Obtener el resultado

$$FT = 735i - 980k - 250i - 1000j + 2000k$$

$$FT = 485i - 1000j + 1020k$$

Problema 2

4-14. Two boys push on the gate as shown. If the boy at B exerts a force of $F_B = 30 \text{ lb}$, 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.



Obtener $\vec{r}$ y $\vec{f}$

$$r_y = 0$$

$$f_y = 0 \quad r_x = 30 \sin 60(6) \quad r_x = 30 \sin 60(6)$$

$$F_x = (-3/5)(9)$$

$$M_o = (r_x F_y - r_y F_x) \quad M_o = (r_x F_y - r_y F_x)$$

$$M_o = 0(30 \sin 60(6)) - 0(-3/5)(9)$$

$$M_o = 155,884 + F_A 5,4 \quad M_o = 155,884 + F_A 5,4$$

$$F_A = 155,884 / 5,4 = F_A = 2886 \text{ lb}$$