EGR 180 6/1/10

Note Title 6/1/2010

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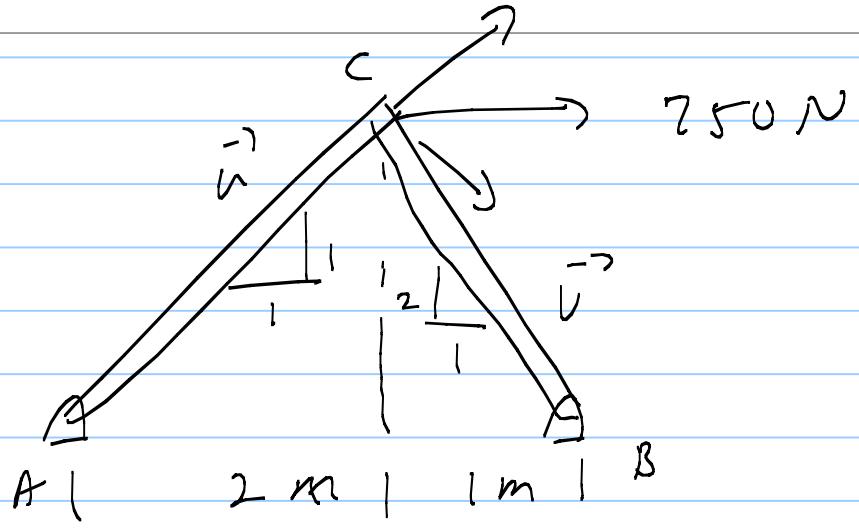
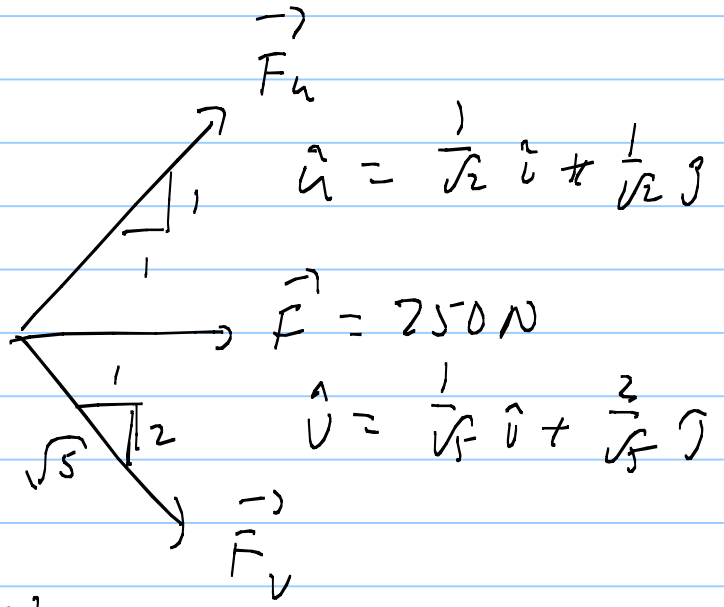


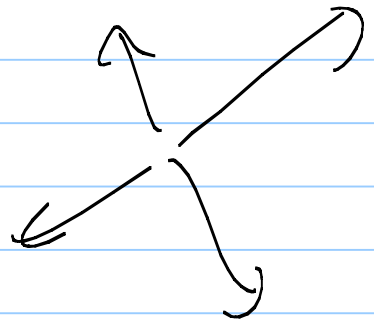


$$\vec{F}_u + \vec{F}_v = \vec{F}$$

$$F_u = \vec{F} \cdot \hat{u} = \frac{750}{\sqrt{2}}\,N = 530\,N$$

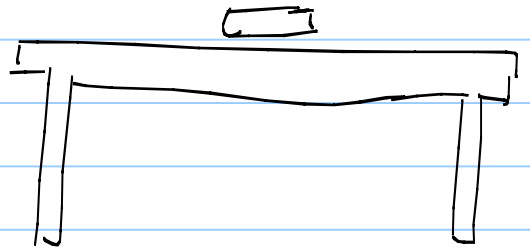
$$F_v = \vec{F} \cdot \vec{v} = \frac{750}{\sqrt{5}}\,N = 335\,N$$

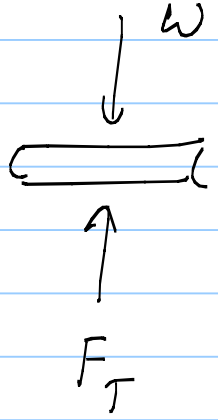
Concurrent Force Systems



$$\sum \vec{F} = 0$$

Free Body Diagram



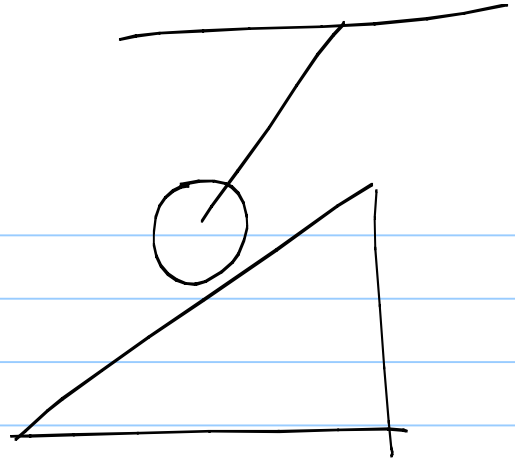


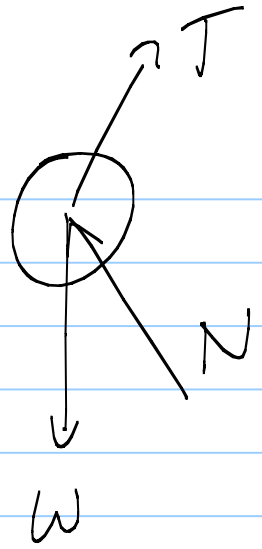
F_y
F_x
T_1
T_2
F_y
F_x
T_1
T_2

A
F_A
ω
F_B
B

C
ω_A
T
T

A
C
B
D
A
T_B
B





$\sum F_x = 0$

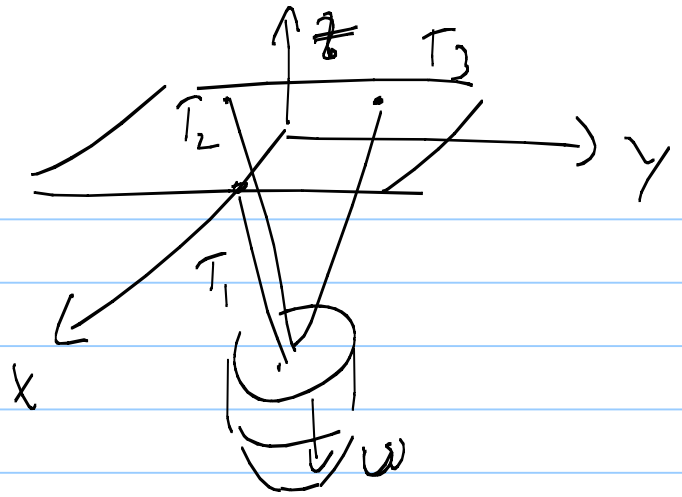
$\sum F_y = 0$

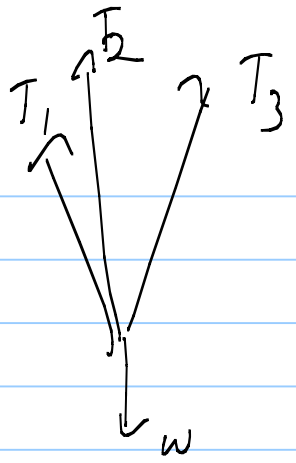
At most 2 unknowns

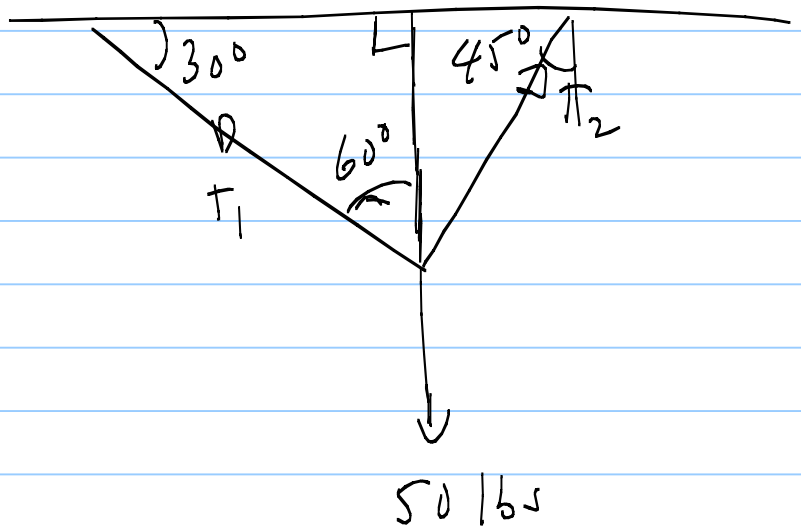
$\sum F_x = 0$

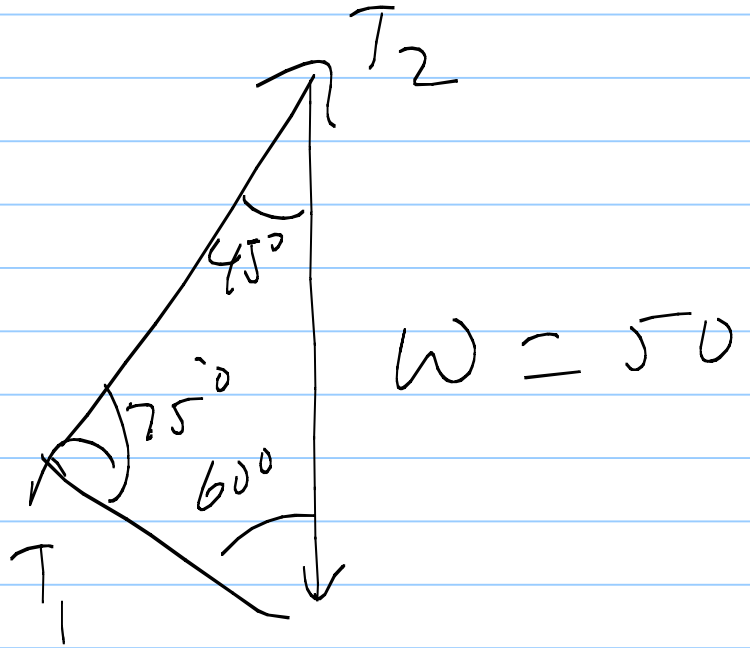
$\sum F_y = 0$ At most 3 unknowns

$\sum F_z = 0$


z
T_3
T_2
y
T_1
x
w


T_2
T_1
T_3
w

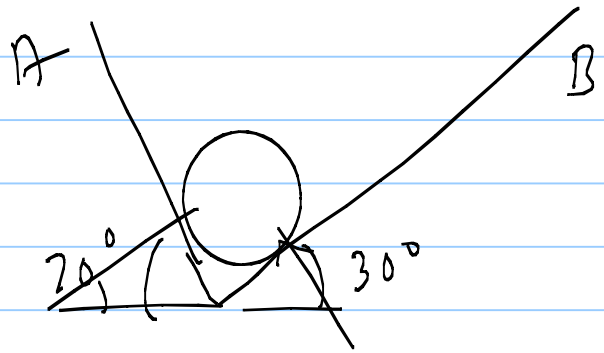

30°
45°
T_2
60°
T_1
50 lbs


T_2
45°
75°
60°
T_1
W = 50

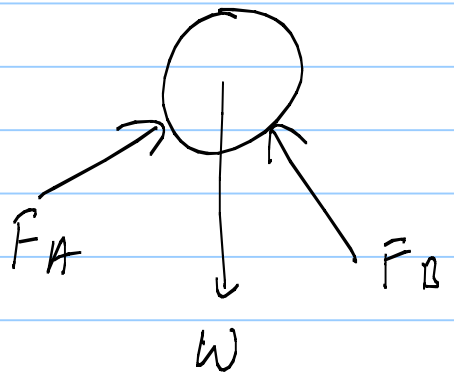
$$\frac{T_2}{\sin(60)} = \frac{T_1}{\sin(45)} = \frac{W}{\sin(75)}$$

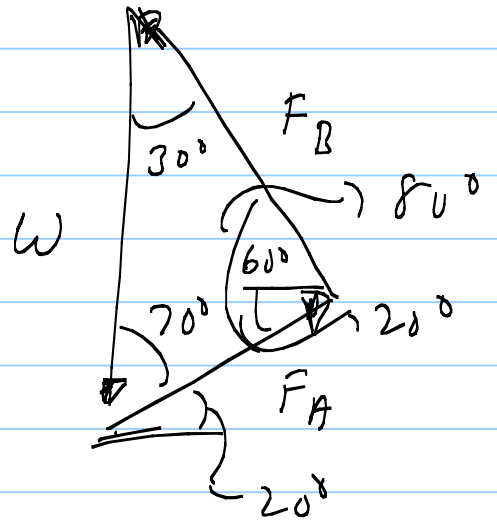
$$T_1 = \frac{50 \sin(45)}{\sin(75)} = 36.6 \text{ lbs}$$

$$T_2 = \frac{50 \sin(60)}{\sin(75)} = 44.8 \text{ lbs}$$



$W = 250\ N$





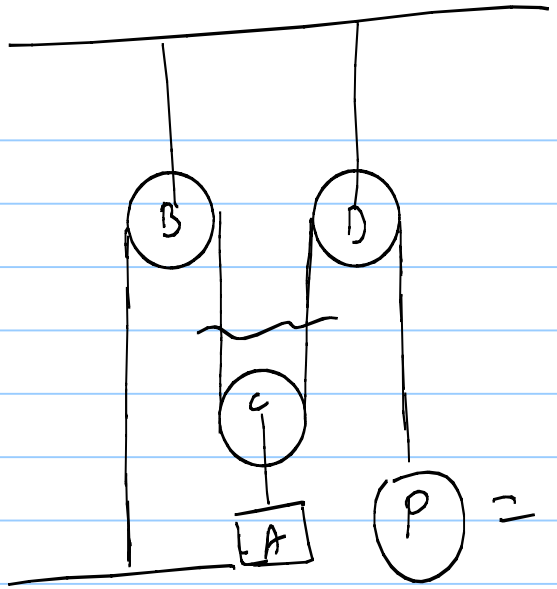
$$\frac{W}{\sin(80)} = \frac{F_A}{\sin(30)} = \frac{F_B}{\sin(70)}$$

$$F_A = \frac{250\sin(30)}{\sin(80)} = 126.9\ N$$

$$F_B = \frac{250\sin(70)}{\sin(80)} = 238.5\ N$$

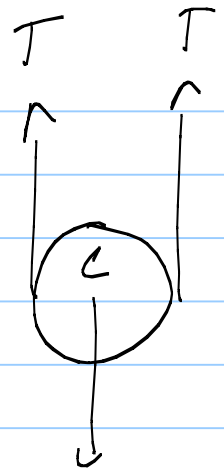
FAT
20°
70°
20°
W
30°
30°
60°
60°
T3

60°
20°
30°
20°



$P = 1000 \text{ lbs}$

$W_A = 2000 \text{ lbs}$

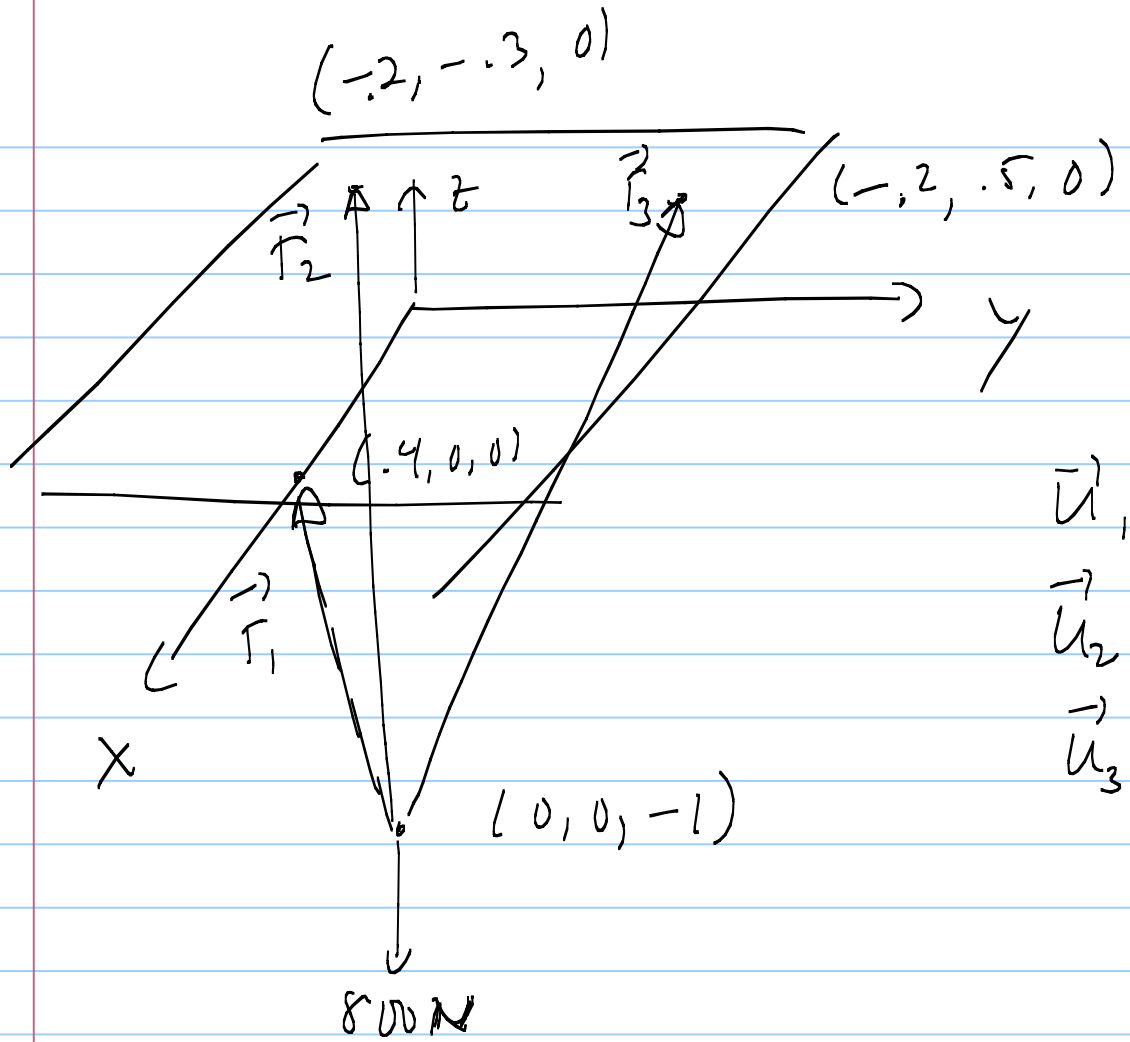


$\sum F_y = 2T - 2000 = 0$

$\Rightarrow T = 1000 \text{ lbs}$

$W_A = 2000 \text{ lbs}$

$P = T$



$$\vec{u}_1 = .4\hat{i} + \hat{k}$$

$$\vec{u}_2 = -.2\hat{i} - .3\hat{j} + \hat{k}$$

$$\vec{u}_3 = -.2\hat{i} + .5\hat{j} + \hat{k}$$

$$\vec{T}_1 = R_1 \vec{u}_1 = .4R_1 \hat{i} + R_1 \hat{k}$$

$$\vec{T}_2 = R_2 \vec{u}_2 = -.2R_2 \hat{i} - .3R_2 \hat{j} + R_2 \hat{k}$$

$$\vec{T}_3 = R_3 \vec{u}_3 = -.2R_3 \hat{i} + .5R_3 \hat{j} + R_3 \hat{k}$$

$$\Sigma F_x = .4R_1 - .2R_2 - .2R_3 = 0$$

$$\Sigma F_y = -.3R_2 + .5R_3 = 0$$

$$\Sigma F_z = R_1 + R_2 + R_3 - 800 = 0$$