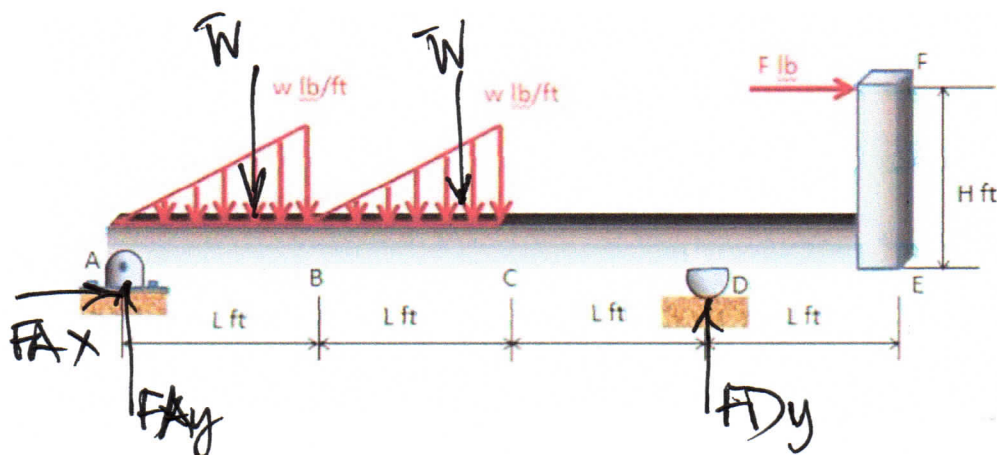


SOLUTION

## ip4STATICS Worksheet for U04\_P14

An L-shaped structure rests on two supports, as shown below. The structure carries two distributed loads and a concentrated force.

Instance variables: force  $F$  lb; load  $w$  lb/ft; lengths  $H$  and  $L$  in ft.



(1) What is the reaction force  $F_A$  at A in equilibrium? ('mag,deg')

(2) What is the reaction force  $F_D$  at D in equilibrium? ('mag,deg')

$$\sum F_x = 0: F_{Ax} + F = 0; F_{Ax} = -F.$$

$$\sum F_y = 0: F_{Ay} + F_{Dy} = \bar{W} + \bar{W}$$

$$\sum M_A = 0: \left(\frac{2L}{3}\right)\bar{W} + \left(\frac{5L}{3}\right)\bar{W} + H \cdot F = (3L) \cdot F_{Dy}$$

$$(2) |F_D| = \left(\frac{7}{9}\right)\bar{W} + \left(\frac{H}{3L}\right)F$$

$$\angle F_D = 90^\circ.$$

$$(1) F_{Ay} = 2\bar{W} - |F_D| = 2\bar{W} - \frac{7}{9}\bar{W} - \left(\frac{H}{3L}\right)F = \frac{11}{9}\bar{W} + \frac{H}{3L}F$$

$$F_{Ax} = -F$$

$$|F_A| = \sqrt{F_{Ax}^2 + F_{Ay}^2}; \angle F_A = \tan^{-1}(F_{Ay}/F_{Ax})$$