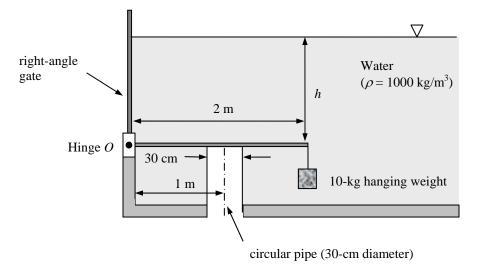# Problem 6-2

A thin, 1.5-m wide (into the page), right-angle gate with negligible mass is free to pivot about a frictionless hinge at Point O. The horizontal portion of the gate is 2-m long and covers a 30-cm diameter drain pipe which contains air at atmospheric pressure. A 10-kg concrete block ($\rho = 2300$ kg/m^3) is tied as a hanging weight to the end of the horizontal section. Denote the minimum water depth at which the gate will pivot to allow water to flow into the pipe to be h_{min}. Develop an equation with h_{min} as the only unknown and solve for its value.

Remark: The lightly shaded area in the figure is filled with water.

right-angle gate

2 m

h

Water
($\rho = 1000$ kg/m^3)

Hinge O

30 cm

1 m

10-kg hanging weight

circular pipe (30-cm diameter)