PROBLEM NO. 1-4	MECHANICAL ENGINEERING DEPARTMENT	NAME KOUL
DATE		SECTION

Given: $m = 100\,Kg$, sketch

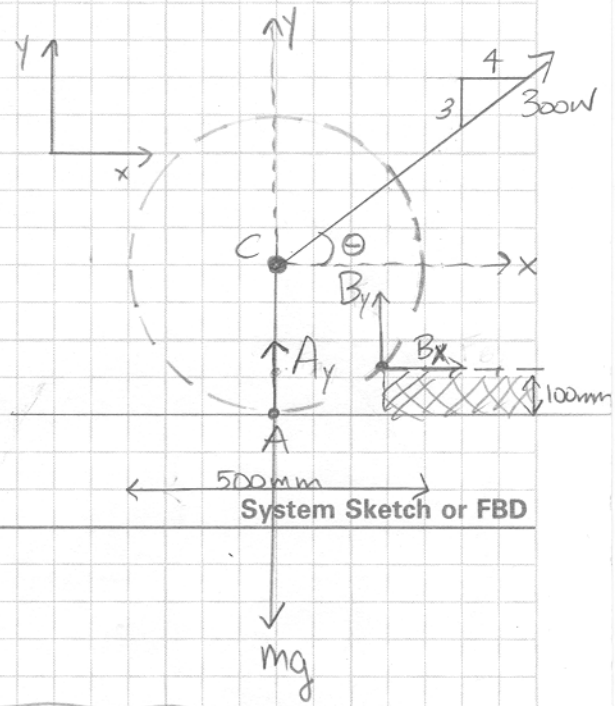
Find: Reaction forces A + B

Relationships:

$\Sigma F_x = 0$ $\quad F = mg$

$\Sigma F_y = 0$

$\Sigma M_z = 0$ $\quad \theta = \tan^{-1}\frac{3}{4} = 36.9°$



System Sketch or FBD

Solution:

$$\Sigma F_x = B_x + 300\cos 36.9° = 0$$

$$\boxed{B_x = -240N \text{ (opposite to drawing)}}$$

$$\Sigma F_y = A_y - (100)(9.8) + B_y + 300\sin 36.9° = 0$$

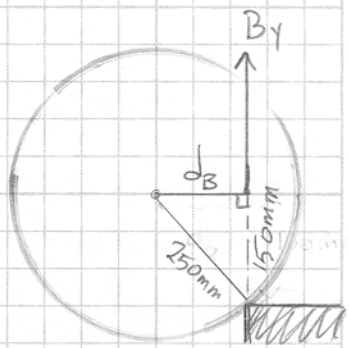
$$= A_y + B_y - 800 = 0$$

$$\circlearrowleft + \Sigma M_c = B_x(250-100) + B_y(d_B) = 0$$

$$150B_x + 200B_y = 0$$

$$\boxed{B_y = 180N \text{ (correctly drawn)}}$$

$$\boxed{A_y = 620N \text{ (correctly drawn)}}$$



$$d_B^2 + (150)^2 = (250)^2$$

$$|B| = \left[(-240)^2 + (180)^2\right]^{1/2} = 300N$$

PROBLEM NO. 1-12	MECHANICAL ENGINEERING DEPARTMENT	NAME KOUL
DATE		SECTION

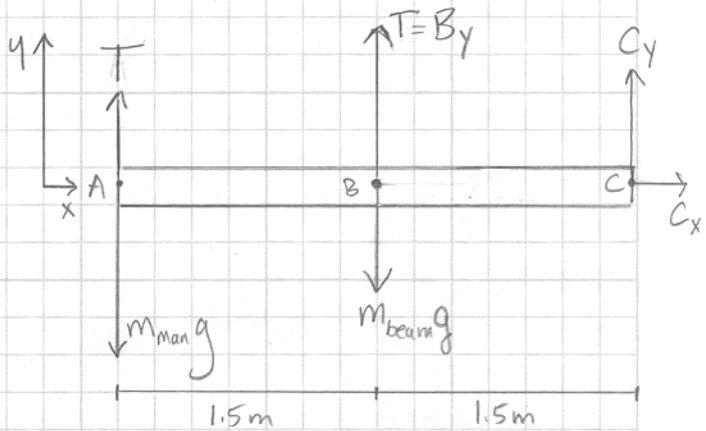
Given: Sketch, $m_{man} = 75\,kg$, $m_{beam} = 40\,kg$

equilibrium

Find: Force on cable, T
Reaction force C

Relationships:

$\Sigma F_x = 0$
$\Sigma F_y = 0$
$\Sigma M_z = 0$
$F = mg$



System Sketch or FBD

Solution:

$$\Sigma F_x = C_x = 0$$

$$\Sigma F_y = 2T + C_y - (75)(9.8) - (40)(9.8) = 0$$

$$2T + C_y - 1127 = 0$$

$$\circlearrowleft + \Sigma M_c = 3(m_{man}g - T) + 1.5(m_{beam}g - T) = 0$$

$$2793 - 4.5T = 0$$

$$\boxed{T = 620.7\,N}$$

$$\boxed{C_y = -114.3\,N \text{ (opposite of drawing)}}$$

PROBLEM NO. 1-40	MECHANICAL ENGINEERING DEPARTMENT	NAME KOUL
DATE		SECTION

Given: Sketch

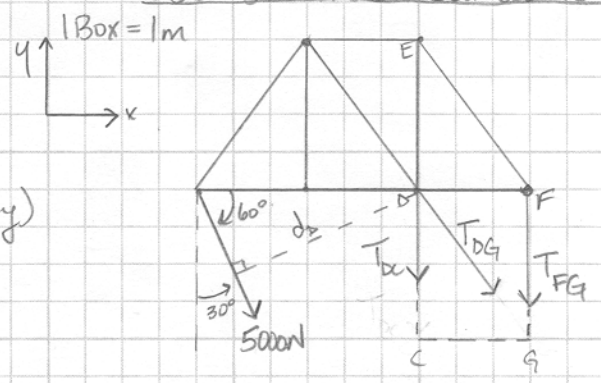
Find: Forces in members:
T_{CD}, T_{DF}, T_{EF}, T_{FG}

Relationships:
No moments are transferred between members, "pinned" joints
$\Sigma F_x = 0$
$\Sigma F_y = 0$
$\Sigma M_z = 0$

System Sketch or FBD

Solution:

FBD of truss cut above CG



$\circlearrowleft^{+} \Sigma M_D = -T_{FG}(3) + 5000\, d_D = 0$

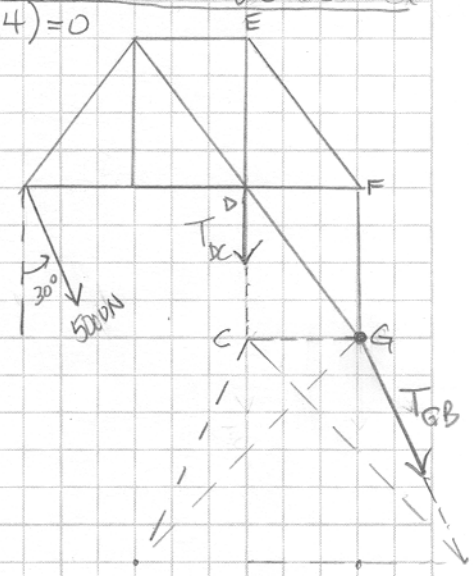
$\boxed{T_{FG} = 8660N}$ (drawn correctly)

tension

$\sin 60° = \frac{d_D}{6}$

FBD of truss above DG

$\circlearrowleft^{+} \Sigma M_G = 3T_{DC} + 5000 \cos 30° (9) - 5000 \sin 30° (4) = 0$



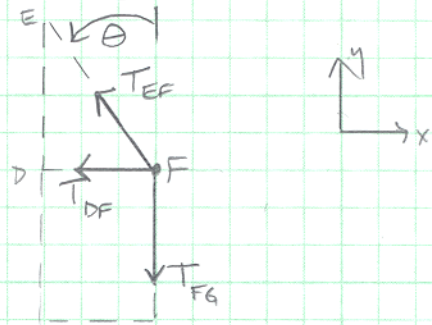
$\boxed{T_{DC} = -9657N}$ (opposite to drawing)

Compression

Solution: 1-40(2)

DF + EF left

FBD of joint F



$\Sigma F_x = -T_{EF}\sin 36.7° - T_{DF} = 0$

$\Sigma F_y = T_{EF}\cos 36.7° - T_{FG} = 0$

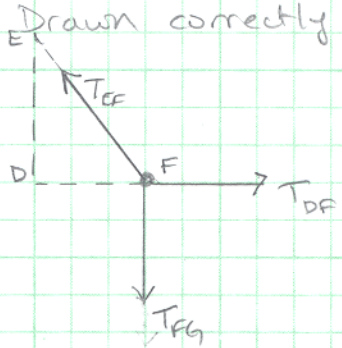
Found already

$\boxed{T_{EF} = 10801\,N}$ (drawn correctly)

tension

$\theta = \tan^{-1}\frac{3}{4} = 36.7°$

$\boxed{T_{DF} = -6455\,N}$ (opposite from drawing)

compression.

Drawn correctly.