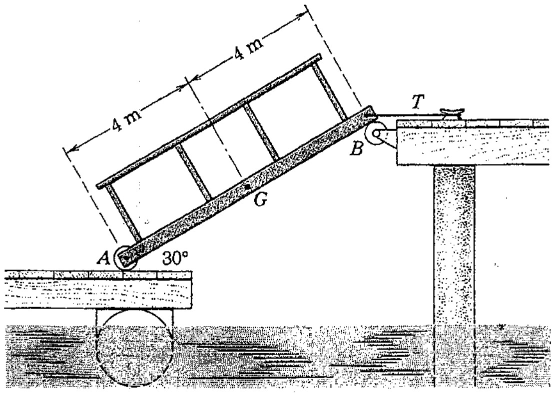
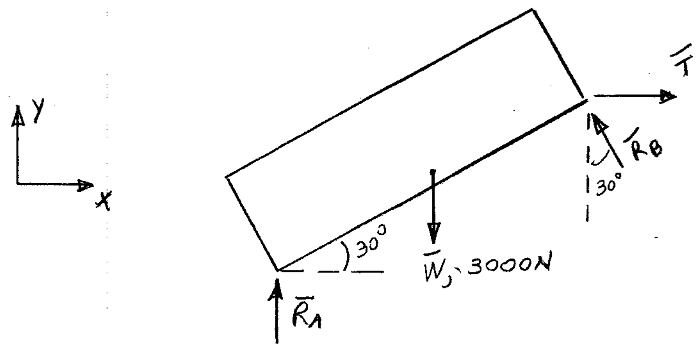
8A A walkway from a pier to a floating dock has a roller at point A and rests on a roller at point B. In addition, there is a cable attached to the walkway from the pier. The walkway weighs 3000 N and the center of gravity is at point G.

a. Draw a FBD of the walkway.
b. Determine the reaction forces acting on the walkway at points A and B.
c. Determine the force that the cable exerts on the walkway at point B.
d. Write the reaction forces as Cartesian vectors. (Use correct directions)





$$\Sigma \bar{F}_x = (T - R_B \sin 30°)\bar{i} = 0$$

$$\therefore T - R_B \sin 30° = 0$$

$$\Sigma \bar{F}_y = (R_A - W + R_B \cos 30°)\bar{j}$$

$$R_A + .866 R_B - 3000\,N = 0$$

$$\Sigma \bar{M}_B = 0 = (-R_A(8m\cos 30°) + W(4m\cos 30°))\bar{k}$$

$$\therefore R_A = \frac{W}{2} = 1500\,N$$

$R_A = 1500\,N$
$R_B = 1732\,N$
$T = 866\,N$

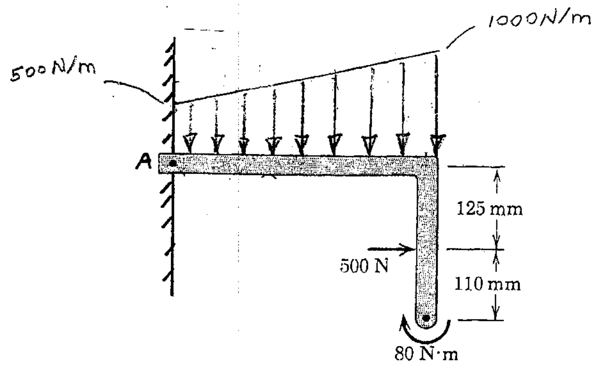
$\therefore \bar{R}_A = 1500\,N(\bar{j})$

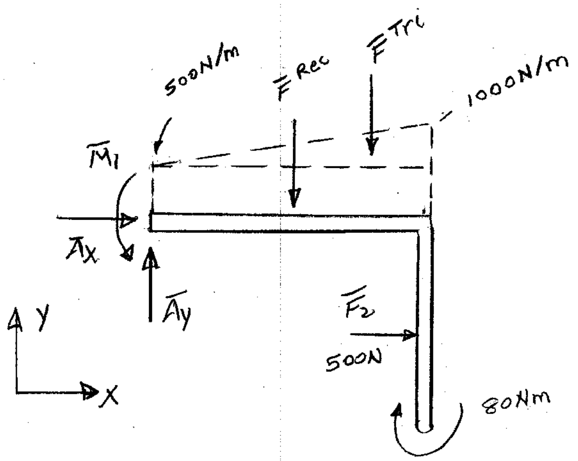
$\bar{R}_B = 1732\,N \sin 30°(-\bar{i}) + 1732\,N \cos 30°(\bar{j}) = 866\,N(-\bar{i}) + 1500\,N(\bar{j})$

$\bar{T} = 866\,N(\bar{i})$

8B The "L" bracket shown below is welded to wall at point A.

a. Draw a FBD of the bracket.
b. Determine the forces and the moment (reactions) that the wall exerts on the bracket.
c. Write the reaction forces and moment as Cartesian vectors. (Use correct directions)





$F^{Tri} = \frac{1}{2} bh = \frac{1}{2}(.4m)(500N/m) = 100N$

$F^{Rec} = bh = (.4m)(500N/m) = 200N$

$\Sigma \bar{F}_x = 0 = (A_x + 500N)\bar{i} = 0$

$\therefore A_x = -500N$ (wrong direction)

$\Sigma \bar{F}_y = 0 = (A_y - 100N - 400N)\bar{j}$

$\therefore A_y = 300N$

$\Sigma \bar{M}_A = 0 = (M_1 - 200N(.2m) - 100N(.266m)$

$+ 500N(.125m) - 80Nm)\bar{k}$

$\therefore M_1 - 40Nm - 26Nm + 62.5Nm - 80Nm$

$M_1 = 83.5 Nm$

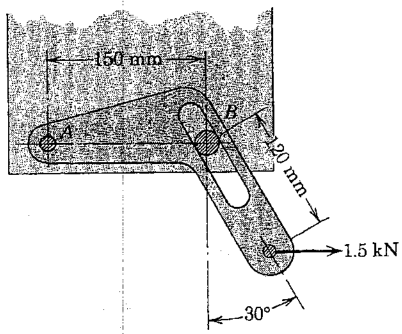
$\therefore \bar{A}_x = 500N(-\bar{i})$

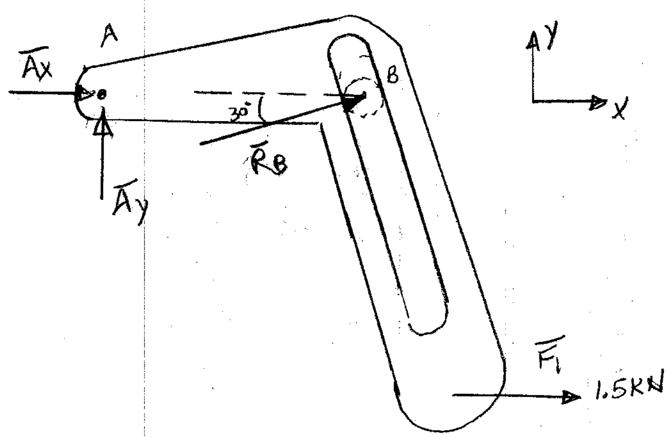
$\bar{A}_y = 300N(\bar{j})$

$\bar{M}_1 = 83.5 Nm (\bar{k})$

8C A bracket is attached to a movable plate. The bracket is pinned to the plate at point A and fits around a dowel pin at point B (frictionless slot).

a. Draw a FBD of the bracket
b. Determine the reaction forces at points A on B that act on the bracket.
c. Write the reaction forces as Cartesian vectors. (use correct directions)





$\Sigma \bar{F}_x = 0 = (A_x + 1.5KN + R_B \cos 30°)\bar{i}$

$\therefore A_x + .866 R_B + 1.5KN = 0$

$\Sigma \bar{F}_y = (A_y + R_B \sin 30°)\bar{j} = 0$

$\therefore A_y + .5 R_B = 0$

$\Sigma \bar{M}_A = 0 = (R_B \sin 30° (.15m) + 1.5KN (.120m \cos 30°))\bar{k}$

$= .075 R_B + .156 KNm = 0$

$\therefore R_B = -2.08$ KN (guess wrong direction)

$\therefore A_y = 1.04$ KN

$\therefore A_x = .301$ KN

$\therefore \bar{A}_x = .301$ KN $(\bar{i})$

$\bar{A}_y = 1.04$ KN $(\bar{j})$

$\bar{R}_B = 2.08 \cos 30° (-\bar{i}) + 2.08 \sin 30° (-\bar{j}) = 1.80(-\bar{i}) + 1.04(-\bar{j})$ (KN)