

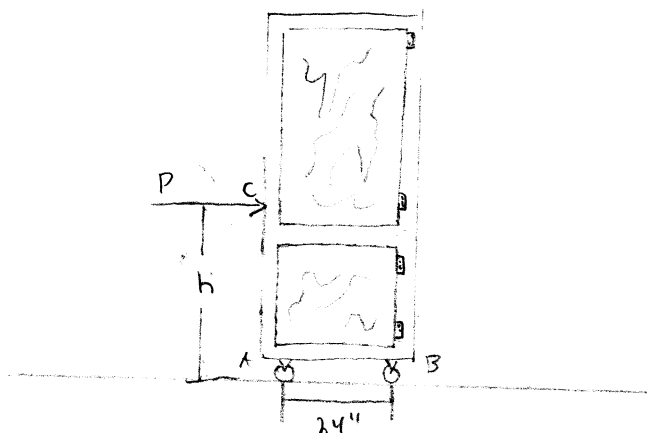
8.17

Given:

$$h = 32 \text{ in}$$

$$W_c = 120 \text{ lb}$$

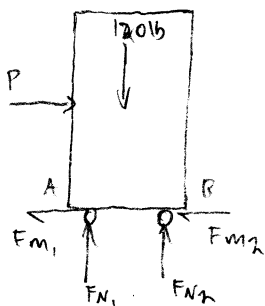
$$\mu_s = 0.30$$



Find: the magnitude of the force P required to move the cabinet to the right (a) if all casters are locked, (b) if the casters at B are locked and the caster at A are free to rotate, (c) if the casters at A are locked and the caster at B are free to rotate.

Solution:
(a)

FBD



$$+\uparrow \sum F_y = 0, \quad -120 \text{ lb} + F_{N1} + F_{N2} = 0$$

$$F_{N1} + F_{N2} = 120 \text{ lb}$$

$$+\rightarrow \sum F_x = 0, \quad -F_{m1} - F_{m2} + P = 0$$

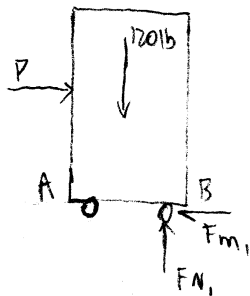
$$- \mu_s F_{N1} - \mu_s F_{N2} + P = 0$$

$$P = \mu_s (F_{N1} + F_{N2})$$

$$= (0.30)(120 \text{ lb})$$

$$= 36 \text{ lb} \rightarrow$$

(b) FBD



Since A can move/roll freely, $F_{m2} = 0$, $F_{N2} = 0$

$$+\rightarrow \sum F_x = 0, \quad -F_{m1} + P = 0$$

$$+\uparrow \sum F_y = 0, \quad F_{N1} - 120 = 0$$

$$1. \quad F_{N1} - 120 = 0$$

$$2. \quad -\mu_s F_{N1} + P = 0$$