

Tema 1 Problemas.

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Solución del problema 1

Hay un señalamiento de límite de velocidad de (55 millas/hora) hay que cambiarlo a metros por segundo y a kilómetros por hora

Datos:

1 Milla=1.609km

1 Kilometro=1000m

1 Hora=3600s

$$55 \frac{mill}{h} \cdot \frac{1.609km}{1km} \cdot \frac{1km}{3600s} = 24.5819 \frac{m}{s}$$

$$55 \frac{mi}{h} \cdot \frac{1.609km}{1mill} = 88.495 \frac{km}{h}$$

Solución del Problema 2

Árbol

Tres Fuerzas son aplicadas a un árbol como se muestra en la siguiente figura #1.

Determinar cuánto vale F_c y el ángulo.

Datos:

$$F_A = 385N \quad \Sigma f_x = 0 \quad F_A + \vec{F_B} \cos 105^\circ + F_c \cos \theta = 0$$

$$F_B = 475N \quad \Sigma f_y = 0 \quad F_B \sin 105^\circ + F_c \sin \theta = 0$$

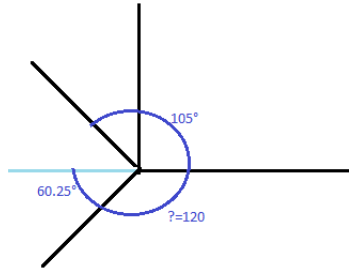


Figure 1: This is a caption

De(1) despejamos $F_C \cos \theta$

$$385N + 475 \cos 105 + F_C \cos \theta = 0$$

$$F_C \cos \theta = -385N - 475 \cos 105 = 256.06$$

De (2) despejamos $F_C \sin \theta$

$$F_C \sin \theta = -475N \sin 105 = -458.81N$$

Ahora dividimos:

$$\frac{F_C \sin \theta}{F_C \cos \theta} = \frac{-458.81N}{256.06N}$$

$$\tan \theta = 1.75$$

$$F_C = 703N$$

$$\theta = \tan^{-1} 1.75 = 60.25$$

$$\theta = 124$$

Regresamos

$$F_C = \frac{256.06N}{\cos(60.25)} = 528.11N$$

$$\theta = 120$$

$$F_C = 528.11N$$

Solución problema 3

Producto cruz

Dos fuerzas actúan sobre la barra mostrada en la figura determine el momento resultante que crean el punto (o). Exprese el resultado como un vector cartesiano.

aquí

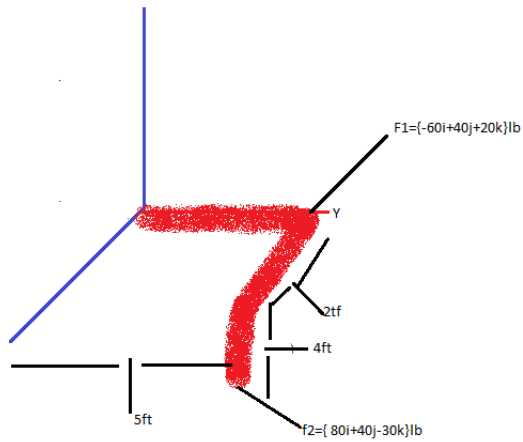


Figure 2: This is a caption

$$\vec{M}_O = \vec{r} \times \vec{F}$$

$$r_A = 0i + 5j + 0k \quad r_B = 4i + 5j - 2k$$

$$F_1 = -60i + 40j + 20k \quad F_2 = 80i + 40j - 30k$$

$$r_A \times F_1 = \begin{vmatrix} i & j & k \\ 0 & 5 & 0 \\ -60 & 40 & 20 \end{vmatrix} + r_B \times F_2 = \begin{vmatrix} i & j & k \\ 4 & 5 & -2 \\ 80 & 40 & -30 \end{vmatrix}$$

$$i[(5)(20) - (0)(40)] - j[(20)(0) - (0)(20)] + k[(0)(40) - (5)(-60)]$$

$$= (i \ 100, \ j \ 0, \ k \ 300)$$

$$i[(40)(-2) - (5)(-30)] - j[(4)(-30) - (80)(-2)] + k[(4)(40) - (5)(80)]$$

$$= (i \ -30, \ j \ 40, \ k \ -240)$$

Problema 4

Momento 2d

Para cada figura determine el momento de la fuerza al rededor del punto O.

A)

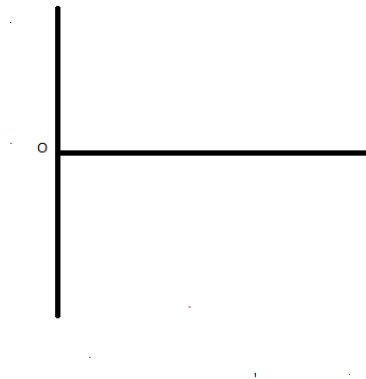


Figure 3: This is a caption

$$r_x = 2m$$

$$F_y = -100N$$

$$r_y = 0m$$

$$F_x = 0$$

$$= k [(2m)(-100N) - (0m)(0)] = -200Nm$$

B)

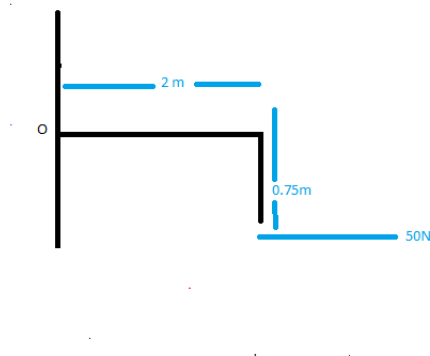


Figure 4: This is a caption

$$r_x = 2m$$

$$F_y = 0$$

$$r_y = -0.75$$

$$F_x = -50N$$

$$=K[(2m)(0) - (0.75)(-50N)] = -37.5Nm$$

C)

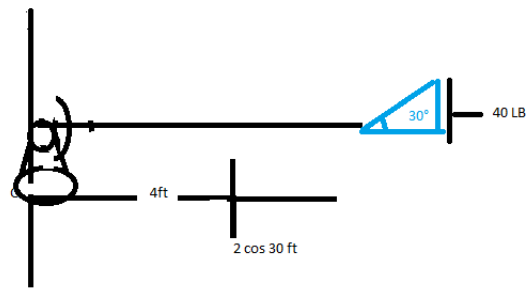


Figure 5: This is a caption

$$r_x = 4 \text{ ft} + 2 \cos 30$$

$$F_y = -40$$

$$r_y = 2 \sin 30$$

$$F_x = 0$$

$$=[(4 + 2 \cos 30)(-40) - (2 \sin 30)(0)] = -172.034$$

D)

$$F_y = -40$$

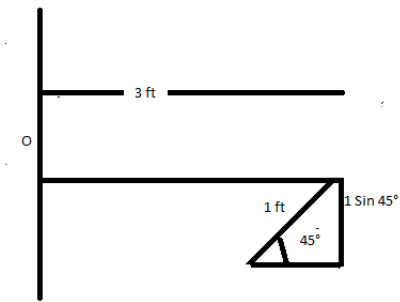


Figure 6: This is a caption

$$rx = 3 - \cos 45$$

$$Fy = 0$$

$$ry = -\sin 45$$

$$Fx = 60$$

$$= [(3 - \cos 45) (0) - (-\sin 45) (60)] = 51.054$$

E)

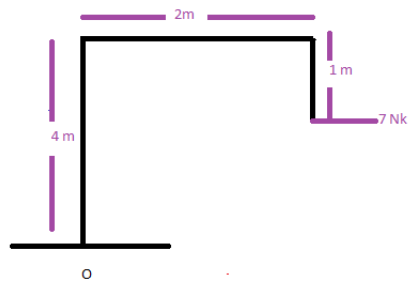


Figure 7: This is a caption

$$rx = 2m$$

$$Fy = 0$$

$$ry = 3m$$

$$Fx = -7kN$$

$$= [(2m)(0) - (3m)(-7kN)] = 21Nm$$

Solución del problema #5

Brazo

Aproximadamente que F_m debe ejercer el musculo extensor sobre el ante brazo para sostener una masa de 7.3kg asuma que el antebrazo tiene una masa de 2.3kg y su centro de gravedad esta a 12cm del codo.

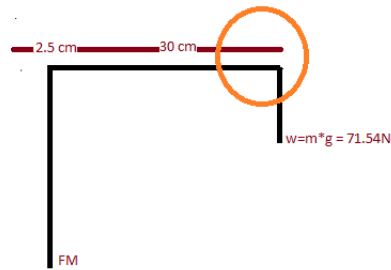


Figure 8: This is a caption

$$[(-F_m)(-2.5cm) + (22.5N)(12cm) + (-71.54)(30cm)] = 0$$

$$[(2.3)(12)(9.8) + 30(7.3)(9.8)] = \frac{2416.68}{2.5} = 966.67$$

$$F_m = 966.67N [(-F_m)(-2.5cm) + (22.5N)(12cm) + (-71.54)(30cm)] = 0$$