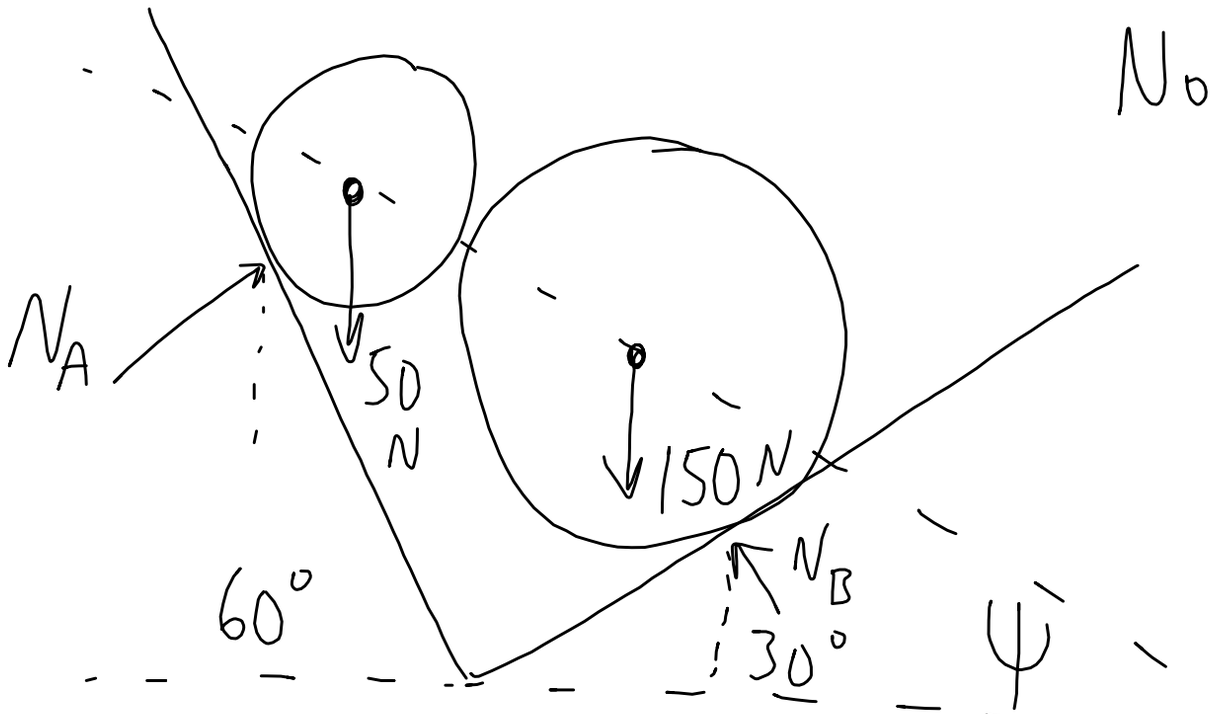


No friction

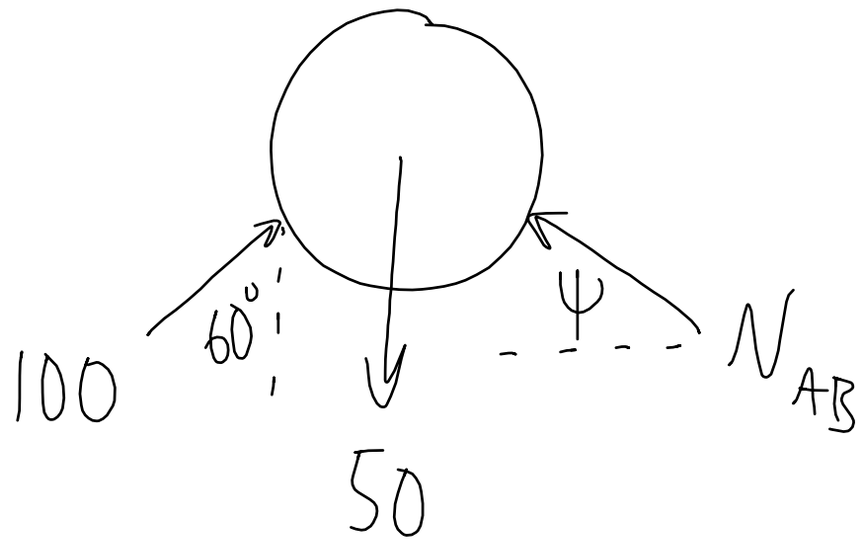
$\psi = ?$

Consider whole system

$\uparrow + \sum F = N_A - 50\cos 60 - 150\cos 60 = 0$

$N_A = 100\ N$

$\nwarrow + \sum F = N_B - 50\sin 60 - 150\sin 60 = 0 \quad N_B = 100\sqrt{3}$



$$\xrightarrow{+} \Sigma F_x = 100 \sin 60 - N_{AB} \cos\psi = 0$$

$$+\uparrow \Sigma F_y = \underbrace{100\cos 60 - 50}_{0} + N_{AB}\sin\psi = 0 \Rightarrow \psi = 0$$

4.112 A 40-lb cellar door is propped open with a light stick, as shown in Figure P4.112. Find the force in the stick.

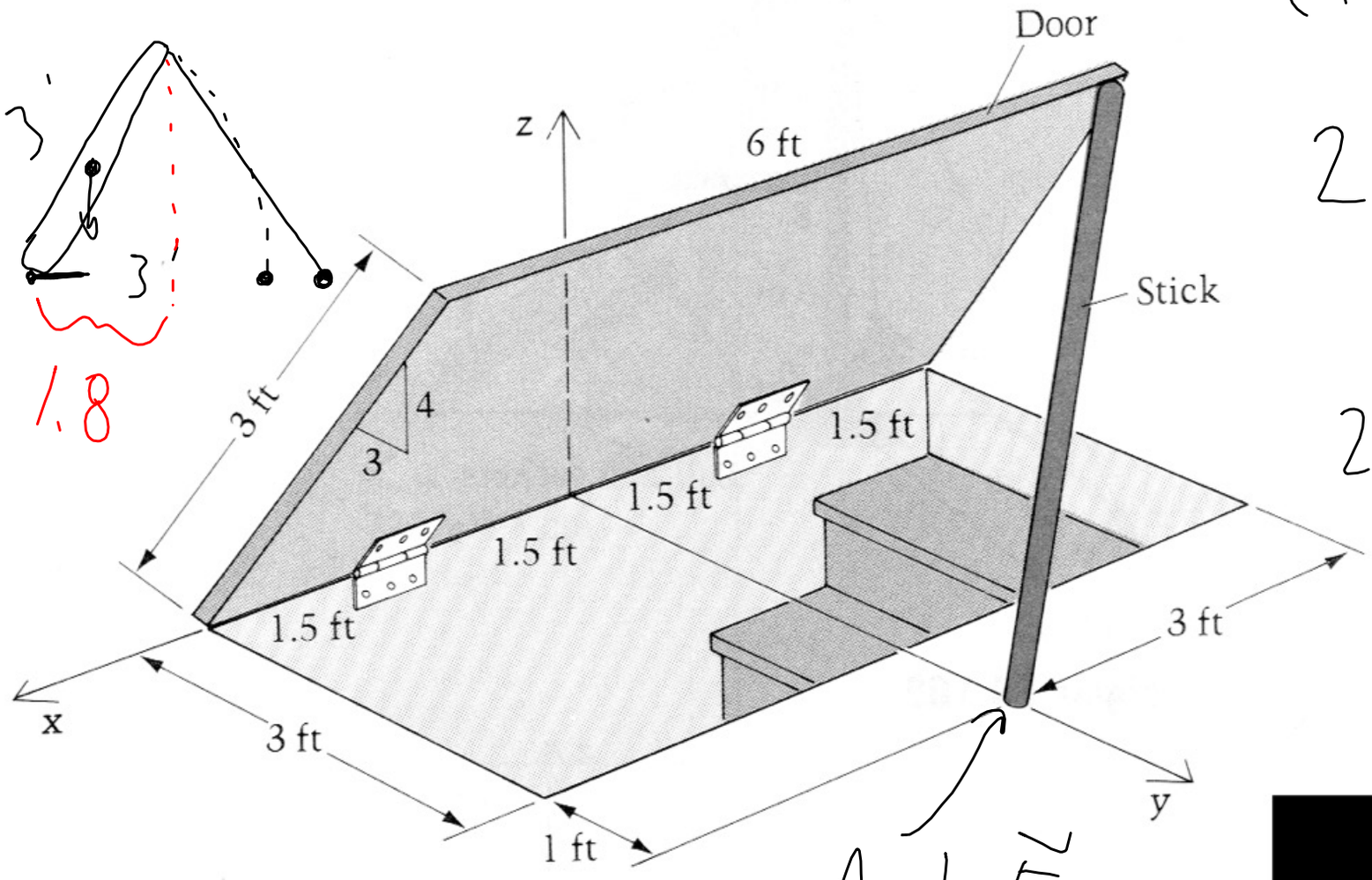


Figure P4.112

List of unknowns (FBD of door)

2 x 3 x F_{comp} @ hinges

2 x 2 x M_{comp} @ hinges

$\bar{F}_{stick}$

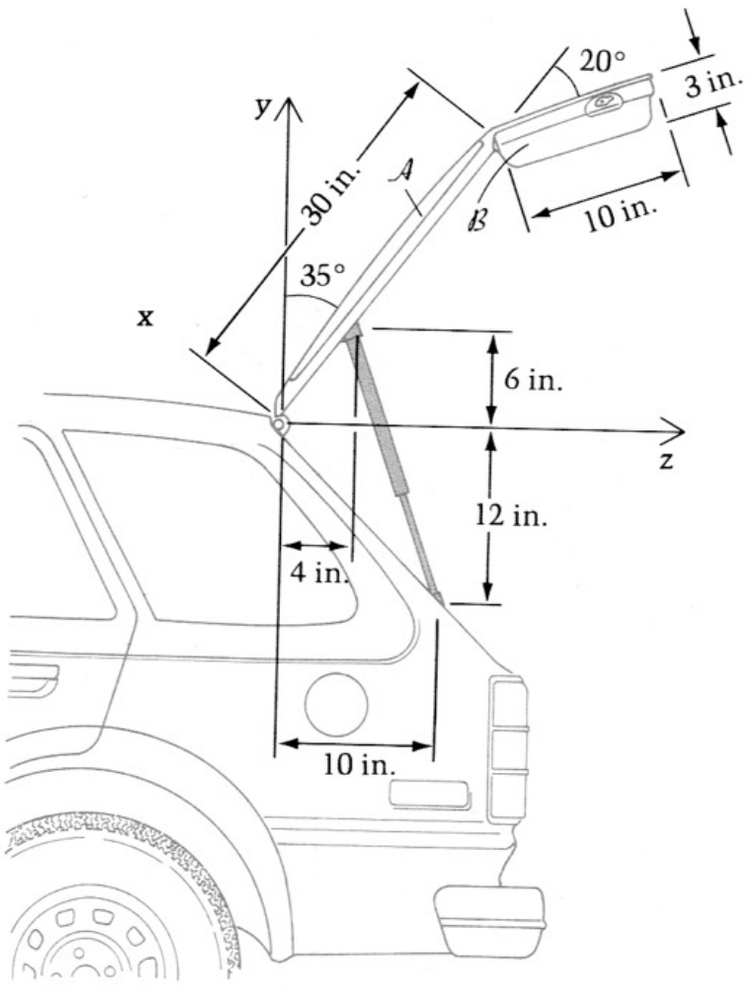
Apply $\bar{F}_{stick}$ here

$$\hat{u}_{stick} = \frac{-3\hat{i} - 2.2\hat{j} + 2.4\hat{k}}{4.427}$$

$$= -.6776\hat{i} - .4969\hat{j} + .5421\hat{k}$$

$$\Sigma M_{x\text{-}axis} = F_{stick}(.5421)(4) - 40(.9) = 0$$

$$F_{stick} = 16.6 \text{ lbs}$$



4.129 The rear door of the station wagon in Figure P4.129 is held up when open by the two gas-filled struts attached to the car by ball-joints. The door weighs 90 lb — 30 lb in part *A* and 60 lb in part *B*. Find the forces in the two struts.

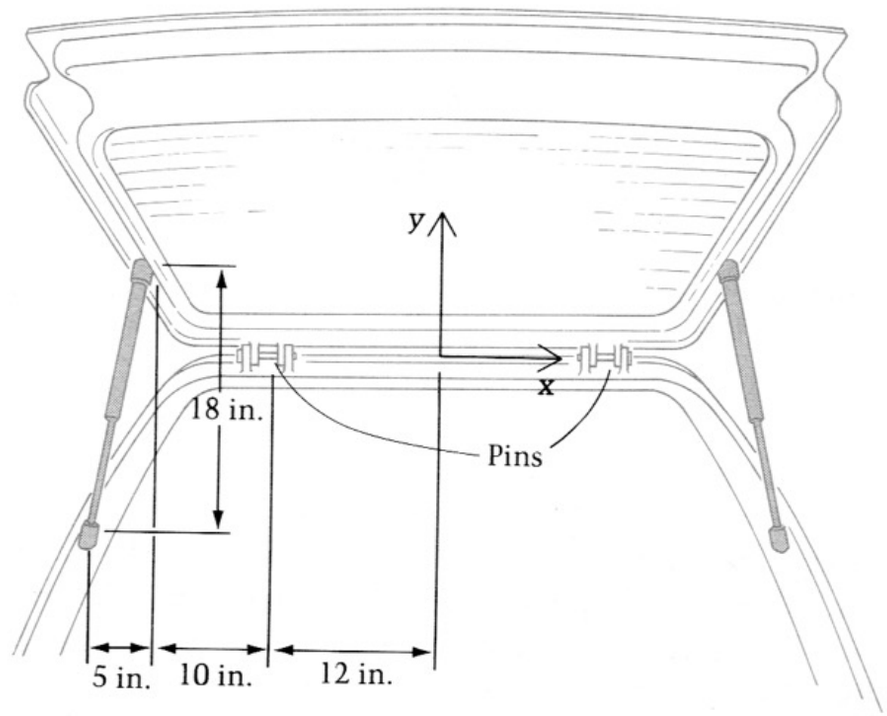
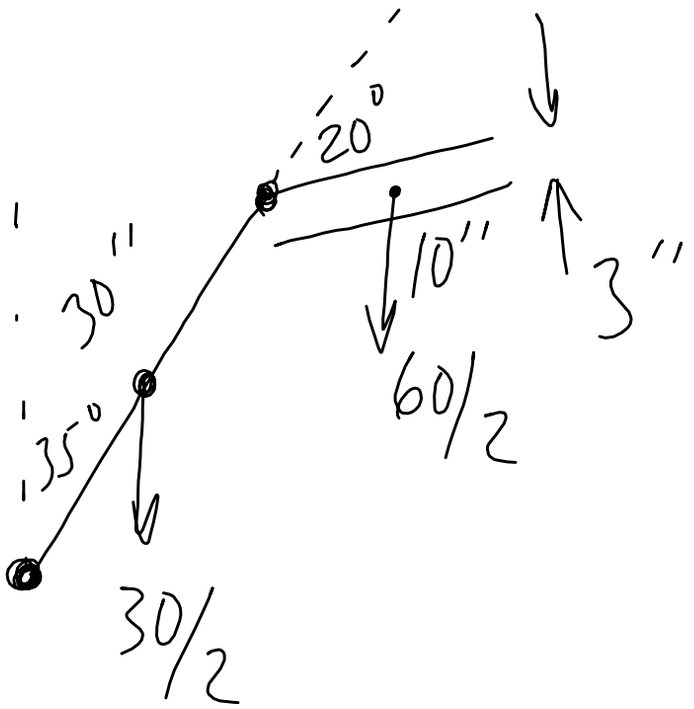
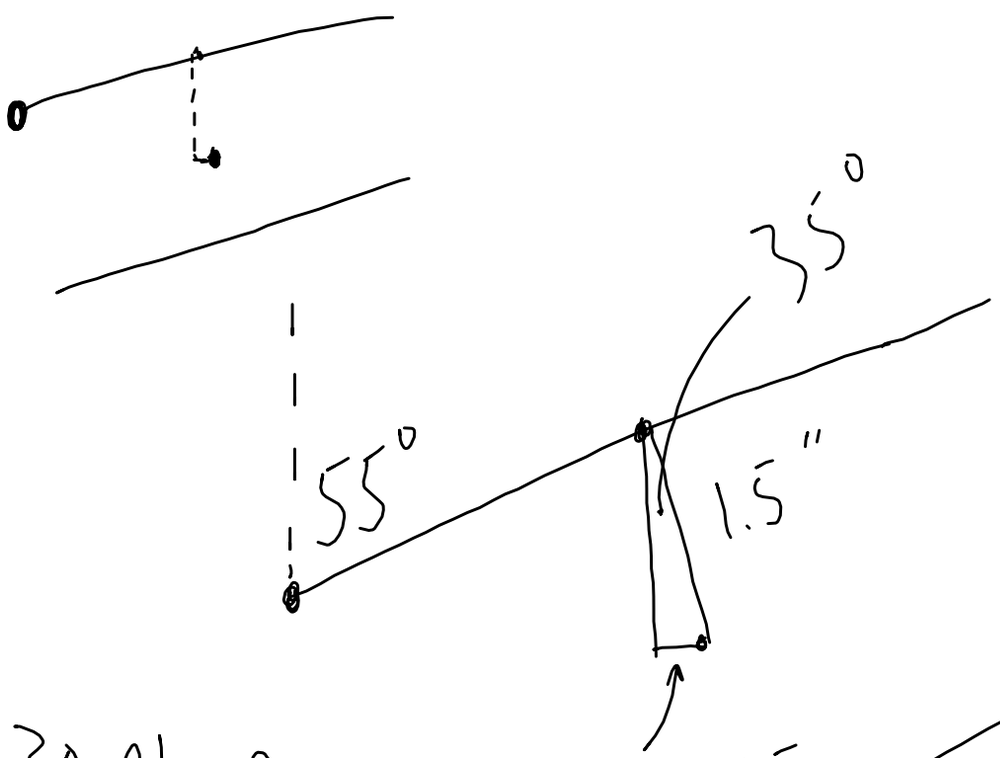


Figure P4.129

$$\hat{u}_{strut} = \frac{5\hat{i} + 18\hat{j} - 6\hat{k}}{\sqrt{5^2+18^2+6^2}} = .2548\hat{i} + .9174\hat{j} - .3058\hat{k}$$





For 15 lb force

$d_\perp = 15 \sin 35$

$= 8.604$

For 30 lb force

$d_\perp = 30 \sin 35$

$+ 5 \sin 55$

$+ 1.5 \sin 35 \quad = 22.163$

$$\sum M_{x\text{-axis}} = 15(8.604) + 30(22.163)$$

$$- F_{strut}(.9174)(4) + F_{strut}(.3058)(6) = 0$$

$$F_{strut} = 144 \text{ lbs}$$