

(A)

A1	δ	A5	a	Σ
A2	γ	B	\wedge	
A3	γ	γ	\wedge	
A4	B	δ	\equiv	
		E	\wedge	

(B) B1 $v_{ev} = \sqrt{\frac{3RT}{M_r}}$

(B)

B2 $\Delta U_{AB} = \Delta U_{A2B}$

(γ)

\dagger $W_{A2B} > W_{AB}$
 $\Delta U_{A2B} = \Delta U_{AB}$

$Q_{A2B} > Q_{AB}$

(Γ)

$$W_{\Gamma A} = 0$$

(Γ1)

$$W_{\Gamma B} = P_{\Gamma B} \Delta V_{\Gamma B}$$

$$= 2 \cdot 10^5 / (-2 \cdot 10^3) = -400 \text{ J}$$

$$W_{AB} = nRT \ln \frac{V_B}{V_A} = P_{AV} \ln 2$$

$$= P_A V_A \cdot \ln 2 = 4 \cdot 10^5 \cdot 2 \cdot 10^{-3} \cdot \ln 2$$

$$= 800 \cdot 0,7 = 560 \text{ J}$$

(Γ2)

$$\Delta U_{AB} = 0$$

$$\Delta U_{\Gamma B} = n C_V \Delta T_{\Gamma B} = \frac{3}{2} n R \Delta T_{\Gamma B} =$$

$$= \frac{3}{2} P_{\Gamma B} \Delta V_{\Gamma B} = \frac{3}{2} \cdot 2 \cdot 10^5 \cdot (-2 \cdot 10^{-3}) =$$

$$= -6 \cdot 10^2 = -600 \text{ J}$$

$$\Delta U_{\Gamma A} = n C_V \Delta T_{\Gamma A} = \frac{3}{2} n R \Delta T_{\Gamma A}$$

$$= \frac{3}{2} V_A \cdot \Delta P_{\Gamma A} = \frac{3}{2} \cdot 2 \cdot 10^{-3} \cdot 2 \cdot 10^5 =$$

$$= 600 \text{ J}$$

$$P_A V_A = P_B V_B \Rightarrow$$

$$4 \cdot 10^5 \cdot 2 \cdot 10^{-3} = P_B \cdot 4 \cdot 10^{-3}$$

$$P_B = 2 \cdot 10^5 \frac{\text{N}}{\text{m}^2}$$

$$Q_{\Gamma A} = \Delta U_{\Gamma A} = 600 \text{ J}$$

$$Q_{\Gamma B} = n C_p \Delta T_{\Gamma B} = \frac{5}{2} n R \Delta T_{\Gamma B}$$

$$= \frac{5}{2} P_{\Gamma B} \Delta V_{\Gamma B} = \frac{5}{2} \cdot 2 \cdot 10^5 \cdot (-2 \cdot 10^{-3})$$

$$= -1000 \text{ J}$$

$$Q_{AB} = 560 \text{ J}$$

(Γ3)

$$\epsilon = \frac{W_{\text{net}}}{Q_{\text{in hot}}} = \frac{W_{\Gamma B} + W_{\Gamma A}}{Q_{AB} + Q_{\Gamma A}}$$

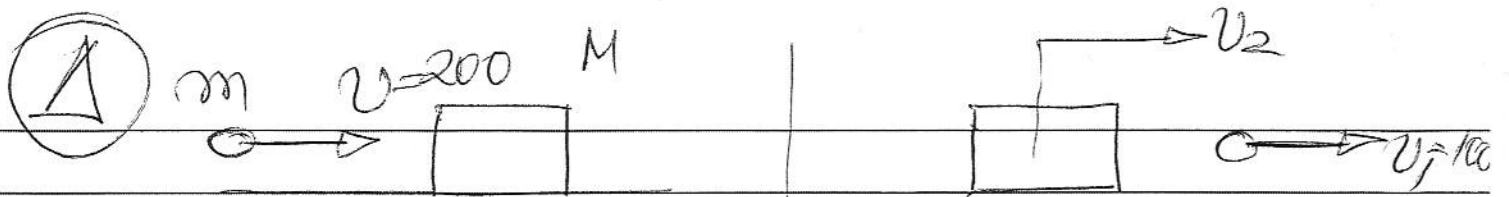
$$= \frac{160}{1160} = \frac{16}{116}$$

(Γ4)

$$\epsilon_c = 1 - \frac{T_c}{T_h} = 1 - \frac{1}{2} = \frac{1}{2}$$

$$\frac{P_{\Gamma} V_{\Gamma} = n R T_{\Gamma} \Rightarrow \frac{T_c}{T_h} = \frac{P_{\Gamma} V_{\Gamma}}{P_A V_A} = \frac{2 \cdot 10^5 \cdot 2 \cdot 10^{-3}}{4 \cdot 10^5 \cdot 2 \cdot 10^{-3}} = \frac{1}{2}$$

$$\frac{P_A V_A = n R T_A}{2}$$



$$\textcircled{11} \quad mv + 0 = mv_1 + M \cdot v_2 \Rightarrow$$

$$0,5 \cdot 200 = 0,5 \cdot 100 + 20v_2$$

$$100 = 50 + 20v_2 \Rightarrow v_2 = \frac{5}{2} \text{ m/sec}$$

$$\textcircled{12} \quad Q = \frac{1}{2}mv^2 - \frac{1}{2}mv_1^2 - \frac{1}{2}Mv_2^2$$

$$= \frac{1}{2}0,5 \cdot 200^2 - \frac{1}{2}0,5 \cdot 100^2 - \frac{1}{2}20 \cdot \frac{25}{4}$$

$$= \frac{1}{2}(20000 - 5000 - 125) = \frac{14875}{2} \text{ J}$$

$$\textcircled{14} \quad X_m = v_1 \cdot t = v_1 \sqrt{\frac{2H}{g}} = 100 \sqrt{\frac{2 \cdot 80}{10}} = 400 \text{ m}$$

$$X_M = v_2 \cdot t = \frac{5}{2} \sqrt{\frac{2H}{g}} = \frac{5}{2} \cdot 4 = 10 \text{ m}$$

$$AB = X_m - X_M = 390 \text{ m}$$

$$\textcircled{13} \quad \vec{F} = \frac{\Delta \vec{P}_{\text{Kл}}}{\Delta t} \Rightarrow \vec{F} = \frac{Mv_2 - 0}{\Delta t} = \frac{20 \cdot \frac{5}{2}}{0,1} = 500 \text{ N}$$

$$\vec{F}_{\text{ш}} = \frac{\Delta \vec{P}_{\text{ш}}}{\Delta t} \Rightarrow \vec{F}_{\text{ш}} = \frac{mv_1 - mv}{\Delta t} = \frac{0,5 \cdot 100 - 0,5 \cdot 200}{0,1} =$$

$$\vec{F}_{\text{ш}} = 500 - 1000 = -500 \text{ N}$$