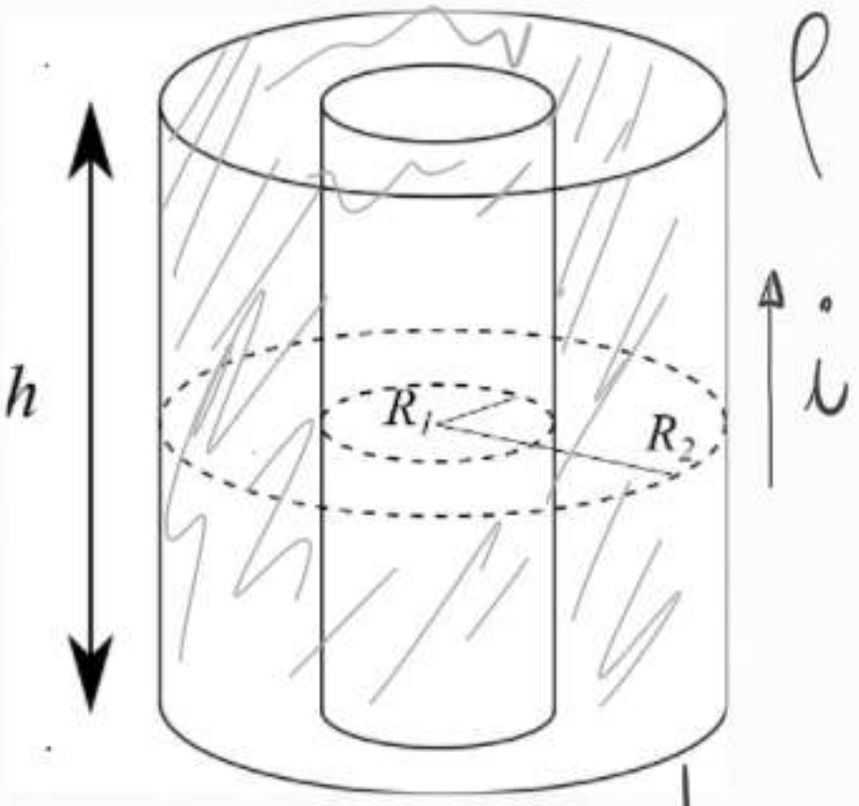


1) $R = ?$

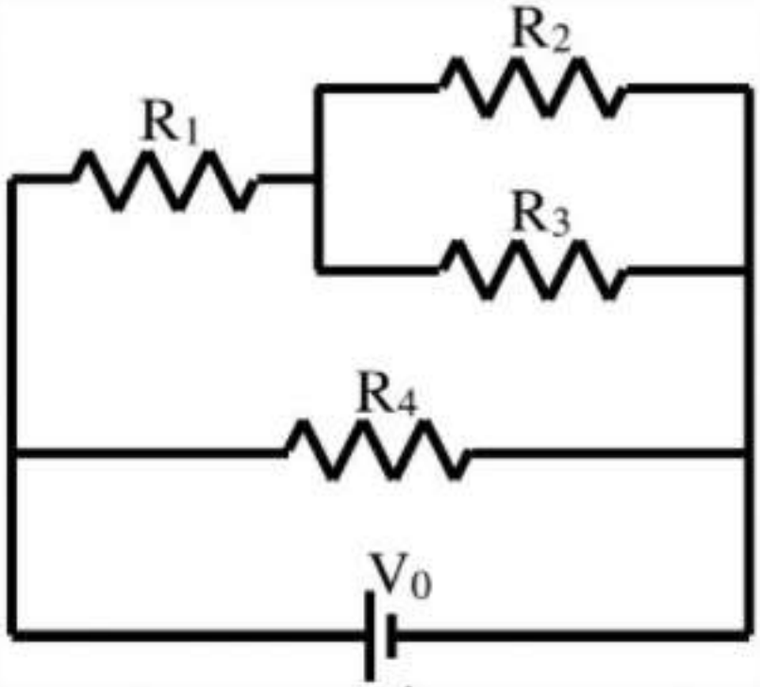
2) $R_1 = 1\,mm$, $R_2 = 1.5\,mm$,
$i = 500\,mA$, $E = 10\,V/m$,
$\rho = ?$

1) $$R = \int_0^h \frac{\rho\, dh'}{\Sigma(h')} = \rho \int_0^h \frac{dh'}{\Sigma} = \frac{\rho}{\Sigma} h = \frac{\rho h}{\pi (R_2^2 - R_1^2)}$$

$$\underline{R = \frac{\rho h}{\Sigma}}, \underline{E, i, \Sigma}, \boxed{\Delta V = R i} = \frac{\rho h}{\Sigma} i$$

$$\Delta V = E h = \frac{\rho h i}{\Sigma} \Rightarrow \boxed{E = \frac{\rho i}{\Sigma}} = \rho J \Rightarrow$$

$$\rho = \frac{E}{J} = \frac{E \Sigma}{i} = \frac{E \pi (R_2^2 - R_1^2)}{i}$$



$R_1 = 1\,\Omega$, $R_2 = 3\,\Omega$, $R_3 = 2\,\Omega$, $R_4 = 2\,\Omega$

$V_0 = 6V$

1) $R_{eq} = ?$, 2) $C_1, C_2, C_3, C_4 = ?$

R_1

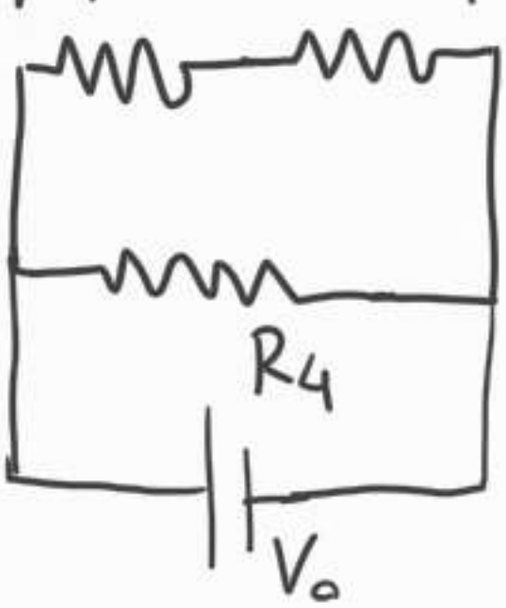
R_4

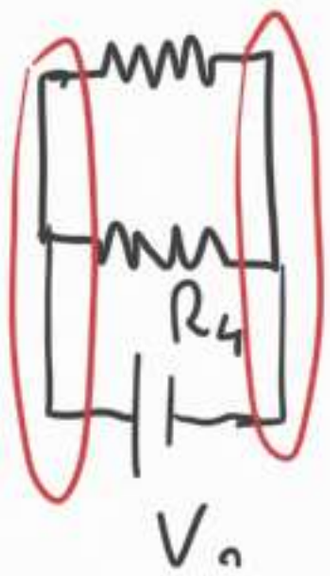
V_0

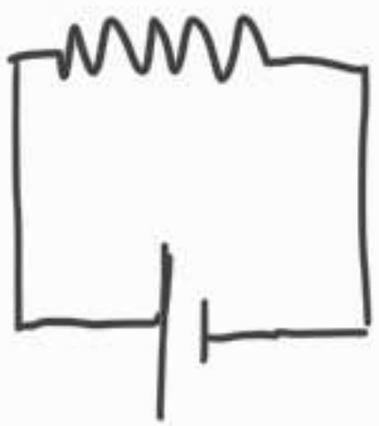
$$R_{eq}^{(1)} = \frac{R_2 R_3}{R_2 + R_3} = \frac{6}{5}\,\Omega$$

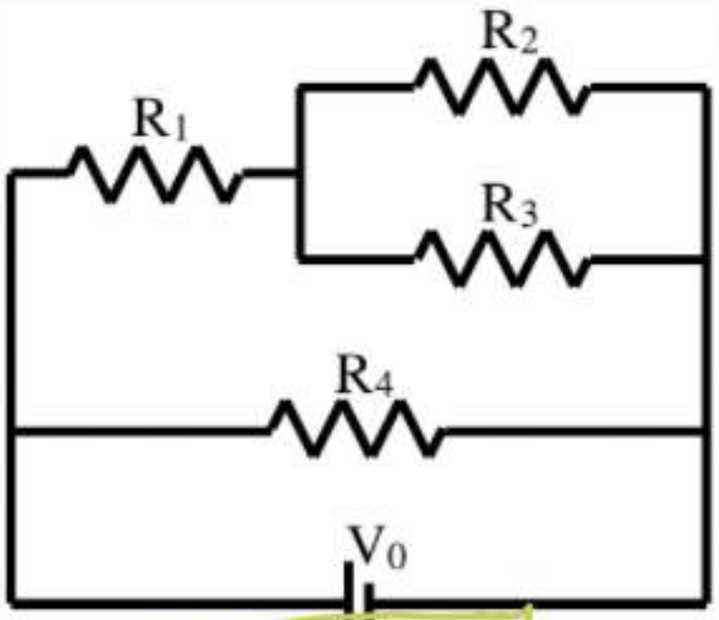
$$R_{eq}^{(2)} = \frac{11}{5}\,\Omega$$

$$R_{eq}^{(3)} = \frac{R_4 R_{eq}^{(2)}}{R_4 + R_{eq}^{(2)}} = 1.05\,\Omega$$



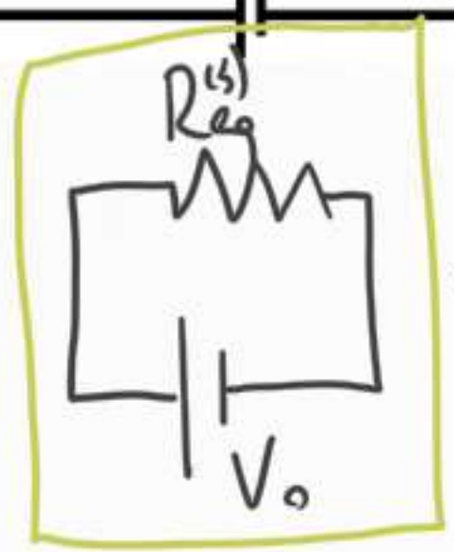


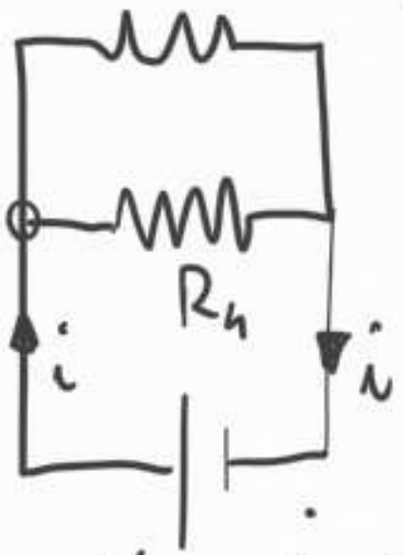




$$P = R i^2$$

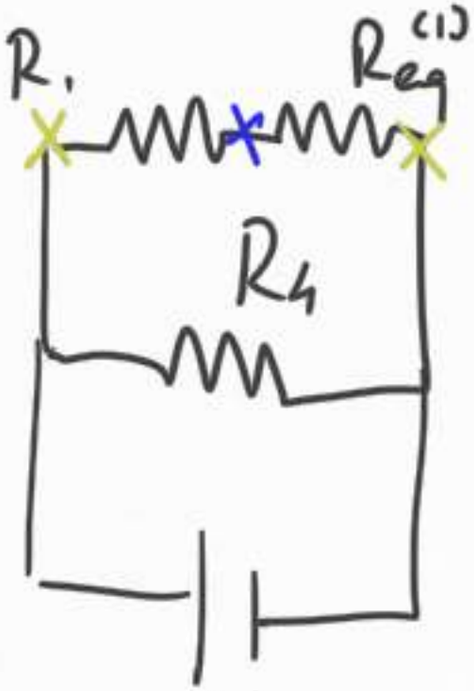
$R_{eq}^{(1)}$ $\quad i_{eq}^{(2)} = \dfrac{V_0}{R_{eq}^{(2)}} = i - i_4$





$$V_0 = R_{eq}^{(3)}\, i \Rightarrow i = V_0 / R_{eq}^{(3)}$$

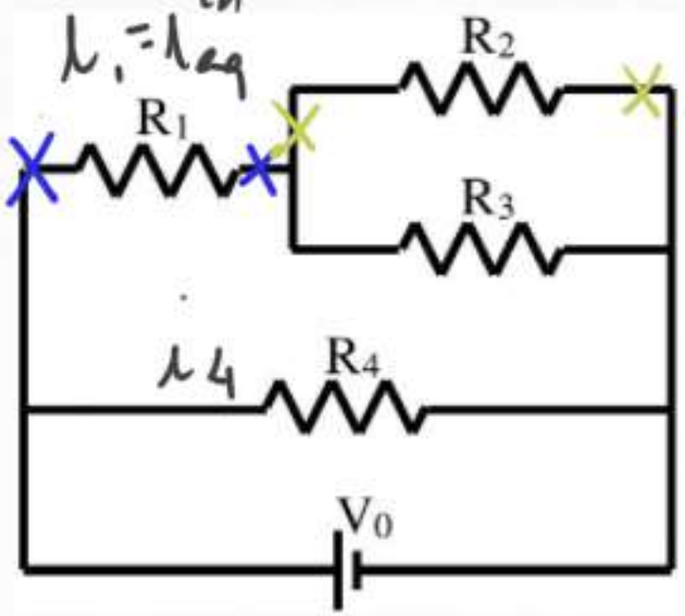
$$i_4 = \frac{V_0}{R_4}$$



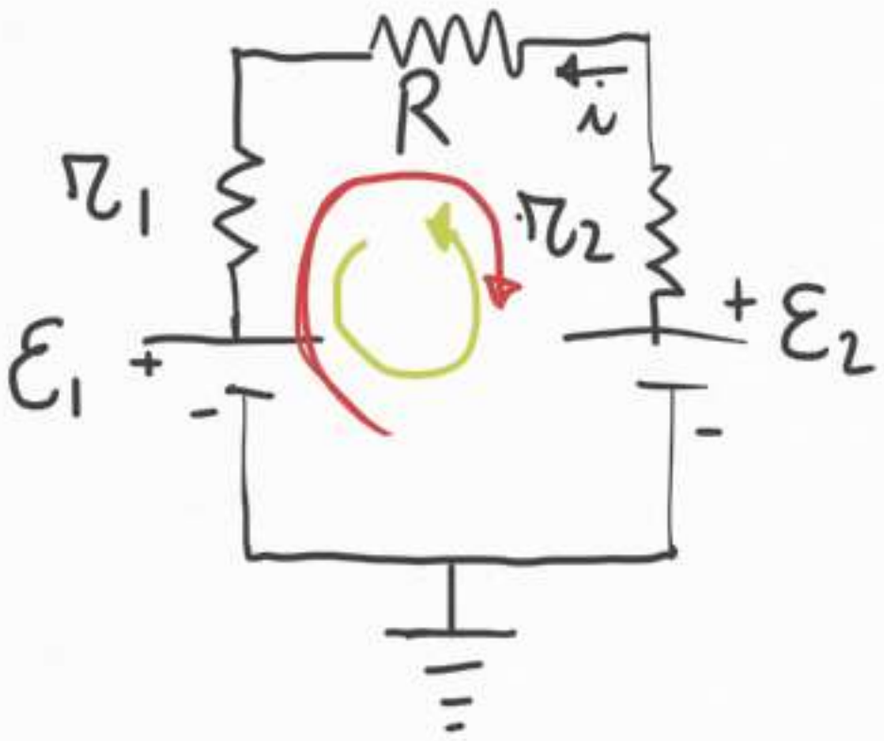
$i_1 = i_{eq}^{(2)} = i_{eq}^{(1)}$

V_0

$$i_2 = \frac{\Delta V_2}{R_2} = \frac{V_0 - \Delta V_1}{R_2} = \frac{V_0 - R_1 i_1}{R_2}$$



$$i_3 = \frac{V_0 - R_1 i_1}{R_3}, \quad i_1 = i_2 + i_3$$



$\varepsilon_1 = 50V,\ \varepsilon_2 = 100V,\ R = 50\,\Omega$

$r_1 = 20\,\Omega,\ r_2 = 30\,\Omega$

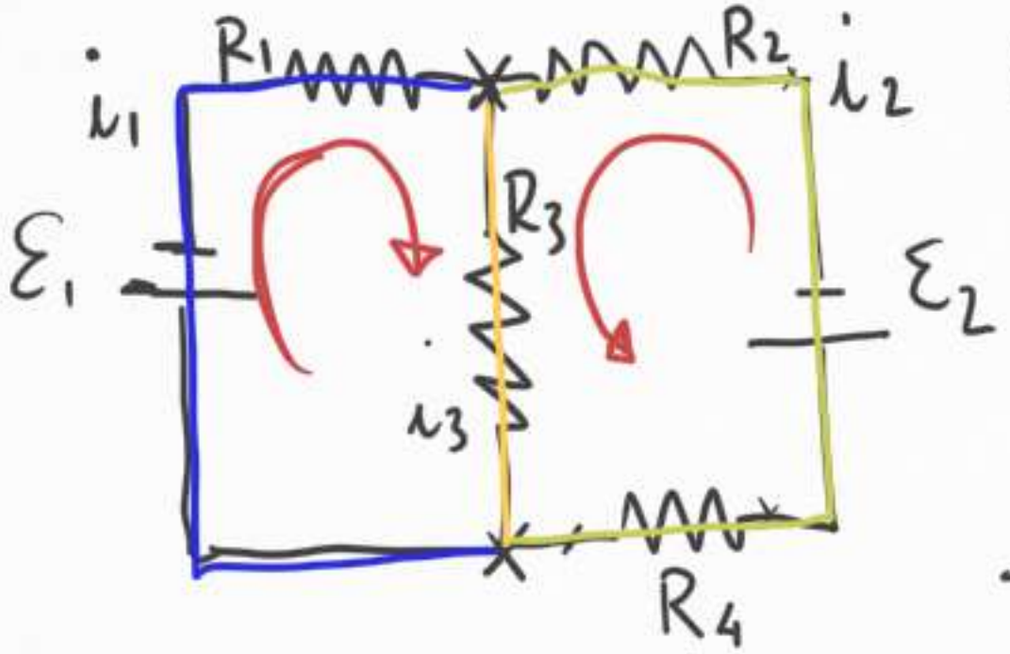
$i = ?$

$$\varepsilon_1 - \varepsilon_2 = (r_1 + r_2 + R)\, i \Rightarrow$$

$$\boxed{i = \frac{\varepsilon_1 - \varepsilon_2}{r_1 + r_2 + R} < 0}$$

$$-\varepsilon_1 + \varepsilon_2 = (r_1 + r_2 + R)\, i \Rightarrow$$

$$\boxed{i = \frac{\varepsilon_2 - \varepsilon_1}{r_1 + r_2 + R} > 0}$$



$\mathcal{E}_1 = 18V,\ \mathcal{E}_2 = 12V,\ R_1 = 12\Omega,\ R_2 = 2\Omega$

$R_3 = 6\Omega,\ R_4 = 4\Omega$

$i_3 = i_1 + i_2$

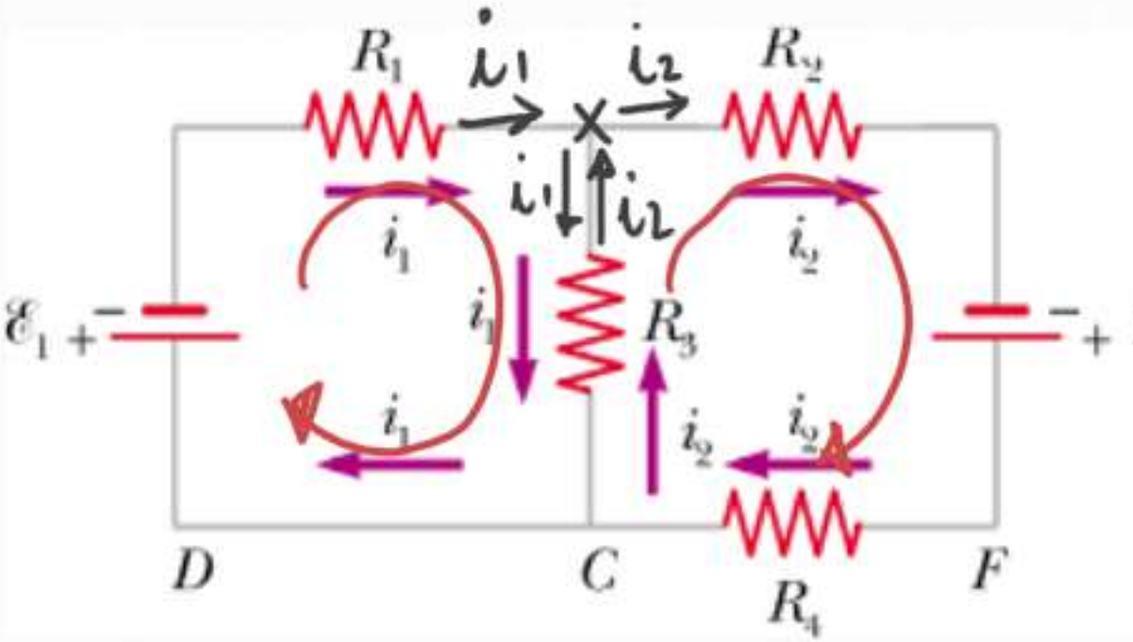
$-\mathcal{E}_1 = R_1 i_1 + R_3 (i_1 + i_2)$

$-\mathcal{E}_2 = (R_2 + R_4) i_2 + R_3 (i_1 + i_2)$

$-18 = 18 i_1 + 6 i_2$

$-12 = 12 i_2 + 6 i_1$

$\Rightarrow \begin{cases} i_1 = 0.8\,A \\ i_2 = 0.6\,A \end{cases} \quad i_3 = 1.4\,A$



$$\begin{cases} -\mathcal{E}_1 = R_1 i_1 + R_3 i_1 - R_3 i_2 \\ \mathcal{E}_2 = (R_2 + R_4) i_2 + R_3 i_2 - R_3 i_1 \end{cases}$$

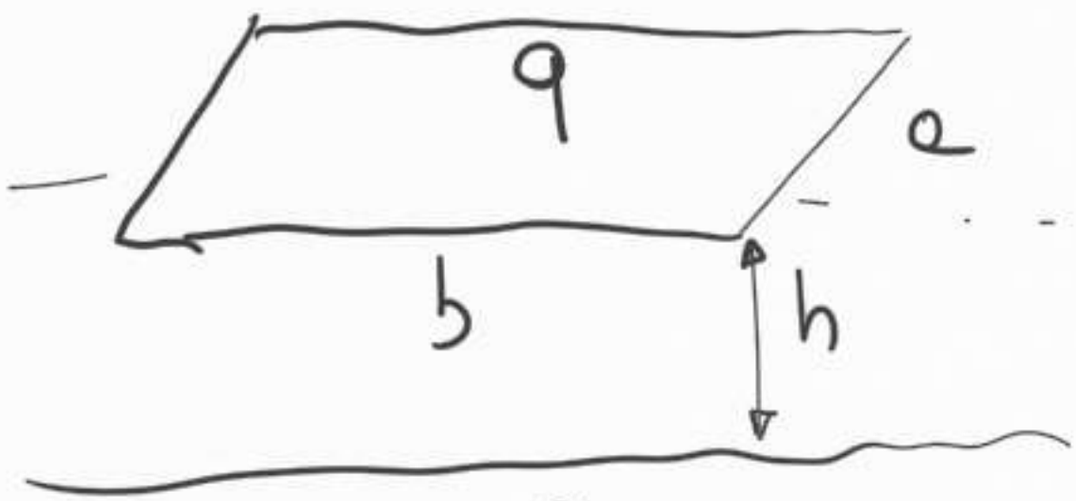
$$i_3^S = i_1 - i_2$$

$$i_3^D = i_2 - i_1$$

$$-\mathcal{E}_1 = R_1 i_1 + R_3 i_3^S = R_1 i_1 + R_3 (i_1 - i_2)$$

$$\mathcal{E}_2 = (R_2 + R_4) i_2 + R_3 i_3^D =$$

$$= (R_2 + R_4) i_2 + R_3 (i_2 - i_1)$$



$a = 2\,km$, $b = 3\,km$, $h = 500\,m$

$q = -80\,C$

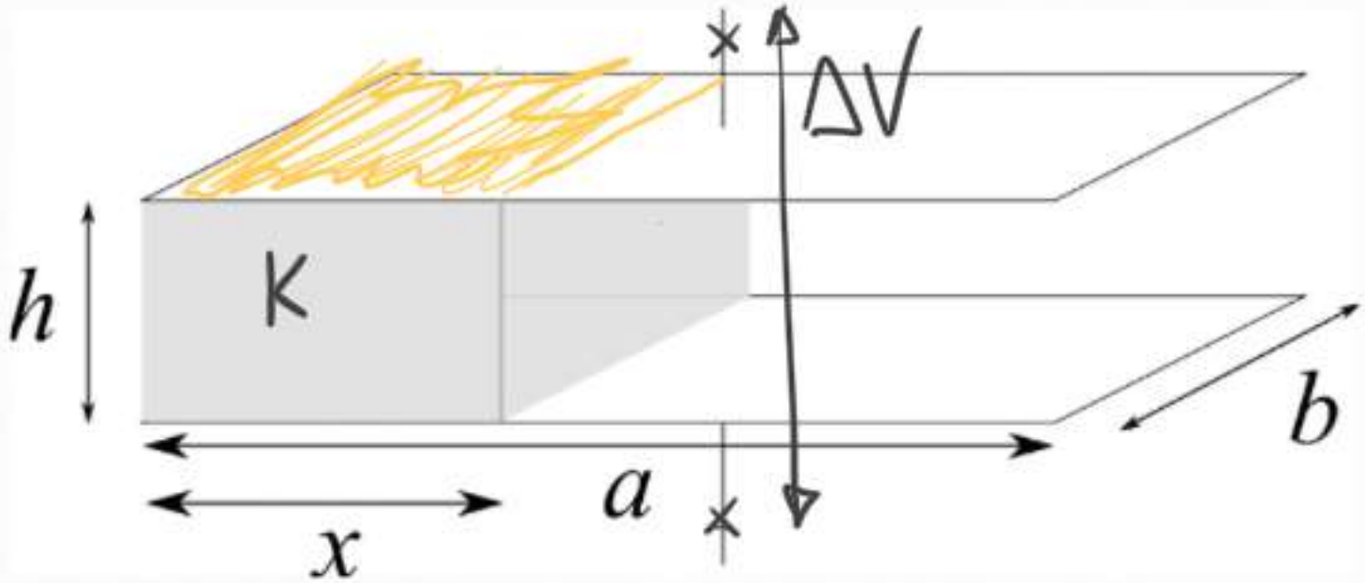
1) $3 \cdot 10^6 \boxed{V/m}$, 2) $U_e = ?$

a) $E = \frac{\sigma}{\varepsilon_0} = \frac{q}{ab\varepsilon_0} < 3 \cdot 10^6 V/m$

b) $C = \frac{\varepsilon_0 \Sigma}{h} = \frac{\varepsilon_0 ab}{h}$, $\Delta V = \frac{q}{C} = \frac{qh}{ab\varepsilon_0} = Eh \Rightarrow$

$E = \frac{q}{ab\varepsilon_0}$

2) $U_e = \frac{1}{2}\frac{q}{C^2} = \frac{1}{2} q \Delta V = \frac{1}{2} C \Delta V^2$



$a \times b \times h$, $x = \frac{a}{3}$, ΔV

1) q_d