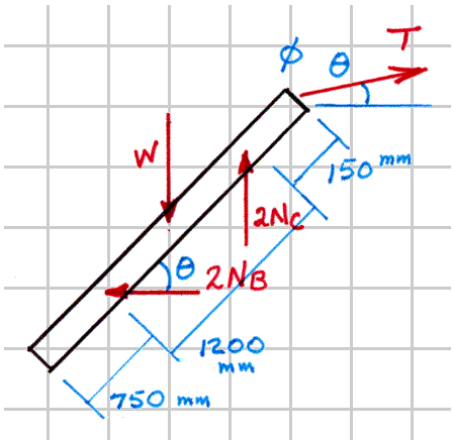
1-38*

$$W = 100(9.81) = 981 \text{ N}$$

$$\cos\theta = \frac{2500 - 1875}{1200} \qquad \theta = 58.612°$$

$$\tan\phi = \frac{300 - 150\sin\theta}{1875 - 150\cos\theta} \qquad \phi = 5.466°$$



There are two rollers (one on each side of the door) at *B* and *D*, hence the $2N_B$ and $2N_C$ on the free-body diagram

$$\rightarrow \Sigma F_x = 0: \qquad T\cos\phi - 2N_B = 0$$

$$\uparrow \Sigma F_y = 0: \qquad T\sin\phi + 2N_C - 981 = 0$$

$$\circlearrowleft \Sigma M_D = 0: \quad (1050\cos\theta)(981) - (150\cos\theta)(2N_C) - (1350\sin\theta)(2N_B) = 0$$

Substituting the first two equations into the third gives

$$(1050\cos\theta)(981) - (150\cos\theta)(981 - T\sin\phi) - (1350\sin\theta)(T\cos\phi) = 0$$

$T = 403.455 \text{ N} \cong 403 \text{ N}$ ..... **Ans.**

$N_B = 200.812 \text{ N} \cong 201 \text{ N}$ ..... **Ans.**

$N_C = 471.283 \text{ N} \cong 471 \text{ N}$ ..... **Ans.**