

In Figure E4.18a, the pin P , which bears against the slot in bar BA , is fixed to rod RT . The weight of W is 125 lb. Find the force the pin exerts onto BA , and the reaction onto BA at B exerted by the ground.

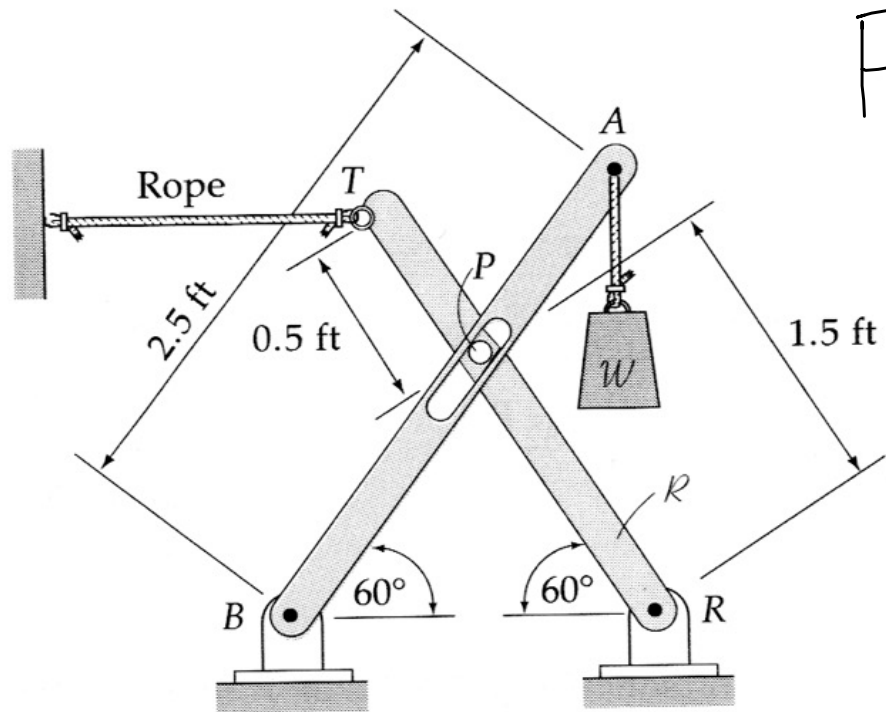
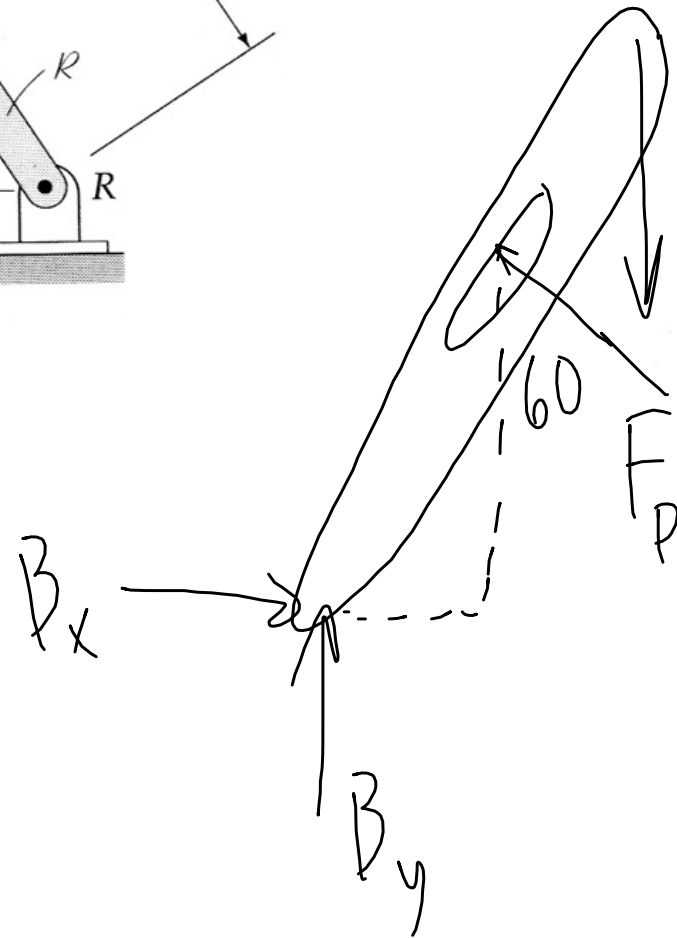


Figure E4.18a

For whole structure \Rightarrow
 5 unknowns = too many



$$\uparrow \sum M_B = F_P (1.5)$$

$$-125(2.5)\left(\frac{1}{2}\right) = 0$$

$$F_P = 104.2 \text{ lbs}$$

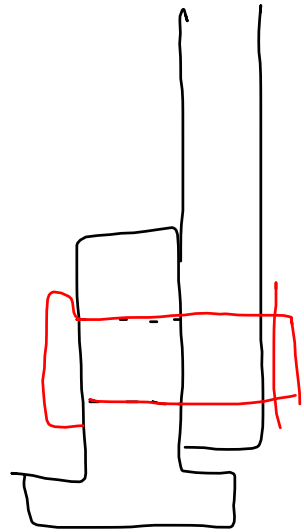
$$\rightarrow \sum F_x = B_x - 104.2 \sin 60 = 0$$

$$B_x = 90.2 \text{ lbs}$$

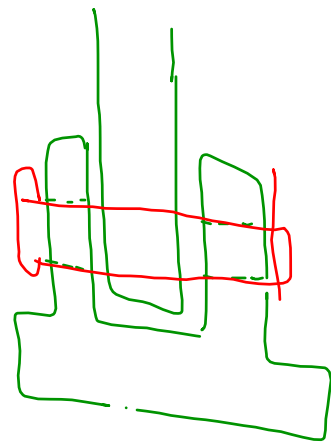
$$\uparrow \sum F_y = B_y + 104.2 \cos 60 - 125 = 0$$

$$B_y = 72.9 \text{ lbs}$$

$$B = \sqrt{B_x^2 + B_y^2} = 115.98 \approx 116 \text{ lbs}$$



single
shear



double
shear

↓ stress

$$\sigma_{\text{shear}} =$$

$$\frac{F_{\text{shear}}}{\text{Area}} = \frac{116 \text{ lbs}}{\left(\frac{\pi (0.25)^2}{4} \right) \text{ in}^2}$$

for 1/4" dia bolt

$$= 2363 \text{ psi}$$

compare to shear strength
of material of pin