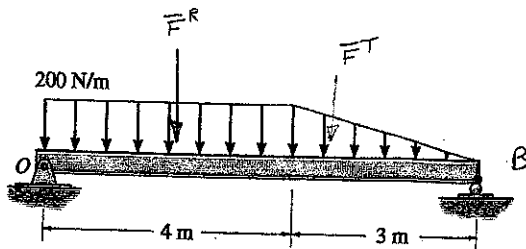


3. Replace the loading shown below by an equivalent force and couple moment acting at point B. Write your answers as vectors.



$$F^{\text{RECT}} = 200 \text{ N/m} (4 \text{ m}) = 800 \text{ N}$$

$$F^{\text{T}} = \frac{1}{2} (3) (200 \text{ N/m}) = 300 \text{ N}$$

$$\bar{x}^{\text{RECT}} = (3+2) \text{ m} = 5 \text{ m}$$

$$\bar{M}_B^{\text{RECT}} = 800 \text{ N} (5 \text{ m}) (\bar{k}) = 4000 \text{ Nm} (\bar{k})$$

$$\bar{x}^{\text{T}} = \frac{2}{3} (3 \text{ m}) = 2 \text{ m}$$

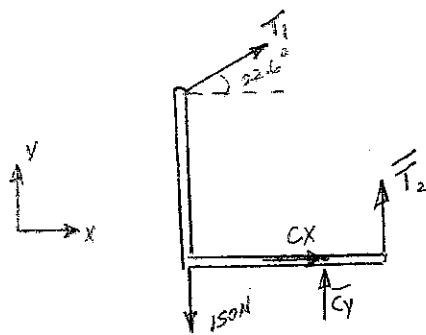
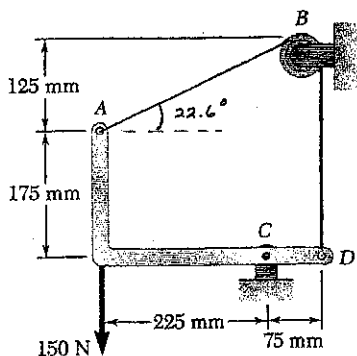
$$\bar{M}_B^{\text{T}} = 300 \text{ N} (2 \text{ m}) (\bar{k}) = 600 \text{ Nm} (\bar{k})$$

$$\bar{F}^{\text{R}} = 1100 \text{ N} (-\bar{j})$$

$$\bar{M}_B^{\text{R}} = 4600 \text{ Nm} (\bar{k})$$

For the structure shown below is pinned at point C and is connected to a cable at points A and D. The pulley at point B is frictionless.

- Draw a complete FBD of the member ACD.
- Find the forces acting on the beam at point C and the tension in the cable.
- Check you answers by summing the moments about a different point than you used in part (b).



$$\Sigma F_x = T_1 \cos 22.6 + C_x = 0$$

$$\Sigma F_y = T_1 \sin 22.6 + C_y + T_2 - 150 = 0$$

$$\Sigma M_c = 0 = -T_1 \cos 22.6 (-175) - T_1 \sin 22.6 (225) + 150(225) + T_2 (75) = 0$$

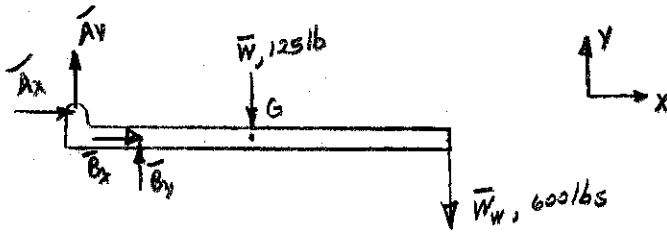
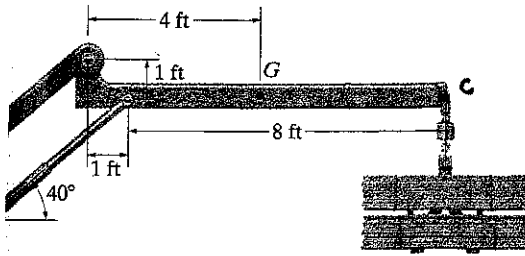
$$\text{but } T_1 = T_2 = T$$

$$T = 195 \text{ N}$$

$$C_x = -180 \text{ N (wrong direction)}$$

$$C_y = -120 \text{ N (wrong direction)}$$

- 3a. Draw a free-body diagram (FBD) of the boom (ABGC) of the articulated crane. The boom is connected to the rest of the crane at points A and B through the use of pins. The boom weighs 125 lbs and the weight acts at point G. The wood load at point C weighs 600 lbs.



- 3b. Draw a free-body diagram of the "L" shaped member AB from the frame shown below. Pins are located at points A, B and C

