

FISICA I

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PROBLEMA 1

Una caja de 250 kg. determine la fuerza en cada uno de los cables

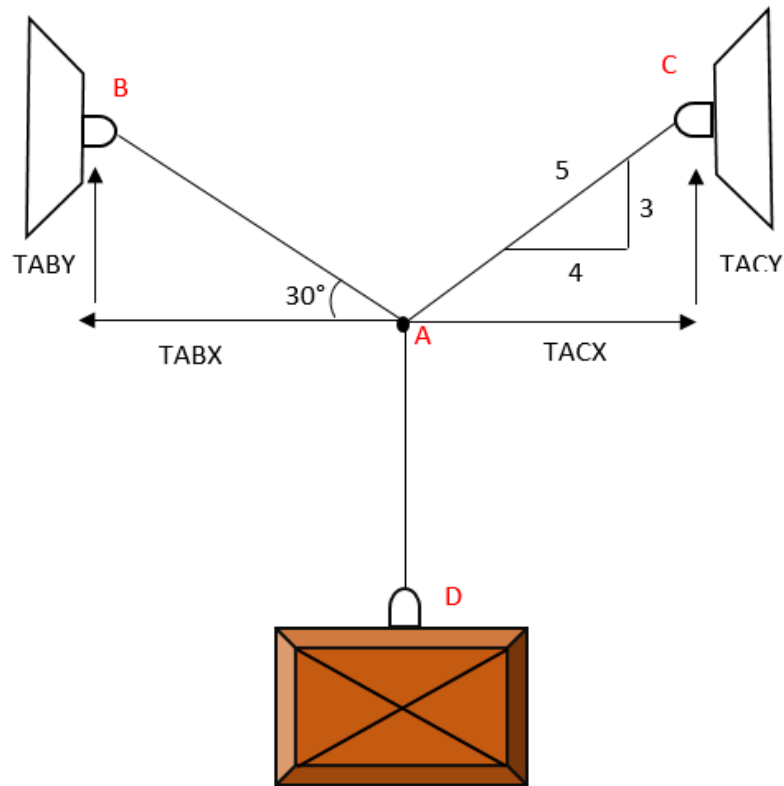


Figure 1: This is a caption

$$TCA: ? \quad \vec{w} = TAD = (250) (9.81) = 2452.5N$$

$$TAB: ?$$

Para TAB:

$$TABx = TAB \cos 30^\circ$$

$$TAB_y = TAB \sin 30^\circ$$

Para TAC:

$$\cos 0 = \frac{c}{h} = \frac{4}{5}$$

$$\cos 0 = \frac{c}{h} = \frac{4}{5}$$

$$\sin 0 = \frac{o}{h} = \frac{3}{5}$$

$$TAC_x = TAC \cos \left(\frac{4}{5} \right) = TAC \left(\frac{4}{5} \right)$$

$$TAC_y = TAC \sin \left(\frac{3}{5} \right) = TAC \left(\frac{3}{5} \right)$$

$$Fx = 0$$

$$TAC_x - TAB_x = 0$$

$$TAC \left(\frac{4}{5} \right) - TAB \cos 30 = 0$$

$$Fy = 0$$

$$TAC \left(\frac{3}{5} \right) - TAB \sin 30 - 2452.5 = 0$$

$$TAC \left(\frac{3}{5} \right) - TAB \sin 30 = 2452.5$$

DE 1

$$TAC \left(\frac{4}{5} \right) = TAB \cos 30$$

$$TAC \left(\frac{5}{4} \right) = TAB \cos 30$$

SUSTITUIR (3) en (2)

$$TAB \sin 30 + \left(\frac{3}{5} \right) \left(\frac{5}{4} \right) TAB \cos 30 = W$$

$$TAB \left(\sin 30 + \frac{3}{4} \cos 30 \right) = W$$

$$TAB = \frac{2425.5}{(\sin 30 + 0.75 \cos 30)}$$

$$= 2133 \text{ N}$$

SUSTITUIR TAB EN (3)

$$TAC = \left(\frac{5}{4} \right) (2133) \cos 30 = 2309 \text{ N}$$

PROBLEMA 2

Una biga tiene una masa de 350 kg. Determine el cable mas corto ABC que puede ser utilizado para levantarla si la fuerza máxima que puede soportar el cable es de 6600 N.

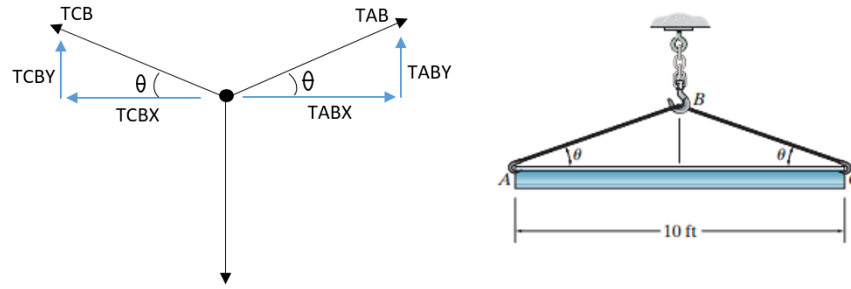


Figure 2: This is a caption

$$W = mg = (350kg)(9.81m/s) = 3433.5 \text{ N}$$

$$F_x = 0$$

$$F_y = 0$$

Para X:

$$TAB_x - TBC_x = 0$$

$$TAB \cos \theta - TBC \cos \theta = 0$$

$$TAB \cos \theta = TBC \cos \theta$$

$$TAB = TBC = 6600 \text{ N}$$

Para Y:

$$TAB_y - TBC_y - W = 0$$

$$TAB \sin \theta + TAB \sin \theta = W$$

$$2 TAB \sin \theta = W$$

$$\sin \theta = \frac{W}{2TAB} = \frac{3433.5N}{2(6600N)} = \frac{3433.5N}{13200N}$$

$$\theta = \sin^{-1} \left(\frac{3433.5N}{13200N} \right) = 15^\circ$$

$$\cos 15^\circ = \frac{ca}{h} = \frac{5ft}{h}$$

$$h \cos 15^\circ = 5ft$$

$$h = \frac{5ft}{\cos 15^\circ}$$

$$L_{ABC} - 2h = \frac{10ft}{\cos 15^\circ} = 10.3ft$$

PROBLEMA 3

Si un bloque de 5 kg. esta suspendido de la polea B y la elongacion de la cuerda es $d=0.15m$, determine la fuerza de la cuerda ABC. Desprecie el tamaño de la polea.

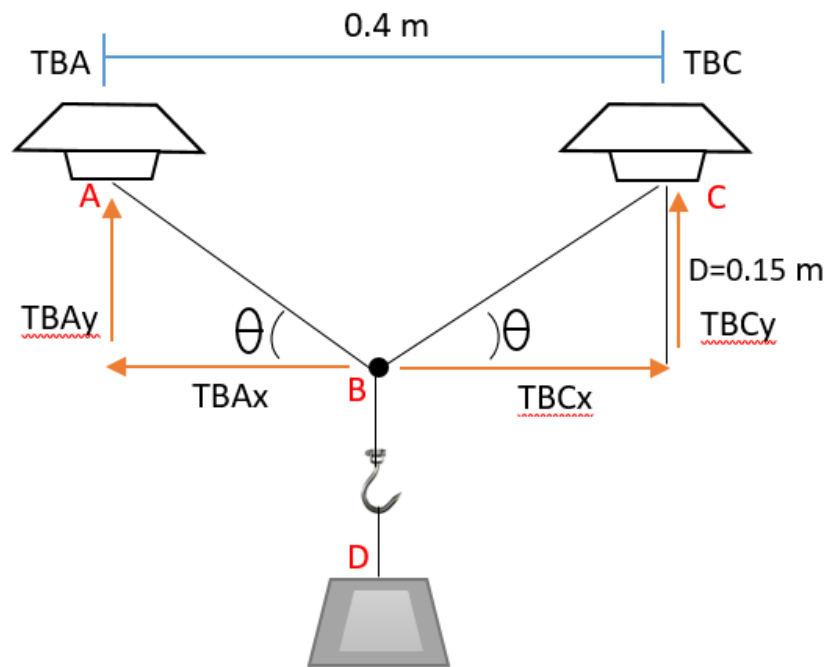


Figure 3: This is a caption

$$W = 5 \times 9.81 = 49.05 N$$

$$\tan \theta = \frac{0.15}{0.2} = 36.87$$

$$F_x = 0$$

$$F_y = 0$$

Para X:

$$TBC_x - TBA_x = 0$$

$$TBC \cos 36.87 - TBA \cos 36.87 = 0$$

$$TBC \cos 36.87 = TBA \cos 36.87$$

$$TBC = TBA$$

Para y:

$$TBCy + TBA - W = 0$$

$$TBC \sin 36.87 = 49.05N$$

Como $TAB = TBC$ nos queda lo siguiente

$$2TBC \sin 36.87 = 49.05$$

$$TBC = \frac{49.05}{2(\sin 36.87)} = 40.87N$$

PROBLEMA 4

Si la masa del C es de 40kg. Determine la masa del colindro A para lograr mantener el sistema en la posicion mostrada.

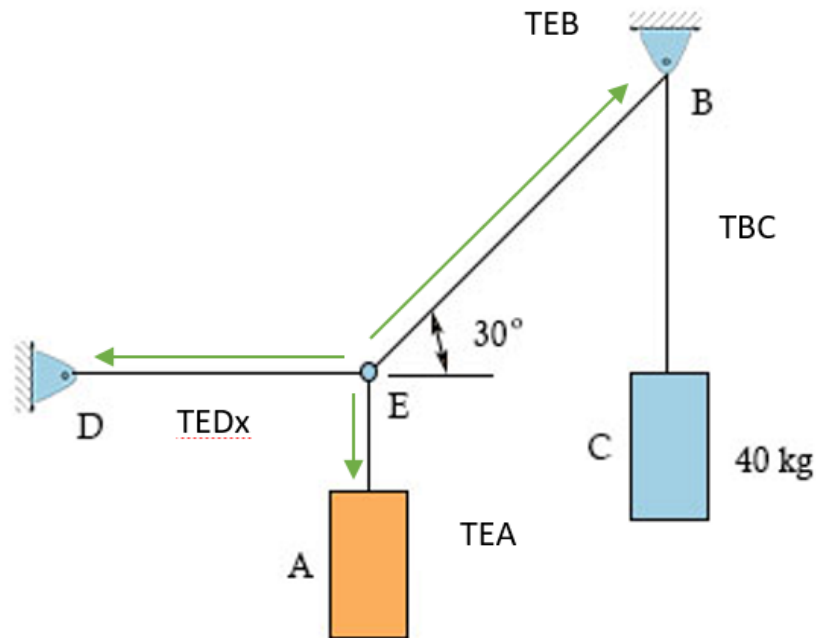


Figure 4: This is a caption

$$W = TCB = 392.4N$$

$$Fy = 0$$

$$-TA + 392.4 \sin 30 = 0$$

$$TA = 196.2N$$

$$W = TA = 196.2N$$

$$TA = \frac{196.2N}{9.8m/s} = 20 \text{ kg}$$