Часть 1

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

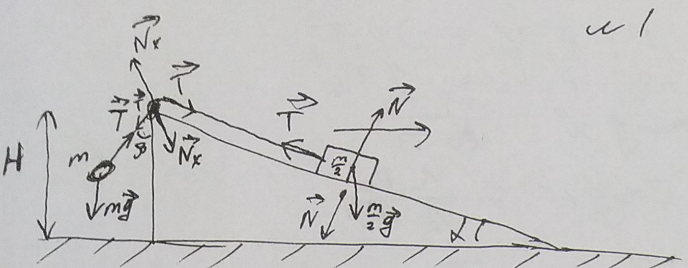
Шифр: **21202958**

ID профиля: **280131**

Вариант 7

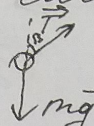
Черновик Вариант 11—07 Часть 1.

№1

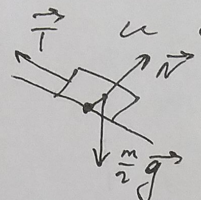


a — ускорение клина

Силы действующие на шарик: сила тяжести: $m\vec{g}$; сила натяжения веревки $\vec{T}$



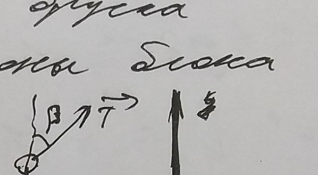
На брусок: сила тяжести $\frac{m}{2}\vec{g}$, сила реакции опоры $\vec{N}$ и сила натяжения $\vec{T}$



T одинаковое т.к. нить невесома

На клин: $\vec{N}$ со стороны бруска и $\vec{N_x}$ со стороны блока

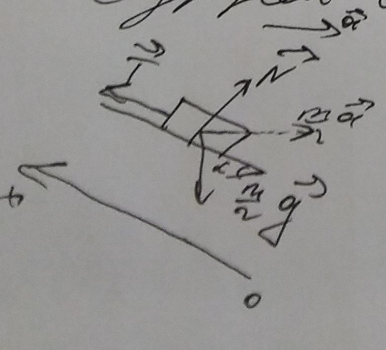
Рассмотрим шарик:



Он движется вправо с ускорением, равным ускорению клина и с каким-то ускорением вниз. $a_x = a_{кл}$ чтобы движение было равноуск. т.к. угол β - const.

„x" (1) $T \cdot \sin\beta = m a_x$; „y" (2) $mg - T\cdot\cos\beta = m a_y$

С другой стороны на блок:



Рассмотрим силы на Ox:

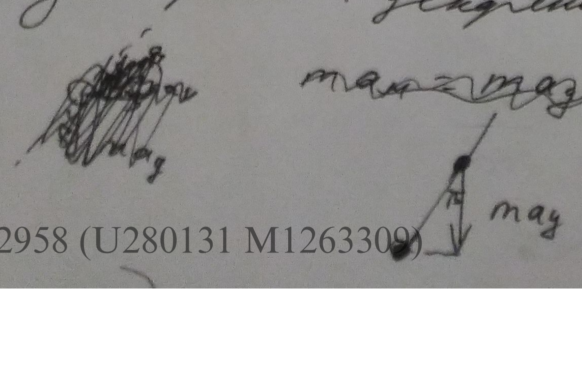
„x" (3) $T - \frac{m}{2} g \cdot \sin\alpha - \frac{m}{2} a \cos\alpha = \frac{m}{2} a_н$

$a_н$ — ускорение вдоль нити.

$\frac{m}{2} a$ — „переданное" ускорение клином

Из шарика: ускорение вдоль нити:

~~$ma_н = ma_y\cos\beta - ma_x\sin\beta$~~



$ma_н = \frac{ma_y}{\cos\beta}$ (4)

21202958 (U280131 M1263309)

Чистовик   №1 продолжение

(2)

y (4) и (3)

$\Rightarrow \cancel{T = \frac{ma}{\sin\beta}}$

$$T - \frac{m}{2} g \sin\alpha - \frac{m}{2} a \cos\alpha = \frac{m}{2} \frac{a_y}{\cos\beta}$$

$y(1): T = \frac{ma}{\sin\beta}$ (*)

$$\Rightarrow (2) \Rightarrow mg - ma \frac{\cos\beta}{\sin\beta} = ma_y$$

$$\frac{ma}{\sin\beta} - \frac{m}{2} g \sin\alpha - \frac{m}{2} a \cos\alpha = \frac{mg}{2\cos\beta} - \frac{ma}{2\sin\beta}$$

$$\frac{a}{\sin\beta} - \frac{g}{2} \sin\alpha - \frac{a}{2} \cos\alpha = \frac{g}{2\cos\beta} - \frac{a}{2\sin\beta}$$

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

$$\frac{5}{4} a - \frac{g}{2} \frac{12}{13} - \frac{a}{2} \cdot \frac{5}{13} = \frac{g}{2} \cdot \frac{5}{3} - \frac{a}{2} \cdot \frac{5}{4}$$

$$\frac{15}{8} a - \frac{5}{26} a = \frac{5}{6} g + \frac{12}{26} g$$

$$\frac{350}{8 \cdot 26} a = \frac{202}{6 \cdot 26} g$$

$$\frac{175}{4} a = \frac{101}{3} g$$

Отв.: 1) $a = 0,77 g$

$$a_н = \frac{a_y}{\cos\beta} = \frac{g - a \frac{\cos\beta}{\sin\beta}}{\cos\beta}$$

$$a_н = \frac{g - \frac{3}{4} a}{\frac{3}{5}} \quad ; \quad a_н = 0,7 g$$

$a_н$ - ~~ускорение~~ и будет ускорение бруска относительно клина.

Отв. 2) $a_н = 0,7 g$

шарик будет двигаться по прямой в СО $\overleftarrow{a}$.

$$\Rightarrow S = \frac{H}{\sin\beta}$$

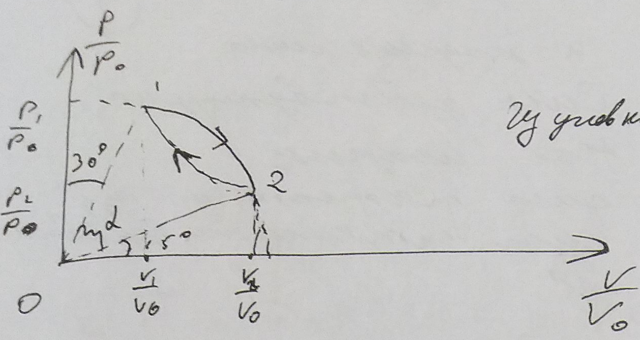
$$a_н = 0,7 g$$

$$S = \frac{a_н \tau^2}{2} \Rightarrow \tau = \sqrt{\frac{2S}{a_н}} \qquad \tau = \sqrt{\frac{2H}{a_н \sin\beta}}$$

Отв. 3) $\tau = 1,89 \sqrt{\frac{H}{g}}$

21202958 (U280131 M1263309)

Чистовик № 2 (3)



„1": $P_1 V_1 = \nu R T_1$

„2": $P_2 V_2 = \nu R T_2$

Из условия: $tg\,30^\circ = \frac{V_1 P_0}{V_0 P_1}$

$ctg\,15^\circ = \frac{V_2 P_0}{V_0 P_2}$

$\frac{P_1 V_1}{P_2 V_2} = \frac{T_1}{T_2}$

$$T_1 - T_2 = \frac{P_1 V_1}{\nu R} - \frac{P_2 V_2}{\nu R}$$

$$T_2 = \frac{P_2 V_2}{\nu R}$$

$$\frac{T_1 - T_2}{T_2} = \frac{P_1 V_1 - P_2 V_2}{P_2 V_2} = \frac{P_1 V_1}{P_2 V_2} - 1$$

$$\frac{V_1}{P_1}\frac{P_0}{V_0} = tg\,30^\circ \; ; \; \frac{V_2}{P_2}\frac{P_0}{V_0} = ctg\,15^\circ$$

$$\Rightarrow tg\,30^\circ \frac{P_1}{V_1} = ctg\,15^\circ \frac{P_2}{V_2}$$

$$\Rightarrow \frac{P_1}{P_2} = \frac{ctg\,15^\circ}{tg\,30^\circ}\frac{V_1}{V_2}$$

Т.к. „01" = „02" (расстояния от одн! и от о до т.2)

$$\left(\frac{P_1}{P_0}\right)^2 + \left(\frac{V_1}{V_0}\right)^2 = \left(\frac{P_2}{P_0}\right)^2 + \left(\frac{V_2}{V_0}\right)^2$$

$$\frac{P_1^2}{P_0^2} + \frac{V_1^2}{V_0^2} = \frac{P_2^2}{P_0^2} + \frac{V_2^2}{V_0^2}$$

$$P_1^2 V_0^2 + V_1^2 P_0^2 = P_2^2 V_0^2 + V_2^2 P_0^2$$

$$(P_1^2 - P_2^2) V_0^2 = P_0^2 (V_2^2 - V_1^2)$$

$$\frac{P_1^2 - P_2^2}{V_2^2 - V_1^2} = \frac{P_0^2}{V_0^2}$$

Работа газа в 1-2 равна площади под графиком 1-2, умноженное на $P_0 V_0$.

$$S_0 = \frac{\alpha}{360}\pi R^2 = \pi\left(\left(\frac{P_1}{P_0}\right)^2 + \left(\frac{V_1}{V_0}\right)^2\right)\cdot\frac{45^\circ}{360^\circ}$$

Чистовик (4)

Чтобы получить нужную работу, к S_0 нужно прибавить $S_{O2\frac{P_2}{P_0}}$ и вычесть $S_{O1\frac{V_1}{V_0}}$

$$S = S_0 + \frac{P_2}{2P_0} \cdot \frac{V_2}{V_0} - \frac{P_1}{2P_0}\frac{V_1}{V_0}$$

$$A_{12} = \frac{1}{8}\pi\left(\frac{P_1^2}{P_0^2} + \frac{V_1^2}{V_0^2}\right)P_0V_0 + \frac{P_2V_2 - P_1V_1}{2}$$

Рассмотрим $\triangle O1\frac{P_1}{P_0}$:

$$R = \sqrt{\left(\frac{P_1}{P_0}\right)^2 + \left(\frac{V_1}{V_0}\right)^2}$$

$$R\sin\alpha = \frac{V_1}{V_0}$$

$$\Rightarrow R = 2\frac{V_1}{V_0}$$

$$\Rightarrow \frac{P_1^2}{P_0^2} + \frac{V_1^2}{V_0^2} = 4\frac{V_1^2}{V_0^2}$$

$$\Rightarrow \frac{P_1^2}{P_0^2} = 3\frac{V_1^2}{V_0^2} \Rightarrow \frac{P_1^2}{V_1^2} = 3\frac{P_0^2}{V_0^2}$$

$$\Rightarrow \frac{P_1}{V_1} = \sqrt{3}\frac{P_0}{V_0} \qquad \frac{P_2}{V_2} = \frac{P_0}{V_0} \cdot 0{,}26$$

$$\cancel{\operatorname{tg} 30^\circ = \frac{P_0}{V_0}\frac{V_1}{P_1}}$$

$$\cancel{\Rightarrow \frac{P_1}{V_1} = \frac{P_0}{V_0 \operatorname{tg} 30}} \qquad \frac{P_1V_1}{V_1^2} = \sqrt{3}\frac{P_0}{V_0}$$

$$\frac{P_1V_1}{P_2V_2} = \cancel{\frac{P_1V_1 \cdot V_2^2}{V_1^2 \cdot P_2 V_2}} \qquad \frac{P_2V_2}{V_2^2} = 0{,}26\frac{P_0}{V_0}$$

$$\Rightarrow \frac{P_1V_1}{P_2V_2} = 6{,}66\frac{V_1^2}{V_2^2}$$

$$\cancel{V_1 \frac{P_1V_1}{}} \quad \frac{P_1}{V_1} = 6{,}66\frac{P_2}{V_2}$$

$$\left.\begin{aligned}\frac{V_1}{V_0} &= R\cdot\sin 30\\ \frac{V_2}{V_0} &= R\cdot\cos 15\end{aligned}\right\} \Rightarrow \frac{V_1}{V_2} = \frac{\sin 30}{\cos 15}$$

$$\Rightarrow \frac{P_1V_1}{P_2V_2} = 6{,}66\cdot\left(\frac{\sin 30}{\cos 15}\right)^2$$

$$\frac{P_1V_1}{P_2V_2} = 1{,}78$$

21202958 (U280131 M1263309)

чистовик (5)

к 2 задаче

$$\frac{T_1-T_2}{T_2} = \frac{P_1V_1}{P_2V_2} - 1$$

$$\frac{T_1-T_2}{T_2} = 1,78-1 = 0,78$$

Отв. 1) $\frac{T_1-T_2}{T_2}=0,78$

$C=0 \qquad C=\frac{\Delta Q}{\Delta T}$

$\Delta Q = 0$

$\Rightarrow$ это точка касания с адиабатой

Уравнение адиабаты: $PV^{\frac{c_P}{c_V}} = const$

$PV^{\frac{5}{3}} = const$

$\Rightarrow dP\,V^{\frac{5}{3}} + \frac{5}{3}PV^{\frac{2}{3}}dV = 0$

$dP\,V^{\frac{5}{3}} = -\frac{5}{3}PV^{\frac{2}{3}}dV$

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

$P^2V_0^2 + V^2P_0^2 = const$

$\Rightarrow 2P\,dP\,V_0^2 + 2V\,dV\,P_0^2 = 0$

$P\,dP\,V_0^2 = -V\,dV\,P_0^2$

$\frac{dP}{dV} = -\frac{P_0^2}{V_0^2}\frac{V}{P}$; $\frac{dP}{dV} = -\frac{5}{3}\frac{PV^{\frac{2}{3}}}{V^{\frac{5}{3}}}$

$\Rightarrow \frac{P_0^2}{V_0^2}\frac{V}{P} = \frac{5}{3}\frac{1}{PV}$

$V^{\frac{2}{3}} = \frac{V_0^2}{P_0^2}$

$\frac{V}{V_0} = \frac{1}{P_0}$

~~sin~~ $\cos\alpha = \frac{V}{V_0R} = \frac{1}{P_0R}$

$$R = \sqrt{\frac{P_1^2V_0^2 + V_1^2P_0^2}{P_0^2V_0^2}} = \sqrt{\frac{3\frac{P_0^2}{V_0^2}V_1^2V_0^2 + V_1^2P_0^2}{P_0^2V^2}} = \sqrt{\frac{4P_0^2V_1^2}{P_0^2V_0^2}}$$

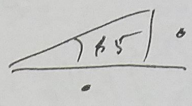
$R = 2\frac{V_1}{V_0}$

$\cos\alpha = \frac{1}{P_0}\frac{V_0}{2V_1}$

21202958 (U280131 M1263309)

$$\frac{P_1^2 - P_2^2}{P_0^2} = \frac{V_2^2 - V_1^2}{V_0^2}$$

$$\frac{P_0}{V_0} = \frac{P_1}{V_1}\ tg\,30$$



$$\frac{P_0}{V_0} = \frac{P_2}{V_2}\ Ctg\,15$$

0,268

3,73

$$\underline{\pi R^2}\quad \frac{P_2^2\left(\left(\frac{ctg\,15}{tg\,30}\right)^2\frac{V_1^2}{V_2^2} - 1\right)}{V_2^2 - V_1^2} = \frac{P_0^2}{V_0^2} \quad 0,577$$

$$\frac{P_2^2\left(ctg\,15^2\,V_1^2 - tg\,30^2\,V_2^2\right)}{tg\,30\,V_2^2\ \left(V_2^2 - V_1^2\right)} = \frac{P_0^2}{V_0^2}$$

$\underline{R\sin\alpha} = \frac{P_1}{P_0}$ $\qquad$ $R\cdot\sin\alpha$ $\quad R\cos\beta$

$$\frac{P_1^2}{P_0^2} + \frac{V_1^2}{V_0^2} = \cancel{\frac{P_1^2}{P_0^2}}$$

$$\frac{P_1 V_1}{V_1^2} = \sqrt{3}\,\frac{P_0}{V_0}$$

$$\cancel{\frac{P_0^2}{V_0^2} V_1^2 = P_1^2}$$

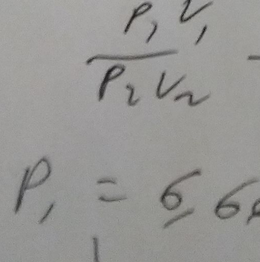
$$\cancel{\frac{P_0^2}{V_0^2} = \frac{P_1^2}{V_1^2} \quad \frac{P_0}{V_0} = \frac{P_1}{V_1}}$$

$$\frac{P_2 V_2}{V_2^2} = 0{,}26\,\frac{P_0}{V_0}$$

$$\cancel{\frac{P_1 V_1}{V_1^2} + \frac{P_2 V_2}{V_2^2} = 2\frac{P_0}{V_0}}$$

$$\frac{P_1 V_1}{P_2 V_2} = 6{,}66\,\frac{V_1^2}{V_2^2}$$

$$P_1 = 6{,}66\,\frac{P_2}{V_2} V_1$$



$$2P\,dP\,V_0^2 + 2V\,dV\,P_1^2 = 0$$

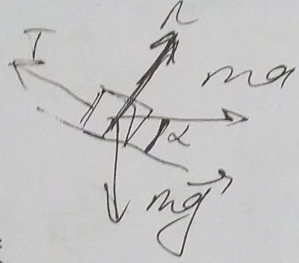
$$2P\,dP\,V_0^2 = -2V\,dV\,P_0^2$$

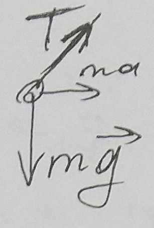
$$\frac{P}{V}\frac{dP}{dV} = -\frac{P_0^2}{V_0^2}$$

$5\ P\ V$

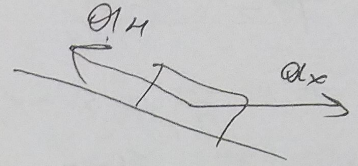
$\frac{9}{25}$ 16

$\frac{25}{169}$ 144





$ma = T \sin\beta$

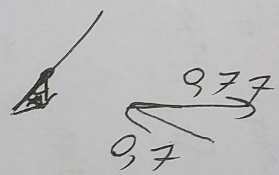


$2T - mg\sin\alpha - ma\cos\alpha = mg\cos\beta - T\cos^2\beta -$

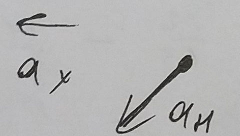
$- T\sin^2\beta$ 0,07

$2T - mg\sin\alpha - ma\cos\alpha = mg\cos\beta - T$

$3T = \frac{3}{5}mg + \frac{12}{13}mg + \frac{5}{13}ma$



$T\sin\beta = ma$



$T\frac{4}{5} = ma$

$\frac{15}{4}ma = \left(\frac{3}{5} + \frac{12}{13}\right)mg + \frac{5}{13}ma$

$a\left(\frac{15}{4} - \frac{5}{13}\right) = \left(\frac{3}{5} + \frac{12}{13}\right)g$

$a \cdot \frac{175}{52} = \frac{99}{65}g$

$a = \frac{99 \cdot 52}{175 \cdot 65}g$

Часть 2

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

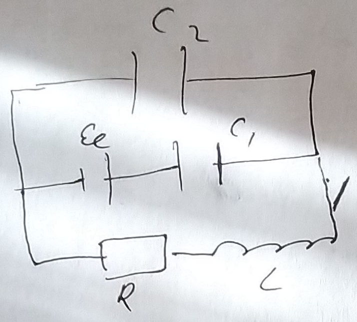
Шифр: **21202958**

ID профиля: **280131**

Вариант 7

чистовик   Вариант 11-07   часть II

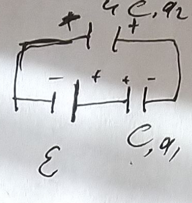
(1)



$C_1 = C$ №3

$C_2 = 4C$

1)



$\mathcal{E} = U_1 + U_2$

$U_1 = \frac{q_1}{C}$

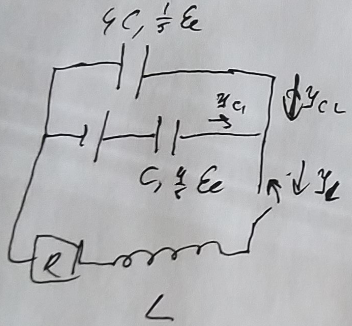
$U_2 = \frac{q_2}{4C}$

$q_1 = q_2 = q$

$\Rightarrow U_1 = \frac{q}{C}\ ; U_2 = \frac{q}{4C} \Rightarrow U_2 = \frac{U_1}{4}$

$\Rightarrow \mathcal{E} = U_1 + U_2 = \frac{5}{4} U_1$

$U_1 = \frac{4}{5} \mathcal{E}\ ; U_2 = \frac{1}{5}\mathcal{E}$



$U_{L0} + U_{R0} = \mathcal{E} - U_1 = U_2$

$U_{R0} = 0$; т.к. $I_0 = 0$

$\Rightarrow U_{L0} = U_2$

$U_{L0} = -\frac{d\Phi}{dt} = -L\frac{dI}{dt}$

$U_{L0} = L \cdot \frac{dI}{dt} = \frac{1}{5}\mathcal{E}$

$\frac{dI}{dt} = \frac{\mathcal{E}}{5L}$ Отв. 1) $\frac{dI}{dt} = \frac{\mathcal{E}}{5L}$

$W_0 = W_{10} + W_{20} = \frac{U_1^2 C_1}{2} + \frac{U_2^2 C_2}{2}$

$W_0 = \frac{16\mathcal{E}^2 C}{25\cdot 2} + \frac{\mathcal{E}^2 \cdot 4C}{25 \cdot 2} = \frac{2\mathcal{E}^2 C}{5}$

$I_{C_1} = I_L - I_{C_2}$

После замыкания ключа

$\frac{dI_L}{dt}L + I_L R = U_{C_2} = \mathcal{E} - U_{C_1}$

Ток перестанет течь, когда конденсатор C_1

чистовик из 3 продолжение (2)

~~???~~ будет напряжение $U_{c1k} = \mathcal{E}$

$U_{c1k} = \mathcal{E}$

$q = \frac{4}{5}\mathcal{E}\cdot C$

$q_k = \mathcal{E}\cdot C$

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

$W_{2k} = 0$

$W_{1k} = \frac{\mathcal{E}^2 C}{2}$

$A_{ист} = \mathcal{E}\Delta q = \frac{1}{5}\mathcal{E}^2 C$

$W_0 + A_{ист} = W_{1k} + W_{2k} + Q$

$Q = \frac{2}{5}\mathcal{E}^2 C + \frac{1}{5}\mathcal{E}^2 C - \frac{\mathcal{E}^2 C}{2}$

$Q = \left(\frac{3}{5} - \frac{1}{2}\right)\mathcal{E}^2 C = \frac{1}{10}\mathcal{E}^2 C$

Отв. 2): $Q = \frac{1}{10}\mathcal{E}^2 C$

$I_{c1} = \cancel{I_{2}} + I_L - I_{c1}$ $\qquad I_L = I_R$

$\frac{dI_L}{dt}L + I_L R = U_{c2} = \frac{q_{c2}}{4C}$

$dI_L L + I_L dt = \frac{q_{c2}\,dt}{4C}$

$dU_{c2} = \frac{dq_{c2}}{\cancel{d}4C}$

$dU_{c1} = \frac{dq_{c1}}{C}$

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

$\Rightarrow dU_{c2} = -dU_{c1}$

$\Rightarrow \frac{dq_{c2}}{4C} = -\frac{dq_{c1}}{C}$

$\frac{dq_{c1}}{dt} = -\frac{dq_{c2}}{4dt}$

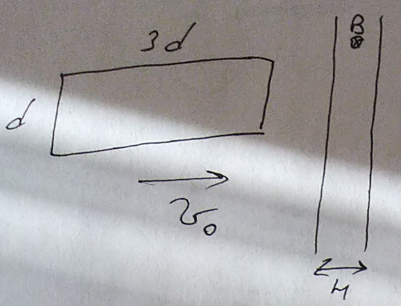
$I_0 = -\frac{I_{c2}}{4}$

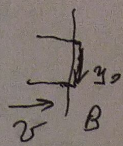
$I_R = I_L = I_{c2} + I_0 = 5I_0$

Ответ 3): $I_R = 5I_0$

чистовик
№ 4

3





$$d\Phi_0 = B \cdot dS_0$$
$$dS_0 = v_0 \cdot dt \cdot d$$
$$d\Phi_0 = v_0\, d\, dt \cdot B$$
$$\varepsilon_0 = -\frac{d\Phi_0}{dt} = -B v_0 d$$

$\Delta\Phi > 0$

$\Rightarrow$ Сразу после вхождения правой ~~грани~~ стороны рамки в поле в рамке будет протекать ток направленный вниз. (по часовой)

На рамку будет действовать сила

$F_A = BIl$

$I = \frac{\varepsilon_0}{R}$

$F = B\frac{\varepsilon_0}{R}l \quad ; l = d$

$$F_0 = \frac{B^2 v_0 d^2}{R}$$

$F_0 = m a_0$

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

Отв. 1) $a_0 = \frac{B^2 v_0 d^2}{mR}$, направлено влево

$d\Phi_x = v_x\, dt \cdot d \cdot B$

$$a_x = \frac{B^2 d^2}{mR} v_x$$

$$a_x\, dt = \frac{B^2 d^2}{mR} v_x\, dt$$

(τ – время выхода правой стороны из поля)

$$\int_0^\tau a_x\, dt = \frac{B^2 d^2}{mR}\int_0^\tau v_x\, dt \quad ; \int v_x\, dt = H$$

$$\Delta v = \frac{B^2 d^2}{mR} \cdot H$$

$$v_x = v_0 - \Delta v = v_0 - \frac{B^2 d^2}{mR} H = v_0 - \frac{B^2 d^3}{5mR}$$

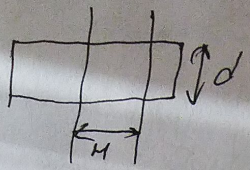
Отв. 2) $v_x = v_0 - \frac{B^2 d^3}{5mR}$

21202958 (U280131 M1263310)

чистовик

л. 4 продолжение

4



После выхода правой стороны из поля:

$d\Phi = B \cdot dS$; $dS = 0$

$\Rightarrow d\Phi = 0$

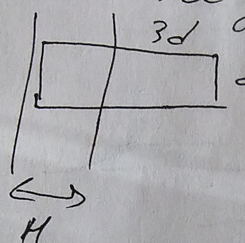
$\Rightarrow F = 0$

$\Rightarrow a = 0$

$\Rightarrow v_{20} = v_1 = v_0 - \frac{B^2 d^3}{5mR}$ до того

~~Ответ 3) $v_2 = v_0 - \frac{B^2 d^3}{5mR}$~~ момента, ~~пока~~ левая сторона не дойдет до поля.

~~Те~~



После этого $d\Phi_k = B\, dS$

$d\Phi < 0$

$\Rightarrow$ Ток течет вниз (против часовой стрелки)

$\Rightarrow a_{x_2} = \frac{B^2 d^2}{mR} v_{x_2}$

Аналогично: ~~a_x~~ $\Delta v_2 = \Delta v = \frac{B^2 d^2}{mR} H$

(ускорение также влево)

$v_2 = v_1 - \Delta v_2 = v_0 - \frac{2}{5} \frac{B^2 d^3}{mR}$

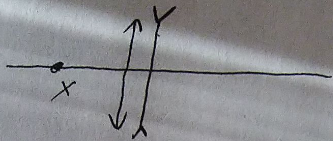
Отв 3). $v_2 = v_0 - \frac{2}{5} \frac{B^2 d^3}{mR}$

чистовик ~~№3 продолжение~~

№5

$l = 25$ см

Пусть D − оптическая сила глаза



Т.к. человек близорукий, ему нужна рассеивающая линза

в 1 случае, когда вдаль:

$D + D_1 = D_x$ (т.к. линза вплотную к глазу оптические силы складываются

Пусть x расстояние от линз до сетчатки глаза

$\frac{1}{x} = \frac{1}{F_x} = D_x$ (для ~~ориентир~~ смотрения в даль)

$D + D_2 = D_y$

$\frac{1}{x} + \frac{1}{l} = \frac{1}{F_y} = D_y$ для чтения с 25 см.

$D_y > D_x$

$\frac{D_1}{D_2} = 3$; $D_1 = 3D_2$

$D_x + \frac{1}{l} = D_y$

$D + D_1 + \frac{1}{l} = D + D_2$

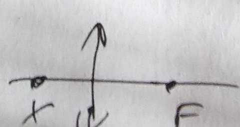
$D_1 - D_2 = -\frac{1}{l}$

$2D_2 = -\frac{1}{l}$

$D_2 = -\frac{1}{2l}$ $\quad D_1 = -\frac{3}{2l}$

$D + D_1 = D_x = \frac{1}{x}$

$D = \frac{1}{x} - D_1 = \frac{1}{x} + \frac{3}{2l}$



$\frac{1}{x} + \frac{1}{a} = \frac{1}{F} = D$

$\frac{1}{a} = D - \frac{1}{x}$

$\Rightarrow \frac{1}{a} = D_1$ $\quad a = \frac{1}{D_1} = \frac{2}{3} l$ Отв.

чистовик

№5 Продолжение

6

$\alpha = \frac{2}{3} l$

$\alpha = 16,(6)$ см

Отв. 1) $\alpha = 16,(6)$ см

$D_1 = \frac{3}{2} l$

Отв 2) $D_1 = 0,06$ Дптр

$D_\Sigma = D + D_3$

$\frac{1}{x} + \frac{1}{50} = D_\Sigma$

$D_\Sigma = \frac{1}{50} + D_1 = 0,08$ Дптр

$D_\Sigma = D + D_3$

$D = D_x + 0,06 = D_g + 0,02 = \frac{1}{x} + 0,06$

$D_3 = D_\Sigma - D = 0,02 - \frac{1}{x}$

$D_3 = 0,03$ Дптр

Ответ 3.) $D_3 = 0,03$ Дптр

$$\frac{1}{F} + \frac{1}{F_1} = \frac{1}{F_x}$$

$$\frac{1}{F} + \frac{1}{F_2} = \frac{1}{F_y}$$

$$\frac{1}{x} = \frac{1}{F_x}$$

$$\frac{1}{x} + \frac{1}{l} = \frac{1}{F_y}$$

$$\frac{1}{F_x} + \frac{1}{l} = \frac{1}{F_y}$$

$$\frac{1}{F_1} + \frac{1}{l} = \frac{1}{F_2}$$

$$\frac{1}{l} = \frac{1}{F_1} - \frac{1}{3F_2}$$

$$\frac{1}{l} = \frac{2}{3F_2}$$

$$F_2 = \frac{2 l}{3}$$

$$F_1 = 2l$$

$$\frac{1}{F} = \frac{1}{x} + \frac{1}{a}$$

$$\frac{1}{a} = \frac{1}{F} - \frac{1}{x} = \frac{1}{F} - \frac{1}{F_x} = -\frac{1}{F_1} \quad \frac{2}{F}$$

$$\frac{1}{a} = \cancel{\frac{2}{3}} - \frac{1}{2l}$$

$$D - D_1 = D_x$$

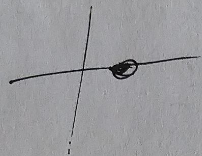
$$\frac{1}{x} + \frac{1}{a} = \frac{1}{F}$$

$$\frac{1}{a} = \frac{1}{F} - \frac{1}{x} = \frac{1}{F} + \frac{1}{F} + \frac{1}{2l}$$

$$\frac{F_2}{F_1} = 3$$

$$F_1 = 3F_2$$

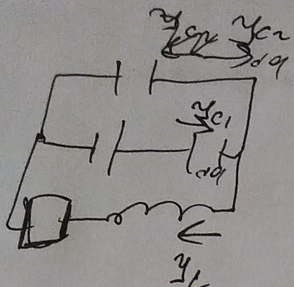
$$\frac{1}{a} = \frac{2}{F} + \frac{1}{2l}$$



$$\frac{1}{F} = \frac{1}{x} + \frac{1}{l} - \frac{3}{2l}$$

$$\frac{1}{F} + \frac{1}{2l} = \frac{1}{x}$$

$$-\frac{1}{F} + \frac{1}{2l} + \frac{1}{a} = \frac{1}{F}$$

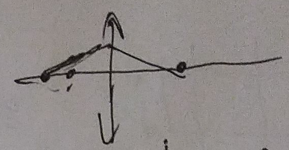


$y_{c_1} = y_{c_2} + y_L$

$y_{c_1} = y_0$

$y_{c_1} = y_\varepsilon$ $\quad u = \frac{q}{4C}$

$\frac{dq_{c_1}}{dt} = y_0$



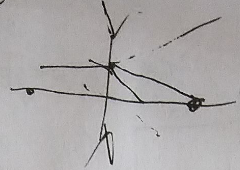
$\frac{1}{2l} + \frac{1}{x} = D_{\text{}}$

$q = \frac{4}{5} \varepsilon_e C$

$y_0 = y_{Lx} - y_{c2x}$ $\quad \frac{1}{x} + \frac{1}{2l} = D$ $\quad q = \frac{4}{5} \varepsilon_e C$

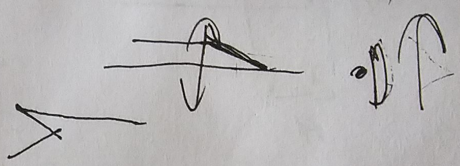
$\frac{1}{x} = D_x$

$\frac{dq_{c_1}}{dt} = y_L - \cancel{\frac{dq_{c_2}}{d}}\ \frac{dq_{c_2}}{dt}$



$\frac{1}{x} + \frac{1}{50} = \frac{1}{F_0}$

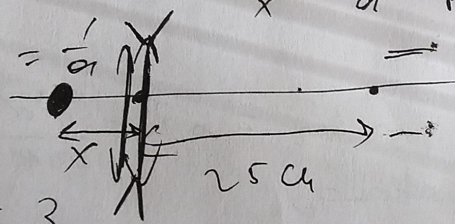
$y_L R + \frac{dy_L}{dt} L = u_{C2}$



$\frac{dq_1 + dq_2}{dt} = y_L$

$\frac{1}{x} + \frac{1}{a} = \frac{1}{F}$

$\frac{1}{F} - \frac{1}{x} = \frac{1}{a}$



$\frac{1}{a} + \frac{1}{b} = \frac{1}{F}$ $\quad \frac{3}{50} - \frac{1}{50} = \frac{1}{25}$

$\frac{D_1}{D_2} = 3$

$\frac{1}{D} = \frac{1}{F}$

$\frac{1}{F_0} + \frac{1}{F_2} = \frac{1}{F_x}$, $\quad \frac{D_y}{D_x} = 3$, $\quad \frac{F_x}{F_y} = 3$ $\quad F_1 = 50$

$\frac{1}{x} + \frac{1}{a} = D$ $\quad \frac{1}{x} + \frac{1}{l_1} = \frac{1}{F_x}$

$\frac{1}{x} + \frac{1}{a} = \frac{1}{x} + D_1$ $\quad \frac{1}{F_y} = \frac{1}{F_0} + \frac{1}{F_1}$

$\frac{1}{x} = 50$ см $\quad \frac{1}{x} = \frac{1}{F_y}$

$\frac{1}{F_x} - \frac{1}{F_y} = \frac{1}{F_2} - \frac{1}{F_1}$

$\frac{1}{a} = D_1$

$\frac{1}{F_y} + \frac{1}{25} = \frac{1}{F_x}$ $\quad \frac{1}{F_x} - \frac{1}{F_y} = \frac{1}{25}$

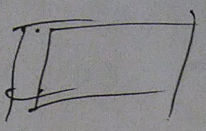
$D_x + D_1 = D_y + D_2$ $\quad \frac{1}{F_x}\ \frac{1}{F_y}$ $\quad \frac{1}{3F_y} - \frac{1}{F_y}$

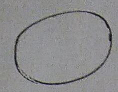
$\frac{2}{3F_y} = \frac{1}{25}$

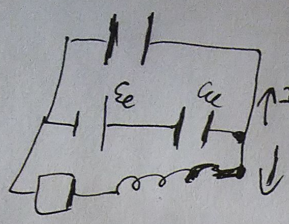
$F_x = \frac{50}{3}$ $\quad F_y = \frac{50}{\cancel{3}}$ см

$$W_0 = \frac{u_1^2 c_1}{2} + \frac{u_2^2 c_2}{2}$$

$W_0 =$

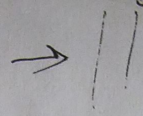






$I_{\phi} = \frac{I}{2} + I_L$

$B \cdot dS$

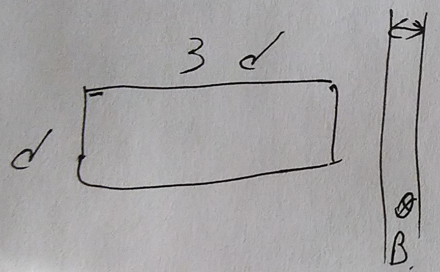


$\frac{L I_L^2}{2}$ $u_L + u_R = \mathcal{E} - u_{c_1} = u_{c_2}$

$$\frac{d\Phi}{dt} = \mathcal{E}$$

$$\frac{dI_L}{dt} L + I_L R = u_{c_2} = \mathcal{E} - \cancel{\mathcal{E}}\, u_{c_1}$$

$$I_0 = \frac{\mathcal{E}}{R}$$



$\rho = \frac{R}{8d}$

R

$\mathcal{E}$

a

$-\Delta v = \frac{B^2 d^2}{mR} \cdot S$

$v = v_0 - a t$

$a_x dt = \frac{B^2 d^2}{mR} v_x dt$

$v_k - v_0 =$

$$a_x = \frac{B^2 d^2}{mR} v_x$$

$\cancel{a_x = \frac{B^2 d^2}{mR}}$

$v_x = v - a_x dt$

$\cancel{v_x = v_0 - a}$

$v_x = v\left(1 - \frac{B^2 d^2}{mR} dt\right)$

$a_x = \frac{B^2 d^2}{mR} v_x$ $S = \int v_x dt$

$\cancel{v_0}$

$\cancel{a_x = \frac{B^2 v_x}{}}$