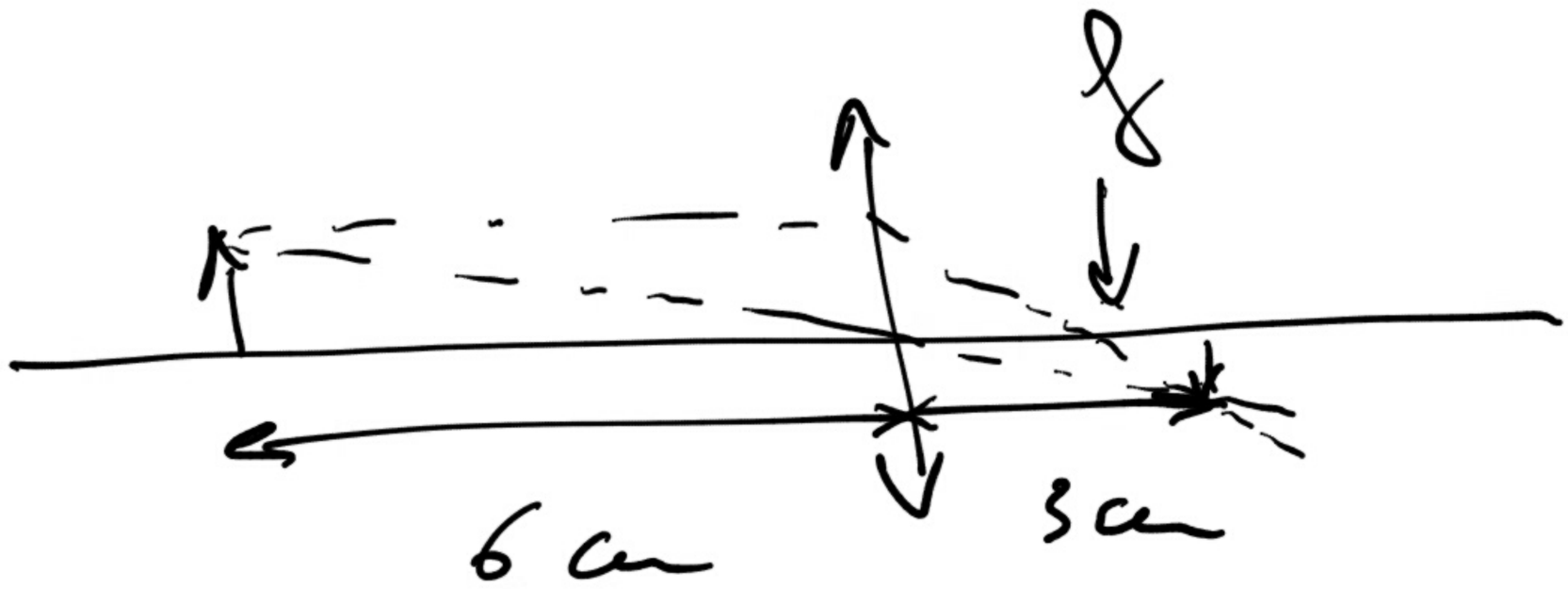
1



Linsenmakerformel: $\frac{1}{f} = \frac{1}{b} + \frac{1}{b}$

$$\frac{1}{f} = \frac{1}{6} + \frac{1}{3} = \frac{1}{6} + \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$$

$$\Rightarrow f = 2\,\text{cm}$$

B

② $p \cdot V = n R T$

$\Rightarrow p = \frac{n R T}{V}$

n = zelfde hoeveelheid

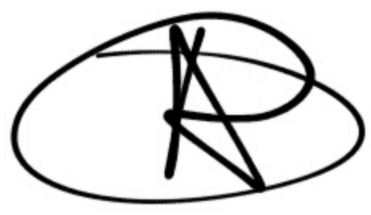
R = C^{te}

Bij een gegeven T en V geldt volgens de grafiek altijd

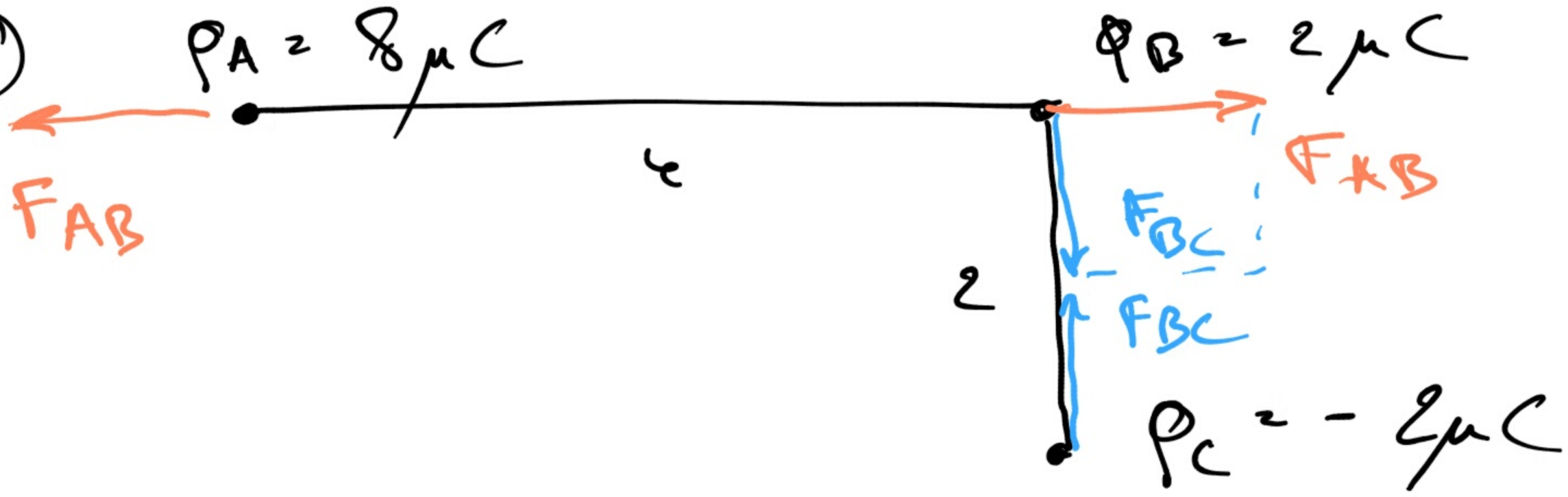
$V_1 < V_2 < V_3$

en dus

$p_1 > p_2 > p_3$



3



$$F_2 \quad \frac{\varphi_1 \cdot \varphi_2}{4\pi\varepsilon_0\varepsilon_r r^2} = C \cdot \frac{\varphi_1 \varphi_2}{r^2}$$

$$F_{AB} = C \cdot \frac{8 \cdot 2}{4^2} = C \cdot \frac{16}{16} = 1\,C$$

$$F_{BC} = C \cdot \frac{2(-2)}{2^2} = C \cdot \frac{-4}{4} = -1\,C$$

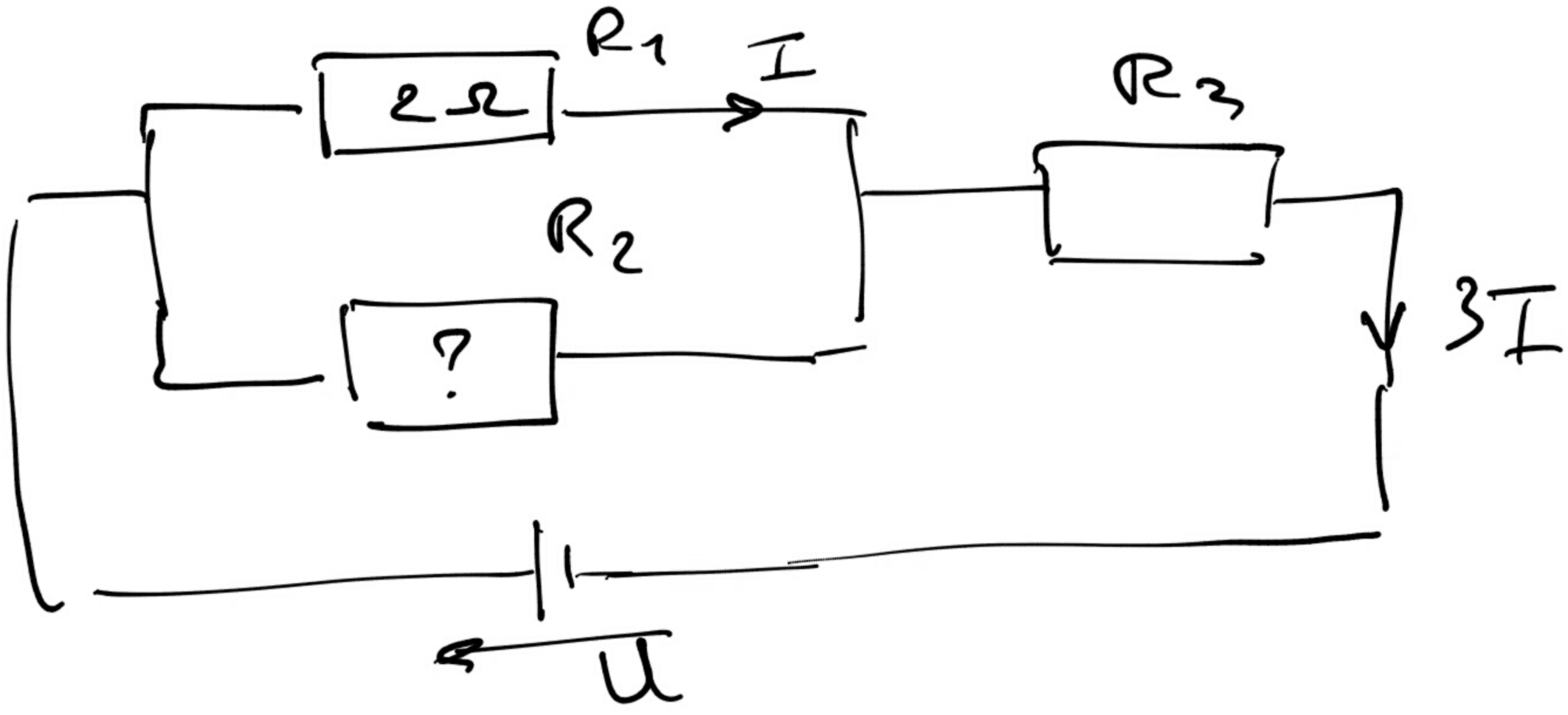
$$|F_{AB}| = |F_{BC}|$$

Even groot en $\perp$ op elkaar

$\Rightarrow$ resultante $\rightarrow$ 45° naar buiten

C

4



$$I_2 = I_3 - I_1 = 3I - I = 2I$$

$$U_2 = U_1$$

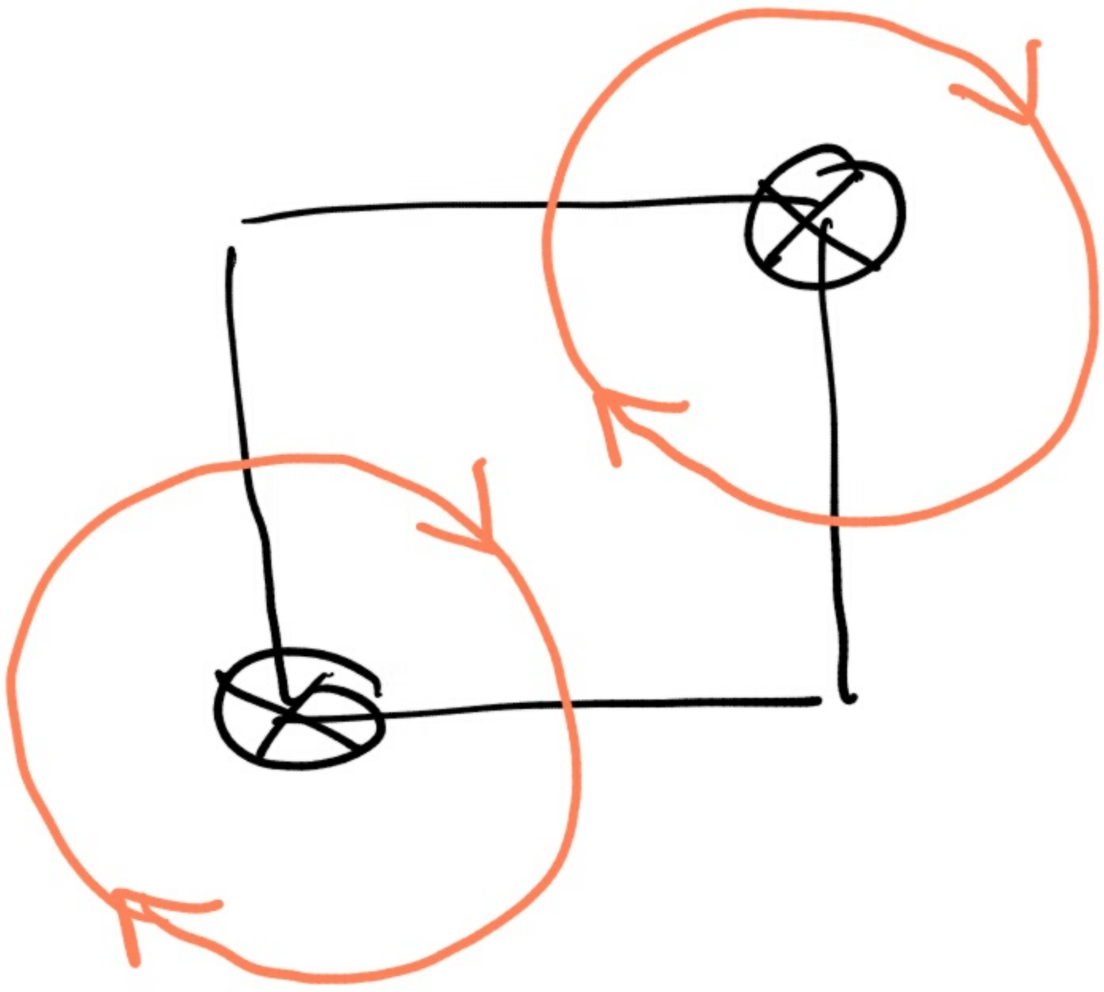
$$\Rightarrow R_1 = \frac{U_1}{I} \qquad R_2 = \frac{U_1}{2I}$$

$$R_2 = \frac{1}{2} R_1$$

$$= 1\Omega$$

A

5



B

Rechterhandregel:

→ duim richting draad

→ veldlijnen richting vingers

Enkel in figuur B zijn de veldlijnen gelijke in grootte en tegengesteld in richting. P is dus waar beide geleiders elkaar opheffen de velden

(6) $^{232}_{90}Th$

α - deeltje $= 2n + 2p$

β - deeltje $\begin{cases} \beta^+ \rightarrow e^+ \text{ (positron)} \\ \beta^- \rightarrow e^- \end{cases}$

$n \begin{cases} p^+ & \text{proton} \\ e^- & \text{elektron} \\ \overline{\nu_e} & \text{antineutrino} \end{cases}$

- 2 α deeltjes

$^{232}_{90}Th - {}^{4}_{2}X \Rightarrow$ $232 - 2.4 = 226$

$90 - 2.2 = \underline{86}$

- 2 β^- deeltjes $\rightarrow = +2 p^+$

$86 + 2 = 88$

(C)

(7) $t = 0 \rightarrow A_0$

$t = 200\ s \rightarrow A_0/32$

$N = N_0 \cdot e^{-\lambda \cdot t}$ → vervalconstante

$\frac{1}{2} N_0 = N_0 \cdot e^{-\lambda t_{1/2}}$

$\ln \frac{1}{2} = -\lambda t_{1/2} \Rightarrow -\ln 2 = -\lambda t_{1/2}$

$\Rightarrow \lambda = \frac{\ln 2}{t_{1/2}}$

$\frac{A_0}{32} = A_0 \cdot e^{-\lambda \cdot 200}$

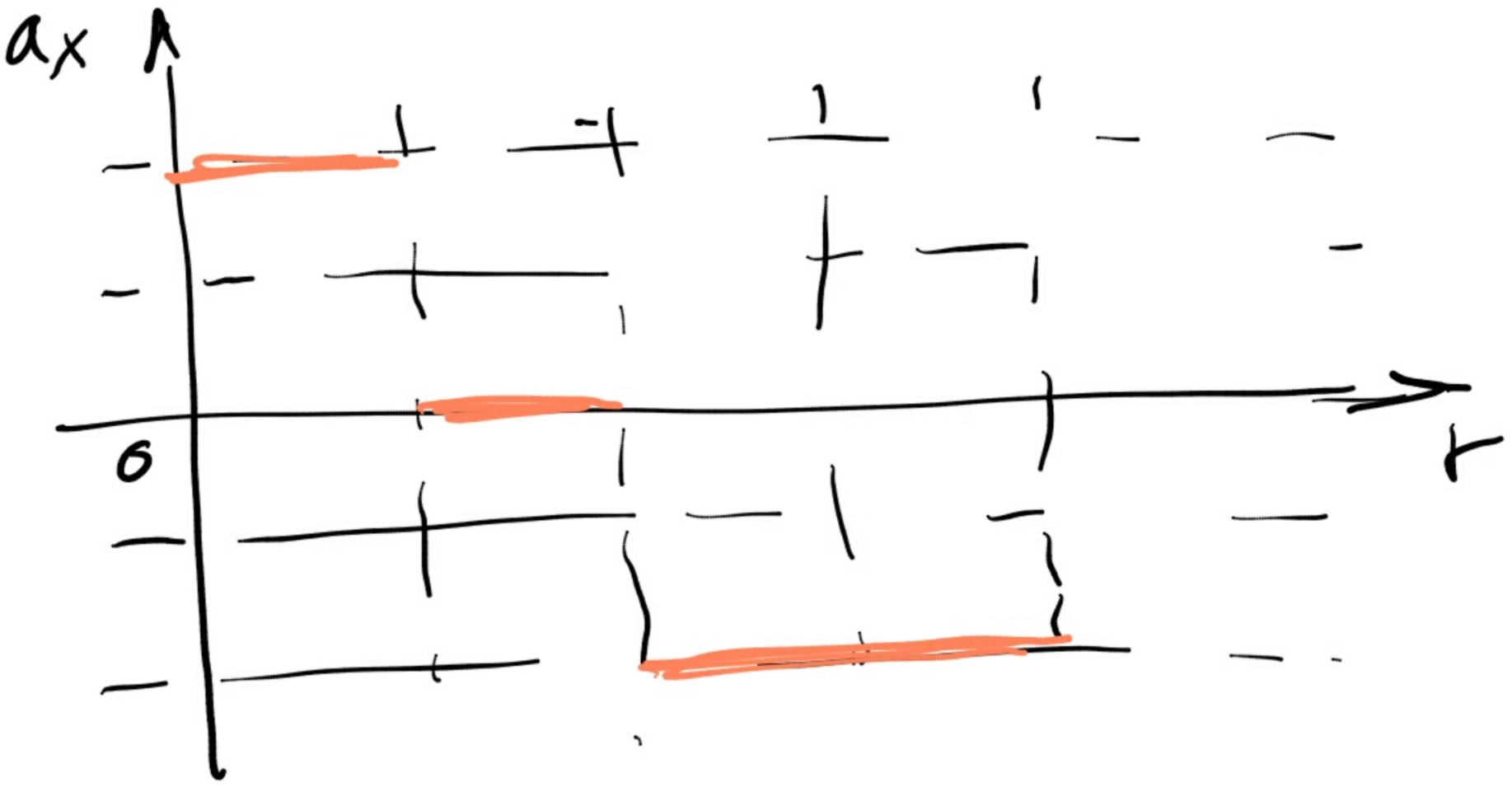
$\ln\left(\frac{1}{2^5}\right) = -\lambda\, 200$

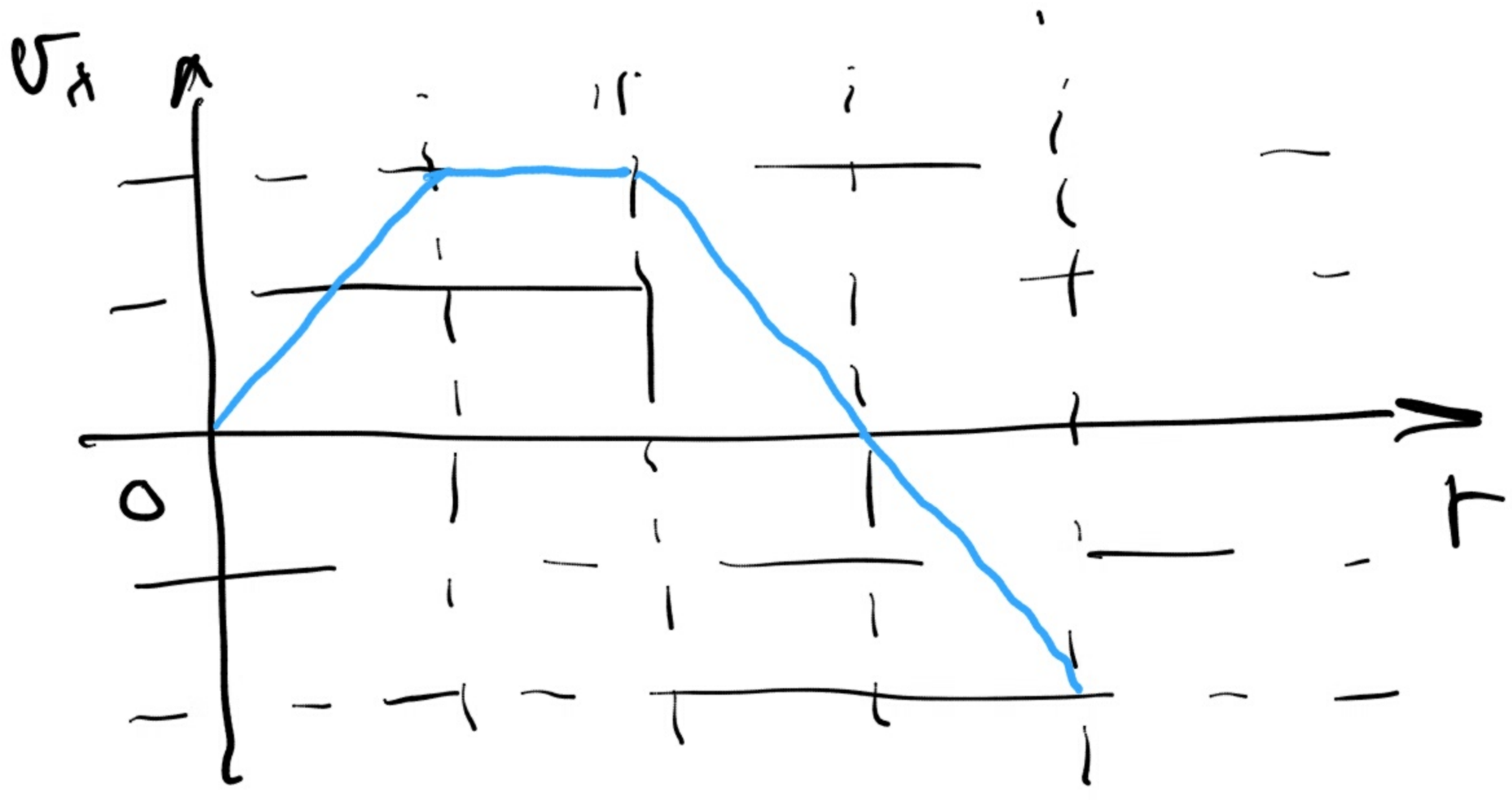
$-5 \ln(2) = -\frac{\ln 2}{t_{1/2}} \cdot 200$

$t_{1/2} = \frac{200}{5} = 40\ s$

B

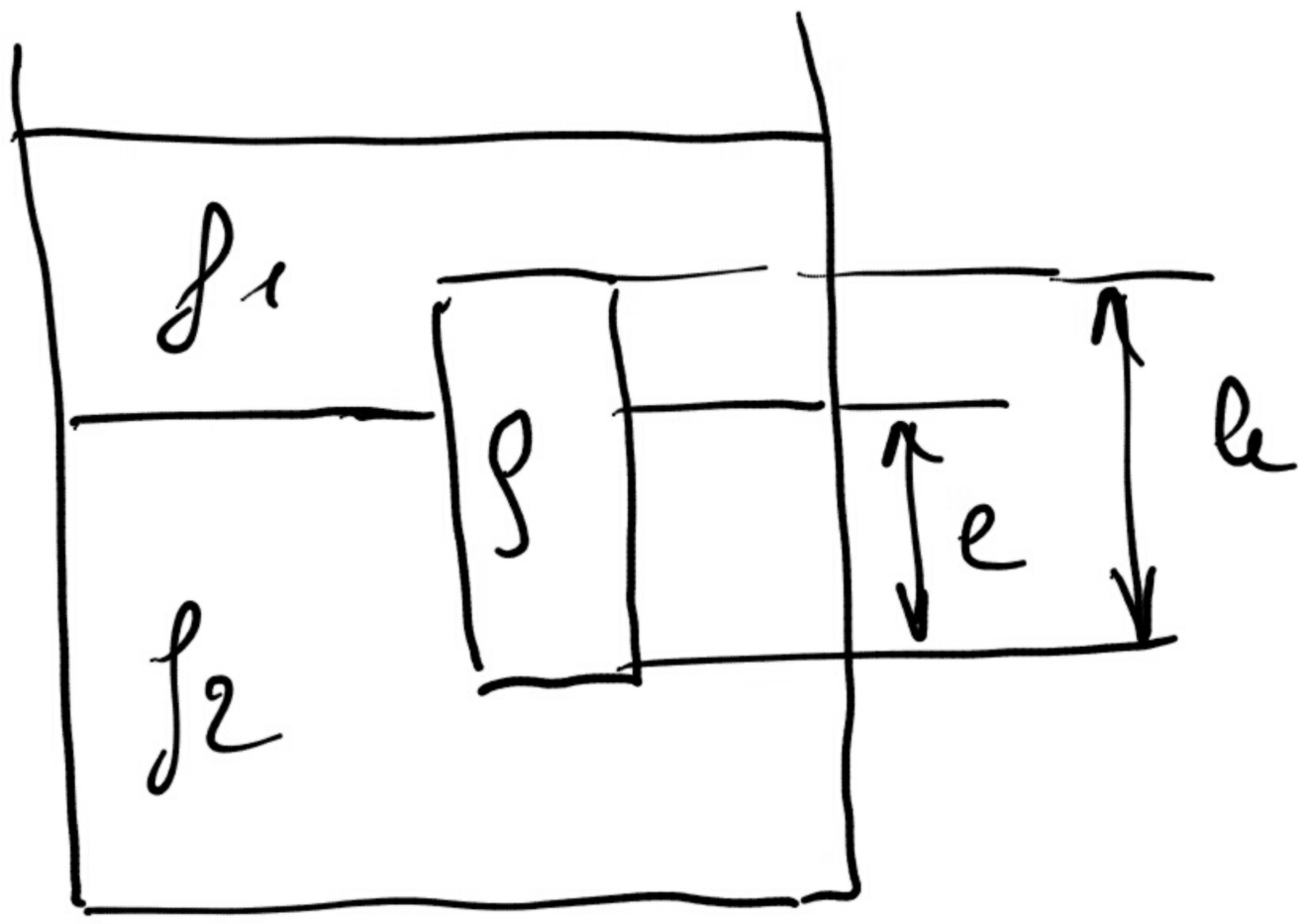
8





C

9



Cylinder : $V_c = \pi r^2 \cdot h$

$V_{c_1} = \pi r^2 (h - \ell)$

$V_{c_2} = \pi r^2 \ell$

Archimedes : $F = \rho \cdot g \cdot V$

$\rho \cdot V_c \cdot g = \rho_1 \cdot V_{c_1} g + \rho_2 V_{c_2} \cdot g$

$\rho \cancel{\pi r^2} \cdot h = \rho_1 \cancel{\pi r^2} (h - \ell) + \rho_2 \cancel{\pi r^2} \cdot \ell$

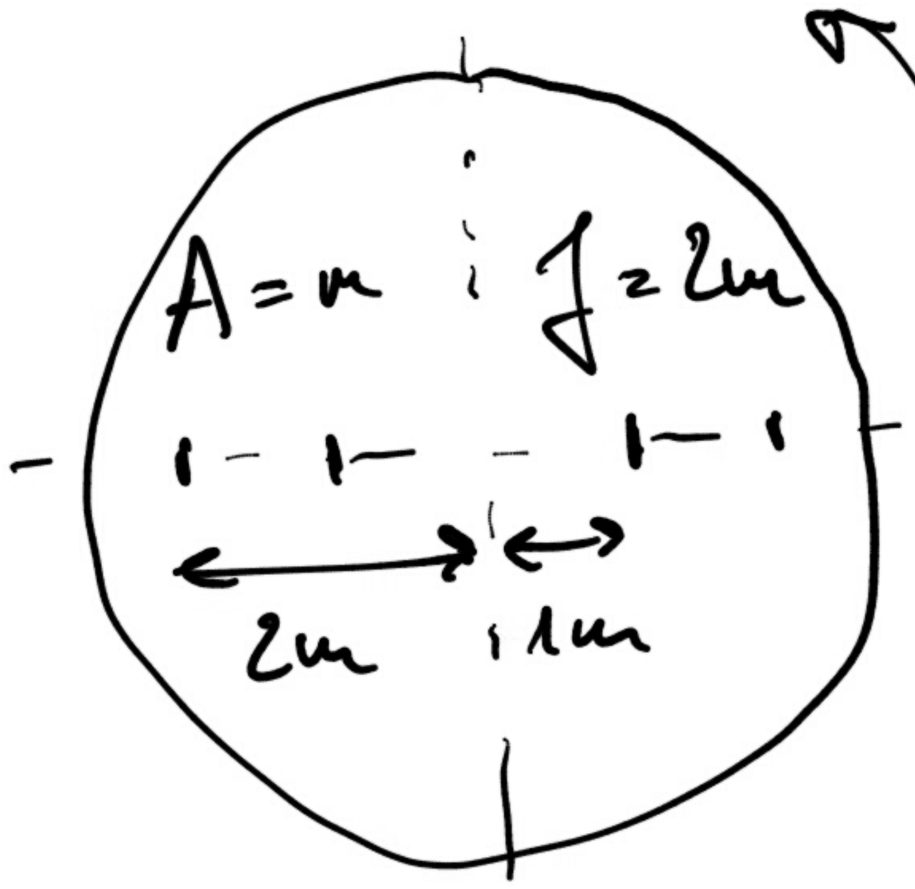
$\rho \cdot h = \rho_1 \cdot h - \rho_1 \ell + \rho_2 \cdot \ell$

$h (\rho - \rho_1) = \ell (\rho_2 - \rho_1)$

$\frac{\ell}{h} = \frac{\rho - \rho_1}{\rho_2 - \rho_1}$

B

10



1 h = 15 d

ω = zelfde voor A als J

$$\omega = \frac{v}{r} \Rightarrow \frac{v_J}{1} = \frac{v_A}{2}$$

$$E_{kJ} = \frac{m_J \cdot v_J^2}{2} = \frac{2m\,(v_A/2)^2}{2}$$

$$E_{kA} = \frac{m_A \cdot v_A^2}{2} = \frac{m \cdot v_A^2}{2}$$

$$\frac{E_{kJ}}{E_{kA}} = \frac{\frac{2m \cdot v_A^2}{8}}{\frac{m \cdot v_A^2}{2}} = \frac{2}{8} \cdot 2 = \frac{4}{8} = \frac{1}{2}$$

C