

SOLUCIÓN DE PROBLEMAS DE EQUILIBRIO

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1.- Una caja de 250 kg. Determine la fuerza en c/u de los cables.

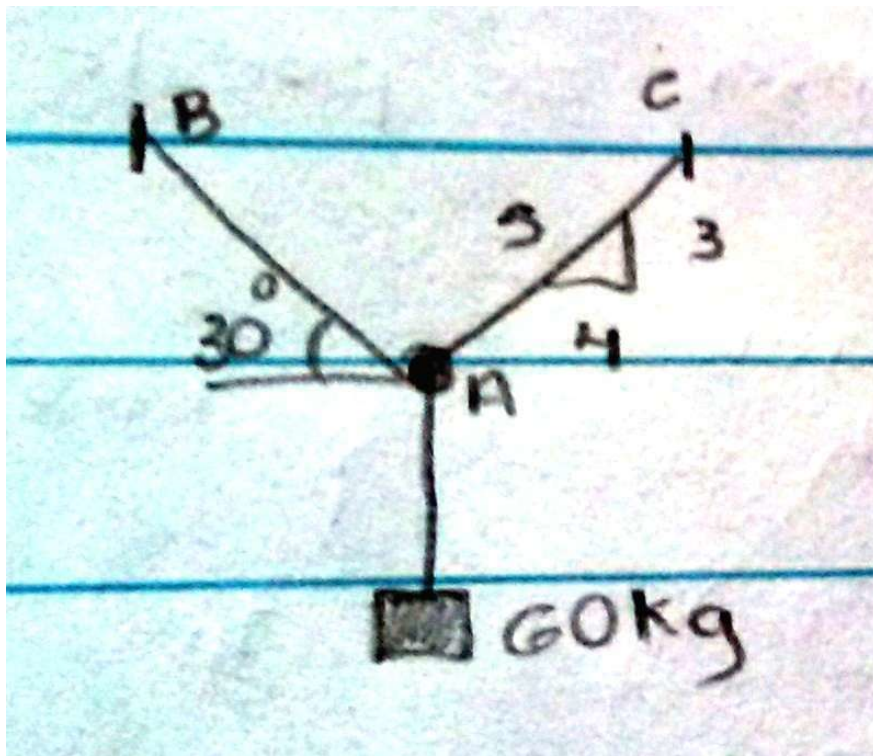


Figure 1: This is a caption

$$\bar{w} = \overline{mg} \quad (250)(9.81) = 2452.5N$$

$$\sum FX \rightarrow TAC \frac{4}{5} + TAB \cos 30 = 0$$

$$\sum FY \rightarrow TAC \frac{3}{5} + TAB \sin 30 - 2452N = 0$$

$$-\frac{5}{4} \left(\frac{4}{5}TAC - 0.866TAB = 0 \right)$$

$$\frac{5}{3} \left(\frac{3}{5} + 0.51TAB = 2452.5 \right)$$

$$-1TAC + 1.0825 \quad TAB = 0$$

$$1TAC + 0.866 TAB = 4087.5$$

$$1.9518 TAB = 4087.5$$

$$TAB = \frac{4087.5}{1.9158} = 2133.57N$$

$$TAC \frac{4}{5} - (0.866)(2133.57) = 0$$

$$TAC \frac{4}{5} - 1847.67 = 0$$

$$TAC \frac{4}{5} = 1847.67$$

$$TAC = \frac{187.57(5)}{4}$$

$$TAC = 2309.59N$$

2.-Una viga tiene una masa de 350 kg . Determine el cable más corto ABC que puede ser utilizado para levantarla si la fuerza máxima se puede soportar el cable 6600Nw.

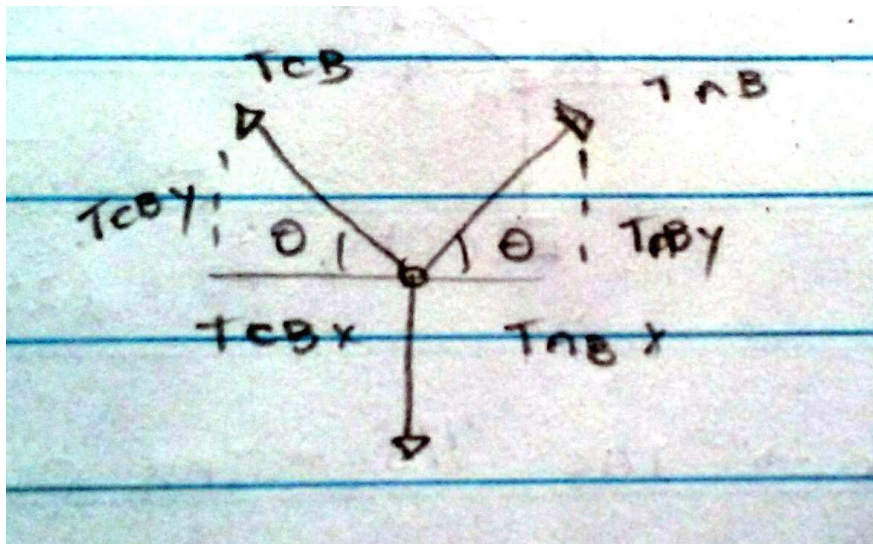


Figure 2: This is a caption

$$W = (350)(9.81) = 34335N$$

$$\sum FX = 0 \quad \sum FY = 0$$

PARA X

$$\sum FX = 0 \quad \sum FY = 0$$

$$TABX - TCBX = 0$$

$$TAB \cos \theta - TCB \cos \theta = 0 \quad TAB \cos \theta = TCB \cos \theta$$

$$TAB = TCB = 6600N$$

PARA Y

$$TABY + TCBY - W = 0$$

$$T_{AB} \sin \theta + T_{AB} \sin \theta = W$$

$$2T_{AB} \sin \theta = W$$

$$\sin \theta = W/2T_{AB} = \frac{3453.5N}{2(6600N)} = \frac{3433.5N}{13200N}$$

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

$$\cos 15 = \frac{CA}{H} = \frac{5ft}{H} \quad = \quad H \cos 15 = 5ft \quad = \quad H = \frac{5ft}{\cos 15}$$

$$L_{ABL} = 2H = \frac{10ft}{\cos 15} = 10.3ft$$

3.-Un bloque de 5kg esta suspendido de la polea B y la elongación es de 0.15m determine la fuerza de la cuerda ABC y desprecie de la polea.

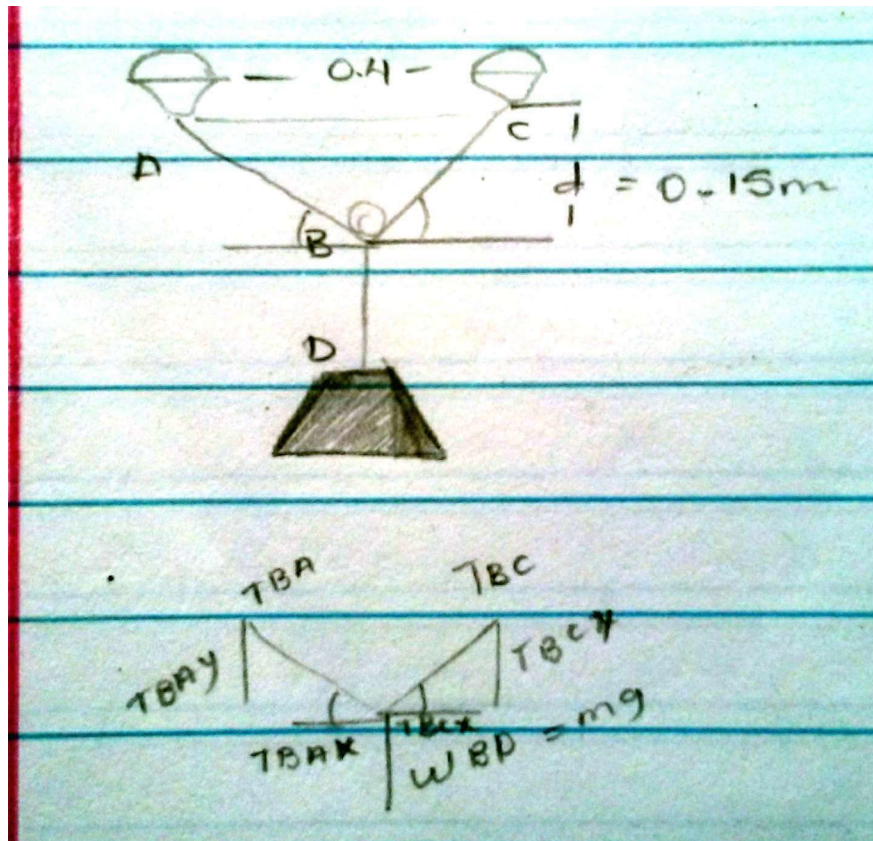


Figure 3: This is a caption

$$\overline{W} = (5)(9.81) = 49.05N$$

$$\sum FX = 0 \quad \sum FY = 0$$

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

$$\sum FX = 0$$

$$T_{BCX} - T_{ABX} = 0 \quad (1)$$

$$T_{BC} \cos 36.87 - T_{AB} \cos 36.87 = 0$$

$$T_{BC} \cos 36.87 = T_{AB} \cos 36.87$$

$$T_{BC} = T_{AB}$$

$$\sum FY = 0$$

$$T_{BCY} + T_{ABY} - W_{BD} = 0$$

$$T_{BC} \sin 36.87 + T_{AB} \sin 36.87 = 49.05N$$

como $T_{AB} = T_{BC}$ nos queda lo siguiente

$$2T_{BC} \sin 36.87 = 49.05N$$

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

4.-Si la masa del cilindro C es de 40kg determine la masa del cilindro A para lograr mantener el sistema en la posición mostrada.

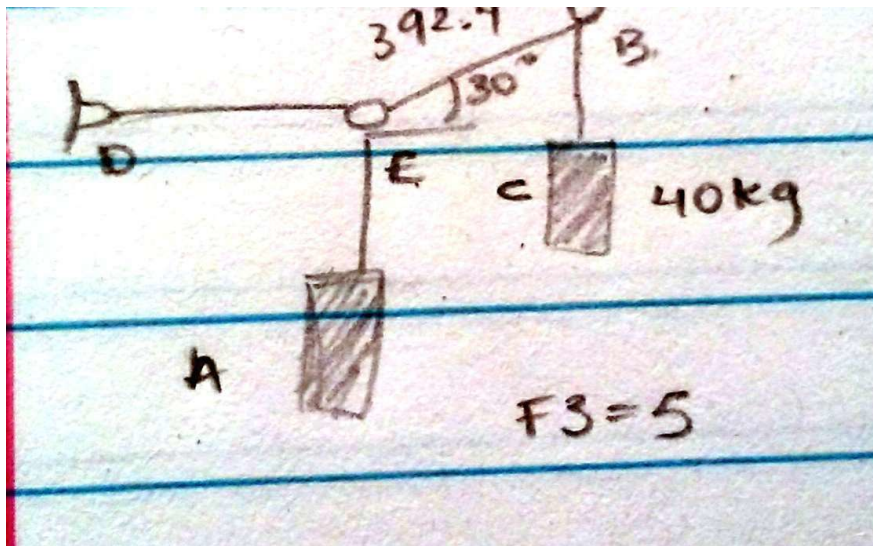


Figure 4: This is a caption

$$T_{ED} = \cos 30$$

$$T_{EA} = \sin 30$$

$$W = (40)(9.81) = 392.4N$$

$$W = 392.4N$$

$$T_{ED} = (392.4)(\cos 30) = 339.4.82$$

$$T_{EA} = (392.4)(\sin 30) = 196.2$$

$$M = \frac{196.2}{9.81} = 20kg$$