Two Adiabatic Expansions

(a) 0.5 moles of a monatomic ideal gas are in a cylinder of volume $V_i = 12.0$ L and at an initial temperature $T = 20^\circ$ C. The cylinder is thermally isolated from its environment (e.g the cylinder is heavily insulated) and a piston is slowly released, so that the volume of the cylinder is doubled. Calculate the final temperature of the gas and the change of its entropy in the expansion.

(b) A cylinder of total volume $V = 24.0$ L is divided into two compartments by a partition that bisects the cylinder. 0.5 moles of an ideal gas at an initial temperature $T = 20^\circ$ C occupy the left compartment, and the right compartment is empty. The partition is broken and the gas expands to fill the entire cylinder. Calculate the final temperature of the gas and the change of its entropy in the expansion.