Часть 1

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

Шифр: **21201091**

ID профиля: **855506**

Вариант 8

N1 $H, m, 5M, \alpha, \beta$

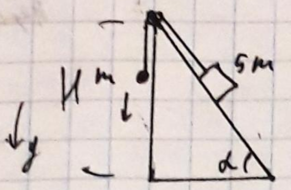
$\cos\alpha = \frac{3}{5}$ $\sin\alpha = \frac{4}{5}$

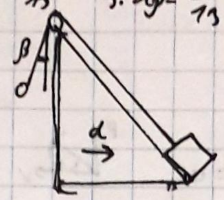
$\cos\beta = \frac{5}{13}$ $\sin\beta = \frac{12}{13}$

$a_{кл}$ - ?

$a_{отн. кл.}$ - ?

T_m - ?

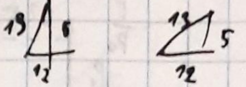




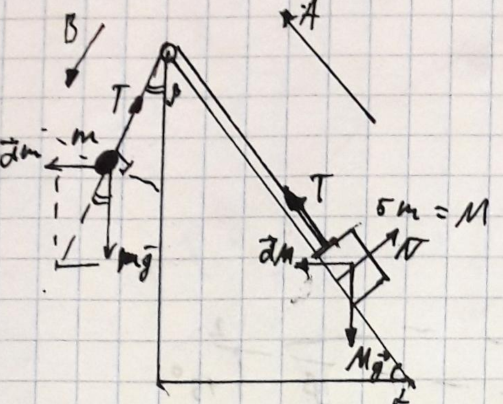
$\frac{25}{169} + \frac{x^2}{169} = 1$

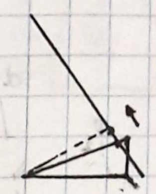
$169 - 25 = x^2$

144



$12 - 39 = -27$





$-27 \cdot 12 + 5 \cdot 57$

$27 \cdot 12 = 324$ $57 \cdot 5 = 285$

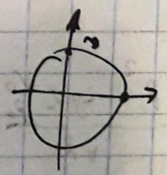
2ЗН:

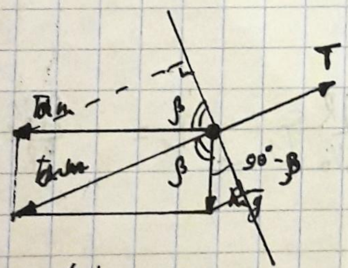
$\cancel{\bar{F}_m = \bar{a}m + m\bar{g} = m(\bar{a} + \bar{g})}$

$tg\,\beta = \frac{12}{5} = \frac{a}{g}$ $\boxed{a_{кл} = \frac{12}{5} g}$ $\boxed{a_{кл} = \frac{12}{5} g}$

$\frac{12}{5} \cdot \left(\frac{12 - 13 \cdot 3}{13}\right) + \frac{5 + 13 \cdot 4}{13} =$

$= \frac{-12 \cdot 27}{13 \cdot 5} + \frac{57 \cdot 5}{13 \cdot 5}$





$\cos(90° - \beta) \cdot mg = \cos\beta \cdot am$

$\sin\beta = \frac{12}{13}$ $\frac{5}{13}$

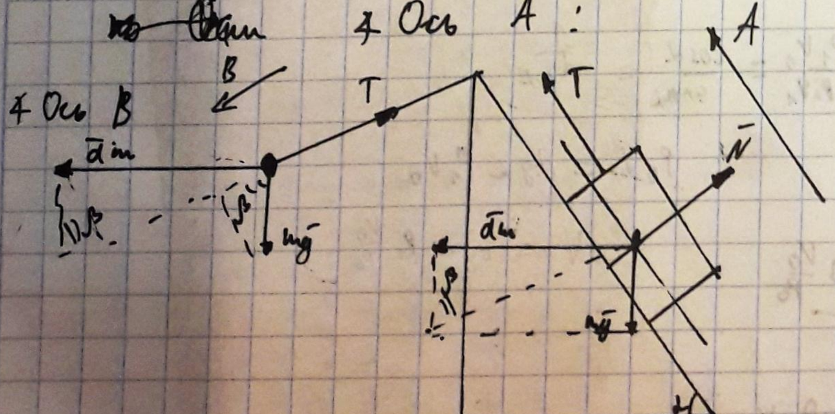
$\frac{12}{13} mg = \frac{5}{13} am$ $a = \frac{12}{5} g$

$\sin\left(\frac{\pi}{2} - x\right) = \cos(x)$

$\cos\left(\frac{\pi}{2} - x\right) = \sin(x)$

4 Ось A:

4 Ось B



$a_\delta M = a_{кл} \cdot M \cdot \cos\alpha - Mg \cdot \sin\alpha + T$

$a_m m = a_{кл} m \cdot \sin\beta + mg \cdot \cos\beta - T$

$a_\delta = a_m$

$\cancel{a_{кл} \cdot M \cos\alpha - Mg \sin\alpha + T = a_{кл} \, m \cdot \sin\beta + mg \cos\beta - T}$

$\cancel{2T = a_{кл}(m \sin\beta - M \cos\alpha) + g(m \cdot \cos\beta + M \sin\alpha) =}$

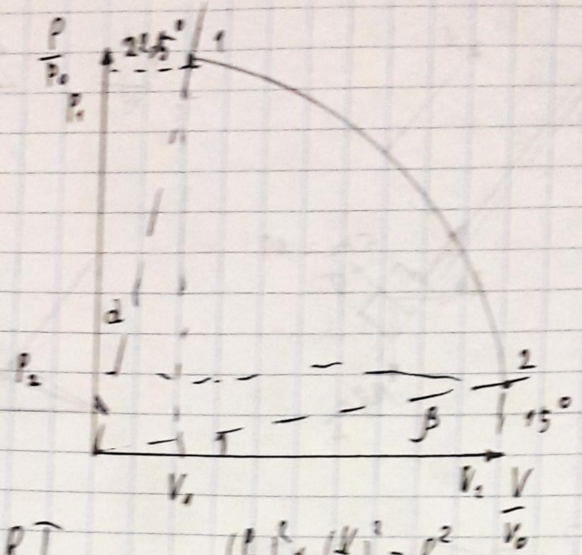
$\cancel{= \frac{12}{5} am\left(\frac{12}{13} - 5 \cdot \frac{3}{5}\right) + am\left(\frac{5}{13} + 5 \cdot \frac{4}{5}\right) =}$

[illegible], одноат.

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

2) $\alpha - ?$ $C_? = 0$

3) $\beta - ?$



$PV = \nu RT$ $\left(\frac{P}{P_0}\right)^2 + \left(\frac{V}{V_0}\right)^2 = R^2$

$Q = \Delta U + A_2$ A_2

$\frac{P^2}{P_0^2} + \frac{V^2}{V_0^2} = R^2$ $V_0^2 P^2 + P_0^2 V^2 = R^2 V_0^2 P_0^2 = const$

$P_1 V_1 = \nu R T_1$ $\frac{P_1 V_1}{P_0 V_0} = \frac{\nu R}{P_0 V_0} T_1$ $T_1 = \frac{P_1 V_1}{\nu R}, = \frac{P_1^2 \, tg\alpha \frac{V_0}{P_0}}{\nu R}$

$\left(\frac{P_1}{P_0}\right)^2 + \left(\frac{V}{V_0}\right)^2 = R^2$

$\frac{P_1}{P_0} = R \cdot \cos\alpha$ $\frac{P_1}{V_1} = \frac{1}{tg\alpha}$ $V_1 = tg\alpha \, P_1$

$\frac{V_1}{V_0} = R \cdot \sin\alpha$ $\frac{P_1 V_0}{P_0 V_1} = \frac{\cos\alpha}{\sin\alpha} = \frac{1}{tg\alpha}$

$P_0 V_1 = tg\alpha \, P_1 V_0$

$V_1 = tg\alpha \, P_1 \frac{V_0}{P_0}$

$T_2 = \frac{P_2 V_2}{\nu R} = \frac{P_2^2 \cdot ctg\beta \frac{V_0}{P_0}}{\nu R}$

$\frac{P_2}{P_0} = R \cdot \sin\beta$ $\frac{P_2 V_0}{P_0 V_2} = tg\beta$ $P_2 V_0 = tg\beta \, P_0 V_2$

$\frac{V_2}{V_0} = R \cdot \cos\beta$ $V_2 = P_2 \frac{V_0}{P_0} \cdot ctg\beta$

$\frac{T_1 - T_2}{T_2} = \frac{\frac{V_0}{P_0 \nu R} tg\alpha P_1^2 - \frac{V_0}{P_0 \nu R} ctg\beta P_2^2}{\frac{V_0}{P_0 \nu R} \cdot ctg\beta P_2^2} = \frac{tg\alpha \, P_1^2}{ctg\beta \, P_2^2} - 1 = tg\alpha \cdot tg\beta \, \frac{P_1^2}{P_2^2} - 1$

$d\delta = d_m$

$d_m = d_{k1}\cdot\sin\beta + mg\cos\beta - \frac{T}{m}$

$\frac{T}{M} + \frac{T}{m} = a_{k1}(\sin\beta - \cos\alpha) + g(\cos\beta + \sin\alpha) =$

$= \frac{12}{5} g\left(\frac{12}{13} - \frac{3}{5}\right) + g\left(\frac{5}{13} + \frac{4}{5}\right) =$

$= g\left(\frac{12}{5}\cdot\frac{12\cdot5 - 3\cdot13}{13\cdot5} + \frac{5\cdot5 + 4\cdot13}{13\cdot5}\right) = g\,\frac{2,4(12\cdot5 - 3\cdot13) + 25 + 4\cdot13}{13\cdot5}$

$21 \quad 50,4 + \qquad g\,\frac{127,4}{13,5} \qquad g\,1,96$

$T\left(\frac{1}{M} + \frac{1}{m}\right) = g\,1,96$

$T\,\frac{m+M}{mM} = g\,1,96 \qquad T = \frac{g\,mM}{m+M}\,1,96 = g\,\frac{5m^2}{6m}\,1,96 =$

$= mg\,\frac{9,8}{6} = mg\,\frac{4,9}{3}$

$T = mg\,\frac{4,9}{3}$

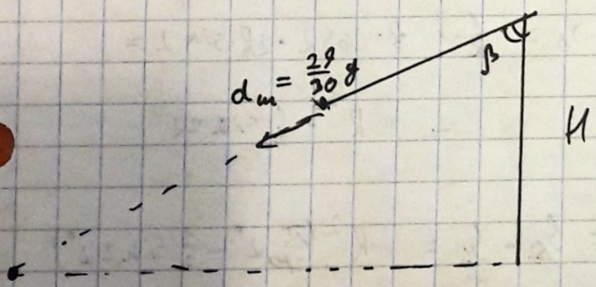
$\frac{m}{M}\,g\,\frac{4,9}{3}$

$d\delta = a_{k1}\cdot\cos\alpha - g\cdot\sin\alpha + \frac{T}{M} = g\left(\frac{12}{5}\cdot\frac{3}{5} - \frac{4}{5} + \frac{4,9}{15}\right) =$

$= g\,\frac{29}{30}$

$\frac{12\cdot3 - 4\cdot5 + \frac{4,9}{3}\cdot5}{25}$

$\frac{3\cdot16 + 4,9\cdot5}{25\cdot3} \qquad \frac{72,5}{25\cdot3} \qquad \frac{725}{750} = \frac{145}{150} = \frac{29}{30}$



$S_m\cdot\cos\beta = H \qquad S_m = \frac{H}{\cos\beta}$

$S_m = \frac{a_m t^2}{2} \qquad t = \sqrt{\frac{2S_m}{a_m}} = \sqrt{\frac{2H}{a_m\cdot\cos\beta}}$

$t = \sqrt{\frac{2H}{\frac{29}{30}g\cdot\frac{5}{13}}} \approx 2,32\sqrt{\frac{H}{g}}$

$t = \sqrt{\frac{H}{g}\cdot\frac{156}{29}}$

$2H \qquad \frac{H}{g}\cdot\frac{2}{\frac{29\cdot5}{30\cdot13}} = \frac{H}{g}\,\frac{2\cdot30\cdot13}{29\cdot5} = \frac{H}{g}\,\frac{156}{29}$

Черновик

$a_б = a_{кл} \cdot \cos\alpha - g\sin\alpha + \frac{T}{M}$ $\qquad a_б = a_м$

$a_м = a_{кл} \cdot \sin\beta + mg\cos\beta - \frac{T}{m}$

$\frac{T}{M} + \frac{T}{m} = a_{кл}(\sin\beta - \cos\alpha) + g(\cos\beta + \sin\alpha) =$

$= \frac{12}{5} g\left(\frac{12}{13} - \frac{3}{5}\right) + g\left(\frac{5}{13} + \frac{4}{5}\right) =$

$= g\left(\frac{12}{5} \cdot \frac{12\cdot5 - 3\cdot13}{13\cdot5} + \frac{5\cdot5 + 4\cdot13}{13\cdot5}\right) = g\,\frac{2,4(12\cdot5 - 3\cdot13) + 25 + 4\cdot13}{13\cdot5}$

21 $\qquad$ 50,4 + $\qquad g\,\frac{127,4}{13,5} \qquad g\,1,96$

$T\left(\frac{1}{M} + \frac{1}{m}\right) = g\,1,96$

$T\,\frac{m+M}{mM} = g\,1,96 \qquad T = \frac{g\,mM}{m+M}\,1,96 = g\,\frac{5m^2}{6m}\,1,96 =$

$= mg\,\frac{9,8}{6} = mg\,\frac{4,9}{3}$

$T = mg\,\frac{4,9}{3}$

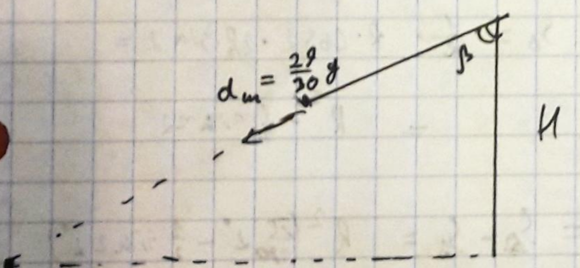
$\frac{m}{M}\,g\,\frac{4,9}{3}$

$a_б = a_{кл} \cdot \cos\alpha - g \cdot \sin\alpha + \frac{T}{M} = g\left(\frac{12}{5} \cdot \frac{3}{5} - \frac{4}{5} + \frac{4,9}{15}\right) =$

$= g\,\frac{29}{30}$

$\frac{12\cdot3 - 4\cdot5 + \frac{4,9}{3}\cdot5}{25}$

$\frac{3\cdot16 + 4,9\cdot5}{25\cdot3} \qquad \frac{72,5}{25\cdot3} \qquad \frac{725}{750} = \frac{145}{150} = \frac{29}{30}$



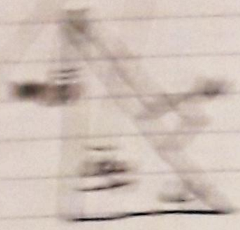
$S_м \cdot \cos\beta = H \qquad S_м = \frac{H}{\cos\beta}$

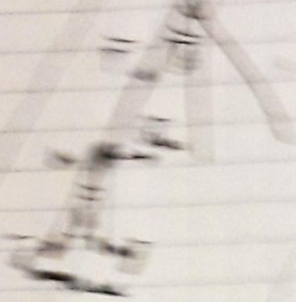
$S_м = \frac{a_м t^2}{2} \qquad t = \sqrt{\frac{2S_м}{a_м}} = \sqrt{\frac{2H}{a_м \cdot \cos\beta}}$

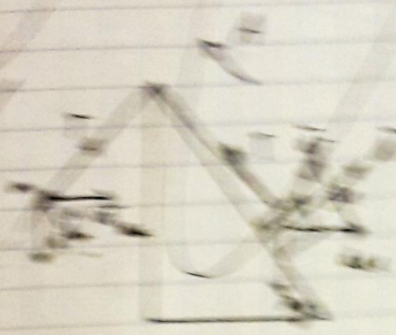
$t = \sqrt{\frac{2H}{\frac{29}{30}g \cdot \frac{5}{13}}} \approx 2,32\sqrt{\frac{H}{g}}$

$t = \sqrt{\frac{H}{g} \cdot \frac{156}{29}}$

$2H \qquad \frac{H}{g} \cdot \frac{2}{\frac{29\cdot5}{30\cdot13}} = \frac{H}{g}\,\frac{2\cdot30\cdot13}{29\cdot5} = \frac{H}{g}\,\frac{156}{29}$



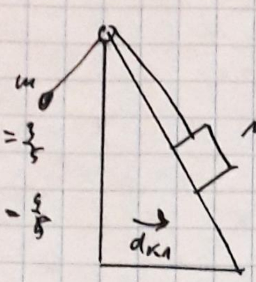




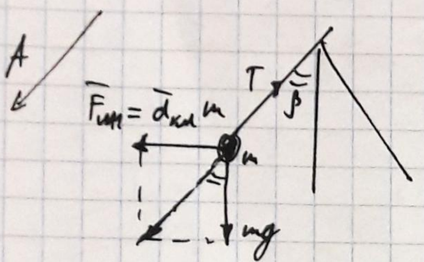
Чистовик ①

$\cos\beta = \frac{5}{13}$ $\cos\alpha = \frac{3}{5}$

$\sin\beta = \frac{12}{13}$ $\sin\alpha = \frac{4}{5}$



перейдём в СО клина, на брусок и шарик будет действовать сила инерции

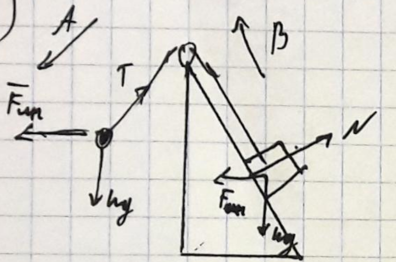


1)

$$\frac{F_{ин.}}{mg} = \frac{m a_{кл}}{mg} = tg\,\beta = \frac{12}{5}$$

$$a_{кл} = \frac{12}{5} g$$

2)



$\bar F_{ин\ для\ шара} = m \cdot \bar a_{кл}$

$\bar F_{ин\ для\ бруска} = M \cdot \bar a_{кл}$

2ЗН. по Оси B:

$$a_{бруска} \cdot M = a_{кл} \cdot M \cdot \cos\alpha - Mg\sin\alpha + T$$

2ЗН по Оси A:

$$a_{шара} m = a_{кл} m \cdot \sin\beta + mg \cdot \cos\beta - T$$

$\bar a_{шара} = \bar a_{бруска}$

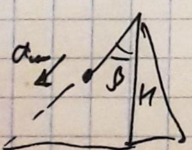
$$T\left(\frac{1}{M} + \frac{1}{m}\right) = a_{кл}(\sin\beta - \cos\alpha) + g(\cos\beta + \sin\alpha) =$$

$$= g \cdot 1,96$$

$$T = mg \cdot \frac{4,9}{3}$$

$$a_{бруска} = a_{кл} \cdot \cos\alpha - g \cdot \sin\alpha + \frac{T}{M} = \frac{29}{30} g$$

3)



$$a_{шара} = a_{бруска} = \frac{29}{30} g$$

$$S_{шара} = \frac{H}{\cos\beta} = a_{ш} \frac{t^2}{2}$$

$$t = \sqrt{\frac{2H}{a_{ш} \cdot \cos\beta}} = \sqrt{\frac{H}{g} \cdot \frac{156}{29}}$$

Ответ: 1) $a_{кл} = \frac{12}{5} g$

2) a бруска отн. клина $= \frac{29}{30} g$

3) $t = \sqrt{\frac{H}{g} \cdot \frac{156}{29}}$

Часть 2

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

Шифр: **21201091**

ID профиля: **855506**

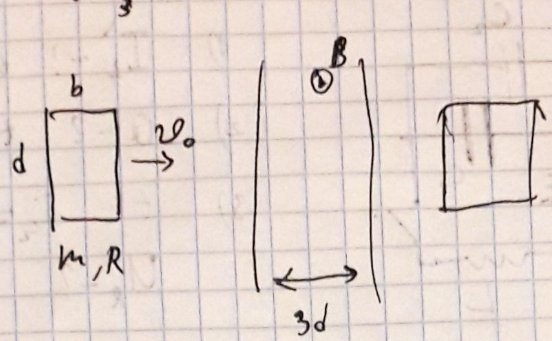
Вариант 8

Черновик №2

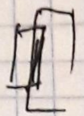
$\underline{d}, \underline{b = \frac{2}{3}d}, \underline{v_0}, \underline{m}, \underline{R},$

$\underline{B}, \underline{H = 3d}$

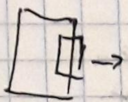
$b = \frac{2}{3} d$

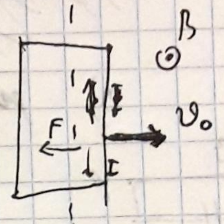


1) $a_0 - ?$

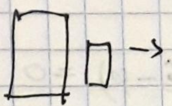


2) $v_1 - ?$





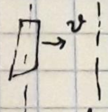
3) $v_2 - ?$



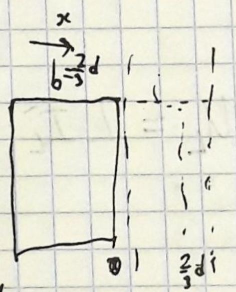
1) $\varepsilon = v_0 B d \qquad I = \frac{\varepsilon}{R} = \frac{v_0 B d}{R}$

$$F = I d \cdot B = \frac{v_0 B^2 d^2}{R} = m a_0$$

$$a_0 = \frac{v_0 B^2 d^2}{mR} \quad \checkmark$$



2) $a(v) = -v \frac{B^2 d^2}{mR}$



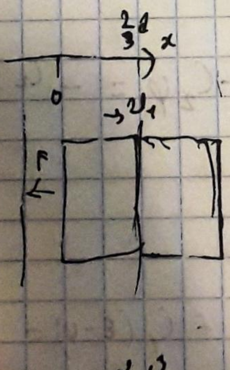
$\cancel{\frac{m v_0^2}{2} = \frac{m v_1^2}{2} + Q}$

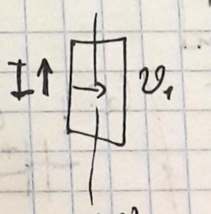
$$\Delta v = \int a\, dt = -\frac{B^2 d^2}{mR} \cdot \int_{t_0}^{t_1} v\, dt = -\frac{B^2 d^2}{mR} \int_{t_0}^{t_1} dx = -\frac{B^2 d^2}{mR}\left(\frac{2}{3}d - 0\right) =$$

$$= -\frac{2}{3} \frac{B^2 d^3}{mR}$$

$$\underline{v_1 = v_0 - \frac{2}{3} \frac{B^2 d^3}{mR}}$$

3)





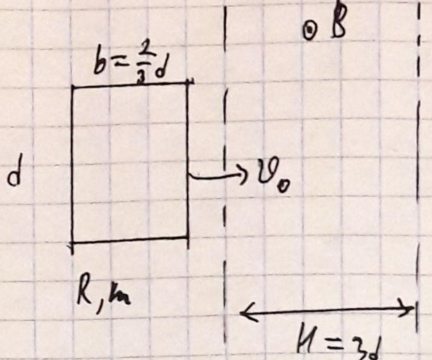
$$a = -v \frac{B^2 d^2}{mR}$$

$$\Delta v = \Sigma a \Delta t = -\frac{B^2 d^2}{mR} \sum \frac{\Delta x}{\Delta t} \Delta t = -\frac{B^2 d^2}{mR} \cdot \frac{2}{3} d$$

$$v_2 = v_1 - \frac{2}{3} \frac{B^2 d^3}{mR} = \underline{v_0 - \frac{4}{3} \frac{B^2 d^3}{mR}}$$

Чистовик ③

№ 4

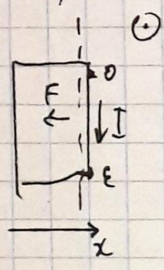


1) a_0 – ?

2) v_1 – ?

3) v_2 – ?

1) рассмотрим момент сразу после вхождения в поле



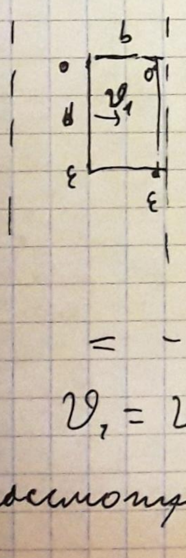
$$\varepsilon = v_0 B d \qquad I = \frac{\varepsilon}{R} = \frac{v_0 B d}{R}$$

$$F = -I \cdot d \cdot B = -\frac{v_0 B^2 d^2}{R}$$

2ЗН: $F = m a$

$$a_0 = -\frac{v_0 B^2 d^2}{mR}$$

2) рассмотрим момент ~~при~~ перед выходом правой стороны из поля



$I = 0 \quad F = 0 \Rightarrow v = const$, когда вся рамка в поле

$$\Rightarrow v_1 = v_0 + \Delta v$$

$$\Delta v = \sum a \Delta t = \sum -v \frac{B^2 d^2}{mR} \Delta t = -\frac{B^2 d^2}{mR} \sum \frac{\Delta x}{\Delta t} \Delta t =$$

$$= -\frac{B^2 d^2}{mR} \cdot \frac{2}{3} d = -\frac{2}{3} \frac{B^2 d^3}{mR}$$

$$v_1 = v_0 - \frac{2}{3} \frac{B^2 d^3}{mR}$$

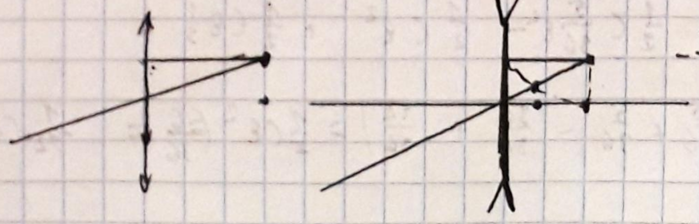
3) рассмотрим рамку после выхода

$$v_2 = v_1 + \Delta v = v_1 - \frac{2}{3} \frac{B^2 d^3}{mR} = v_0 - \frac{4}{3} \frac{B^2 d^3}{mR}$$

Черновик №3

$f = x - ?$

$F_2 - ?$



$-\frac{1}{F} = \frac{1}{d} - \frac{1}{f}$

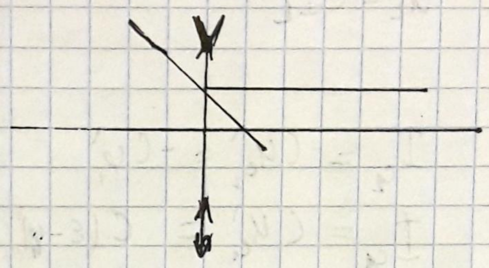
$\frac{1}{f} = \frac{1}{d} + \frac{1}{F} = \frac{F+d}{dF}$

$f = \frac{dF}{F+d_1}$

$d_1 = 25$ см $= 0{,}25$ м

$f = x$

$\Gamma_1 = \frac{f}{d} = \frac{F}{F+d_1}$



$-\frac{1}{F} = \frac{1}{d} - \frac{1}{f}$ $d = F$

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

Γ_2

$\Gamma_2 = \frac{f}{d_2} = \frac{F}{F+d_2}$

$\frac{1}{F_2} = \frac{5}{F_1}$

$F_1 = 5F_2$

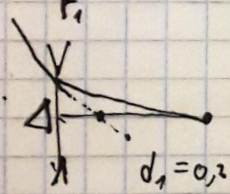
$\frac{F_2}{F_2+d_2} = \frac{x}{d_2}$

$F_2 = x$ $F_2 - x$

$\frac{x}{x+d_2} = \frac{x}{d_2}$

$x d_2 = x^2 + x d_2$

$x^2 = 0$



$d_1 = 0{,}25$ м

$\frac{5F_2}{5F_2+d_1} = \frac{x}{d_1}$

$\frac{-x}{-x+d_2} = \frac{x}{d_2}$

$\frac{5 d_1 F_2}{5F_2+d_1} = \frac{d_2 F_2}{F_2+d_2}$

$-x d_2 = -x^2 + x d_2$

$5 d_1 (F_2 + d_2) = d_2 (5F_2 + d_1)$

$x^2 + 2x d_2 = 0$

$5 d_1 F_2 + 5 d_1 d_2 = 5 d_2 F_2 + d_1 d_2$

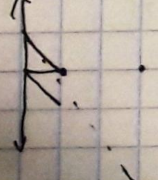
$x(x + 2d_2) = 0$

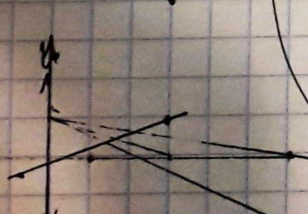
$F_2 (5d_1 - 5d_2) = -4 d_1 d_2$

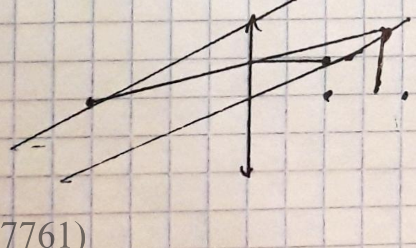
$2d_2 = -x$

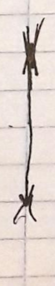
$F_2 = \frac{4 d_1 d_2}{5(d_2 - d_1)}$

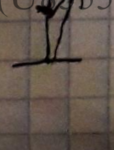
$d_2 = +\frac{x}{2}$





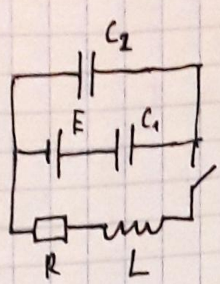






Чистовик ①

№3

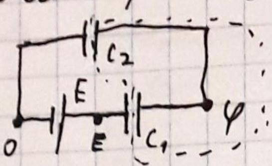


1) I_L' -? сразу после замыкания

2) Q -?

3) U_R -?, когда $I_{C_2} = I_0$

1) рассмотрим цепь до замыкания

МУП: 

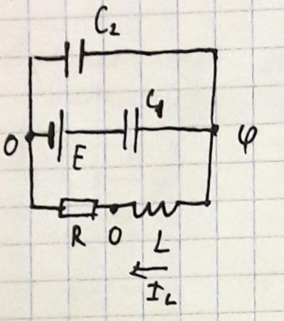
– изолированная система, $\sum q = const = 0$

$0 = +C_2(\varphi - 0) - C_1(\mathcal{E} - \varphi)$

$0 = 5C\varphi - C\mathcal{E} + C\varphi$

$6C\varphi = C\mathcal{E} \qquad \varphi = \frac{1}{6}\mathcal{E}$

2) рассмотрим цепь сразу после замыкания



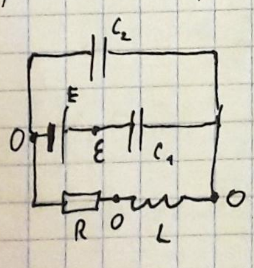
U_C – скачком не меняется $\Rightarrow \varphi = \frac{1}{6}\mathcal{E}$

I_L – скачком не меняется $\Rightarrow I_L = 0$

$I_L = I_R = 0 \Rightarrow U_R = 0 \Rightarrow U_L = \varphi = \frac{1}{6}\mathcal{E}$

$U_L = L I_L' \qquad I_L' = \frac{U_L}{L} = \frac{\mathcal{E}}{6L}$

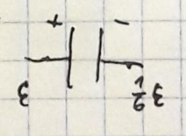
3) рассмотрим цепь в уст. режиме.



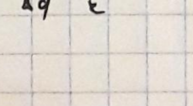
$U_L = 0, \quad I_C = 0$

$U_{C_2} = 0, \quad U_{C_1} = \mathcal{E}$

4 конденсатор C_1:

было: 

$q = C_1 U_{C_1} = C_1(\mathcal{E} - \frac{1}{6}\mathcal{E}) = \frac{5}{6}C\mathcal{E}$

стало: 

$q = C_1 U_{C_1} = C_1 \cdot \mathcal{E} = C\mathcal{E}$

$\Delta q = C\mathcal{E} - \frac{5}{6}C\mathcal{E} = \frac{1}{6}C\mathcal{E}$

ЗСЭ: $W_{C_1} = W_{C_2} + Q - A_б, \quad A_б = \Delta q \cdot \mathcal{E}$

$\frac{C_1(\frac{5}{6}\mathcal{E})^2}{2} + \frac{C_2(\frac{1}{6}\mathcal{E})^2}{2} = \frac{C_1\mathcal{E}^2}{2} + 0 + Q - \frac{C\mathcal{E}^2}{6}$

$Q = \frac{1}{2}C\mathcal{E}^2\left(\frac{25}{36} + \frac{5}{36} - \frac{36}{36} + \frac{12}{36}\right) = \frac{1}{12}C\mathcal{E}^2$

$W_{C_1}+W_{C_2} = W'_{C_1}+W'_{C_2}+Q-A_S$

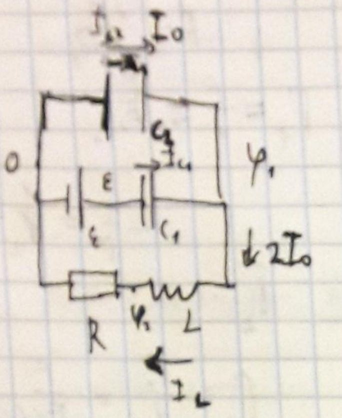
$Q = W'_{C_1}+W'_{C_2}-W_{C_1}-W_{C_2}+A_S =$

$= \frac{C_1(\varepsilon-\varphi)^2}{2}+\frac{C_2\varphi^2}{2}-\frac{C_1\varepsilon^2}{2}-0+q_S\cdot E =$

$= \frac{1}{2}C\frac{25}{36}\varepsilon^2+\frac{1}{2}C\frac{5}{36}\varepsilon^2-\frac{1}{2}C\varepsilon^2+\frac{1}{2}C\varepsilon\frac{1}{3} =$

$= \frac{1}{2}C\varepsilon^2\left(\frac{25}{36}+\frac{5}{36}-\frac{36}{36}+\frac{12}{36}\right) = \frac{1}{2}C\varepsilon^2\frac{6}{36} = \frac{1}{12}C\varepsilon^2$

3)

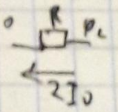


$I_C = CU_C' = C\varphi'$

$U_L = CI_L'$

$I_{C_2} = -CU_{C_2}' = -C\varphi_1'$

$I_{C_1} = CU_{C_1}' = C(\varepsilon-\varphi_1)' = -C\varphi_1' = I_{C_2} = I_0$



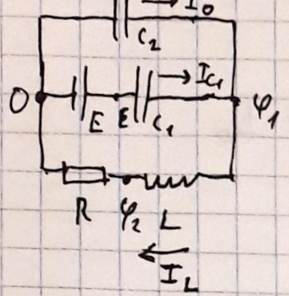
$\varphi_2 = 2I_0R$

$U_R = 2I_0R$

Чистовик ②

N3

4) рассмотрим момент, когда $I_{C_2} = I_0$



$$I_C = CU_C'$$

$$I_{C_2} = -CU_{C_2}' = -C\varphi_1'$$

$$I_{C_1} = CU_{C_1}' = C(\varepsilon-\varphi_1)' = -C\varphi_1' = I_{C_2} = I_0$$

$$I_L = I_{C_1} + I_{C_2} = 2I_0 = I_R$$

$$U_R = RI_R = 2I_0R$$

Ответ: 1) $I_L' = \frac{\varepsilon}{6L}$

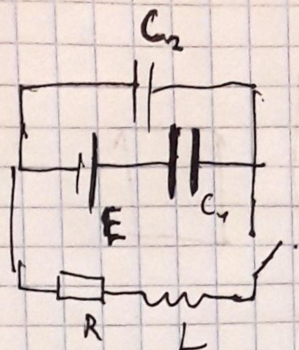
2) $Q = \frac{C\varepsilon^2}{12}$

3) $U_R = 2I_0R$

Черновик

$C_1 = C$

$C_2 = 5C$



1) $I_L' - ?$ $t=0$

2) $Q - ?$ $t_0 \to \infty$

3) $t:$ $I_{C_2} = I_0$

$U_R - ?$

$I_C = C U_C'$

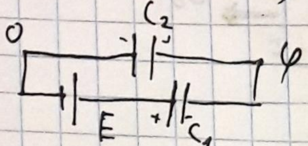
$U_L = L I_L'$

I скачком не меняется

~~U_C скачком не меняется~~

0) при ключ разомкнутом

уст. режим.



C

$+C_2\varphi - C_1(\varepsilon - \varphi) = 0$

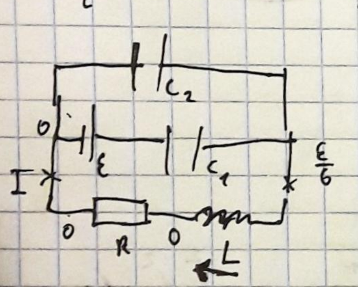
$5C\varphi = C\varepsilon - C\varphi$

$6C\varphi = C\varepsilon$ $\quad 6\varphi = \varepsilon$ $\quad \varphi = \frac{\varepsilon}{6}$

1) $t = 0$

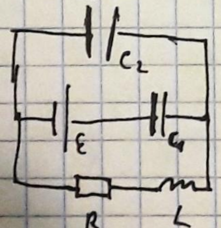
I_L скачком не изм.

U_C скачком не изм.



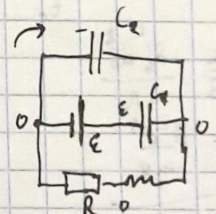
$U_L = L I_L'$ $\quad I_L' = \frac{U_L}{L} = \frac{\varepsilon}{6L}$

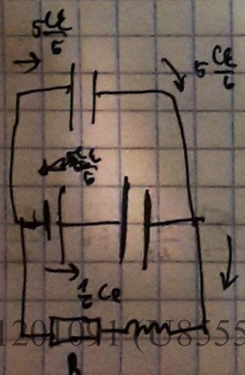
2)

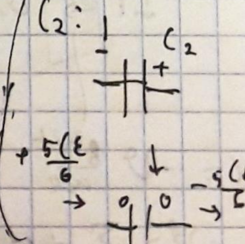


$t \to \infty$

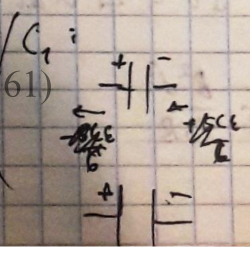
установ. режим.







$q_- = -C_2\varphi = -C_2\frac{\varepsilon}{6} = -\frac{5C\varepsilon}{6}$



$q_+ = +C_1(\varepsilon - \varphi) = \frac{5C\varepsilon}{6}$

$q_+ = +C_1\varepsilon = C\varepsilon$