TOBB UNIVERSITY OF ECONOMICS AND TECHNOLOGY

MAK104 STATICS
2017-2018 SUMMER
28.05.2018
QUIZ 3 – SOLUTION

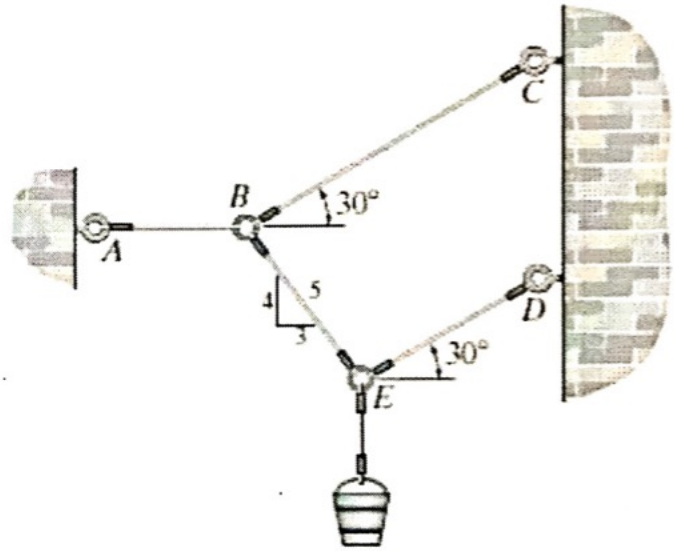
Name Surname: Number:

TOTAL TIME: 15 Minutes

GOOD LUCK

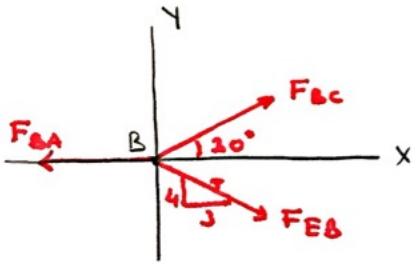
QUESTION: Determine the maximum weight of the bucket that the wire system can support so that no single wire develops a tension exceeding $100lb$.

Şekildeki sistemde kablolarda oluşan gerilmeler $100lb$ 'yi geçmemektedir. Buna göre kablo sisteminin taşıdığı kepçenin maximum ağırlığını belirleyiniz.

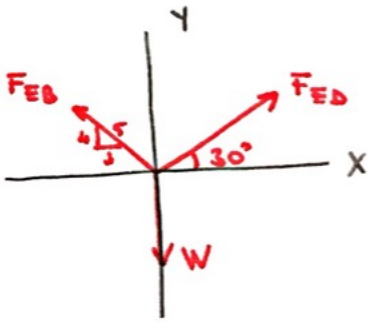


W (lb)	

Joint B:



Joint E:



If we write force equilibrium for Joint E:

$(\pm_{\rightarrow})\ \Sigma F_x = 0 : F_{ED}\cos 30 - F_{EB}\cdot\left(\frac{3}{5}\right) = 0$
$(+\uparrow)\ \Sigma F_y = 0 : F_{ED}\cdot\sin 30 + F_{EB}\cdot\left(\frac{4}{5}\right) - W = 0$
$\Rightarrow F_{ED} = 0.6043W$, $F_{EB} = 0.8723W$

$F_{EB} = 0.8723W$ was found. Applying this result for Joint B we get;

$(+\uparrow)\ \Sigma F_y = 0 : F_{BC}\cdot\sin 30 - 0.8723W\left(\frac{4}{5}\right) = 0 \Rightarrow F_{BC} = 1.3957W$

$(\pm_{\rightarrow})\ \Sigma F_x = 0 : 1.3957W\cdot\cos 30 + 0.8723W\cdot\left(\frac{3}{5}\right) - F_{BA} = 0 \Rightarrow F_{BA} = 1.7320W$

In the question maximum allowable force is given as 100N

$F_{BA} = 100N = 1.7320W \Rightarrow \boxed{W = 57.71b}$