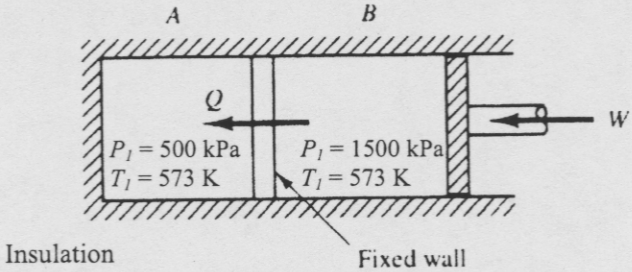
Unified Engineering **Name:**
Thermo Quiz 1 **Fall 2008**

First, consider chambers A and B shown below, each of volume V_1 = 0.01 m³. The chambers contain air separated by a fixed, heat conducting wall. A piston performs work on chamber B resulting in heat transfer between the two chambers. The initial conditions are as shown below. The whole system is adiabatic and the final pressure in chamber A is 1600 kPa. Air can be treated as an ideal gas with constant specific heats and you can assume $\gamma = 1.4$ and R = 287 J/kg-K.



a) Sketch the situation on your solution sheet and define appropriate systems.

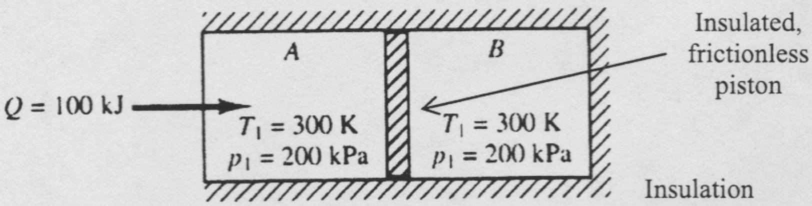
b) Describe in words the thermodynamic processes in chambers A and B (e.g. "isobaric expansion in chamber A because ..." – no equations necessary).

c) Determine the final temperatures in chambers A and B.

d) Find the heat interaction Q between the two chambers.

e) Determine the work done on chamber B.

Next, an insulated, frictionless piston separates two masses of air, 1 kg each, in a rigid tank. The initial pressure and temperature in each side are equal as shown below. The tank is insulated except for the left end. When an amount of heat is transferred through the tank wall, the temperature in chamber A becomes 400K.



f) Sketch the situation on your solution sheet and define appropriate systems.

g) Describe in words the thermodynamic processes in chambers A and B (e.g. "isobaric expansion in chamber A because ..." – no equations necessary).

h) Find the work done on chamber B.

i) Determine the final temperature in chamber B.