# A leak

A hollow insulated cylinder of height $2H$ and volume $2V$ is closed from below by an insulating piston. The cylinder is divided into two initially identical chambers by an insulating diaphragm of mass m. The diaphragm rests on a circular ledge and a gasket between them provides tight contact. Both chambers are filled with gaseous helium at pressure p and temperature T. A force is applied to the piston, so that it moves upwards slowly.
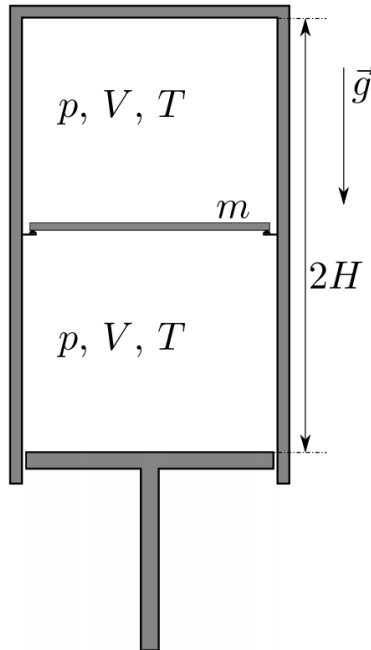
a) Find the volume of the lower chamber V_0 when the gas starts to leak between the chambers

b) Find the temperature T_1 in the upper chamber when the piston touches the diaphragm.

c) Find the temperature T_2 in the lower chamber immediately before the piston touches the diaphragm.