



• 4/11/03

$$R = 10 \text{ cm} = 1,0 \cdot 10^{-1} \text{ m}$$

$$v_0 = 200 \text{ m/s} = 2,00 \cdot 10^2 \text{ m/s}$$

$$m = 10 \text{ g} = 1,0 \cdot 10^{-2} \text{ kg}$$

$$1) \quad \frac{1}{2} m v_0^2 = f e \quad f = \frac{1}{2} \frac{m v_0^2}{e} = \frac{1}{2} \frac{10^{-2} \cdot 4 \cdot 10^4}{10^{-1}} =$$

$$= \underline{20 \cdot 10^3 \text{ N}}$$

$$2) \quad f = m a$$

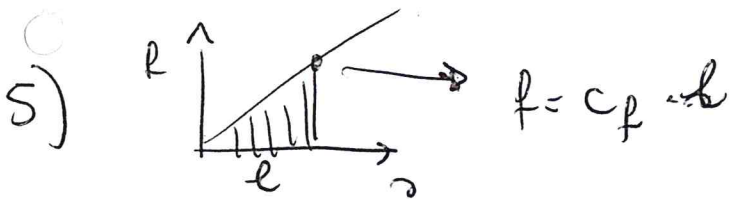
$$a = \frac{f}{m} = \frac{2 \cdot 10^3}{10^{-2}} = \underline{2,0 \cdot 10^5 \text{ m/s}^2}$$

$$3) \quad v = v_0 - a t \quad 0 = v_0 - a t \quad t = \frac{v_0}{a} = \frac{2 \cdot 10^2}{2 \cdot 10^5} =$$

$$x = 0,12 \text{ m} = 1,2 \cdot 10^{-1} \text{ m} \quad = \underline{1 \cdot 10^{-3} \text{ s}}$$

$$4) \quad \frac{1}{2} k x^2 = \frac{1}{2} m v_0^2$$

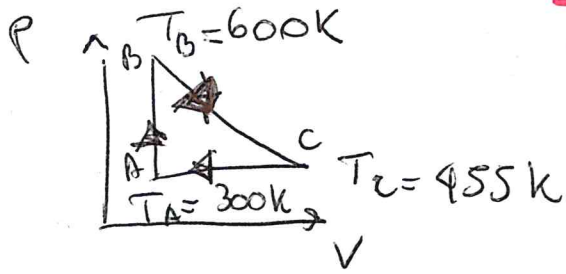
$$k = \frac{m v_0^2}{x^2} = \frac{10^{-2} \cdot 4 \cdot 10^4}{1,44 \cdot 10^{-2}} = \underline{2,8 \cdot 10^4 \frac{\text{N}}{\text{m}}}$$



$$\frac{1}{2} m v_0^2 = \frac{1}{2} c_f e^2 \quad c_f = \frac{m v_0^2}{e^2} = \frac{10^{-2} \cdot 4 \cdot 10^4}{10^{-2}} =$$

$$= \underline{4,0 \cdot 10^8 \frac{\text{N}}{\text{m}}}$$

# II



1)  $Q_{AB} = C_V \Delta T = \frac{3}{2} R \cdot 300 = 3,74 \cdot 10^3 \text{ J}$

$Q_{BC} = 0$  adiab.!

$Q_{CA} = C_P \Delta T = -\frac{5}{2} R \cdot 155 = -3,22 \cdot 10^3 \text{ J}$

$Q_{TOT} = +0,52 \cdot 10^3 \text{ J}$

2)  $L_{AB} = 0$  isocore!  $\Delta V = 0$ !

$L_{BC} = -\Delta U_{BC} = 1,81 \cdot 10^3 \text{ J}$  del I  
mimo p'0!

~~U\_{CA}~~

$L_{CA} = P_A \cdot (V_A - V_C) = P_A \left( \frac{R T_A}{P_A} - \frac{R T_C}{P_C} \right) = R (T_A - T_C) =$   
 $= 8,31 \cdot (-155) = -1,29 \cdot 10^3 \text{ J}$

$L_{TOT} = 0,52 \cdot 10^3 \text{ J}$

$\rightarrow = Q_{TOT}$  ulsto  
ile  
 $\Delta U_{TOT} = 0$

3)  $\Delta U_{AB} = C_V \Delta T = 3,74 \cdot 10^3 \text{ J}$

$\Delta U_{BC} = C_V \Delta T = \frac{3}{2} R \cdot (-155) = -1,81 \cdot 10^3 \text{ J}$

$\Delta U_{CA} = C_V \Delta T = \frac{3}{2} R \cdot (-155) = -1,93 \cdot 10^3 \text{ J}$

$\Delta U_{TOT} = 0$  verifikuoto

4)  $\eta = \frac{L_{TOT}}{Q_{AB}} = \frac{0,52 \cdot 10^3}{3,74 \cdot 10^3} = 0,139 \rightarrow 14\%$

5)  $P_A = 1,00 \text{ atm}$   $P_C = 1,00 \text{ atm}$   $V_A = V_B$   $\frac{R T_A}{P_A} = \frac{R T_B}{P_A}$   $P_B = P_A \frac{T_B}{T_A}$