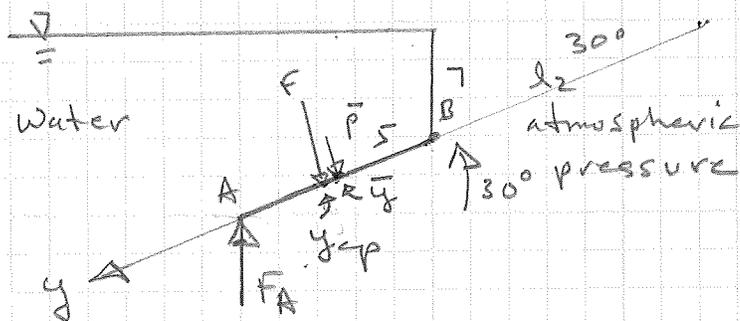


PROBLEM 3.73

3.73 The rectangular gate measures 10 ft by 6 ft ( $l = 10$  ft) and is pin-connected at point B. If the surface on which the gate rests at A is frictionless, and if the water surface is 7 ft above point B, what is the reaction at A? Neglect the weight of the gate.



$$F = \bar{p} A$$

$$A = l \times 6 = 10 \times 6 = 60 \text{ ft}^2$$

$$\bar{p} = \gamma \bar{y} \sin 30^\circ \quad \gamma = 62.4 \text{ lbf/ft}^3$$

$$F = 35,568 \text{ lbf}$$

$$\bar{y} = 5 + l_2 \quad l_2 = 7 / \sin 30^\circ = 14$$

$$y_{cp} = \bar{y} + \frac{I}{\bar{y} A} = 19 + \frac{6 \times 10^3}{12} = 19.439 \text{ ft}$$

$$\sum M_B = 0$$

$$F_A \times (10 \cos 30^\circ) = F \times 5.439$$

$$F_A = 22,338 \text{ lbf}$$