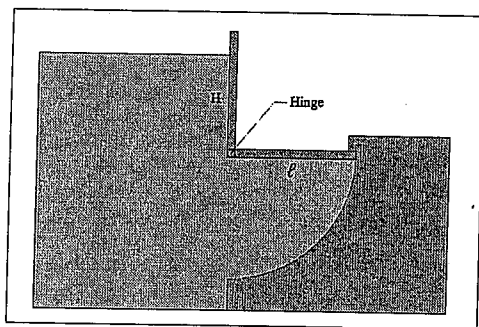
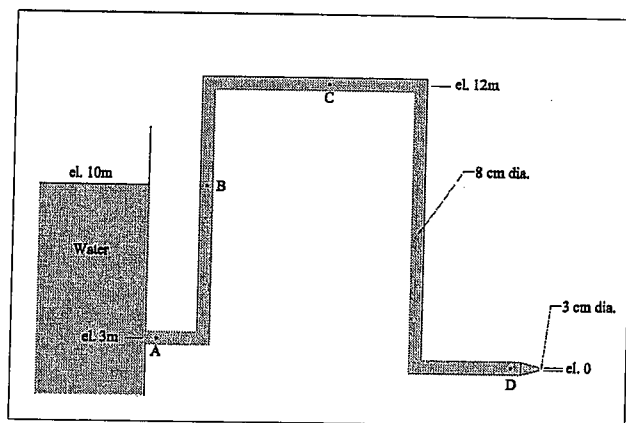


- 20% 1. Explain the following terms:
 (1) Reynolds number (2) Froude number (3) total energy (4) friction loss
 (2) Minor loss

- 20% 2. For the gate show in the figure calculate the height H that will result in the gate opening automatically. Assume $l = 2.0\text{ m}$ and neglect the weight of the gate)



- 20% 3. The overall loss coefficient for the pipe shown in figure; up to A it is 0.8, from A to B it is 1.2, from B to C it is 0.8, from C to D it is 2.2. Estimate the flow rate and the pressure at A, B, C and D. (loss $h_L = k \frac{V^2}{2g}$ where k is coefficient)



- 20% 4. A 1:20 scale model of a ship is used to test the resistance of water on the prototype ship. A drag of 10 N is measured at a model speed of 2.4 m/s. What speed is for the prototype ship? And how much is the total drag forces on the prototype ship. Neglect viscous effect and assume the same fluid for model and prototype.

- 20% 5. There are three very important laws for fluid mechanics to deal with the fluid problems such as the (1) conservation of mass (or continuity equation), (2) conservation of momentum, and (3) conservation of energy. Write their equations and explain how to apply them in the problems.