

Problemas sobre el teorema de Varignon

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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.

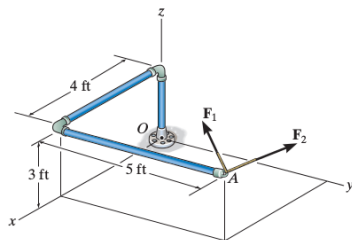


Figura 1: Problema 1

$$\mathbf{F}_1 = 100\mathbf{i} - 120\mathbf{j} + 75\mathbf{k}$$

$$\mathbf{F}_2 = -200\mathbf{i} + 250\mathbf{j} + 100\mathbf{k}$$

$$\mathbf{r}_A = 4\mathbf{i} + 5\mathbf{j} + 3\mathbf{k}$$

$$\mathbf{r}_B = 4\mathbf{i} + 5\mathbf{j} + 3\mathbf{k}$$

$$\mathbf{F}_1 \times \mathbf{r}_B$$

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

$$\begin{matrix} 4 & 5 & 3 \\ 100 & -120 & 75 \end{matrix}$$

$$\begin{matrix} 100 & -120 & 75 \end{matrix}$$

$$\mathbf{i} (5 (75) - (-120) (3))$$

$$\mathbf{j} ((4) (75) - (100) (3))$$

$$\mathbf{k} ((4) (-120) - (100) (5))$$

$$\mathbf{i} (375 + 360) - \mathbf{j} (300 - 300) + \mathbf{k} (-480 - 500)$$

$$= 735\mathbf{i} - 980\mathbf{k}$$

$$\mathbf{F}_2 \times \mathbf{r}_A$$

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

$$\begin{matrix} 4 & 5 & 3 \\ -200 & 250 & 100 \end{matrix}$$

$$\begin{matrix} -200 & 250 & 100 \end{matrix}$$

$$\mathbf{i} ((5) (100) - (250) (3)) - \mathbf{j} ((4) (100) - (-200) (3)) +$$

$$\mathbf{k} ((4) (250) - (-200) (5))$$

$$\mathbf{i} (500 - 750) - \mathbf{j} (400 + 600) + \mathbf{k} (1000 + 1000)$$

$$= -250\mathbf{i} - 1000\mathbf{j} + 2000\mathbf{k}$$

$$\text{SUMA TOTAL (FT)}$$

$$\mathbf{F}_T = 735\mathbf{i} - 980\mathbf{k} - 250\mathbf{i} - 1000\mathbf{j} + 2000\mathbf{k}$$

$$- \mathbf{F}_T = 485\mathbf{i} - 1000\mathbf{j} + 1020\mathbf{k}$$

$$+$$

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.

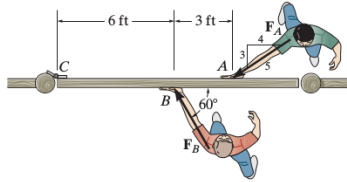


Figura 2: Problema 2

$$r_y = 0$$

$$r_y = 3u \sin 60^\circ(6)$$

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

$$M_o = (r_x f_y - r_y F_x)$$

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

$$M_o = 155.88 \text{ A} + F_A \text{ S.A}$$

$$F_A = 155.88 \text{ A/S.A}$$

$$F_A = 28.86 \text{ Ab}$$