The University of Jordan
Faculty of Engineering
And Technology
Civil Engineering Department

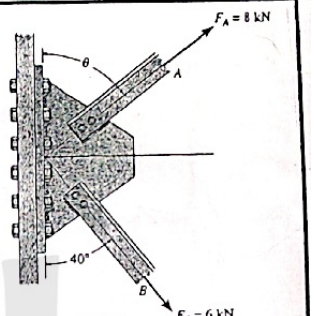
الجامعة الأردنية
كلية الهندسة والتكنولوجيا
قسم الهندسة المدنية

Statics

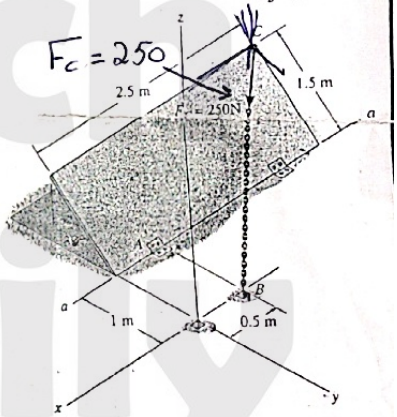
Midterm Exam

Prof.Dr. Yasser Hunaiti

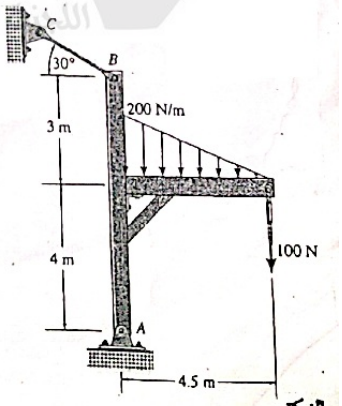
Determine the angle θ for connecting member A to the plate so that the resultant force of F_A and F_B is directed horizontally to the right. Also, what is the magnitude of the resultant force.



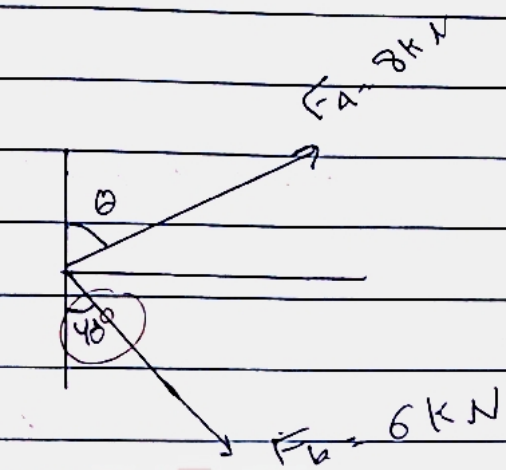
Determine the magnitude of the moment of the force F_C about the hinged axis *aa* of the door.



Determine the horizontal and vertical components of reaction at the pin A and the force in the cable BC. Neglect the thickness of the members.



Q2:1



$\Sigma F_y = 0$ XX $\Sigma F_y = R_y = 0$

$F_A \cos\theta - F_b \cos 40 = 0$

$8 \cos\theta - 6 \cos 40 = 0$

$8 \cos\theta = 6 \cos 40$

$\theta = \cos^{-1} \frac{6 \cos 40}{8}$

$= 54.9^\circ$

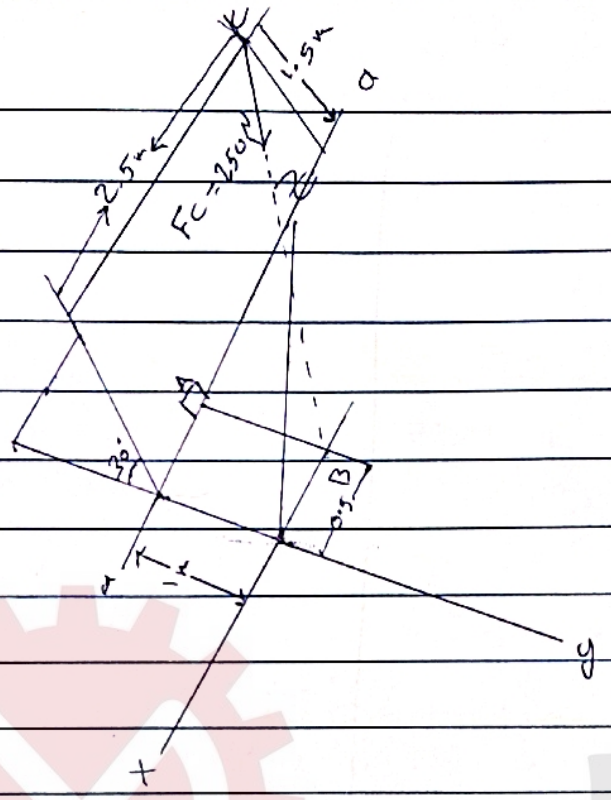
9

$R = \Sigma F = \Sigma F_x = F_A \sin\theta + F_b \cos 50$

$= 8 \sin 54.9 + 6 \cos 50$

$= 10.4 \text{ kN}$

Q: 2



3

$dx = 2.5 - 0.5 = 2\,m$

$dy = 1 + 1.5\cos 30 = 2.3\,m$

$dz = 1.5 \sin 30 = -0.75\,m$

$d = \sqrt{dx^2 + dy^2 + dz^2} = 3.14\,m$

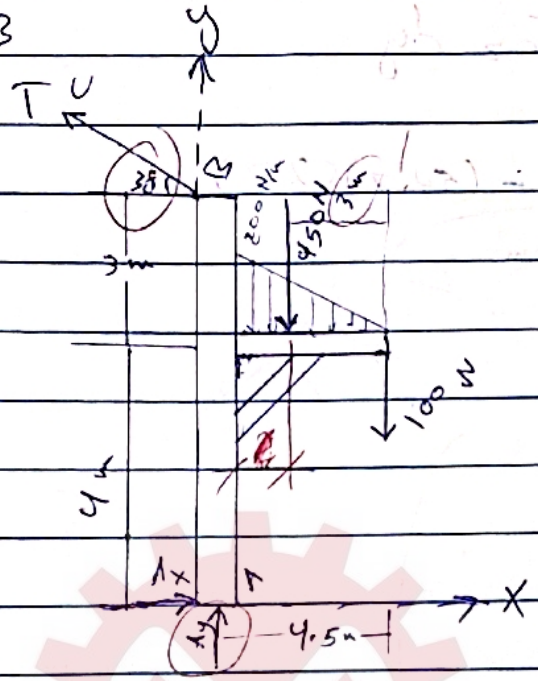
$F_c = 250\,N$

$\frac{F_{cx}}{dx} = \frac{F_c}{d} \Rightarrow F_{cx} = 159.2\,N\,x$

$F_{cy} = \frac{(dy)(Fc)}{d} = 183.1\,N$

$F_{cz} = \frac{(dz)(Fc)}{d} = -59.7\,N$

Q: 3



(9)

$\Sigma F_x = 0$

$A_x - T\cos 30 = 0$ --- (1)

$\Sigma F_y = 0 \Rightarrow A_y + T\sin 30 - 450 - 100 = 0$ --- (2)

$\Sigma M_A = 0$

$-(100)(4.5) - (450)(1.5) + (T\cos 30)(7) = 0$

$\Rightarrow \boxed{T = 185.6}$ The force in BC

substitute in (1)

$A_x = T\cos 30$

$\boxed{A_x = 160.7}$

sub. in (2)

$A_y = 550 - T\sin 30$

$\boxed{A_y = 457.2}$