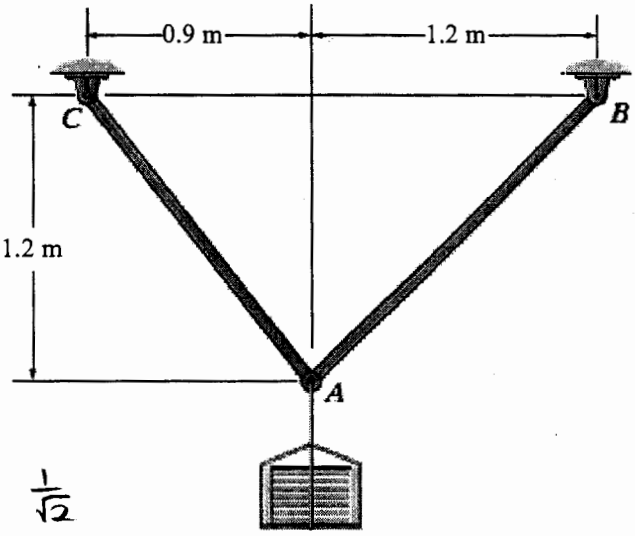
King Fahd University of Petroleum & Minerals
CIVIL ENGINEERING DEPARTMENT

CE 201 STATICS (Sections 1 & 2)

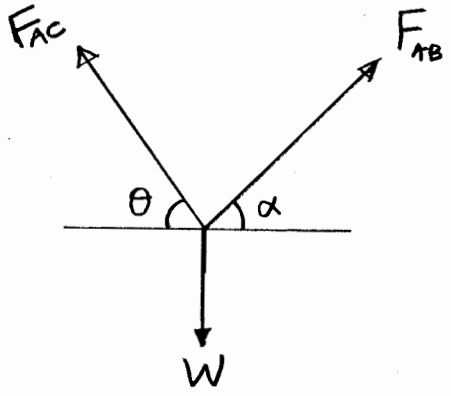
Second Semester 1432 / 2011 (102)

Name: Key 1 ID #: _____	**Quiz # 3**	Score ___ / 10

If members *AC* and *AB* can support a maximum tension of 1500 N and 1250 N, respectively, determine the largest weight of the crate that can be safely supported.



F.B.D



$\sin\theta = \frac{4}{5} = 0.8$; $\sin\alpha = \frac{1}{\sqrt{2}}$

$\cos\theta = \frac{3}{5} = 0.6$; $\cos\alpha = \frac{1}{\sqrt{2}}$

$$\Sigma F_x = -F_{AC}\cos\theta + F_{AB}\cos\alpha = 0 \quad \text{---} \quad (3.1)$$

$$\Sigma F_y = F_{AC}\sin\theta + F_{AB}\sin\alpha - W = 0 \quad \text{---} \quad (3.2)$$

Assume the tensile strength of member AC controls, then from (3.1),

$-1500(0.6) + F_{AB}\left(\frac{1}{\sqrt{2}}\right) = 0 \Rightarrow F_{AB} = 1272.79\text{N} > 1250\text{N}$

Hence, the strength of AB controls. So from (3.1), we have

$-0.6F_{AC} + 1250\left(\frac{1}{\sqrt{2}}\right) = 0 \Rightarrow F_{AC} = 1473.14\text{N} < 1500\text{N-OK}$,

and from (3.2),

$W = 1473.14\left(\frac{1}{\sqrt{2}}\right) + 1250\left(\frac{1}{\sqrt{2}}\right) \Rightarrow \boxed{W = 2062.40\text{N}}$

Therefore the largest weight of the crate that can be safely supported is 2062.40N

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CE 201 STATICS (Sections 1 & 2)

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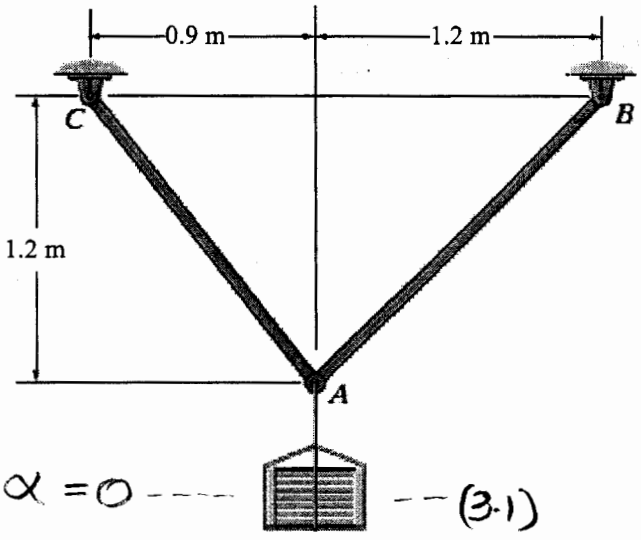
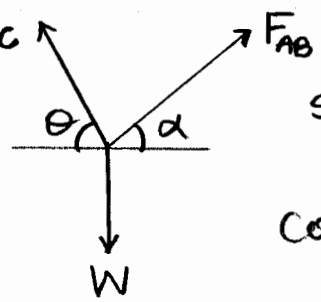
Name: Key 2	Quiz # 3	Score ___ / 10
ID #: ___		

If members AC and AB can support a maximum tension of 1500 N and 1250 N, respectively, determine the largest weight of the crate that can be safely supported.



F.B.D



$\sin\theta = 0.8$

$\cos\theta = 0.6$

$\sin\alpha = \frac{1}{\sqrt{2}}$

$\cos\alpha = \frac{1}{\sqrt{2}}$

$\Sigma F_x = 0: \quad -F_{AC}\cos\theta + F_{AB}\cos\alpha = 0 \quad \cdots \quad (3.1)$

$\Sigma F_y = 0: \quad F_{AC}\sin\theta + F_{AB}\sin\alpha = 0 \quad \cdots \quad (3.2)$

Assume the tensile strength of member AB controls, then from (3.1),

$-0.6F_{AC} + 1250\left(\frac{1}{\sqrt{2}}\right) = 0 \Rightarrow F_{AC} = 1473.14\,N < 1500\,N$ - OK,

and from (3.2),

$W = 1473.14\left(\frac{1}{\sqrt{2}}\right) + 1250\left(\frac{1}{\sqrt{2}}\right) \Rightarrow \boxed{W = 2062.40\,N}$

Hence the maximum weight of the crate that can be safely supported is 2062.40N