Часть 1

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

Шифр: **21201364**

ID профиля: **882315**

Вариант 4

Чистовик

№2

Для процесса справедливо: $\Delta Q = \Delta A + \Delta U$; (1)

$\Delta Q = C\nu\Delta T = \frac{9}{5}R\frac{T}{T_0}\nu\Delta T$

а) при охлаждении от T_0 до $\frac{3T_0}{4}$: $dQ = \frac{9\nu R}{5T_0}T\,dT$

$\Rightarrow \int_0^{Q_1} dQ = \frac{9}{5}\frac{\nu R}{T_0}\int_{T_0}^{\frac{3T_0}{4}} T\,dT$, $\Rightarrow Q_1 = \frac{9\nu R}{5T_0}\cdot\frac{T^2}{2}\Big|_{T_0}^{\frac{3T_0}{4}} = \frac{9\nu R}{5T_0}\left(\frac{16T_0^2}{32} - \frac{9T_0^2}{32}\right) = \frac{63}{160}\nu RT_0$

б) распишем ур-ие 1:

$\frac{9}{5}\nu R\frac{T}{T_0}dT = dA + \frac{3}{2}\nu R\,dT$, $\Rightarrow dA = \frac{9}{5}\nu R\frac{T}{T_0}dT - \frac{3}{2}\nu R\,dT$

$\Rightarrow \int_0^{A} dA = \frac{9\nu R}{5T_0}\int_{T_0}^{T_1} T\,dT - \frac{3}{2}\nu R\int_{T_0}^{T_1} dT$

$\Rightarrow A(T_1) = -\frac{9\nu R}{5T_0}\cdot\frac{T_0^2}{2} + \frac{9\nu R}{5T_0}\cdot\frac{T_1^2}{2} - \frac{3}{2}\nu RT_1 + \frac{3}{2}\nu RT_0 = +\frac{9\nu R}{10T_0}T_1^2 - \frac{3}{2}\nu RT_1 - \frac{9\nu R}{10}T_0 + \frac{15}{10}\nu RT_0$

Это ур-ие параболы с ветвями ~~вниз~~ вверх, $\Rightarrow$ минимум в точке $T_1 = \frac{\frac{3}{2}\nu R}{\frac{9\nu R}{5T_0}} =$

$= \frac{15}{18}T_0 = \frac{5}{6}T_0$

И работа $A_{min} = A(\frac{5}{6}T_0) = \frac{9\nu R}{10T_0}\cdot\frac{25}{36}T_0^2 - \frac{3}{2}\nu R\cdot\frac{5}{6}T_0 + \frac{3}{5}\nu RT_0 = \nu RT_0\left(\frac{5}{8} - \frac{5}{4} + \frac{3}{5}\right) =$

$= \cancel{\left(\frac{3}{5} - \frac{5}{8}\right)\nu RT_0} = -\frac{1}{40}\nu RT_0$

Ответ: 1) $Q_1 = \frac{63}{160}\nu RT_0$

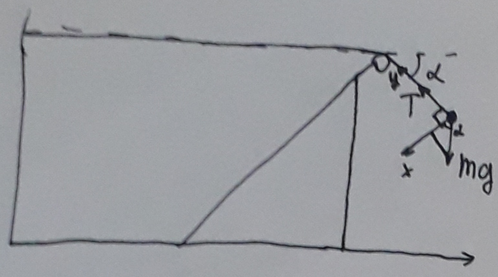
2) $T_1 = \frac{5}{6}T_0$

3) работа газа $A = -\frac{1}{40}\nu RT_0$

1

Чистовик

№1

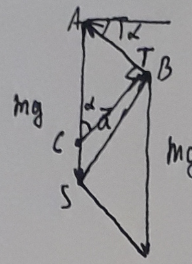


1) В начальный момент времени для шарика на $O_x \perp$ нити: $mg\cos\alpha = ma_ш$

$a_ш = g\cos\alpha$ – т.к. $\alpha = const$, $a_ш = const$

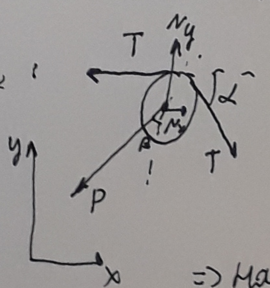
в нач. момент $V_ш(0) = 0$, $\Rightarrow T = mg\sin\alpha$

Покажем, что это всегда так:



т.к. $\alpha = const$, $BC = mg\cos\alpha\ \forall t$, $\Rightarrow AC = mg$, но $AS = mg$, $\Rightarrow AC = AS$ и в любой момент времени угол наклона уск. одинаков. и ускорение шарика $a = g\cos\alpha$, значит наклон ускорения к вертикали $= \arccos(\frac{8}{17})$

2) рассмотрим блок на клине:



т.к. блок легкий ($m=0$):

O_x: $T - T\cos\alpha = N_x$

O_y: $N_y = T\sin\alpha$

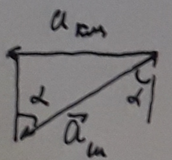
$\Rightarrow$ на клин действует сила

$\vec{P} = \sqrt{N_x^2 + N_y^2} = T\sqrt{\sin^2\alpha + 1 - 2\cos\alpha + \cos^2\alpha} = T\sqrt{2(1-\cos\alpha)}$

$= T\sqrt{2 \cdot \frac{9}{17}} = \sqrt{\frac{18}{17}}\,T$

а действует она под углом $tg\beta =$

$= \frac{N_x}{N_y} = \frac{1-\cos\alpha}{\sin\alpha}$ к вертикали



Ясно, что ускорение клина $a_{кл} = \frac{a_ш \cdot \sin\alpha}{\sin\alpha}$ (см. рис.), $\Rightarrow a_{кл} = \cancel{a_ш\, ctg\alpha}\ g\ \cancel{ctg\alpha}\ \cos\alpha\sin\alpha$

~~Найдем $ctg\alpha$: $\sin^2\alpha + \cos^2\alpha = 1$, $\Rightarrow \sin\alpha = \sqrt{\frac{17^2 - 8^2}{17^2}} = \sqrt{\frac{9 \cdot 25}{17^2}} = \frac{15}{17}$, $\Rightarrow ctg\alpha = \frac{\cos\alpha}{\sin\alpha} = \frac{8}{15}$~~, $\Rightarrow a_{кл} = \frac{8}{18} g =$

$= g \cdot \frac{8}{17} \cdot \frac{15}{17} = \frac{120}{17^2} g = \frac{120}{289} g$ (т.к. $\sin\alpha = \frac{15}{17}$)

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тогда запишем ур-е движения для клина в проекции на горизонт:

$Ma_{кл} = P\sin\beta$, $\Rightarrow Ma_{кл} = \sqrt{\frac{18}{17}}\,T \cdot \sin(arctg(\beta)) = \sqrt{\frac{18}{17}}\, mg\sin\alpha\sin\beta$, $\Rightarrow \frac{m}{M} = \sqrt{\frac{17}{18}}\frac{a_{кл}}{g\sin\alpha\sin\beta}$

Чистовик

№1

$$\frac{m}{M} = \sqrt{\frac{17}{18}}\,\frac{a_{кл}\sin\alpha}{g\sin\alpha\sin\beta} = \sqrt{\frac{17}{18}}\,\frac{g\cos\alpha}{g\sin\beta} = \sqrt{\frac{17}{18}}\,\frac{\cos\alpha}{\sin\beta}$$

Найдем $\sin\beta$: $tg\beta = \frac{1-\frac{6}{17}}{\frac{15}{17}} = \frac{5}{15} = \frac{1}{3}$, $\Rightarrow 1 + tg^2\beta = \frac{1}{\cos^2\beta}$, т.е $\frac{1}{\cos^2\beta} = \frac{1}{9} + 1 = \frac{10}{9}$, $\Rightarrow \cos^2\beta = \frac{9}{10}$

$\Rightarrow \sin^2\beta = 1 - \frac{9}{10} = \frac{1}{10}$, $\Rightarrow \sin\beta = \frac{1}{\sqrt{10}}$, $\Rightarrow \frac{m}{M} = \sqrt{\frac{17}{18}} \cdot \frac{8\cdot\sqrt{10}}{17\cdot} = \sqrt{\frac{17\cdot 10}{18\cdot 17}}\,8 = 8\sqrt{\frac{10}{306}}$

~~Ответ: 1)~~ $\cancel{\cos\alpha = \frac{8}{17}}$

~~2)~~ $\cancel{a_{кл} = \frac{120}{289}g}$

~~3)~~ $\cancel{\frac{m}{M} = 8\sqrt{\frac{10}{306}}}$

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4) Найдем время падения шарика: $H = \frac{a_y\tau^2}{2} = \frac{a\cos\alpha\,\tau^2}{2}$, $\Rightarrow \tau = \sqrt{\frac{2H}{a\cos\alpha}} =$

$= \sqrt{\frac{2H}{g\cos^2\alpha}} = \frac{1}{\cos\alpha}\sqrt{\frac{2H}{g}} = \frac{17}{8}\sqrt{\frac{2H}{g}}$

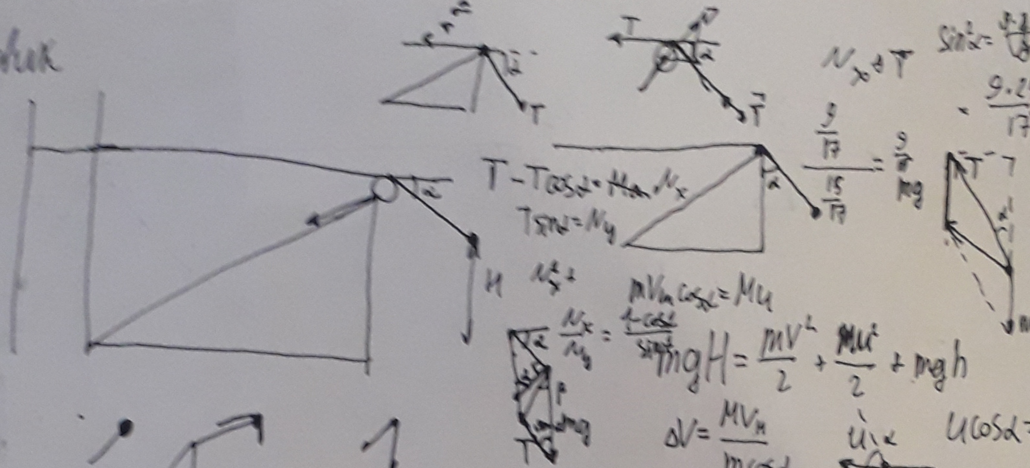
Ответ: 1) $\cos\alpha = \frac{8}{17}$

2) $a_{кл} = \frac{120}{289}g$

3) $\frac{m}{M} = 8\sqrt{\frac{10}{306}}$

4) $\tau = \frac{17}{8}\sqrt{\frac{2H}{g}}$

Черновик



$N_x \neq T$

$\sin^2\alpha = \frac{9\cdot 25}{17^2}$ $1-\frac{8^2}{17^2}$

$= \frac{9\cdot 25}{17^2} \Rightarrow \sin\alpha = \frac{15}{17}$

$T - T\cos\alpha = Ma\ N_x$

$T\sin\alpha = N_y$

$\frac{\frac{9}{17}}{\frac{15}{17}} = \frac{9}{mg}$

$T\sin\alpha = mg$

$T\cos\alpha = ma$

$mg\,ctg\,\alpha = ma$

$N_x^2 =$

$mV_m\cos\alpha = Mu$

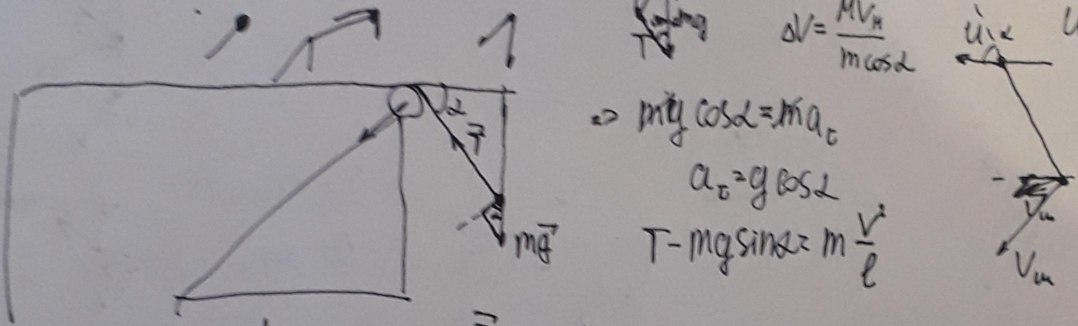
$\frac{N_x}{N_y} = \frac{1-\cos\alpha}{\sin\alpha}$

$mgH = \frac{mV^2}{2} + \frac{Mu^2}{2} + mgh$

$a = g\,ctg\,\alpha$

$\Delta V = \frac{MV_M}{m\cos\alpha}$

$u\cos\alpha = V_m\cos\beta$



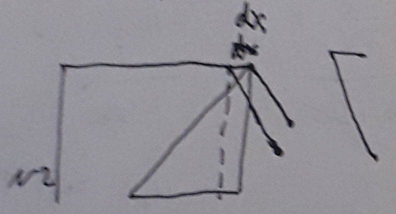
$\Rightarrow mg\cos\alpha = ma_\tau$

$a_\tau = g\cos\alpha$

$T - mg\sin\alpha = m\frac{V^2}{l}$

$\cos^2 + \sin^2 = 1$

$1 + tg^2 = \frac{17^2}{8^2}$



$F\cos\beta = Ma$

$T - mg\sin\alpha = m\frac{\Delta V^2}{l+\Delta l}$

$dl = dx$

$T = mg\sin\alpha$

$dQ(T) = c\nu dT = \frac{9}{5}R\frac{T}{T_0}\nu dT$

$tg^2 = \frac{(17-8)(17+8)}{8^2} =$

$\int_0^Q dQ = \frac{9}{5}\frac{R\nu}{T_0}\int_{T_0}^{\frac{3T_0}{4}} T\,dT$ $pV = \nu RT$ $= \frac{9\cdot 25}{8^2} =$

$pdV + Vdp = \nu RdT$

$T_0,\ c(T) = \frac{9}{5}R\frac{T}{T_0}$

$V_M = u$

$Q = c\nu\Delta T$

$m\frac{M^2V_M^2}{m\cos^2\alpha(l+\Delta l)}$

$Q = \frac{9}{5}\frac{\nu R}{T_0}\left(\frac{T^2}{2}\right)\Big|_{T_0}^{\frac{3T_0}{4}}$

$tg = \frac{3\cdot 5}{8} = \frac{15}{8}$

$Q = \frac{9}{5}\frac{\nu R}{T_0}\left(\frac{16T_0^2}{32} - \frac{9T_0^2}{32}\right) =$

$\Delta Q = \Delta A + \Delta U$

$\Delta Q = \frac{3}{2}\nu R\Delta T + p\Delta V$

$\frac{9}{5}R\frac{T}{T_0}dT = \frac{3}{2}\nu RdT + pdV$

$= \frac{9}{5}\frac{\nu R}{T_0}\cdot\frac{7T_0^2}{32} = \frac{63}{160}\nu RT_0$

$\frac{9}{5}R\frac{1}{T_0}\sum TdT - \frac{3}{2}\nu R\sum dT + \sum pdV$

$dA = \frac{9}{5}R\frac{T}{T_0}\nu dT + \frac{3}{2}\nu RdT$

$\frac{a_y}{a_x} = ctg\beta$

$T\frac{\cos\alpha}{\cancel{\sin\alpha}} - mg = ma_y$

$T\cos\alpha - mg = m\,ctg\beta\,a_x$

$T\,\cancel{\cos}\sin\alpha = ma_x$

$T\sin\alpha = ma_x$

$\int_0^A dA = \frac{9}{5}\frac{\nu R}{T_0}\int_{T_0}^{T'} T\,dT + \frac{3}{2}\nu R\int_0^{T'} dT$

$a_y = ctg\beta\,a_x$

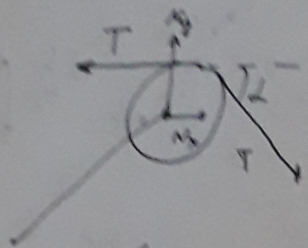
$a_x\,ctg\,\alpha - g = a_y$

$ctg\beta = \frac{T\cos\alpha - mg}{T\sin\alpha}$

$A = \frac{9}{5}\frac{\nu R}{T_0}\cdot\left(\frac{T_0^2}{2} - \frac{T'^2}{2}\right) + \frac{3}{2}\nu RT' = \frac{9}{5}\frac{\nu R}{T_0}\cdot\frac{T_0}{2} - \frac{9}{5}\frac{\nu R}{T_0}\cdot\frac{T'^2}{2} + \frac{3}{2}\nu RT'$

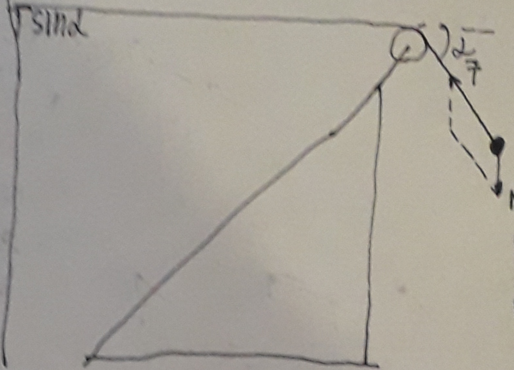
21201364 (U882315 M1267826)

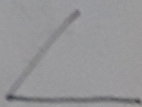
Черновик

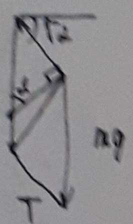


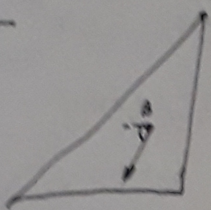
$N_x = T - T\cos\alpha$

$N_y = T\sin\alpha$



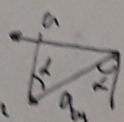


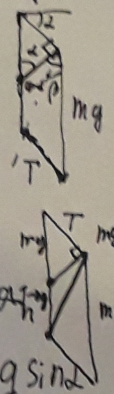




$a_\tau = \cancel{mg\sin\alpha}\ \cos\alpha$

a ~~$mg\cos\alpha = ma_n$~~

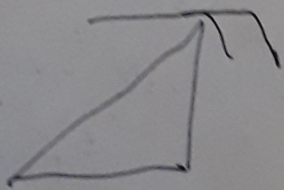


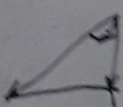


$N_x^2 + N_y^2 =$

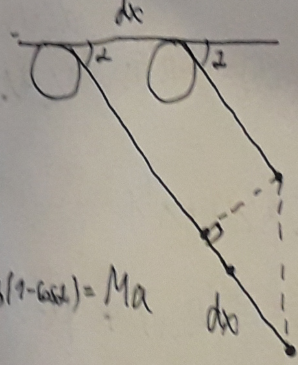
$a_{кл} = \frac{a_n}{\sin\alpha}$ $\quad ma_n = T - mg\sin\alpha$

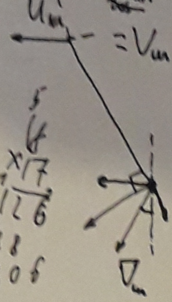
$\sqrt{T^2(\sin^2\alpha + 1 - 2\cos\alpha + \cos^2\alpha)} = T\sqrt{2-2\cos\alpha}$





$U_{кл}\cos\alpha = V_{кл}\cos\beta$

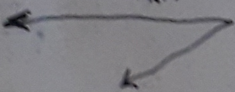




18
×17
126
18
306

~~$T\sin\beta$~~

$T\sin\beta = Ma$



$mg\sin\alpha\sin\beta(1-\cos\alpha) = Ma$

4) $H = \frac{a_y t^2}{2}$

$1 + tg^2\beta = \frac{1}{\cos^2\beta}$

$1 + \frac{(1-2\cos+\cos^2)}{\sin^2} = \frac{1}{\cos^2\beta}$

$\frac{1}{\cos^2\beta} = \frac{2-2\cos}{\sin^2}$

Часть 2

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

Шифр: **21201364**

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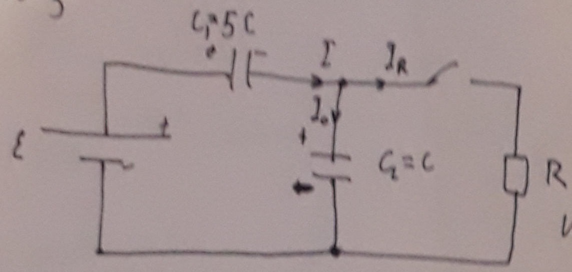
Вариант 4

Чистовик

№3



1) закон Кирхгофа $I_R R = U_{C2}$

Напряжение на C_2 в момент t=0 найдем из системы: $\begin{cases} q_1 = q_2, \Rightarrow 5CU_1 = CU_2 \\ U_1 + U_2 = \mathcal{E}, \Rightarrow U_1 = \frac{\mathcal{E}}{6}, \Rightarrow U_2 = \frac{5\mathcal{E}}{6} \end{cases}$

$\Rightarrow q = \frac{5}{6}\mathcal{E}C$

$\Rightarrow I_R = \frac{5}{6}\frac{\mathcal{E}}{R}$

2) После замыкания конденс. разрядятся, а через ист пройдет заряд $q_1 + q_2$

$\Rightarrow A_{ист} = W_0 + Q$, $Q = 2q\mathcal{E} - W_0 = 2q\mathcal{E} - \frac{q^2}{2C} - \frac{q^2}{10C} = 2q\mathcal{E} - \frac{25\cdot\mathcal{E}^2C^2}{36\cdot2C} - \frac{25\mathcal{E}^2C^2}{36\cdot10C} =$

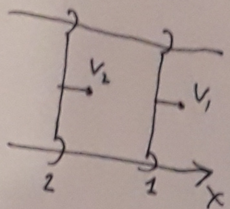
$= \frac{10}{6}\mathcal{E}^2C - \frac{25\cdot10+50}{36\cdot2\cdot10}\mathcal{E}^2C = \mathcal{E}^2C\left(\frac{2\cdot10}{2\cdot6} - \frac{30}{36\cdot2}\right) = \frac{15}{12}\mathcal{E}^2C$

Ответ: 1) $\frac{5\mathcal{E}}{6R}$

2) $\frac{15}{12}\mathcal{E}^2C$

1

№4 Чистовик



1) В нач. момент: $\mathcal{E}_i = \cancel{BIl} B v_0 L$, $\Rightarrow I = \frac{B v_0 L}{6R}$

$\Rightarrow$ 2 з-н Ньютона: $BIL = 2ma_0$, $\Rightarrow a_0 = \frac{B^2L^2v_0}{12mR}$.

2) перейдем в СО, связанную со второй перемычкой. Тогда $\vec{V}_{2\,отн} = 0$

$V_{1\,отн} = V_1 - V_2$

$a_{1\,отн} = a_1 - a_2$

тогда для первой перемычки: $-\frac{B^2l^2 V_{1\,отн}}{6R} = 2m a_{1\,отн}$, $\Rightarrow \frac{dV_{1\,отн}}{V_{1\,отн}} = -const \cdot dt$, $\Rightarrow$

$\Rightarrow \int\limits_{V_0}^{V_{отн}} d\ln V_{1\,отн} = -\int\limits_0^t const \cdot dt$, $\Rightarrow \ln\frac{V_{отн}}{V_0} = -const \cdot t$, $\Rightarrow V_{отн} = V_0 e^{-const \cdot t}$. При $t \to \infty$

$V_{отн} \to 0$, т.е. $V_1 - V_2 = 0$, $\Rightarrow V_1 = V_2$ – скорости перемычек сравняются

~~для малых моментов справедливо:~~ $\cancel{dV_1 = -a_1 dt}$, $\cancel{dV_2 = a_2 dt}$ $\Rightarrow$ $\cancel{\int_{V_0}^{V_1} dV_1 = -a_1 t}$, $\cancel{\int_0^{V_2} dV_2 = a_2 t}$ $\Rightarrow$ $\cancel{\begin{cases} V_1 = V_0 - a_1 t \\ V_2 = a_2 t \end{cases}}$

~~Из з-нов Ньютона для обеих перемычек:~~ $\cancel{\begin{cases} F_A = 2ma_1 \\ F_A = \frac{m}{2}a_2 \end{cases}}$, $\Rightarrow$ $\cancel{a_2 = 4a_1}$ $\Rightarrow$

$\Rightarrow$ $\cancel{\begin{cases} V_1 = V_0 - a_1 t \\ V_2 = 4a_1 t \end{cases}}$ $\Rightarrow$ $\cancel{\begin{cases} a_1 t = \frac{V_0}{5} \\ V_1 = V_2 = \frac{4V_0}{5} \end{cases}}$

для малых моментов справедливо: $\begin{matrix} dV_1 = -a_1 dt \\ dV_2 = +a_2 dt \end{matrix} \Big| \Rightarrow \frac{dV_1}{dV_2} = -\frac{a_1}{a_2} = -\frac{1}{4}$, $\Rightarrow$ *

Из з-нов Ньютона для обеих перемычек: $\begin{cases} F_A = 2ma_1 \\ F_A = \frac{m}{2}a_2 \end{cases} \Rightarrow a_2 = 4a_1$

$* \Rightarrow \int\limits_{V_0}^{V_1} dV_1 = -\frac{1}{4}\int\limits_0^{V_2} dV_2$, $\Rightarrow \begin{cases} V_1 - V_0 = -\frac{1}{4}V_2 \\ V_1 = V_2 \end{cases} \Rightarrow V_1 = V_2 = \frac{4}{5}V_0$

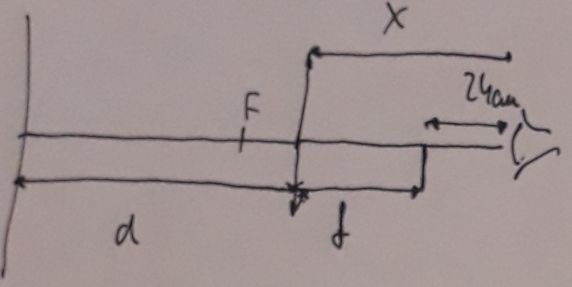
2

Ответ: 1) $a_0 = \frac{B^2L^2}{12mR}V_0$

2) $V_1 = V_2 = 0{,}8V_0$

Чистовик

№5



1) ф-ла тонкой линзы: $\frac{1}{d}+\frac{1}{f}=\frac{1}{F}$

$\Rightarrow \frac{1}{96}+\frac{1}{f}=\frac{1}{24}$

$\frac{1}{f}=\frac{4}{96}-\frac{1}{96}=\frac{3}{96}=\frac{1}{32} \Rightarrow f=32$ см

$\Rightarrow x=f+24=56$ см.

2) необходимо, чтобы выполнялось усл.

21201364 (U882315 M1267827)

$dV_1 = -\frac{1}{4} \ldots$

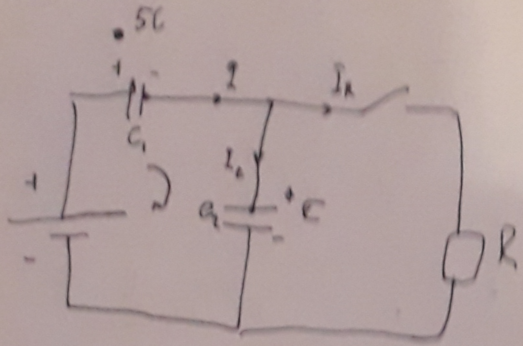
$V_1 - V_0 = -\frac{1}{4} V_2$

$V_1 - V_2$

$\frac{2}{2} = 96n$

$n = \frac{3}{2}$

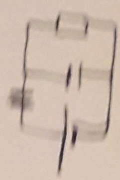
Черновик



$I = \frac{\mathcal{E}}{R}$ $\quad I$

$\mathcal{E} = U_{C_1} + U_{C_2} = \frac{q_1}{5C} + \frac{q_2}{C}$

$\mathcal{E} = I_R R$

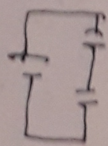


$U_C = \mathcal{E}$

$U_R =$

1) $I = 0$

2) q_0:



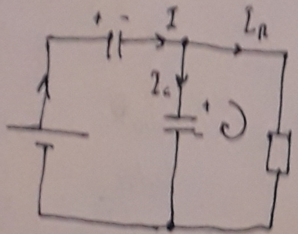
$q_1 = q_2 \;\Rightarrow\; \cancel{U_1} \quad q_1 = 5CU_1, \; q_2 = CU_2 \Rightarrow U_2 = 5U_1$

$U_1 + U_2 = \mathcal{E}$

$6U_1 = \mathcal{E}, \; U_1 = \frac{\mathcal{E}}{6} \qquad q = \frac{5}{6}\mathcal{E}C$

$U_2 = \frac{5\mathcal{E}}{6}$

после:



$I_R R = q \; U_{C_2} = \frac{q}{C_2}$

$\Delta q_R R = \frac{q_{C_2}}{C_2}\Delta t$

$Q = UIt = q_R U$

$\frac{B^2l^2V_1 - B^2l^2V_2}{6R} = 2ma_1 = \frac{m}{2}a_2$

$x(V)$

$\frac{B^2l^2}{V_0 \cdot R} x = mV$

$\frac{BlV}{6R}$

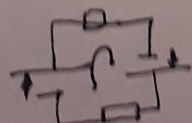
$\cancel{W_0}$ $A = W - W_0 + Q$ $\quad$ №4

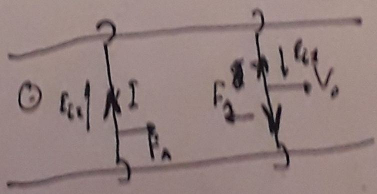
$A = q\mathcal{E}$

В СО: $a' = 5a_1$

$V_1' = V_1 - V_2$

$V_2' = 0$





$I = \frac{Bl(V_1 + V_2)}{6R}$

$I = \frac{\mathcal{E}_{i1} + \mathcal{E}_{i2}}{6R}$ для второй: $\mathcal{E}_{i2} = BlV_2$

$\mathcal{E}_{i1} = BlV_1$

$\Rightarrow r = 6R$

на вторую: BI_2

$I = \frac{\mathcal{E}_{i1} - \mathcal{E}_{i2}}{6R}$

$I_0 = \frac{BlV_0}{6R}$

$\frac{B^2l^2}{6R}(V_1 + V_2) = 2ma_1 \qquad \frac{B^2l^2 \cancel{V}}{6m} dt = d\ln V$

$a_2 = 4a_1 \qquad BIL = 2ma$

$\frac{B^2l^2}{6R}V_1' = 10ma' \qquad -\frac{B^2l^2}{6m}t = \ln\frac{V}{V_0}$

$F_A = BIL \qquad a_0 = \frac{BIL}{2m} = \frac{B^2l^2V_0}{12mR}$

$V = V_0 e^{-\frac{B^2l^2}{6m}t}$

$\frac{B^2l^2}{6R}V_1' = 10m\frac{dV_1'}{dt} \Rightarrow c\,dt = d\ln V$

$F = \frac{B^2l^2V}{6m} = m\frac{dV}{dt}$

$y = 10r \quad \frac{dV_1}{dV_2} = -\frac{a_1}{a_2} = -\frac{1}{4}$

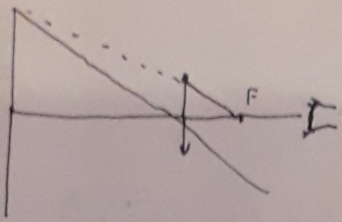
$\frac{v}{2} = r + g$

r

$= h$

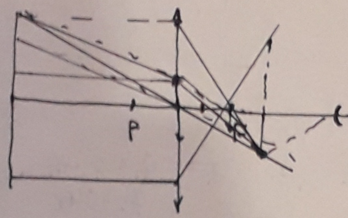
$\frac{v}{2} = 96h$

$r = n$



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

$-\frac{1}{d} = \frac{1}{F} - \frac{1}{f} = \frac{1}{2}$

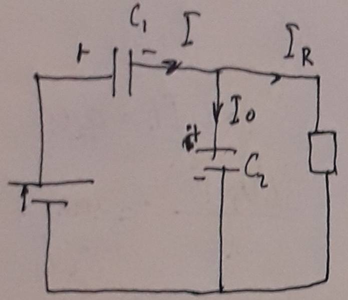


$+\frac{1}{96} = \frac{1}{24} - \frac{1}{f}$

$\frac{1}{f} = \frac{3}{96} - \frac{1}{96} = \frac{2}{96} = \frac{1}{48}$

$f = 48$

$\frac{h}{H} = \frac{f}{d}$



$I = I_0 + I_R$

$\mathcal{E} = U_{c1} + IR - I_0 R$

$I_0 = \frac{dq_{c2}}{dt}$

$S_1 = v_0 t + \frac{a_1 t^2}{2}$

$S_2 = \frac{a_2 t^2}{2}$

$\mathcal{E} = U_{c1} + I_R R$

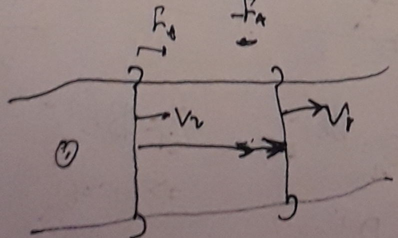
$\mathcal{E} = U_{c1} + U_{c2}$

$I_R R = -U_{c1}$

$A = 2q\mathcal{E}$

$cV_1 - cV_2 = ma_1$

$cV_1 - cV_2 = \frac{ma_2}{2}$



$I_R R = U_{c2}$

$\mathcal{E} = \frac{q_{c1}}{C} + I_R R$

$\mathcal{E}_{i1} = BlV_1$

$\mathcal{E}_{i2} = BlV_2$

$\Rightarrow I = \frac{\mathcal{E}_{i1} + \mathcal{E}_{i2}}{6R} = Bl\frac{V_1 + V_2}{6R}$

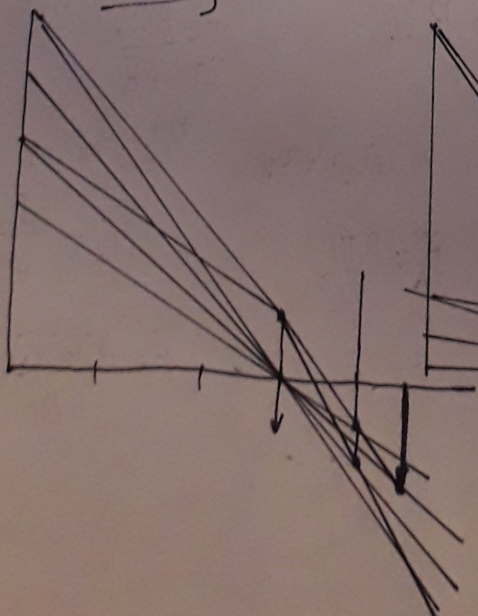
$F_A = B^2 l^2 c(V_1 + V_2) = ma_1$

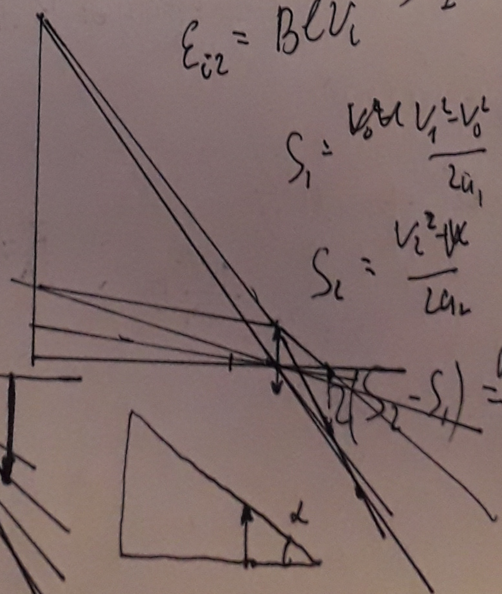
$S_1 = \frac{V_1^2 - V_0^2}{2a_1}$

$c(V_1 + V_2) = \frac{m}{2} a_2$

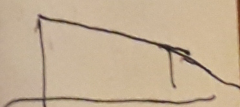
$S_2 = \frac{V_2^2 + V_0^2}{2a_2}$

$a_2 = 4a_1$



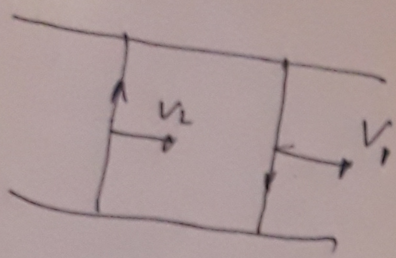


$2(S_2 - S_1) = \frac{4V_2^2}{4a_4} - \frac{V_1^2 + V_0^2}{a_1}$



$\alpha \leq 0{,}1$ рад

Черновик



$$I = \frac{Bl}{6R}(V_1+V_2)$$

$\vec{V}_{a\delta}$

$\vec{V_1} = \vec{V}_{or} + \vec{V_2}$

в СО связ. с V_2: $V_2' = 0$

$V_1' = V_1 - V_2$

$a_1' = 3a_1$

$$\Rightarrow I = \frac{BlV_1'}{6r}$$

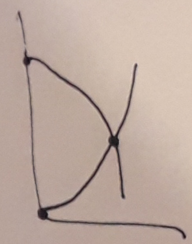
$$\mathcal{E}_i = Bl(V_1 - V_2) = BlV_1'$$

$$\Rightarrow \frac{BlV_1'}{6r} = 2ma_1'$$

$dx =$

$$\frac{BlV_1'}{6r} = 2m\frac{dV_1'}{dt}$$

$\alpha = \frac{r}{x}$

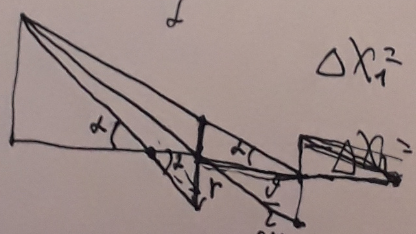


$$V_1' = e^{-ct}$$

$V_1 - V_2$

$$96 - \frac{r\alpha}{I}$$

$$\alpha = \frac{96}{}$$



$$\Delta x_1 = \frac{a_1\Delta t_1^2}{2} + V_0\Delta t$$

$V_1 = v_0 - a_1 t$

$v_2 = a_2 t = 4a_1 t$

$\alpha < 0{,}1$ рад $\sin\alpha = \frac{96}{y+96} = \frac{r}{y} \leq 0{,}1$

$\Rightarrow v_0 - a_1 t = 4a_1 t$

$y = 10r$

$$\frac{dV_1}{dv_2} = -\frac{a_1}{a_2} = -\frac{1}{4}$$

$$\frac{\frac{9}{2}}{10r + 96} = 0{,}1$$

$dV_1 = -\frac{1}{4}dV_2$

$\frac{9}{2} = r + 9{,}6$

$v_1 - v_0 = -\frac{1}{4}v_2$

$r = 4{,}5 - 9{,}6$

$n < 0{,}1$

$v_1 - v_0 = -\frac{1}{4}v_1$

$$\frac{\frac{9}{2}}{\frac{1}{n}r + 9_0} = n$$

$\frac{9}{2} = 96n$

$\frac{9}{2} = 96n + \frac{1}{n}r$

$n = \frac{9}{2 \cdot 9}$

$r = n\left(\frac{9}{2} - 96n\right)$