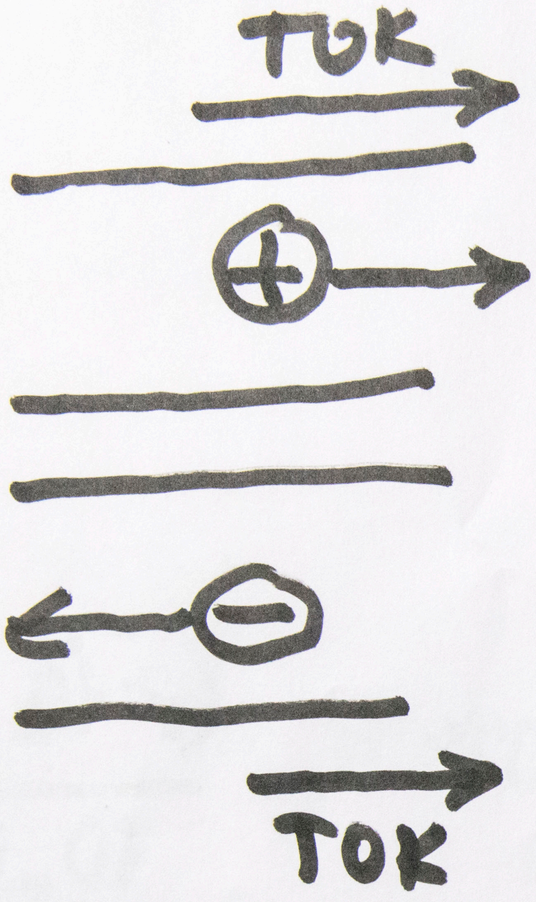
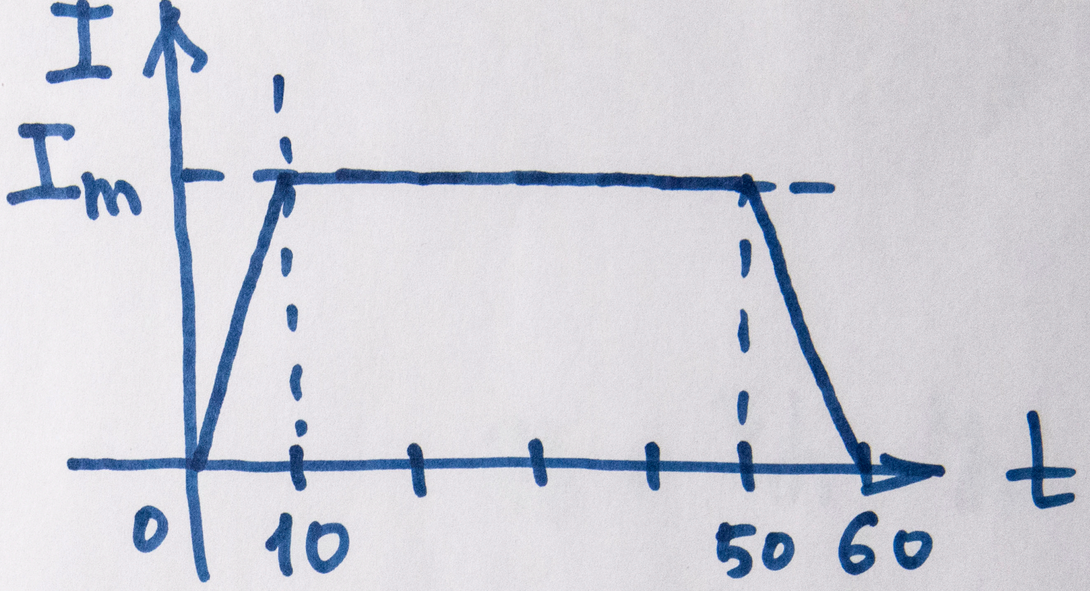
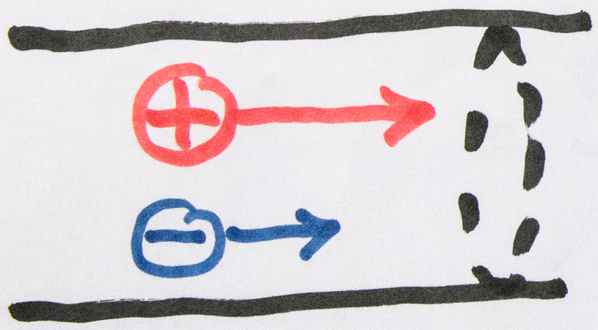




$\tau_1 = 10\,c \quad \tau_2 = 40\,c$

$\tau_3 = 10\,c = \tau_1$



$$\Delta q = |\Delta q_+| - |\Delta q_-|$$

$$I = \frac{\Delta q}{\Delta t}$$

$$q_\Sigma = q_1 + q_2 + q_3$$

$$q_2 = \tau_2 \cdot I_m$$

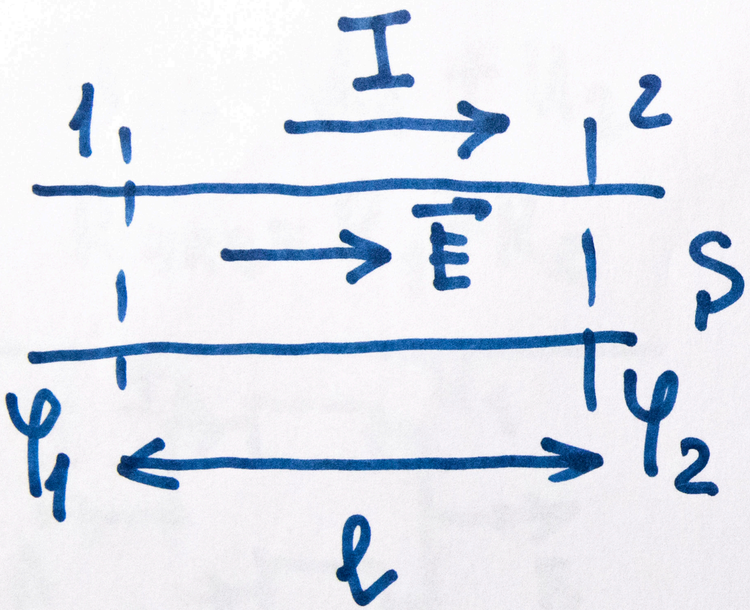
$$q_1 = \frac{I_m}{2} \cdot \tau_1 = q_3$$

$$q_\Sigma = \tau_1 I_m + \tau_2 I_m$$

$$I_m = \frac{q_\Sigma}{\tau_1 + \tau_2} = \underline{\underline{2\,A}}$$

$$R = \rho \frac{\ell}{S}$$

$$S = a^2$$



$$\varphi_1 - \varphi_2 = U$$

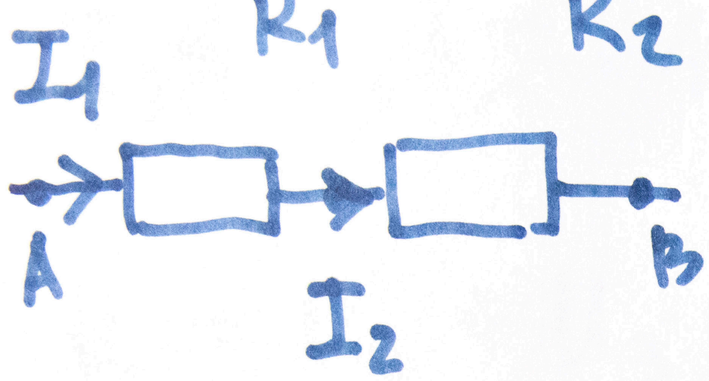
$$I = \frac{\varphi_1 - \varphi_2}{R}$$

$$U = I \cdot R =$$

$$= I \cdot \rho \frac{\ell}{a^2} =$$

$$= 2A \cdot 9 \cdot 10^{-8} \text{ Ом} \cdot \text{м} \cdot \frac{10^2 \text{ м}}{(3 \cdot 10^{-3} \text{ м})^2} =$$

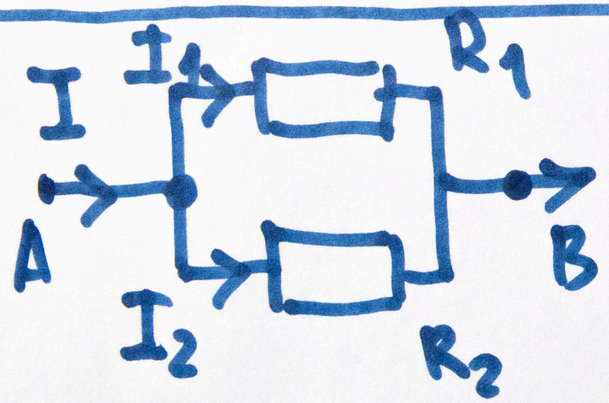
$$= \underline{\underline{2 \text{ В}}}$$



$$I_1 = I_2 = I$$

$$U_{AB} = U_1 + U_2$$

$$R_{экв} = R_1 + R_2$$



$$U_{AB} = U_1 = U_2$$

$$I = I_1 + I_2$$

$$R_{экв} = \frac{R_1 R_2}{R_1 + R_2}$$

$$R_{246} = 3R$$

$$\frac{R_3 \parallel R_{246}}{R_{3\,246}} = \frac{R_3 R_{246}}{R_3 + R_{246}} = \frac{3}{4} R$$

$$R_{экв} = R_1 + R_{3246} + R_5 =$$

$$= 2R + \frac{3}{4} R = \frac{11}{4} R =$$

$$= \underline{5{,}5\ Ом}$$

$$I_2 = I_4 = I_6 = 1\ А = I$$

$$U_3 = \underline{I_3 \cdot R} = \underline{U_{246}}$$

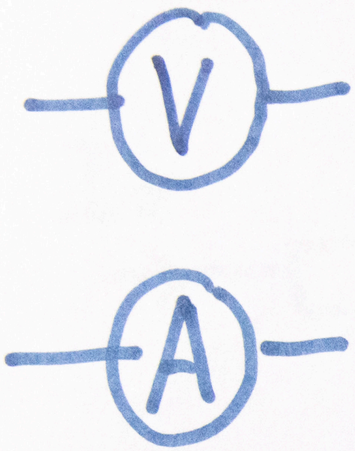
$$U_{246} = U_2 + U_4 + U_6 = 6\ В$$

$$U_2 = I \cdot R = 2\ В\ ,\ \underline{I_3 = 3\ А}$$

$$I_1 = I_3 + I = 4A = I_5$$

$$U = U_1 + U_3 + U_5 = \underline{\underline{22\,B}}$$

$$U_1 = \underline{I_1} \cdot \underline{R} = 8\,B = U_5$$



$R_V = \infty$

$r_A = 0$

$$U_V = I \cdot R_{экв}$$

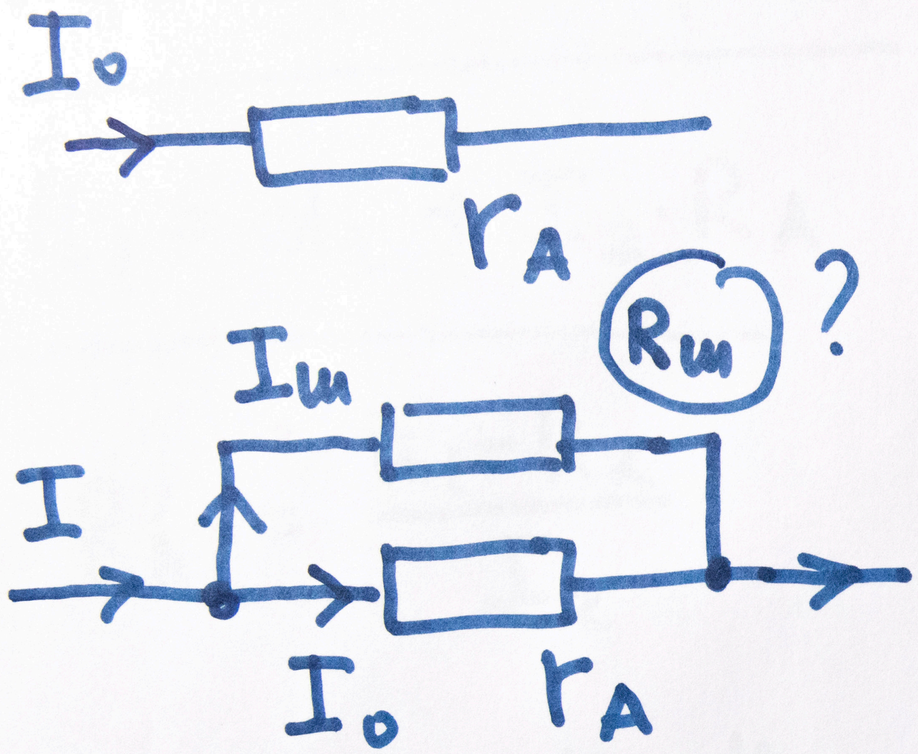
$$R_{экв,1} = 3r$$

$$R_{экв,2} = \frac{r \cdot 3r}{r + 4r} = \frac{3}{4} r$$

$$R_{экв} = r + R_{экв,2} = \frac{7}{4} r$$

$$U_V = 4A \cdot \frac{7}{4} Ом =$$

$$= \underline{\underline{7\,В}}$$



$$\begin{cases} \underline{I} = \underline{I_0} + I_m \\ U_m = I_m \cdot R_m = \\ \quad = U_A = I_0 \cdot r_A \end{cases}$$

$$R_m = \frac{I_0 \cdot r_A}{I_m} =$$

$$= \frac{I_0 \cdot r_A}{I - I_0} =$$

$$\approx \underline{0{,}07 \text{ Ом}}$$

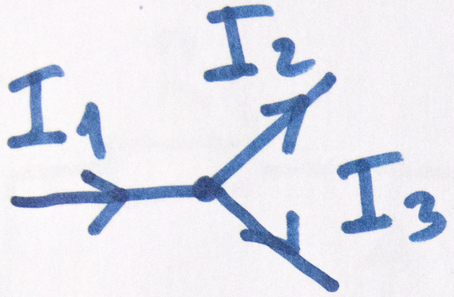
$$U_1 = I_1 \cdot R + I_1 \cdot R_A$$

$$U_1 = U_2 + I_2 \cdot R_A$$

$$R_A = \frac{U_1 - U_2}{I_2}$$

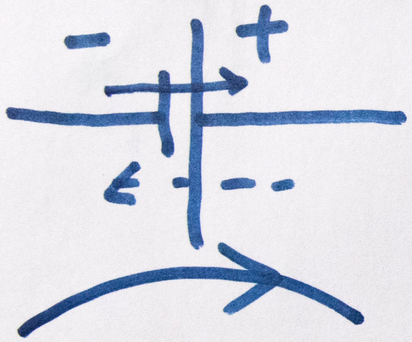
$$R = \frac{U_1}{I_1} - \frac{U_1 - U_2}{I_2} =$$

$$= 90 \text{ Om}$$



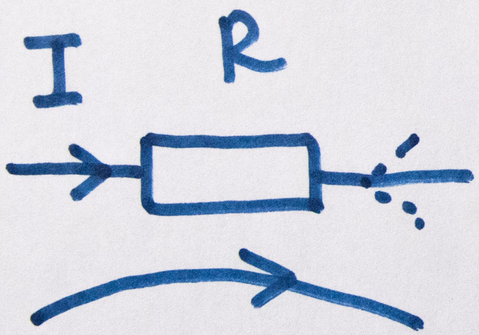
$$I_1 = I_2 + I_3$$

$$\sum \mathcal{E}_i = \sum U_i$$



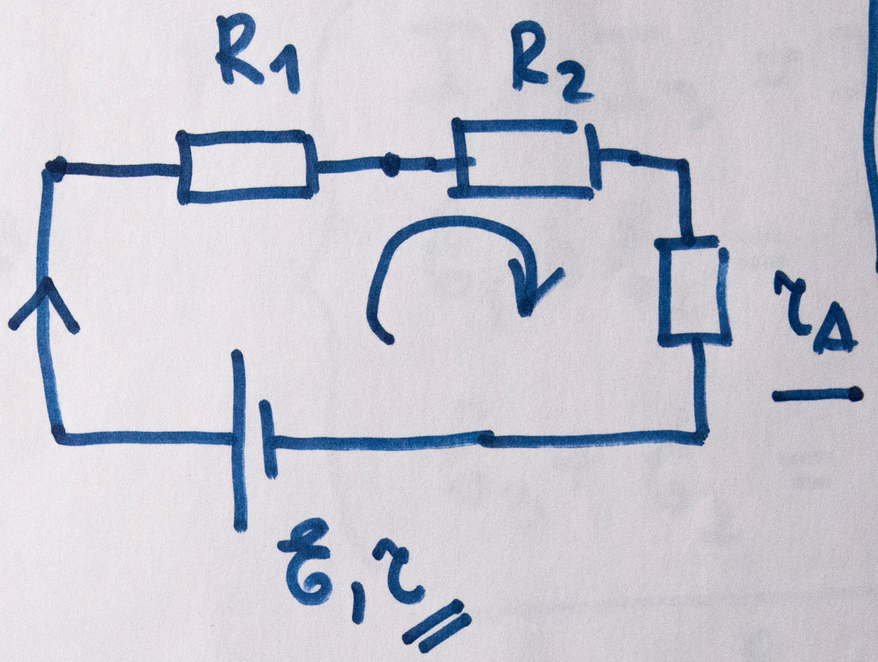
$$+\mathcal{E}$$

$$-\mathcal{E}$$



$$+I \cdot R$$

$$-I \cdot R$$



$$\mathcal{E} = I \cdot R_1 + I \cdot R_2 + I \cdot (r + r_A)$$

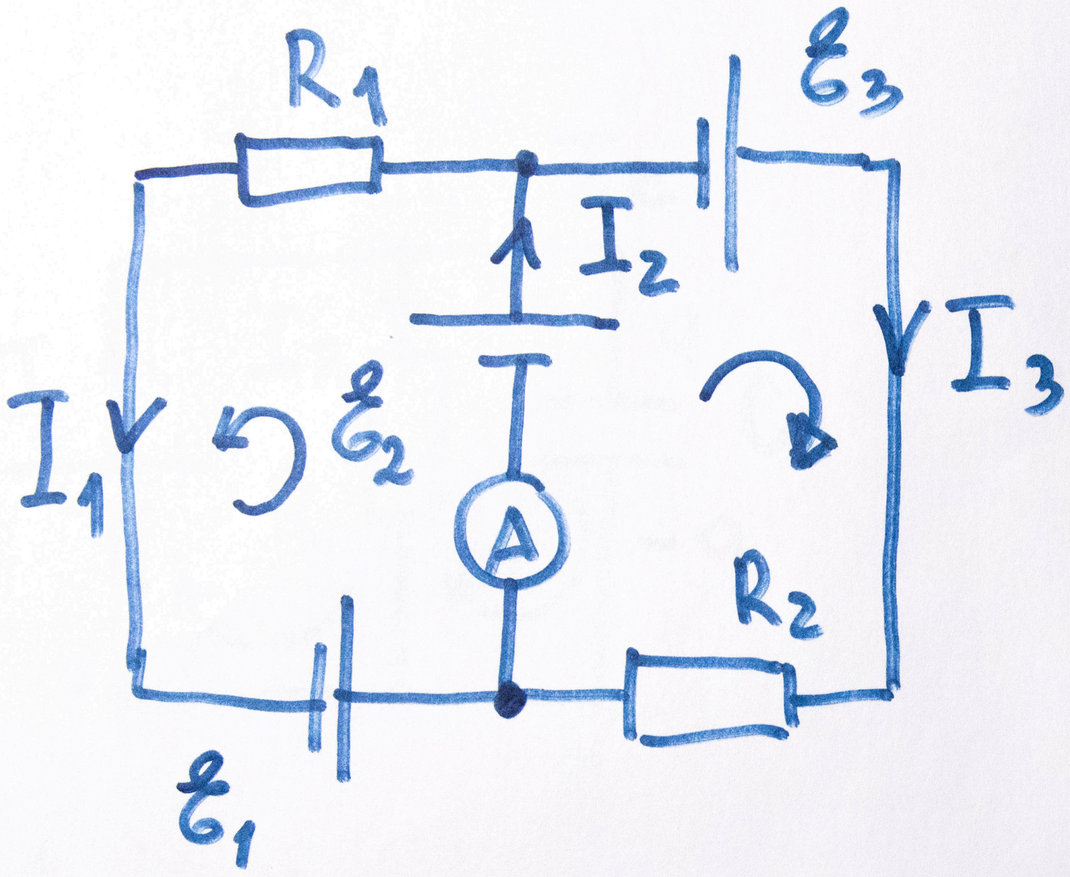
$$I = \frac{\mathcal{E}}{R_1 + R_2 + (r + r_A)} \approx$$

$$\approx \frac{\mathcal{E}}{R_1 + R_2} = \underline{\underline{0{,}21\,A}}$$

$$V = I \cdot R_1 = \underline{\underline{4{,}2\ B}}$$

$$V = 4{,}6\ B$$

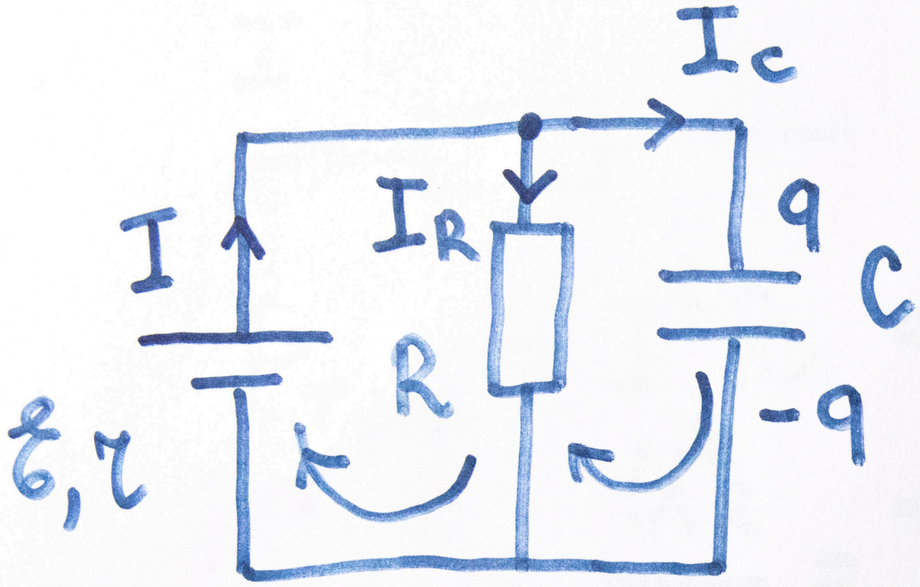
$$I_A = 0{,}21\,A$$



$$\begin{cases} I_1 + I_3 = I_2 \\ \mathcal{E}_1 + \mathcal{E}_2 = I_1 \cdot R_1 \\ \mathcal{E}_3 + \mathcal{E}_2 = I_2 \cdot R_2 \end{cases}$$

$$I_2 = \frac{\mathcal{E}_3 + \mathcal{E}_2}{R_2} =$$

$$= \frac{6\ \text{В}}{3\ \Omega\text{м}} = 2\ \text{А}$$



$$\begin{cases} I = I_R + I_C \\ U_C = \dfrac{q}{C} \\ \mathcal{E} = I \cdot r + I_R \cdot R \end{cases}$$

$$0 = \frac{q}{C} - I_R \cdot R$$

СТАЦИОНАРНЫЙ РЕЖИМ !

$$q = \text{const} \Rightarrow I_C = 0 !$$

$$I = I_R$$

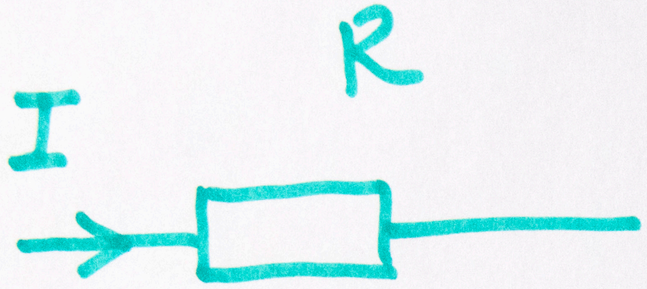
$$I = \frac{\mathcal{E}}{R + r} = I_R$$

$$\frac{q}{C} = I_R R = \frac{\mathcal{E} \cdot R}{R + r}$$

ПЛОСКИЙ

$$U_C = E \cdot d$$

$$E = \frac{\mathcal{E} \cdot R}{(R + r) d} = 4 \cdot 10^3 \text{ В/м}$$



$$P_{тепл} = I^2 R = \frac{U_R^2}{R} = \underline{I \cdot U_R}$$

$U = 30$ В

$I = 1{,}5$ А

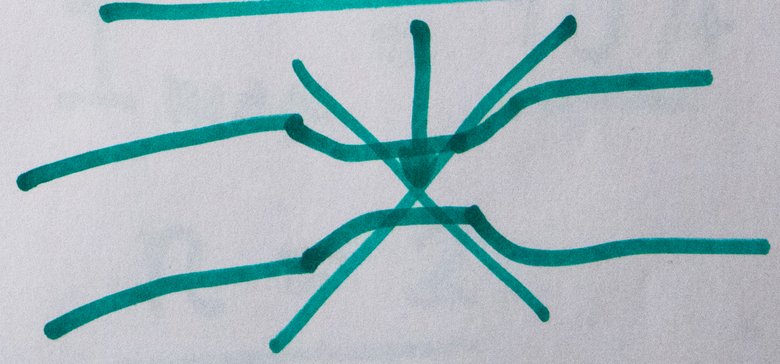
$$P = U \cdot I = \underline{45 \text{ Вт}}$$

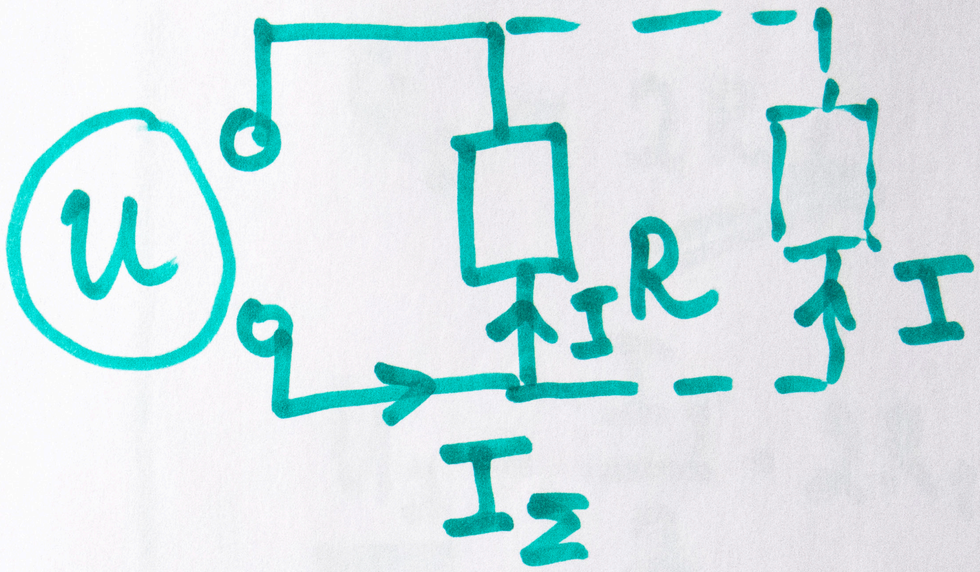
$$R_x < R_н$$

$$P_{тепл,x} = \frac{U^2}{R_x}$$

$$P_{тепл,н} = \frac{U^2}{R_н}$$

$$P_{тепл,x} > P_{тепл,н}$$





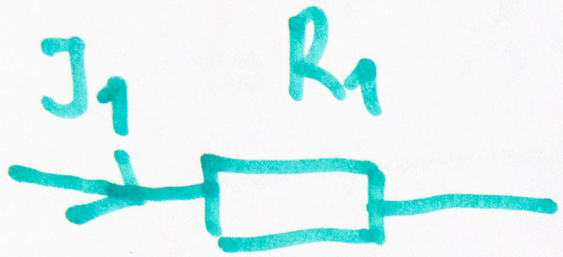
$$P = I \cdot U$$

$$I = \frac{P}{U} = \underline{3{,}6\ A}$$

$$I_\Sigma = n\,I$$

$$I_{max} = \underline{10\ A}$$

$$\underline{n = 2}$$



$$P_1 = I_1^2 R_1$$

$$U_1 = I_1 \cdot R_1$$

$$R_1 = \rho_1 \frac{l_1}{S_1}$$

$$\rho_2 = \rho_1$$

$$l_2 = l_1$$

$$S_2 = \frac{S_1}{2}$$

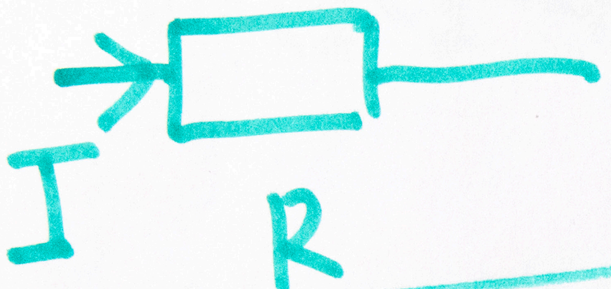
$$I_2 = \frac{1}{2} I_1$$

$$R_2 = 2R_1$$

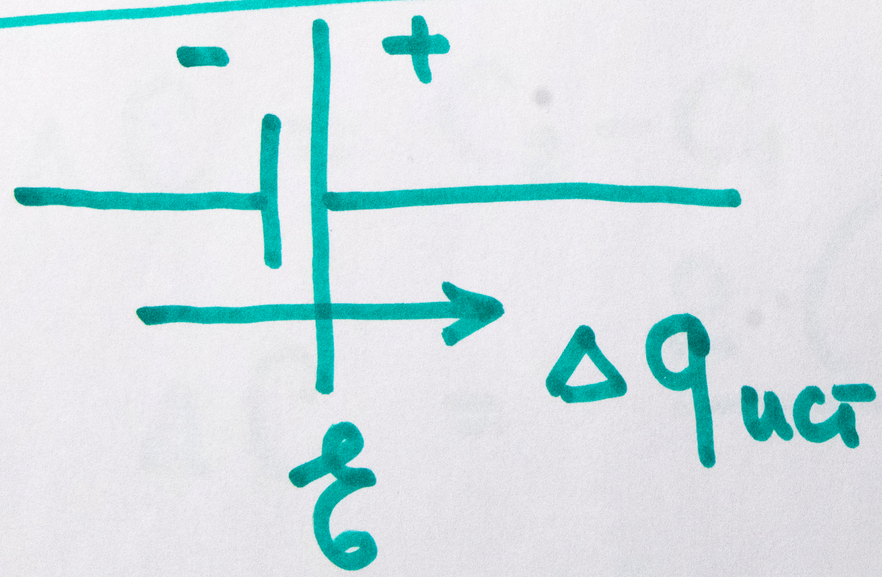
$$U_2 = \frac{I_1}{2} \cdot 2R_1 = I_1 R_1 = U_1$$

$$P_2 = \frac{I_1^2}{4} \cdot 2R_1 = \frac{1}{2} P_1$$

$$Q = I^2 R \cdot t$$



$$A_{ист} + A_{внеш} = Q_{\Sigma} + W_к - W_н$$



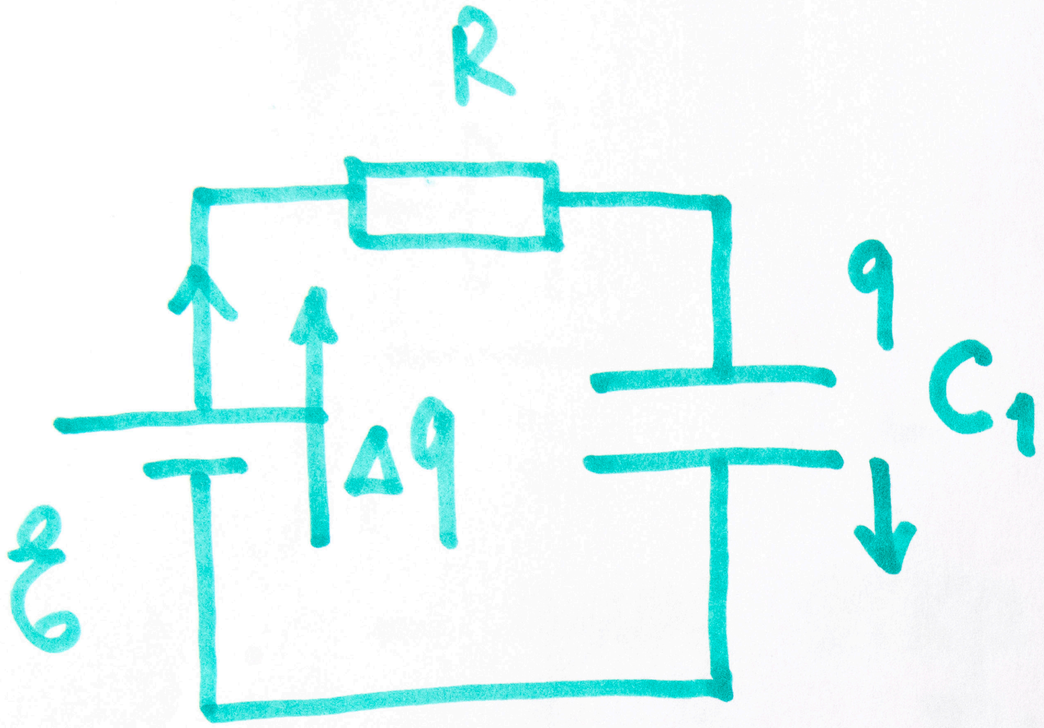
$$A_{ист} = \mathcal{E} \cdot \Delta q_{ист}$$

$$\mathcal{E}^2 \cdot (C_2 - C_1) = Q_\Sigma - A_{внеш} + \frac{\mathcal{E}^2 \cdot (C_2 - C_1)}{2}$$

$$\frac{(C_2 - C_1)\mathcal{E}^2}{2} = Q_\Sigma - A_{внеш} \qquad C = \frac{\varepsilon \cdot S}{d}$$

$$\Delta C = C_2 - C_1$$

$$\Delta C = \frac{2 \cdot (Q_\Sigma - A_{внеш})}{\mathcal{E}^2} = -0{,}01\,Ф$$



1. Нач. $I = 0$

$U_C = \mathcal{E}$

$W_H = \frac{C_1 \mathcal{E}^2}{2}$

2. Кон. $I = 0$

C_2 $W_K = \frac{C_2 \mathcal{E}^2}{2}$

3. $\Delta q_{исп.} = q_K - q_H$

$q_H = C_1 \mathcal{E}$

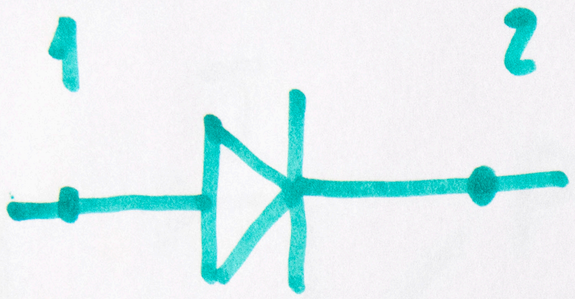
$q_K = C_2 \mathcal{E}$

$\Delta q_{ист} = (C_2 - C_1)\mathcal{E}$

$A_{ист} = \mathcal{E}^2 \cdot (C_2 - C_1)$

4. $A_{внеш} \Rightarrow$ изм.

5. $Q_\Sigma \Rightarrow$ изм



$\varphi_1 > \varphi_2$ –

– диод откр

$I \neq 0$

$\varphi_1 < \varphi_2$

– диод закрыт.

$I = 0$

1-й сл. D_2 – откр

D_1 – закр

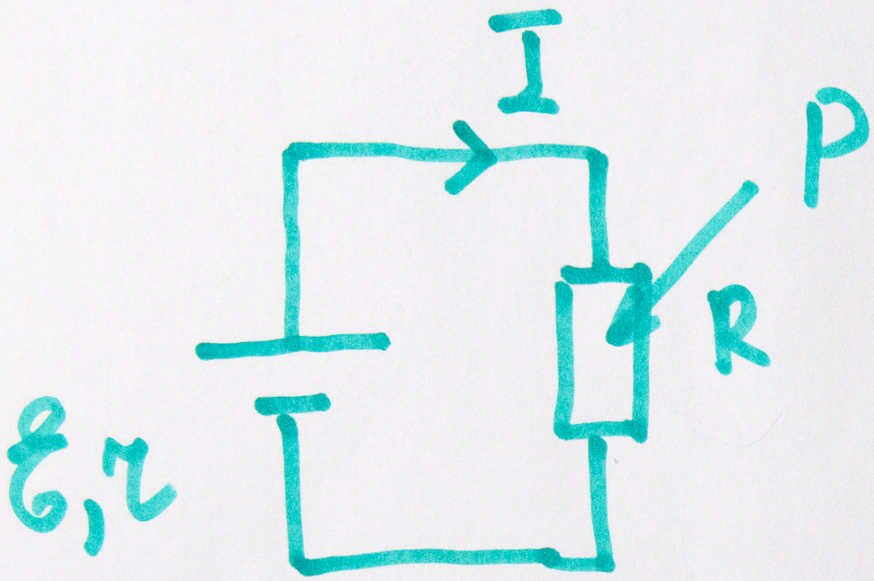
$$I_2 = \frac{\mathcal{E}}{R_2}, \quad P_2 = \frac{\mathcal{E}^2}{R_2}$$

$$R_2 = \frac{\mathcal{E}^2}{P_2} = 20 \text{ Ом}$$

2-й сл D_2 – закр

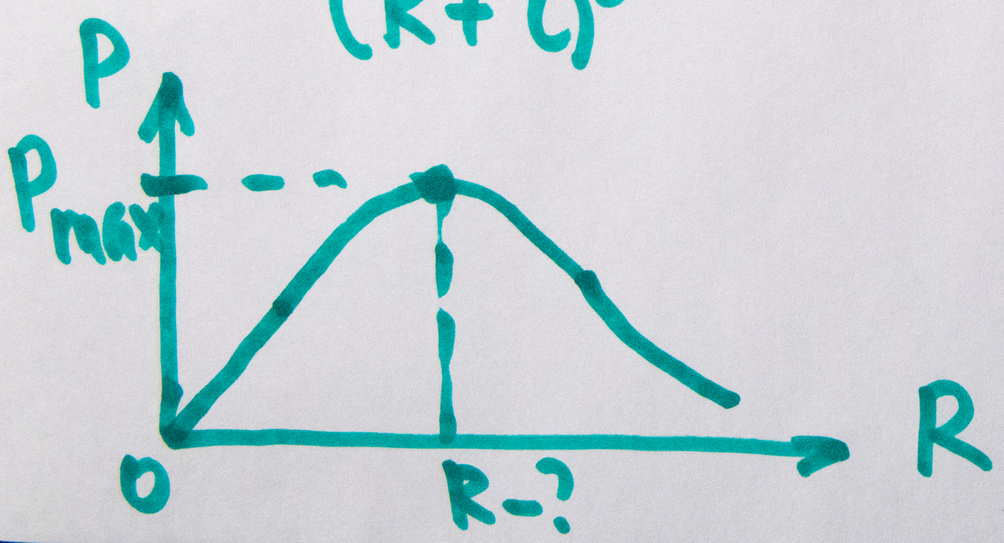
D_1 – откр

$$R_1 = \frac{\mathcal{E}^2}{P_1} = 10 \text{ Ом}$$



$$I = \frac{\varepsilon}{R + r}$$

$$P = \frac{\varepsilon^2 \cdot R}{(R+r)^2}$$



$$P' = 0 \rightarrow P = P_{max}$$

$$P' = \varepsilon^2 \frac{(R+r)^2 - R \cdot 2 \cdot (R+r)}{(R+r)^4} =$$

$$= \frac{\varepsilon^2}{(R+r)^3} (r - R) = 0$$

$$\underline{R = r}$$

$$P_{max} = \frac{\varepsilon^2}{4r} = \underline{4{,}5\ Вт}$$