① $\bar{r} = \bar{v}_0 t + \frac{1}{2} a t^2$ $\quad \bar{a} = 4\hat{i} - 2\hat{j}$ $\quad \bar{v}_0 = 8\hat{i} + 12\hat{j}$

y: $\quad y = 12t - \frac{1}{2} 2t^2$ $\quad \frac{dy}{dt} = 12 - 2t = 0$ $\quad$ då $t = 6s$

vid $t = 6s$ $\quad \bar{v} = \bar{v}_0 + \bar{a}t$

$\bar{v} = (8\hat{i} + 12\hat{j}) + (4\hat{i} - 2\hat{j}) \cdot 6 = 32\hat{i} + 12\hat{j} - 12\hat{j} = \underline{\underline{32\hat{i}}}$

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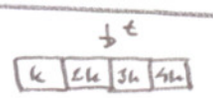
②



$\Delta t_1 + \Delta t_2 + \Delta t_3 + \Delta t_4 = 25°C$ (1)

Värmeledning: $P = k \cdot S \frac{\Delta t}{l}$ samma flöde i alla delar

$\Rightarrow k \cdot \Delta t_1 = 2k \cdot \Delta t_2 = 3k \Delta t_3 = 4k \Delta t_4 \quad \Rightarrow \Delta t_2 = \frac{1}{2} \Delta t_1 \quad \Delta t_3 = \frac{1}{3} \Delta t_1$

$\Delta t_4 = \frac{1}{4} \Delta t_1$

Ins. i (1)

$\Rightarrow \Delta t_1 \left(1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}\right) = 25 \quad \Rightarrow \Delta t_1 \cdot \frac{25}{12} = 25 \Rightarrow \Delta t_1 = 12°C$;; $\Delta t_2 = 6°C$

;; $t = 12 + 6 = \underline{\underline{18°C}}$

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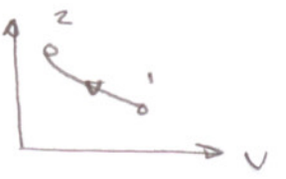
③ Adiabat: $pV^\gamma = konst$ $\quad \gamma = \frac{7}{5}$



$V_1 = 200\,l$ $\quad V_2 = 74{,}1\,l$ $\quad p_1 = 1\,atm$ $\quad T_1 = 300\,K$

;; $p_2 = p_1 \left(\frac{V_1}{V_2}\right)^{7/5} = 1 \left(\frac{200}{74{,}1}\right)^{7/5} = 3{,}98\,atm.$

Allm. gaslagen: $pV = nRT$

$1 \cdot 200 = nR \cdot 300$

$3{,}98 \cdot 74{,}1 = nR\,T_2$

$\Rightarrow T_2 = 300 \frac{3{,}98 \cdot 74{,}1}{1 \cdot 200} = \underline{\underline{445\,K}}$

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④

$l = \frac{l_0}{2}(1 + \alpha \cdot \Delta t)$

$\alpha = 25 \cdot 10^{-6}$

$l_0/2 = 1{,}50\,m$

$\Delta t = 32°C$

$\cos\theta = \frac{l_0/2}{l_0/2\,(1 + \alpha \cdot \Delta t)}$

$\tan\theta = \frac{x}{l_0/2} \Rightarrow x = \tan\theta \cdot \frac{l_0}{2} = 0{,}06\,m = \underline{\underline{6\,cm}}$

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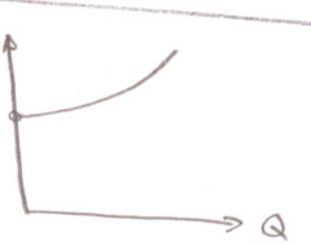
⑤ Isoterm expansion: $Q = nRT \cdot \ln \frac{V_f}{V_i}$

avläsning: $V_f \approx 0{,}33\,m^3$ $\quad V_i = 0{,}20\,m^3$

$Q = 1200\,J$



$T = \frac{Q}{nR \cdot \ln \frac{V_f}{V_i}} = \frac{1200}{0{,}825 \cdot 8{,}31 \cdot \ln \frac{0{,}33}{0{,}20}} = \underline{\underline{350\,K}}$