Часть 1

Олимпиада: **Физика, 11 класс (1 часть)**

Шифр: **21201675**

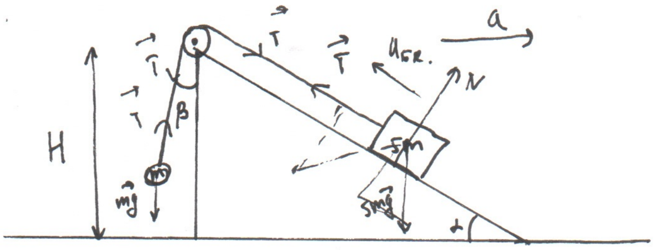
ID профиля: **350247**

Вариант 8

Чистовик   Вариант 11-08   Физика 11 кл

1

№1



Дано

α, $\cos\alpha = \frac{3}{5}$;

m, $5m$, β $\cos\beta = \frac{5}{13}$

1) a - ?

2) $a_{отн.кл.} = a_{бк}$ - ?

3) t - ?

a - ? $\sin\beta = \frac{12}{13}$.

1) $mg\cos\beta - T + ma\sin\beta = ma_{бк}$. (1)

$T + 5ma\cos\alpha - 5mg\sin\alpha = 5a_{бк}\cdot m$ (2)   (3) $mg - T\cos\beta = 5m a_{бк}\cos\beta$

$mg\frac{5}{13} - T + ma\cdot\frac{12}{13} = ma_{бк}$

$$\begin{cases} T + 5ma\cdot\frac{3}{5} - 5mg\cdot\frac{4}{5} = 5\left(mg\frac{5}{13} - T - ma\frac{12}{13}\right) & (4) \\ mg - \frac{5}{13}T = \frac{5}{13}\left(mg\frac{5}{13} - T + ma\frac{12}{13}\right); & (5) \end{cases}$$

$T + 3ma - 4mg = \frac{25}{13}mg - 5T - \frac{60}{13}ma.$

$6T = \frac{77}{13}mg - \frac{99}{13}ma$ (4')

$mg - \frac{5}{13}T = \frac{25}{13^2}mg - \frac{5}{13}T + \frac{60}{13^2}ma$ (5')

$ma = \frac{169}{60}\cdot mg\left(1 - \frac{25}{169}\right) = \frac{144}{60}mg = \frac{12}{5}mg$

$a = \frac{12}{5}g$;

Ответ: 1) $a = \frac{12}{5}g$

2) $a_{бк} = \frac{3}{2}g$

3) $t = 2\sqrt{\frac{13H}{15g}}$

2) $a_{бк}$ - ?   (1)+(2)

$mg\cos\beta + 5ma\cos\alpha + ma\sin\beta - 5mg\sin\alpha = 6ma_{бк}$

$a_{бк} = \frac{1}{6}\cdot\left(\frac{5}{13}g + \frac{5\cdot4}{5}\cdot\frac{12}{5}g + \frac{12}{5}g\cdot\frac{12}{13} - \frac{5\cdot4\cdot g}{5}\right) =$

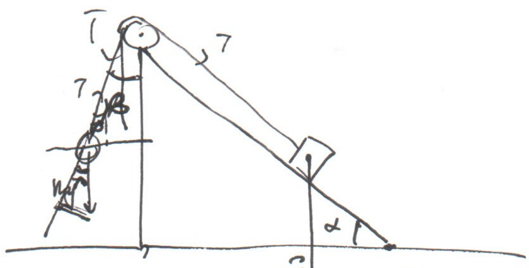
$= \frac{1}{6}\cdot\left(\frac{25 + 68 + 144 - 52}{65}\right)g = \frac{1}{6}\cdot\frac{585}{65}g = \frac{9}{6}g = \frac{3}{2}g$

3) Рассмотрим в системе отсчёта связанной с клином.

$\frac{H}{\cos\beta} = \frac{a_{бк}t^2}{2}$, $t = \sqrt{\frac{2H}{a_{бк}\cdot\cos\beta}} = \sqrt{\frac{24\cdot2\cdot13}{3g\cdot5}} = \sqrt{\frac{4\cdot13\cdot4}{15\cdot g}} = 2\sqrt{\frac{13H}{15g}}$

Черновик.

1) a - ?

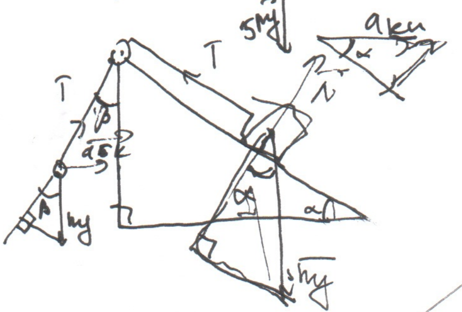


1) $mg - T\cos\beta = 5mg\cos\alpha\, a_{\text{вк}}$;

$mg\cos\beta - T + ma \cdot \sin\beta = m a_{\text{вк}}$.

$T + 5ma\cos\alpha - 5mg\sin\alpha = 5ma_{\text{вк}}$

(1)



1) $T - mg\cdot\cos\beta = 0$;

$T = mg\cos\beta$;

$T - 5mg\sin\alpha = 5m\cdot\cos\alpha\cdot a$

$mg\cos\beta - 5mg\sin\alpha = 5m\cos\alpha\cdot a$

$\sin\alpha = \sqrt{1-\cos^2\alpha} = \sqrt{1-\frac{9}{25}} = \frac{4}{5}$;

$g\cdot\frac{5}{13} - \frac{5\cdot 4}{5}g = 5\cdot\frac{3}{5}$

$\frac{5}{13}g - 4g = 3a$

$39a = 5g - 52g$

$a = -\frac{47}{39}g$

$\frac{52}{3}$

$1\cdot 13$

$\frac{13}{3}$

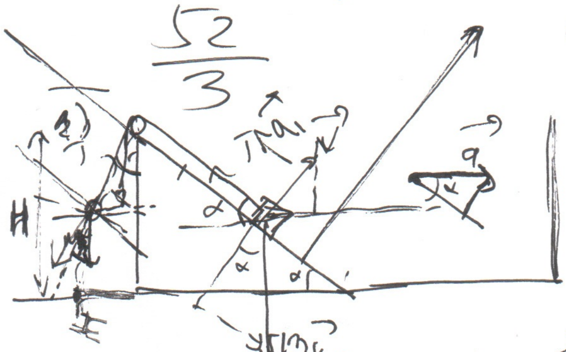
$\frac{2H}{\frac{3}{2}g\cdot\frac{5}{13}}$

$a = \frac{47}{39}g$!

отвечу позже.

$a \approx 1,2$ м/с^2 ~~—~~

$\frac{13}{3}$



$v_{\text{отн.н}} = v_{\text{пер.}} + v_{\text{пот}}$

$a_н$

$T - 5mg\sin\alpha = 5ma_1$

$T = mg\cos\beta$;

$mg\frac{5}{13} - \frac{5\cdot 4}{5}mg = 5ma_1$

$\frac{5}{13}$

$5g + 52g = 5a_1$

$-\frac{47}{3}g = a_1$

$\cos\beta = \frac{5}{13}$

$\frac{mv_0^2}{2} + mgH = \frac{mv^2}{2}$

$H = v\cdot\cos\beta\cdot t$;

$v = \sqrt{2gH}$

$H = \sqrt{2gH}\cdot\cos\beta\, t$

$t = \frac{H}{\sqrt{2gH}\cdot\cos\beta} = \frac{13\sqrt{H}}{5\sqrt{g2}}$

$t = \sqrt{\frac{2H}{a_{\text{пер}}\cdot\cos\beta}}$

2,4

$\frac{2\cdot H}{\frac{3}{2}} = \frac{4H\cdot 13}{3\cdot 5 g}$

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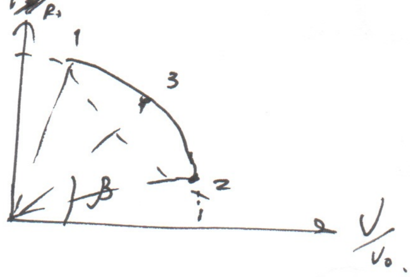
3) $p = p_0\sqrt{R^2 - \left(\frac{V}{V_0}\right)^2}$ $\cancel{(*)}$



$$\eta = 1 + \frac{Q_x}{Q_н} = 1 + \frac{A_{32} + \Delta U_{32}}{A_{13} + \Delta U_{13}}$$

$$A_{32} = \int_{V_2}^{V_3} p_0\sqrt{R^2 - \left(\frac{V}{V_0}\right)^2}\,dV = p_0 R\int_{V_2}^{V_3}\sqrt{1-\left(\frac{V}{V_0 R}\right)^2}\,dV;$$

Источник

$$A_{13} = p_0 R\int_{V_1}^{V_3}\sqrt{1-\left(\frac{V}{V_0 R}\right)^2}\,dV; \Rightarrow$$

$$\Delta U_{32} = C_V \nu (T_2 - T_3)$$

$$\Delta U_{13} = C_V \nu (T_3 - T_1);$$

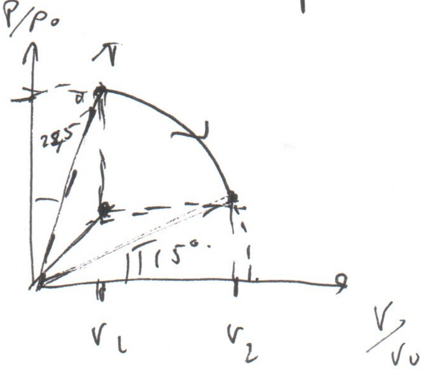
$$\eta = 1 + \frac{p_0 R\int_{V_2}^{V_3}\sqrt{1-\left(\frac{V}{V_0 R}\right)^2}\,dV + C_V\nu(T_2 - T_3)}{p_0 R\int_{V_1}^{V_3}\sqrt{1-\left(\frac{V}{V_0 R}\right)^2}\,dV + C_V\nu(T_3 - T_1)}$$

Ответ: 1) $\frac{T_1 - T_2}{T_2} = \frac{2-\sqrt{2}}{\sqrt{2}}$.

2) $\alpha = \operatorname{arctg}\sqrt{\frac{5}{7}}$

3) $\eta = 1 + \frac{p_0 R\int_{V_2}^{V_3}\sqrt{1-\left(\frac{V}{V_0 R}\right)^2}\,dV + C_V\nu(T_2 - T_3)}{p_0 R\int_{V_1}^{V_3}\sqrt{1-\left(\frac{V}{V_0 R}\right)^2}\,dV + C_V\nu(T_3 - T_1)}$

Черновик



$$\frac{T_2 - T_1}{T_2} - ;$$

$$p_1 \sin 15^\circ = p_2 \cos 22{,}5^\circ$$

$$T_2 - T_1 = \frac{p_1 V_1}{\nu R}\left(\frac{\sqrt{2}}{2} - 1\right) \quad T_1 > T_2$$

$$\Rightarrow \frac{T_1 - T_2}{T_2} =$$

$$\alpha = 90 - \beta \qquad tg\alpha = \sqrt{\frac{5}{7}}.$$

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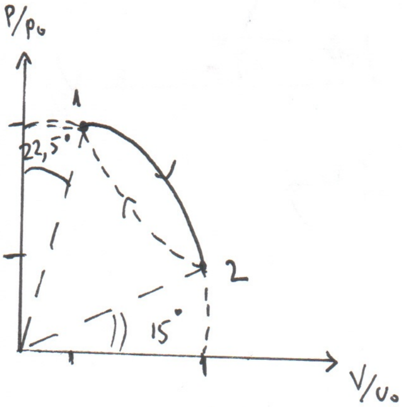
3) $\eta = \cancel{1 + \alpha p_0 V_2 - p_0 \sqrt{R^2 - V^2}} \frac{}{V_0}$

Чистовик

(2)

№2



Дано:

$\alpha_1 = 22{,}5^\circ$ $C_V = \frac{5}{2}R$

$\alpha_2 = 15^\circ$

$i = 5$

1) $\frac{T_1 - T_2}{T_2}$ - ?

2) α_3 - ?

3) η - ?

~~Ответ: 1) $\frac{2-\sqrt{2}}{\sqrt{2}}$~~

~~2) $\alpha = \text{ctg}\sqrt{\frac{5}{7}}$~~

~~$\text{tg}\,\alpha = \sqrt{\frac{5}{7}}$~~

1) $\sin 22{,}5 = \frac{\frac{V_1}{V_0}}{R}$; $\sin 15^\circ = \frac{\frac{p_2}{p_0}}{R}$; $\cos 22{,}5^\circ = \frac{\frac{p_1}{p_0}}{R}$; $\cos 15^\circ = \frac{\frac{V_2}{V_0}}{R}$

$p_1 \cdot \sin 15^\circ = p_2 \cdot \cos 22{,}5^\circ$;

$V_1 \cdot \cos 15^\circ = V_2 \cdot \sin 22{,}5^\circ \Rightarrow$

$p_1 V_1 = \nu R T_1$

$p_2 V_2 = \nu R T_2$

$$T_2 - T_1 = \frac{1}{\nu R}(p_2 V_2 - p_1 V_1) = \frac{p_1 V_1}{\nu R}\left(\frac{\sin 15^\circ}{\cos 22{,}5^\circ} \cdot \frac{\cos 15^\circ}{\sin 22{,}5} - 1\right) =$$

$$= \frac{p_1 V_1}{\nu R}\left(\cancel{\frac{\sin 30^\circ}{\cos 45^\circ}}\ \frac{\sin 30^\circ}{\cos 45^\circ} - 1\right) = \frac{p_1 V_1}{\nu R}\left(\frac{\sqrt{2}}{2} - 1\right); \quad T_1 > T_2;$$

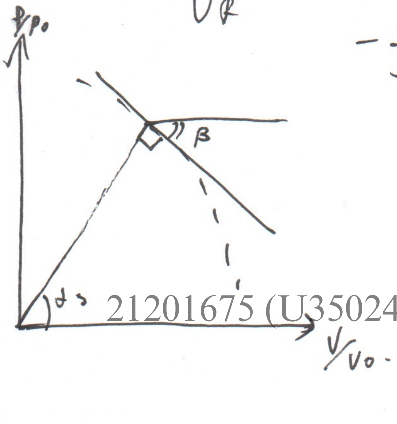
$$\Rightarrow \frac{T_1 - T_2}{T_2} = \frac{\frac{p_1 V_1}{\nu R}\left(1 - \frac{\sqrt{2}}{2}\right)}{\frac{p_2 V_2}{\nu R}} = \frac{1 - \frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = \frac{2 - \sqrt{2}}{\sqrt{2}} \quad (1)$$

2) $Q = \Delta U + A$

$c\,dT = p\,dV + C_V\,dT$; $c = 0$. $\quad p\,dV + \frac{5}{2}p\,dV + \frac{5}{2}V\,dp = 0$

$p\,dV + C_V\,dT = 0$; $\quad T = \frac{p\,dV}{\nu R}$; $\quad \frac{7}{2}p\,dV = -\frac{5}{2}V\,dp$

$p\,dV + \frac{C_V\,V}{\nu R} \cdot d(pV) = 0$. $\quad \rightarrow \quad -\frac{7}{5}\frac{p}{V} = \frac{dp}{dV}$;



$-\frac{7}{5}\frac{p_0}{V_0} \cdot \text{tg}\,\alpha = \frac{dp}{dV}$ $\quad \frac{7}{5}\text{tg}\,\alpha = \frac{-d\left(\frac{p}{p_0}\right)}{d\left(\frac{V}{V_0}\right)} = \text{tg}\,\beta$

$\text{tg}\,\alpha = \frac{dp(5V_0)}{dV(-7p_0)}$ $\quad \rightarrow \quad \frac{7}{5}\text{tg}\,\alpha = \text{tg}(90 - \alpha)$

$\frac{7}{5}\text{tg}\,\alpha = \text{ctg}\,\alpha$ $\quad \text{tg}^2\alpha = \frac{5}{7}$ $\quad \alpha = 90 - \beta$

$\text{tg}\,\alpha = \sqrt{\frac{5}{7}}$

~~Ответ:~~

Часть 2

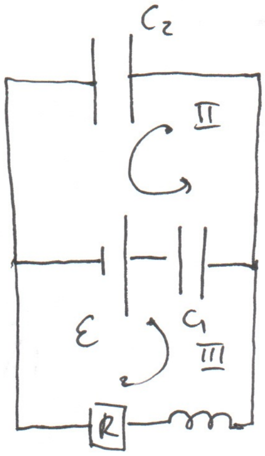
Олимпиада: **Физика, 11 класс (2 часть)**

Шифр: **21201675**

ID профиля: **350247**

Вариант 8

№3 Дано



$C_1 = C$

$C_2 = 5C$

1) быстрот. возр. тока −? $\frac{dI}{dt}$

2) Q −?

3) U_R −?

1) $\mathcal{E} = U_1 + U_2$

$q_1 = q_2 \Rightarrow C_1 U_1 = C_2 U_2$

$C U_1 = 5 C U_2$

$U_1 = 5 U_2$

$\mathcal{E} = 6 U_2$

$U_2 = \frac{\mathcal{E}}{6}$

$U_1 = \frac{5}{6}\mathcal{E}$;

1) (после замык. I в R равен 0)

$\mathcal{E} = U_1 + L\frac{dI}{dt}$ $\frac{dI}{dt} = \mathcal{E} - U_1 = \mathcal{E} - \frac{5}{6}\mathcal{E} = \frac{1}{6}\mathcal{E}$

2) (после уст. режима. в цепи ток 0)

$A_и = \Delta W_1 + \Delta W_2 + Q$

III $\mathcal{E} = U_1$

III $\mathcal{E}_1 = U_1' + U_2' \Rightarrow U_2' = 0$)

$A_и = \mathcal{E}\Delta q_1 = \mathcal{E} C_1 (\mathcal{E} - \frac{5}{6}\mathcal{E}) = \frac{1}{6}\mathcal{E}^2 C$

$\Delta W_1 = \frac{C U_1'^2}{2} - \frac{C U_1^2}{2} = \frac{C\mathcal{E}^2}{2} - \frac{C(\frac{5}{6}\mathcal{E})^2}{2} = \frac{11}{36}\cdot\frac{C\mathcal{E}^2}{2}$;

$\Delta W_2 = 0 - \frac{5 C U_2^2}{2} = -\frac{C\mathcal{E}^2}{5\cdot 2}$; $\Rightarrow$

$Q = \frac{1}{6}C\mathcal{E}^2 - \frac{11\cdot C\mathcal{E}^2}{36\cdot 2} + \frac{C\mathcal{E}^2}{10} = \frac{82}{720}C\mathcal{E}^2 = \frac{41}{360}C\mathcal{E}^2$

3) из II $\mathcal{E} = \frac{q_2}{C_2} + \frac{q_1}{C_1}$ − (продифференцируем)

$0 = \frac{I_2}{5C} + \frac{I_1}{C}$ при $I_2 = I_0$ $I_1 = \frac{-I_0}{5}$;

$I_1 = \frac{-I_2}{5}$

$I_R = I_2 + |I_1| = \frac{6}{5}I_0$

$U_R = I_R \cdot R = \frac{6}{5} I_0 \cdot R$

Ответ: 1) $\frac{1}{6}\mathcal{E}$

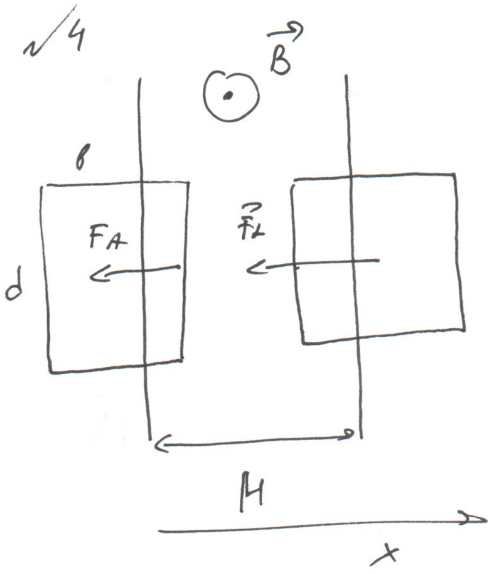
2) $\frac{41}{360}\mathcal{E}^2 C$

3) $U_R = \frac{6}{5} I_0 R$

Чистовик

2

№4



Дано:

$m,\ d,\ b = \frac{2}{3}d,\ v_0,\ R,\ H = 3d,\ B$

1) $a - ?$

2) $v_1 - ?$

3) $v_2 - ?$

1) $\mathcal{E}_{is} = \frac{\Delta\Phi}{\Delta t} = \frac{\Delta(BS\cos\alpha)}{\Delta t} = B\frac{\Delta S}{\Delta t} =$

$= B\cdot d\,\frac{dx}{dt} = Bdv;$

2) $\mathcal{E}_i = Bdv$

$I = \frac{\mathcal{E}_{is}}{R} = \frac{Bdv}{R}$

$BId = -ma$

$a = \frac{BId}{-m} = \frac{-B^2d^2v}{mR}$

$F_a = BId = -ma$

$\frac{B^2d^2}{R}\cdot v = -m\frac{dv}{dt} \quad \Big|\cdot dt$

$\frac{B^2d^2}{R}\cdot\underbrace{v\cdot dt}_{dx} = -m\,dv$

$\int\limits_0^b \frac{B^2d^2}{R}dx = -\int\limits_{v_0}^{v_1} m\,dv;$

$\frac{B^2d^2}{R}b = -m(v_1 - v_0) \qquad v_1 = v_0 - \frac{B^2d^2b}{R}$

3) аналогично пункту 2 $\quad v_2 = v_1 - \frac{B^2d^2b}{R}$

Ответ: 1) $a = \frac{-B^2d^2v_0}{mR}$

2) $v_1 = v_0 - \frac{B^2d^2b}{R}$

3) $v_2 = v_1 - \frac{B^2d^2b}{R}$

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Чистовик.

3

№5

Решение:

Дано:
$l_3 = 50$ см
$l = 25$ см.
$\frac{D_1}{D_2} = 5$

I) x - ?
(II) D_3 - ?

$$D_ч - D_1 = \frac{1}{l} + \frac{1}{b} \quad (1)$$

$$D_ч - D_2 = \frac{1}{b}; \quad (2) \quad (l_1 = \infty)$$

I)
1) $$D_ч = \frac{1}{x} + \frac{1}{b} \quad (3)$$

(1)+(2) $$D_ч - 5D_2 = \frac{1}{l} + D_ч - D_2$$

$$D_2 = -\frac{1}{4l} \quad \Rightarrow \quad D_1 = \frac{-5}{4l}$$

для удалённых

2) $$D_ч = \frac{1}{b} + \frac{1}{4l} \quad в\ (3)$$

$$\frac{1}{b} + \frac{1}{4l} = \frac{1}{x} + \frac{1}{b} \qquad \frac{1}{x} = \frac{1}{4l}$$

$x = 4l$
$x = 1$ м

II 1) $l_3 = 0,5$ м

2) $$D_ч - D_3 = \frac{1}{l_3} - \frac{1}{b};$$

$$\cancel{\frac{1}{b}} + \frac{1}{4l} - D_3 = \frac{1}{l_3} + \cancel{\frac{1}{b}}$$

$$D_3 = \frac{1}{4l} - \frac{1}{l_3} = -1 \text{ дптр}$$

Ответ: 1) $x = 1$ м

2) $D_3 = -1$ дптр.

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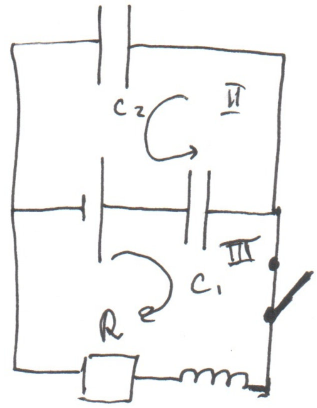
№3



Дано:

$C_1 = C$

$C_2 = 5C$

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1) $\infty\ 0$

2) Q

3) U_R

Черновик (1)

1) $\mathcal{E} = U_1 + U_2$

$q_1 = q_2$

$\cancel{C_1U_1 = C_2U_2}$ $C_1U_1 = C_2U_2$; $CU_1 = 5CU_2$;

$U_1 = 5U_2$

$\mathcal{E} = 6U_2$; $U_2 = \frac{\mathcal{E}}{6}$

$U_1 = \frac{5}{6}\mathcal{E}$;

2) (После замыкания ключа I в R равен 0)

$\mathcal{E} = U_1 + L\frac{dI}{dt}$ $\quad \frac{dI}{dt} = \mathcal{E} - U_1$; $\quad \mathcal{E} - \frac{5}{6}\mathcal{E} = \frac{1}{6}\mathcal{E}$

3) (После уст. режима в цепи ток 0);

$A_u = \Delta W_1 + \Delta W_2 + Q$; $\quad (\mathcal{E} = U_1)$ II

$(\mathcal{E}_1 = U_1' + U_2' \Rightarrow U_2' = 0)$ III

$A_u = \mathcal{E}\Delta q_1 = \mathcal{E}\cdot C_1\left(\mathcal{E} - \frac{5}{6}\mathcal{E}\right) = \frac{1}{6}C\mathcal{E}^2$

$\Delta W_1 = \frac{CU_1'^2}{2} - \frac{CU_1^2}{2} = \frac{C\mathcal{E}^2}{2} - \frac{C\left(\frac{5}{6}\mathcal{E}\right)^2}{2} = \frac{11}{36}\cdot\frac{C\mathcal{E}^2}{2}$;

$\Delta W_2 = 0 - \frac{5CU_2^2}{2} = -\frac{C\mathcal{E}^2}{5\cdot 2} \Rightarrow$

$Q = \frac{1}{6}C\mathcal{E}^2 - \frac{11}{36}\frac{C\mathcal{E}^2}{2} + \frac{C\mathcal{E}^2}{10} = \frac{82}{720}C\mathcal{E}^2 = \frac{41}{360}C\mathcal{E}^2$

4) II $\mathcal{E} = \frac{q_2}{C_2} + \frac{q_1}{C_1}$; ; продифференцируем $\Rightarrow$

$0 = \frac{I_2}{5C} + \frac{I_1}{C}$; $\quad I_1 = -\frac{I_2}{5}$; $\quad$ при $I_2 = I_0$; $I_1 = -\frac{I_0}{5}$

$I_R = I_2 + |I_1| = \frac{6}{5}I_0$

$U_R = I_R \cdot R = \frac{6}{5}I_0R$ · Ответ

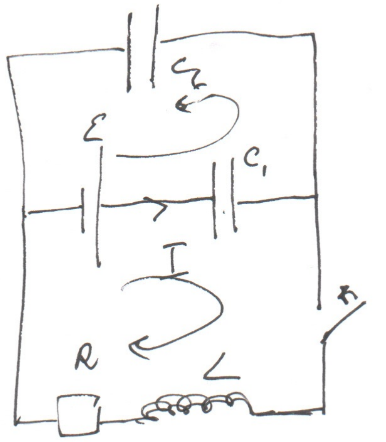
1) $\mathcal{E} - U_1$

2) $\frac{41}{360}C\mathcal{E}^2$

3) $\frac{6}{5}I_0R$

Черновик 2

№3.



$C_1 = C$

$C_2 = 5C$

1) $\cancel{P}_{C_1}$ бдр.

2) $Q_{-?}$ при замык.

3) U_R -? -под момент замык.

$\cancel{P} = U_L \cdot I$; $= \frac{\varepsilon^2}{R}$ $\quad I_{C_2} = I_0$

$\cancel{I = \frac{\varepsilon}{R}}$ $\quad U_L = \varepsilon$; $\quad LI$

№1 2 $\quad A = \Delta W + Q$; $\quad \varepsilon \cdot \Delta q = \left(\frac{LI^2}{2} - \frac{C_1\varepsilon^2}{2} - \frac{C_2\varepsilon^2}{2}\right) + Q.$

$C_1 + C_2 = 6C$ $\quad 6C\varepsilon^2 = \frac{LI^2}{2} - \frac{C_1\varepsilon^2}{2} - \frac{C_2\varepsilon^2}{2} + Q$

$q = 6C\varepsilon$;

$6C\varepsilon^2 + \frac{C_1\varepsilon^2}{2} - \frac{C_2\varepsilon^2}{2} - \frac{LI^2}{2} = Q$; $\quad \varepsilon = IR$

$I = \frac{\varepsilon}{R}$;

3) $\cancel{\varepsilon = U_{C_1} + U_D + IR}$ $\quad U_R$; $\quad A = \Delta W + Q$;

$\varepsilon \Delta q = \left(\frac{C_1 U_{C_1}^2}{2} + \frac{C_2 U_{C_2}^2}{2} - \frac{LI^2}{2}\right) + Q.$

~~установ~~ реж УСТ режим

2) $I = 0$

$6 \cdot 2 \cdot 10$ $\quad 10$ $\quad \cancel{36 \cdot 2}$ $36 \cdot 2.$

$\frac{\cancel{12}}{6} - \frac{11 C \varepsilon^2}{720} + \frac{36 \cdot 2}{}$

$120 - 11C\varepsilon^2$

$\frac{120 - 110}{720}$

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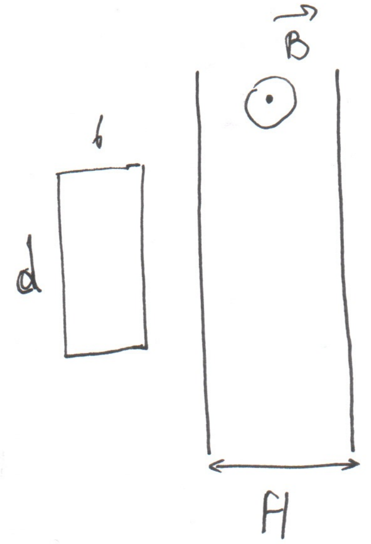
Черновик (3)

№4



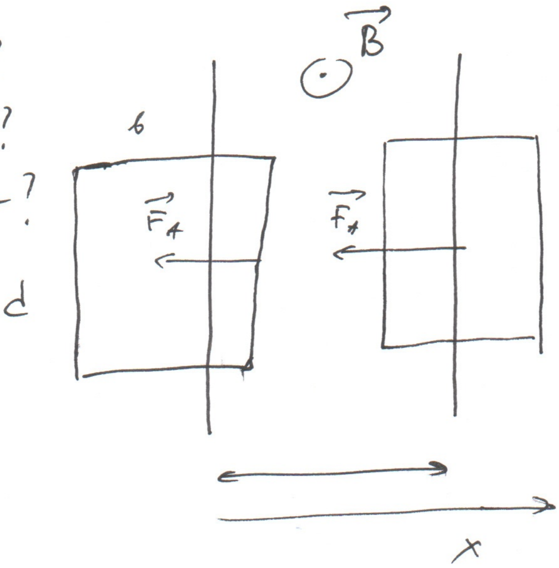
Дано:

$m,\ d\quad b = \frac{2}{3}d,\ v_0,\ R,\ H = 3d,\ B$

1) $a - ?$

2) $v_1 - ?$

3) $v_2 - ?$



1) $\mathcal{E}_{is} = \frac{\Delta\Phi}{\Delta t} = B\frac{\Delta S}{\Delta t} = Bd\cdot\frac{dx}{dt} = Bdv$!

1) $\mathcal{E}_i = Bdv$

2) $I = \frac{\mathcal{E}_i}{R} = \frac{Bdv}{R}$

$F_A = BId$

$F_A = -ma$

$\cancel{BId = ma}$

$\cancel{a = \frac{BId}{m}} =$

$BId = -ma$

$a = \frac{BId}{-m} = -\frac{B^2d^2\cdot v}{mR}$

$\frac{B^2d^2}{R}v = -m\frac{dv}{dt}$ $\quad \cdot dt$

тогда $\frac{B^2d^2}{R}\underbrace{v\cdot dt}_{dx} = -m\,dv$

$\int\limits_0^b \frac{B^2d^2}{R}dx = -\int\limits_{v_0}^{v_1} m\,dv;$

$\frac{B^2d^2}{R}b = -m(v_1 - v_0)\qquad v_1 = v_0 - \frac{B^2d^2b}{R};$

3) аналогично (2) - пункту:

$v_2 = v_1 - \frac{B^2d^2b}{R}\qquad v_2 = v_1 - \frac{B^2d^2}{R}$

$\int\limits_0^b \frac{B^2d^2}{R}dx = \cancel{-m}\int\limits_{v_1}^{v_2} m\,dv$

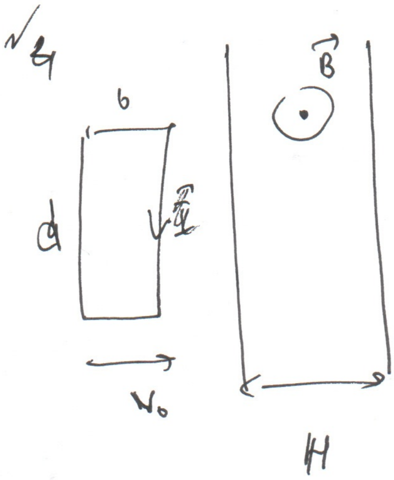
~~Ответ~~:

$\frac{B^2d^2 b}{R} = -m(v_2 - V_1)$

Черновик

4

№4



$\Delta\Phi$

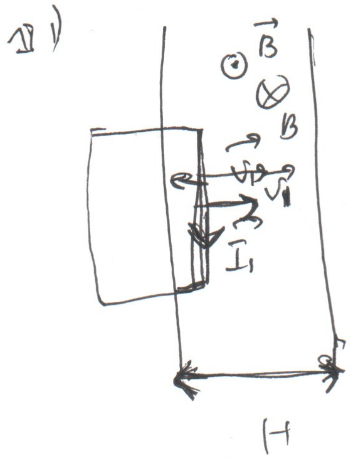
$a - ?$

$\cancel{\frac{mv_0^2}{2} = \frac{mv^2}{2}}$

$F_A = Bqv_0 = ma.$

$S = 3d$

1)



$\Delta\Phi = BS\cos\alpha$

$\Rightarrow B_i \downarrow\uparrow B$

$\mathcal{E}_{is} = \frac{\Delta\Phi}{\Delta t} = \frac{\Delta(BS\cos\alpha)}{\Delta t} = B\left(\frac{\Delta S}{\Delta t}\right) = Bv\,d$

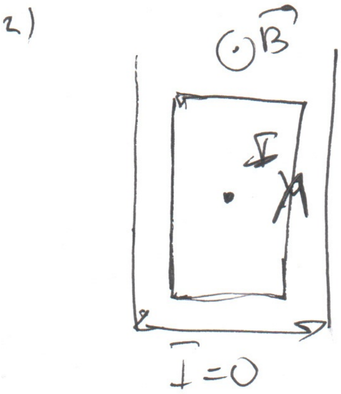
$I_1R = Bv_1d;$

$IR = \mathcal{E};$

$\cancel{v_1 = \frac{I_1R}{Bd}}$

$F_A =$

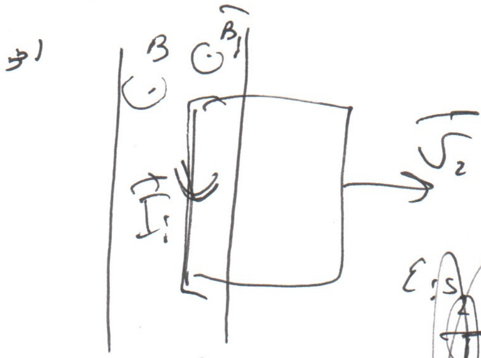
2)



$I = 0$

$a =$

3)



$\mathcal{E}_{is} = Bv_2d$

$\cancel{I_2 = \frac{Bv_2d}{R}}$

$F_A = -ma$

$a = \frac{F_A}{-m} = \frac{-BId}{m} = \frac{-B^2d^2v}{m}$

Черновик (5)

№5 Дано:

$l = 25$ см

$\frac{D_1}{D_2} = 5$

$x - ?$

$D_3 - ?$

$D_н - D_1 = \frac{1}{l} + \frac{1}{b}$ (1)

$D_н - D_2 = \frac{1}{b}$ (2) $(l_1 = \infty)$

1) $x - ?$ $D_н = \frac{1}{x} + \frac{1}{b}$ (3)

(1)+(2) $\cancel{D_н} - 5D_2 = \frac{1}{l} + \cancel{D_н} - D_2$

$D_2 = -\frac{1}{4l} \Rightarrow D_1 = -\frac{5}{4l}$.

2) $D_н = \frac{1}{b} + \frac{1}{4l}$ в (3)

$\cancel{\frac{1}{b}} + \frac{1}{4l} = \frac{1}{x} + \cancel{\frac{1}{b}}$ $\frac{1}{x} = \frac{1}{4l}$;

$x = 4l$

$x = 1$ м

2) $l_3 = 0{,}5$ м

$D_н - D_3 = \frac{1}{l_3} - \frac{1}{b}$;

$\frac{1}{b} + \frac{1}{4l} - D_3 = \frac{1}{l_3} + \frac{1}{b}$;

$D_3 = \frac{1}{4l} - \frac{1}{l_3} = -1$ дптр.

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