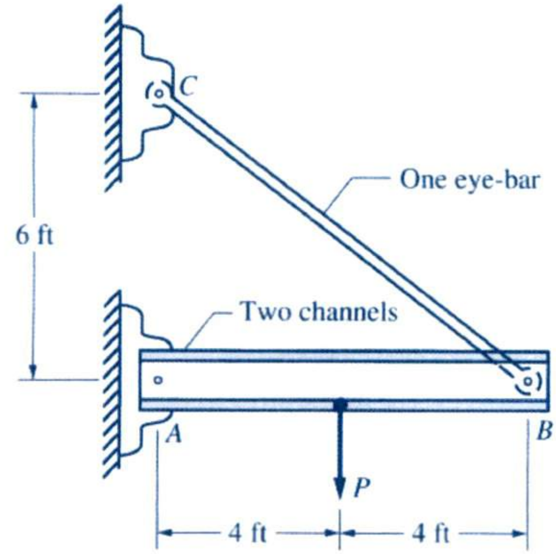
9-29

The wall bracket shown in Fig. P9-29 carries a load of P = 12 kips. The allowable tensile stress in the eye bar is 20 ksi, and the allowable shear stress in the pins is 12 ksi. Select (a) the diameter of the eye bar and (b) the diameter of the pin at A, which is in double shear.

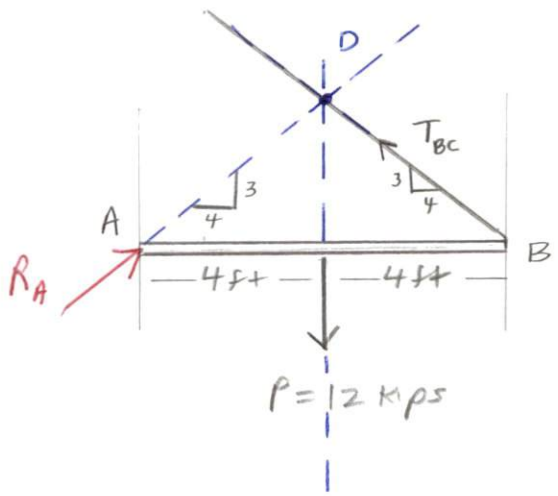


If the wall bracket is in equilibrium, member AB is in equilibrium.

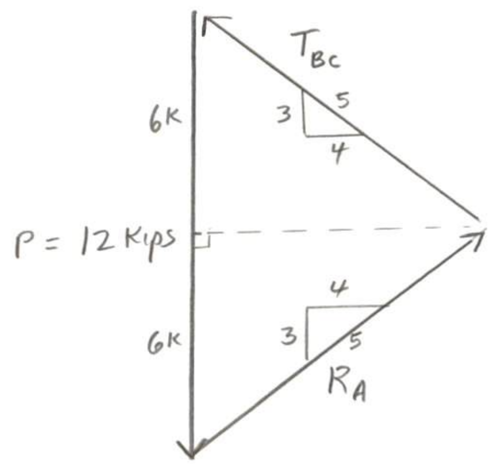
AB is a three-force body

The three forces are concurrent at D

Solution.



FBD - member AB



Force- Triangle

$$T_{BC} = R_A = \frac{5}{3}(6K) = 10 \text{ Kips}$$

(a) size of the eye bar:

$$A = \frac{P}{\sigma_{allow}} = \frac{T_{BC}}{\sigma_{allow}} = \frac{10 \text{ kips}}{20 \text{ kip/in}^2} = 0.5 \text{ in}^2$$

$$A = \frac{\pi d_{bar}^2}{4} = 0.7854\, d_{bar}^2 = 0.5 \text{ in}^2$$

$$d_{bar} = \sqrt{\frac{0.5 \text{ in}^2}{0.7854}} = 0.798 \text{ in.}$$

Use $d_{bar} = 13/16$ in.

(b) diameter of the pin at A:

$$A_s = \frac{R_A/2}{\tau_{allow}} = \frac{10\ \text{kips}/2}{12\ \text{kips/in}^2} = 0.417\ \text{in}^2$$

$$A_s = \frac{\pi d^2}{4} = 0.7854\, d_{pin}^2 = 0.417\ \text{in}^2$$

$$d_{pin} = \sqrt{\frac{0.417\ \text{in}^2}{0.7854}} = 0.729\ \text{in}$$

use $d_{pin} = 3/4$ in.