

Exercice 5 :  $n = 0,5$  moles

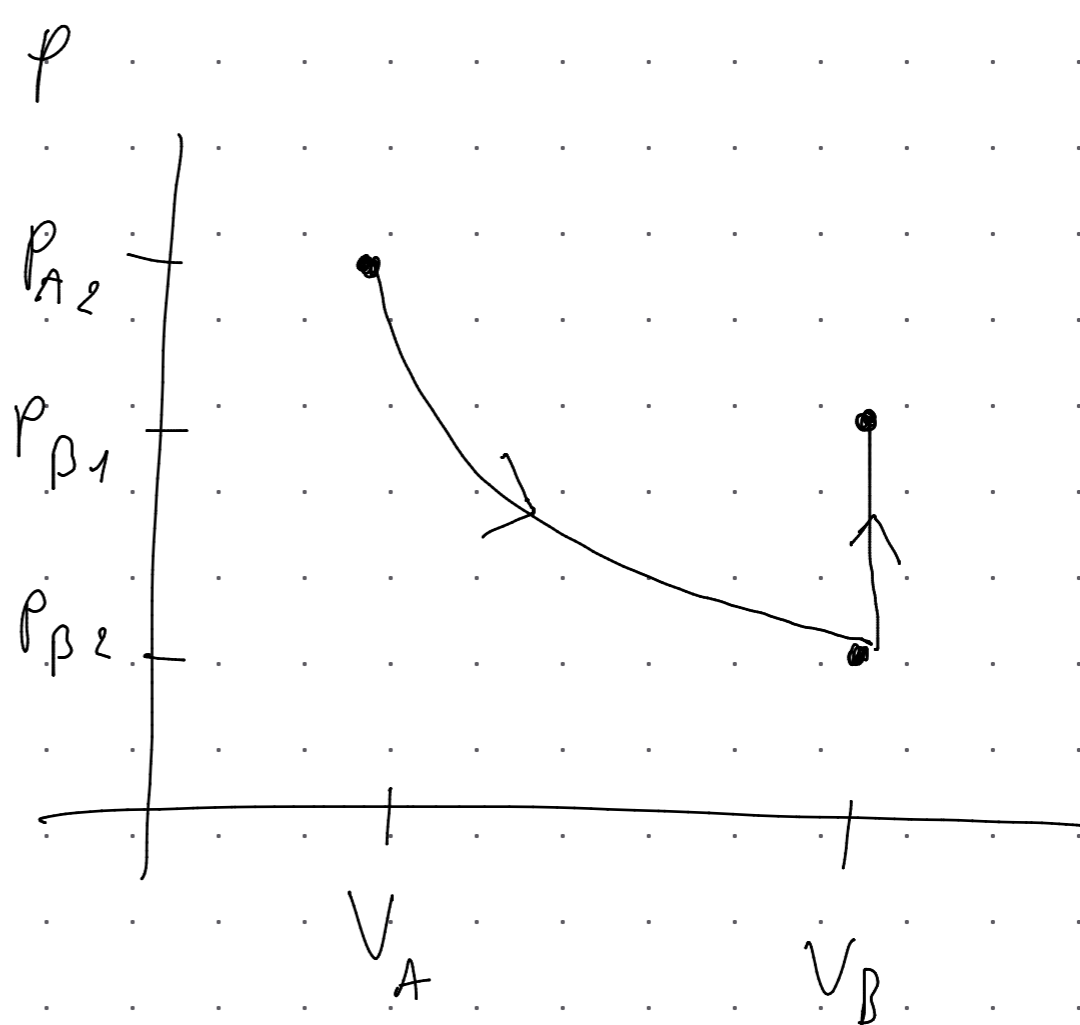
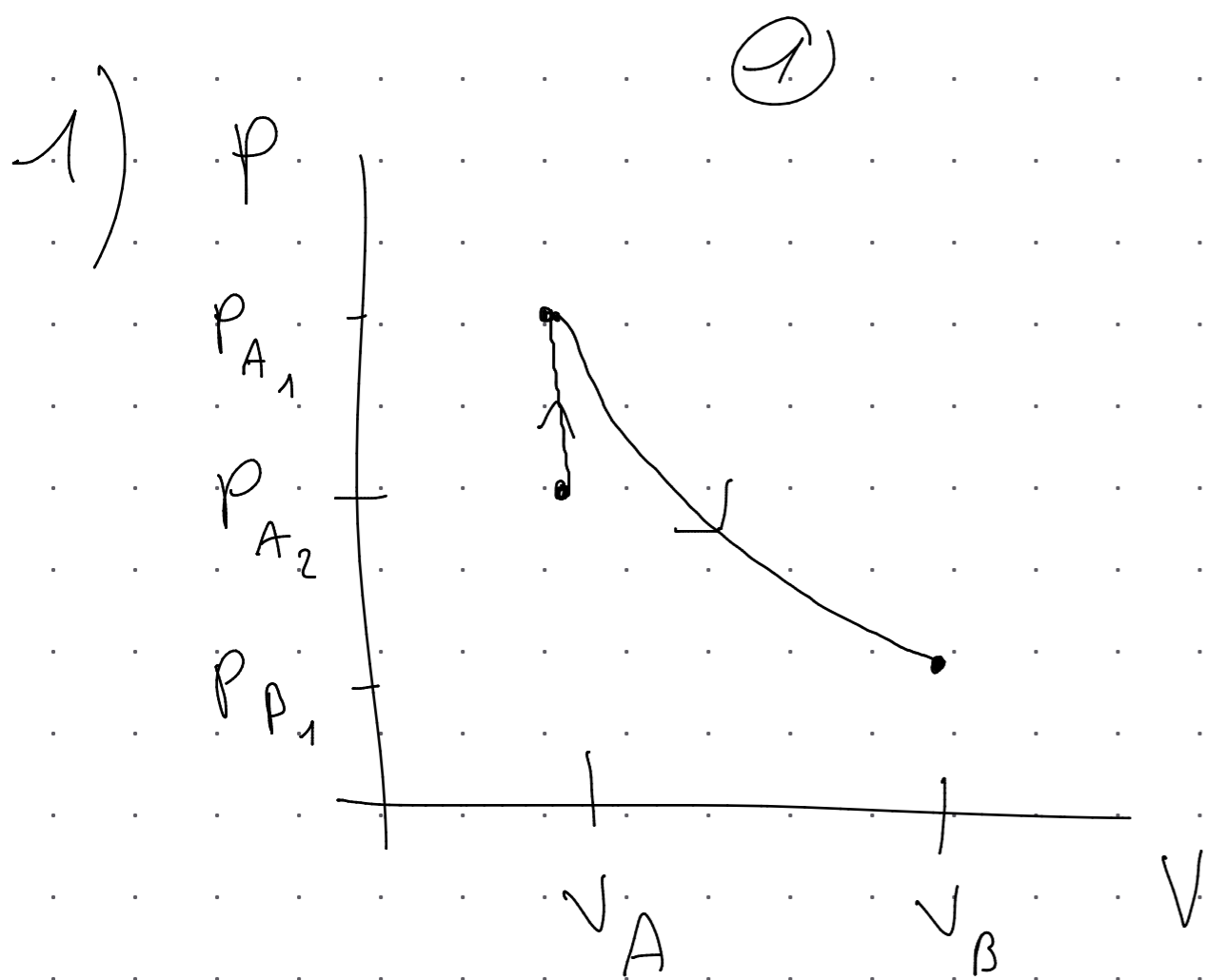
Quasi-statique  $\Rightarrow$  réversible

$$V_A = 5 \text{ l} \quad V_B = 20 \text{ l}$$

$$\gamma = 1,4$$

$$T_A = 287 \text{ K} \quad T_B = 350 \text{ K}$$

$$P_A = ? \quad P_B = ?$$



2)  $\textcircled{1}$  chauffage isochore  $\rightarrow$  détente isotherme

$$W_{11} = 0$$

$$\Delta T = 0$$

$$Q = C_V \Delta T$$

$$C_V = \frac{nR}{\gamma - 1} = \frac{0,5 \times 8,314}{1,4 - 1} = 10,4 \text{ J} \cdot \text{K}^{-1}$$

$$Q_{11} = 10,4 \cdot (350 - 287) \\ = 655,2 \text{ J}$$

$$W_{12} = -nRT \ln\left(\frac{V_f}{V_i}\right) \\ = 0,5 \times 8,314 \times 350 \ln\left(\frac{5}{20}\right) \\ = -8017,0 \text{ J}$$

$$Q_{12} = 2017 \text{ J}$$

isotherme donc

$$\Delta U = 0 \quad W = -Q$$

$$W_1 = W_{11} + W_{12} \\ = -2017 \text{ J}$$

$$Q_1 = Q_{11} + Q_{12} \\ = 655,2 + 2017 \\ = 2672,2 \text{ J}$$

$$\Delta U_1 = W_1 + Q_1 \\ = 655,2 \text{ J}$$

② isotherme  $\Delta U = 0$   $W = -Q$

$$W_{21} = -nRT \ln \left( \frac{V_i}{V_f} \right)$$

$$W_{21} = -0,5 \times 8,314 \times 287 \times \ln \left( \frac{5}{20} \right) \\ = 1654 \text{ J}$$

$$Q_{21} = -1654 \text{ J}$$

chauffage isochore  $W_{22} = 0$

$$Q_{22} = C_V \Delta T \\ = 10,4 \times (350 - 287) \\ = 655,2$$

$$W_2 = W_{21} + W_{22} = 1654 \text{ J}$$

$$Q_2 = Q_{21} + Q_{22} = -1654 + 655,2 = -998,8 \text{ J}$$

$$\begin{aligned}\Delta U_2 &= W_2 + Q_2 \\ &= 1654 - 998,8 \\ &= 655,2\end{aligned}$$

4.) Les évolutions 1 et 2 commencent à un résultat identique mais la 1 a un travail + important.

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