[tex1] **Entropy change caused by expanding ideal gas**

Consider the amount $n = 1$mol of a classical ideal gas in a box of volume V_1 with heat-conducting walls. The gas is described by the equation of state $pV = nRT$ and the internal energy $U = \frac{3}{2}nRT$. Now we let the gas expand to the volume $V_2 = 2V_1$ via two different processes (see Figure):

(a) by quasi-static isothermal expansion;

(b) by leakage through a hole in one wall.

Calculate the change in entropy ΔS_G of the gas and ΔS_E of the environment during each process. Express the results in SI units.