Часть 1

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

Шифр: **21201448**

ID профиля: **166210**

Вариант 6

Черновик

$i=5 \qquad C_V = \frac{5}{2}R\nu \qquad\qquad C_p = C_V + \nu R = \frac{7}{2}\nu R$

2-1 - Адиабата $\quad pV^{\frac{C_p}{C_V}} = const = pV^{\frac{7}{5}}$

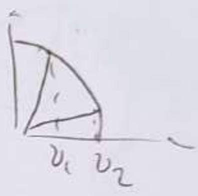
$$p_1V_1^{\frac{7}{5}} = p_2V_2^{\frac{7}{5}}$$

$$p_1^2 + V_1^2 = p_2^2 + V_2^2$$

$p_1V_1 = \nu RT_1$

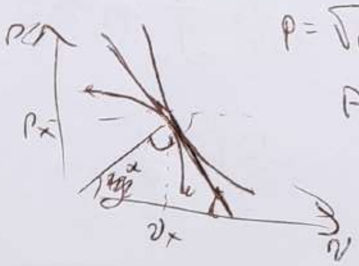
$p_2V_2 = \nu RT_2$

$$\frac{T_2}{T_1} = \frac{p_2V_2}{p_1V_1} = \left(\frac{V_1}{V_2}\right)^{\frac{2}{5}}$$



$$\frac{V_1}{V_2} = \frac{\sin 22{,}5^\circ}{\cos 15^\circ} = \frac{0{,}38}{0{,}96} \approx 0{,}39$$

$$c = \frac{Q}{\Delta T} =$$



$p = \sqrt{a^2 - V^2} \qquad p' = -\frac{V}{\sqrt{a^2-V^2}}$

$p = cV^{-\frac{7}{5}} \qquad p' = -\frac{7}{5}c\cdot V^{-\frac{12}{5}}$

$$\frac{V_x^{\frac{3}{5}}}{\sqrt{a^2-V_x^2}} = \frac{7}{5}c\cdot$$

$$V_x^{\frac{6}{5}} = \frac{49}{25}c^2\cdot(a^2 - V_x^2)$$

$$V_x^{\frac{6}{5}} + 2c^2V_x^2 = 2c^2a^2$$

c_0:
$$-\frac{7}{5}c_0(\cos\alpha)^{-\frac{12}{5}} = \frac{\cos\alpha}{\sin\alpha}$$

$$c_0 = -\frac{5}{7}\frac{\cos\alpha^{\frac{12}{5}}}{\sin\alpha}$$

$pV^{\frac{7}{5}} = c$

$$\sin\alpha\,(\cos\alpha)^{\frac{7}{5}} = c_0$$

$$\sin^2\alpha = \frac{5}{7}\cos^2\alpha$$

$$1 = \frac{12}{7}\cos^2\alpha$$

Черновик

$P = \sqrt{a^2 - v^2}$ $\qquad P' = -\frac{v}{\sqrt{a^2-v^2}}$

$P = c\, v^{-\frac{7}{5}}$ $\qquad P' = -\frac{7}{5} c\, v^{-\frac{12}{5}}$

$A_1 = \cancel{\int_{0,38}^{0,96} \sqrt{a^2-v^2}}\ d\,a^2 - v^2$

$= -\frac{1}{2} \int_{0,38}^{0,96} \sqrt{t}\, dt =$

$=$

$$A_1 = \int_{0,38}^{0,96} \sqrt{a^2-v^2}\, dv = -\frac{1}{3}\left((1^2 - 0{,}96)^{\frac{3}{2}} - (1^2 - 0{,}38)^{\frac{3}{2}} \right) = -\frac{1}{3}(0{,}08 - 0{,}48) \approx 0{,}13$$

$$\int \sqrt{a^2 - v^2}\, dv = -\frac{1}{2}\int \sqrt{t}\, dt = -\frac{1}{2} \cdot \frac{2}{3} \cdot t^{\frac{3}{2}} = -\frac{1}{3} t^{\frac{3}{2}}$$

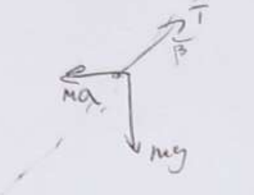
$$A_2 = c\int_{0,38}^{0,96} v^{-\frac{7}{5}}\, dv = -c\,\frac{5}{2} \cdot v^{-\frac{2}{5}} \Big|_{0,38}^{0,96} = -c\,\frac{5}{2}\left(\underbrace{\frac{1}{0{,}96^{\frac{2}{5}}}}_{0{,}98} - \underbrace{\frac{1}{0{,}38^{\frac{2}{5}}}}_{0{,}68} \right)$$

$$= -0{,}66\,(1{,}02 - 1{,}47) = 0{,}66 \cdot 0{,}45 = \overset{0{,}26}{\cancel{0{,}297 \approx 0{,}3}}$$

$$0{,}96^{-\frac{7}{5}} \cdot 0{,}25 = c = \frac{1}{0{,}94} = \overset{0{,}94}{\cancel{1{,}06}} \approx 0{,}265 = c$$

$0{,}23$

черновик



$\vec{ma} + \vec{mg} + \vec{T} = m\vec{A}$

$T = \sqrt{\ }$

$\cancel{m\sqrt{a^2+g^2}} - T = \cancel{2}mA - m\sqrt{a^2+g^2}$

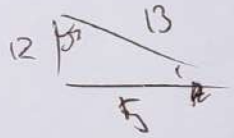
$2ma\cos\alpha + T - 2mg\sin\alpha = 2mA$

нерастяжимость нити
невесомость

$v_0 = 0$; $H = \dfrac{A \cdot \frac{\cancel{\sin\beta}}{\cos\beta}\, t^2}{2}$

$- \begin{matrix}169 \\ 144\end{matrix}$

$t = \sqrt{H} \cdot \sqrt{\dfrac{2}{1.688}} = \underline{1{,}088\sqrt{H}}$ с.

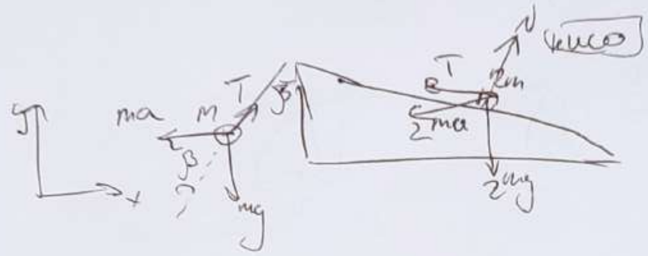


Черновик

№1

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

$\Rightarrow \sin\alpha = \frac{3}{5}$



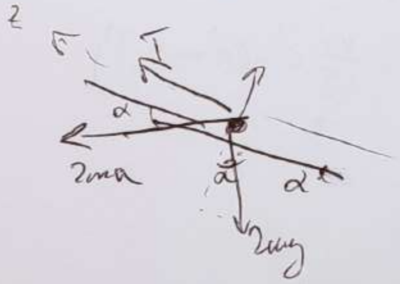
$\cos\beta = \frac{12}{13}$

① $\vec{ma} + \vec{mg} + \vec{T} = 0$ $\quad \widehat{\vec{T}\, Oy} = \beta$

$\Rightarrow \widehat{Oy\,(\vec{ma}+\vec{mg})} = \beta \Rightarrow tg\beta = \frac{a}{g} \Rightarrow \cos\beta = \frac{g}{\sqrt{a^2+g^2}} = \frac{12}{13}$

$\frac{1}{\sqrt{(\frac{a}{g})^2+1}} = \frac{12}{13}$ $\quad \left(\frac{13}{12}\right)^2 - 1 = \frac{a^2}{100}$

$a = 4{,}16$ м/с^2 $\quad \Rightarrow T = m\cdot\sqrt{a^2+g^2} \approx 10{,}83\,m$



$z:\ 2ma\cos\alpha + T - 2mg\sin\alpha = 2mA$

$2\cdot\frac{4}{5}\cdot 4{,}16 + 10{,}83 - 2\cdot 10\cdot\frac{3}{5} = 3A$

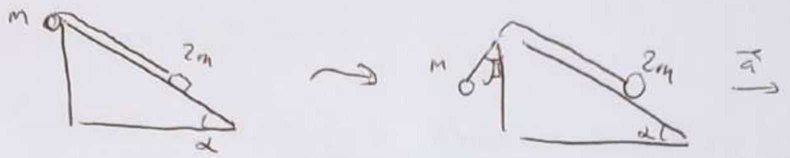
$\Rightarrow A = \frac{5{,}486}{3} \approx$ ~~2,743~~ $1{,}82$

Физика 11кл. I тур

Вариант 11-06

Чистовик:

№1

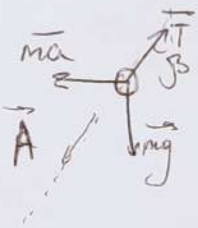


a – уск клина

Перейдем в НСО связ с клином.

1) Шарик:

A – уск. шара, бруска отн. клина

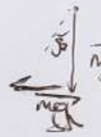


II ЗНН:
$m\vec a + m\vec g + \vec T = m\vec A$

$\vec T, m\vec A$ под углом β к верт =>

=> $m\vec a + m\vec g$ под углом β к верт.

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



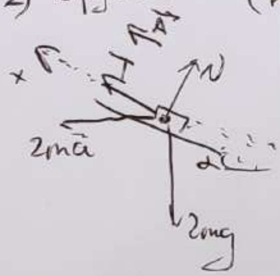
$\Rightarrow \operatorname{tg}\beta = \frac{a}{g} = \frac{5}{12}$

$g = 10\,м/с^2 \Rightarrow \boxed{a = 4{,}16\ м/с^2}$ (1)

Из II ЗНН

$mA = m\sqrt{a^2+g^2} - T \Rightarrow T = m\sqrt{a^2+g^2} - mA$

2) Брусок (Нить нев. и нер => силы нат. нити (T) равны, и тела исп одинак уск (A))



II ЗНН на ось x:

$2mA = T + 2ma\cos\alpha - 2mg\sin\alpha$

$\Leftrightarrow 3mA = m\sqrt{a^2+g^2} + 2ma\cdot\frac{4}{5} - 2mg\cdot\frac{3}{5}$

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

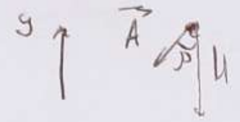
$\Leftrightarrow A = \frac{1}{3}\cdot(10{,}83 + 6{,}656 - 12) \approx \boxed{1{,}828\ м/с^2 = A}$ (2)

Физика 11 класс I тур
Вариант 11-06

Чистовик

Продолжение задачи №1

б) Шарик:



$\dfrac{v(0)=0}{A=const}$ Кинематика по оси y

$$H = \frac{A\cos\beta \cdot \tau^2}{2}$$

τ - время падения

$$\tau = \sqrt{\frac{2H}{A\cos\beta}} = \sqrt{H} \cdot \sqrt{\frac{2}{1.688}} \approx \boxed{1{,}088\sqrt{H} = \tau}$$ (3)

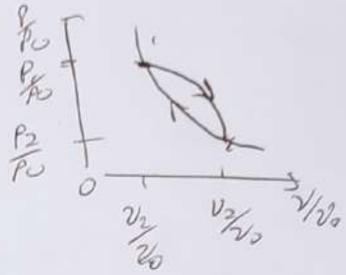
Ответ:
1) $a = 4{,}16$ м/с^2
2) $A = 1{,}828$ м/с^2
3) $\tau = 1{,}088\sqrt{H}$ с

Чистовик.

Физика 11кл I тур
вариант 11-06

№2

$i=5$ $\quad C_V = \frac{5}{2}\nu R \Rightarrow C_p = \frac{7}{2}\nu R$



Ур Клап Менд: $\quad p_1 V_1 = \nu R T_1$

$p_2 V_2 = \nu R T_2$

$$\frac{T_2}{T_1} = \frac{\left(\frac{p_2}{p_0}\cdot\frac{V_2}{V_0}\right)}{\left(\frac{p_1}{p_0}\right)\left(\frac{V_1}{V_0}\right)}$$

2-1 $Q=0 \Rightarrow$ Адиабата

записано для (1)(2)

$$\frac{p}{p_0}\cdot\left(\frac{V}{V_0}\right)^{\left(\frac{C_p}{C_V}\right)} = \underset{\text{const}}{C} = \frac{p}{p_0}\left(\frac{V}{V_0}\right)^{\frac{7}{5}}$$

$$\frac{T_2}{T_1} = \left(\frac{V_1}{V_2}\right)^{\frac{2}{5}}$$

1-2 - окр-ть

$$\frac{\left(\frac{V_1}{V_0}\right)}{\left(\frac{V_2}{V_0}\right)} = \frac{\sin 22{,}5^\circ}{\cos 15^\circ} \approx 0{,}39$$

$$\Rightarrow \boxed{\frac{T_2}{T_1} \approx 0{,}69} \quad (1)$$

$\frac{p}{p_0} = P \quad \frac{V}{V_0} = V$

~~Пусть p_0, V_0 такие, что~~

~~$a=1 \Rightarrow C = 0{,}96 \cdot 0{,}25^{\frac{7}{5}} \approx 0{,}23$~~

1-2: $P = \sqrt{a^2 - V^2}$

2-1: $P = C \cdot V^{-\frac{7}{5}}$

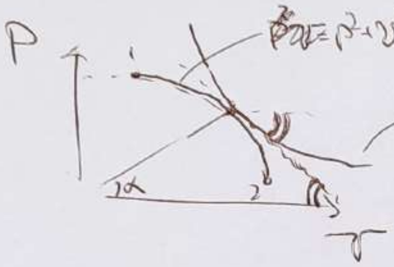
Чистовик

Физика Илл Iтур

Вариант 11-06

Продолжение задачи №2

Теплоемкость $C = 0 \Leftrightarrow \frac{Q}{\Delta T} = 0 \Leftrightarrow Q = 0 \Leftrightarrow$ процесс адиабат.



$p^2 + V^2 = 1$

$PV^{\frac{7}{5}} = c_0$

1) $\sin\alpha (\cos\alpha)^{\frac{7}{5}} = c_0$

2) $p = c_0 V^{-\frac{7}{5}} \Rightarrow p' = c_0 \cdot \left(-\frac{7}{5}\right) \cdot V^{-\frac{12}{5}}$

$\Rightarrow \frac{7}{5} c_0 (\cos\alpha)^{-\frac{12}{5}} = \operatorname{ctg}\alpha = \frac{\cos\alpha}{\sin\alpha} \Rightarrow c_0 = \frac{5}{7} \frac{\cos\alpha^{\frac{17}{5}}}{\sin\alpha}$

$\left.\begin{matrix}1)\\2)\end{matrix}\right| \Rightarrow \sin^2\alpha (\cos\alpha)^{\frac{7}{5}} = \frac{5}{7} (\cos\alpha)^{\frac{17}{5}} \Rightarrow \operatorname{tg}\alpha = \sqrt{\frac{5}{7}} \approx 0{,}84$

$\boxed{\operatorname{tg}\alpha \approx 0{,}84}$ (2)

$P_{12} = \sqrt{a - V^2}$ $\quad P_{2\text{-}1} = c\, V^{-\frac{7}{5}}$

$A_{12} = \int_{0{,}32}^{0{,}96} \sqrt{a^2 - V^2}\, dV = -\frac{1}{3} (1 - V^2) \Big|_{0{,}32}^{0{,}96}$

$a = 1 \Rightarrow c = 0{,}96^{\frac{7}{5}} \cdot 0{,}25 \approx 0,$

$\Rightarrow A_{12} = -\frac{1}{3}(0{,}08 - 0{,}48) \approx 0,$

$\int \sqrt{a^2 - V^2}\, dV = -\frac{1}{2} \int \sqrt{t}\, dt = -\frac{1}{2} \cdot \frac{2}{3} t^{\frac{3}{2}}$

$A_{21} = c \int_{0{,}32}^{0{,}56} V^{-\frac{7}{5}}\, dV = -c \cdot \frac{5}{2} \cdot V^{-\frac{2}{5}} \Big|_{0{,}32}^{0{,}56} \approx 0{,}25$

$\frac{A_{12}}{A_{12} - A_{21}} \approx \frac{0{,}13}{0{,}12} \approx \boxed{1{,}08}$ (3) $\quad$ Ot: $\boxed{\frac{T_2}{T_1} \approx 0{,}65}$

$\operatorname{tg}\alpha \approx 0{,}84$

$\frac{A_{12}}{A_{12} - A_{21}} = 1{,}08$

(4)

Часть 2

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

Шифр: **21201448**

ID профиля: **166210**

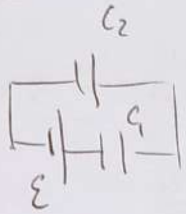
Вариант 6

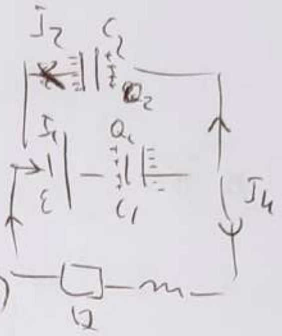
Черновик

№3

$C_1 = C$

$C_2 = 3C$

1) 

→ 2) 

$\mathcal{E} = \frac{Q_1(0)}{C} + \frac{Q_2(0)}{3C} = U_1(0) + U_2(0)$

$I_4 = I_1 + I_2$ $\qquad I_4(0) = 0$

$0 = I_4 R + L \cdot \frac{dI_4}{dt} + \frac{Q_1}{C}$

$\mathcal{E} = \frac{Q_2}{3C} + I_4 R + L\frac{dI_4}{dt}$

$\Rightarrow \mathcal{E} = \cancel{2\left(I_4R + L\frac{dI_4}{dt}\right) + \frac{Q_1}{C}} + \frac{Q_2}{3C}$

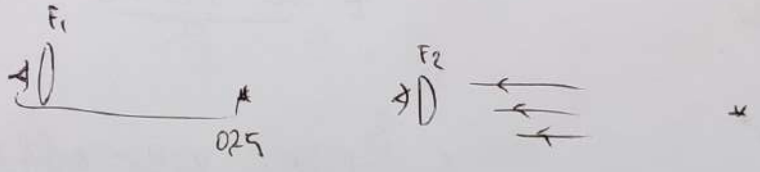
$\mathcal{E}=$

$t = a$.

$I_2 = I_1 + I_4$

$\cancel{0 = I_4 R + L\frac{dI_4}{dt}} + \frac{Q_1}{C}$ $\qquad \mathcal{E} = \frac{Q_1}{C} + \frac{Q_2}{3C}$

$\mathcal{E} = -\cancel{\frac{Q_2}{3C} + I_4 R} + L\frac{dI_4}{dt}$ $\qquad \mathcal{E} = \frac{Q_1}{C} + \underbrace{I_4 R}_{0} + \cancel{L}\frac{dI_4}{dt}$



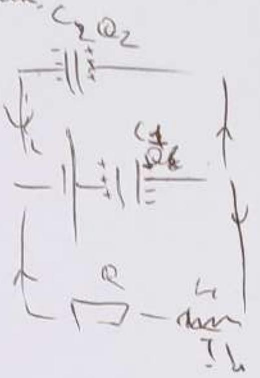
$\frac{7}{3} = \frac{F_2}{F_1}$ $\qquad \frac{1}{f_r} + \frac{1}{F_1} = 4 + \frac{1}{d_1}$ $\qquad \frac{1}{f_r} + \frac{1}{F_2} = \frac{1}{d_1}$ $\qquad \frac{1}{f_r} + 3 = \frac{1}{d_1}$

$3 = \frac{1}{d_1} - \frac{1}{f_r}$

$\frac{1}{f_r} = \frac{1}{d_1} + \frac{1}{d_8} =$ $\qquad \frac{1}{F_1} = 4 + \frac{1}{F_2}$ $\qquad 1 = 4F_1 + \frac{F_1}{F_2}^{\frac{3}{7}}$ $\qquad F_1 = \frac{1}{7}$

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

Черновик.



1) $\mathcal{E} = -\frac{Q_1}{C} + \frac{Q_2}{3C}$

$Q_1 + Q_2 = 0$

$3\mathcal{E}C = -Q_2 + 3Q_1 = 4Q_1$

$\Rightarrow \boxed{Q_1 = \frac{3}{4}\mathcal{E}C}$

$\mathcal{E} = -\frac{Q_1}{C} + \frac{Q_2}{3C}$

$\mathcal{E} = -\underbrace{\frac{Q_1}{C}}_{// t=0} + \underbrace{I_L R}_{// t=0 \; 0} + L\frac{dI_L}{dt}$

$-\frac{3}{4}\mathcal{E}$

$\frac{7}{4}\frac{\mathcal{E}}{L} = \frac{dI_L}{dt}\Big|_{t=0}$

$\frac{Q_2}{3C} = I_L R + L\frac{dI_L}{dt}$

$L\frac{dI_L}{dt} + \cancel{\dot{Q}_1 R} + \frac{Q_2}{3C}$

$I_L = \dot{Q}_1 - \dot{Q}_2$

$\dot{Q}_2 = I_0$

$0 = -\frac{1}{C}\dot{Q}_1 + \frac{1}{3C}\dot{Q}_2$

$\dot{Q}_1 = \frac{1}{3}I_0$

$I_{L_1} = \frac{4}{3}I_0$

Уст. реж:

$\frac{dI_L}{dt} = 0$

$I_L = 0$

$\mathcal{E} = -\frac{Q_1}{C} + I_L R$

$\mathcal{E} = -\frac{Q_1}{C} + \frac{Q_2}{3C}$

$Q_1 = -\mathcal{E}C$

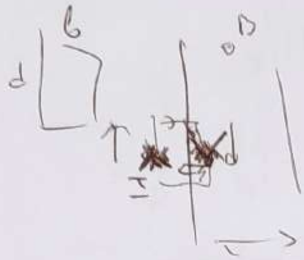
$\Uparrow$

$I_L R = \frac{Q_2}{3C} \Rightarrow Q_2 = 0$

$\mathcal{E}\int_0^\infty \dot{Q}_1 dt + \frac{\frac{9}{16}\mathcal{E}^2 C}{2} + \frac{\frac{3}{16}\mathcal{E}^2 C}{2} = Q + \frac{\mathcal{E}^2 C}{2}$

$\frac{3}{2}\mathcal{E}^2 C = \frac{\mathcal{E}^2 C}{2} + Q$

Черновик



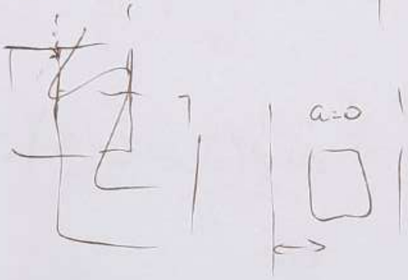
$$|\mathcal{E}| = \frac{d\Phi}{dt} = B\cdot\frac{dS}{dt} = \boxed{B\cdot v_0\cdot d}$$

$$\Rightarrow I = \frac{\mathcal{E}}{R} = \frac{Bv_0 d}{R}$$

$$a = \frac{F_A}{m} = \frac{I\cdot B\cdot d}{m} = \frac{B^2 v_0 d^2}{mR} \quad (1)$$

$b = \frac{d}{4}$

$h = 2d = 8b$



$a = const$

$c \cdot v$

$a=0$

v_0

$b = v_0 t - \frac{at^2}{2}$

$D = v_0^2 -$

$v_1 = v_0 - a\tau$

$v_2 = v_0$

$\frac{a}{2}t^2 - v_0 t + b = 0$

$D = v_0^2 - 2ab$

$$t = \frac{v_0 \pm \sqrt{v_0^2 - 2ab}}{a}$$

$$v_1 = \sqrt{v_0^2 - 2ab}$$

$$\tau = \frac{v_0 - \sqrt{v_0^2 - 2ab}}{a}$$

$$b = \int_0^{\tau} v\,dt = \quad v(t) = v_0 - \int_0^t$$

$\dot{x} c = v \Rightarrow v = \exp$

$v_0 \exp\{\frac{t}{c}\}$

Черновик.

$I_4 = 0$

$\frac{dI_4}{dt} = 0$

$\varepsilon = \frac{-Q_1}{C} \Rightarrow \underline{Q_1 = -\varepsilon C}$

$\varepsilon = Q_2 = 0$

$\frac{3}{2} \varepsilon^2 C = \frac{1}{2} \varepsilon^2 C + Q$

$\frac{3}{8} \varepsilon^2 C + \frac{3}{2} \varepsilon^2 C = \frac{5}{8} \varepsilon^2 C + Q$

$Q = \frac{1}{2} \varepsilon^2 C$

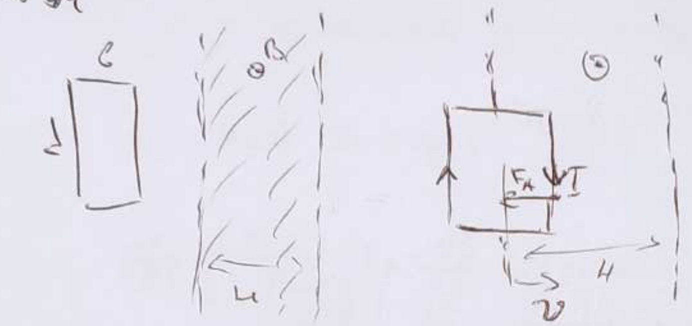
Чистовик

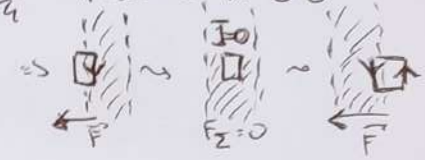
Физика Иск II тур

Вариант 11-06

№ 3.4

$b = \frac{d}{4}$ $h = 2d \Rightarrow h = 8b > b$





Известно, что пластина пройдет поле

Нач. момент и до момента вхожд левой грани

1) $I = \frac{\varepsilon}{R} = \frac{1}{R}\frac{d\varphi}{dt} = \frac{B}{R}\cdot\frac{dS}{dt} = \frac{B}{R}\cdot v_0 d$

Возникш в контуре по З-н Фар.

$$\Rightarrow a_{t=0} = \frac{F_A}{m} = \frac{IBd}{m} = \boxed{\frac{B^2 v_0 d^2}{mR} = a|_{t=0}} \quad ①$$

$$a = \frac{B^2 d^2}{mR}\cdot v \Rightarrow v(t) = v_0 \exp\left\{-\frac{t\, mR}{B^2 d^2}\right\}$$

$$x(t) = -\frac{v_0 B^2 d^2}{mR}\exp\left\{-\frac{t\, mR}{B^2 d^2}\right\} + \frac{v_0 B^2 d^2}{mR}$$

$$b = \frac{v_0 B^2 d^2}{mR}\left(1 - \exp\left\{-\frac{\tau mR}{B^2 d^2}\right\}\right) \Rightarrow$$

τ - время входа лев грани

$$\Rightarrow \tau = -b\,\frac{B^2 d^2}{mR}\ln\left(1 - \frac{bmR}{v_0 B^2 d^2}\right)$$

$$v_1 = v(\tau) = \cancel{v_0\left(\frac{v_0 B^2 d^2}{v_0 B^2 d^2 - bmR}\right) = v_1} = \boxed{v_0\left(1 - \frac{bmR}{v_0 B^2 d^2}\right) = v_1} \quad ②$$

при движ рамки внутри поля скор не меняется т.к $F_\Sigma = 0$ т.к $I = 0$

Физика 11 кл II тур

Вариант 11-00

Чистовик

Продолж задачи №4

далее аналогично с выходом рамки;

с точностью до $v_0 = v_1$

$$v(t) = v_1 \exp\left\{-\frac{t\,mR}{B^2 d^2}\right\} \ldots$$

$$v_2 = v_1 - \frac{b\,mR}{B^2 d^2} = \boxed{v_0 - \frac{2b\,mR}{B^2 d^2} = v_2}$$ (3)

Ответ: 1) $a = \frac{B^2 d^2}{mR} v_0$

2) $v_1 = v_0 - \frac{b\,mR}{B^2 d^2} = v_0 - \frac{mR}{4B^2 d}$

3) $v_2 = v_0 - \frac{2b\,mR}{B^2 d^2} = v_0 - \frac{mR}{2B^2 d}$

Чистовик

Физика 11кл II тур

Вариант 11-06

№5

(1)

$$\frac{1}{f_г}+\frac{1}{F_1}=\frac{1}{0{,}25}+\frac{1}{d}$$

$f_г$ — оптическая глаза; d — раст. внутри глаза

(2) $$\frac{1}{f_г}+\frac{1}{F_2}=\frac{1}{d}$$

$$\frac{1}{F_1}-\frac{1}{F_2}=4$$

$$\frac{F_1}{F_2}=\frac{7}{3}$$

$$\Rightarrow \begin{cases} F_1=-\frac{1}{3}\,м \\ \boxed{F_2=-\frac{1}{7}\,м} \end{cases} \text{①}$$

$$\frac{1}{f_г}=\frac{1}{x}+\frac{1}{d}\ (2) \Rightarrow$$

$$\Rightarrow -\frac{1}{x}=-\frac{1}{F_2}=7 \Rightarrow \boxed{x=\frac{1}{7}\,м} \text{①}$$

должно быть ~~мнимый~~ ~~изображение~~ источник

т.е. не с окосо

$$\frac{1}{f_г}+\frac{1}{F_3}=\frac{1}{0{,}5}+\frac{1}{d}$$

$$\overset{(2)}{\Rightarrow} \frac{1}{F_3}=\frac{1}{F_2}+2 \Rightarrow \boxed{F_3=-\frac{1}{5}\,м}\ 2$$

Ответ: 1) $F_2=-\frac{1}{7}\,м \approx 0{,}14\,м$; $x=\frac{1}{7}\,м \approx 0{,}14\,м$ ~~[illegible]~~ источник

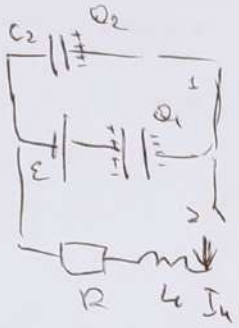
2) $F_3=-\frac{1}{5}\,м=-0{,}2\,м$

Чистовик

Физика 11 кл II тур

Вариант 11-06

№3



ключ разомкн

1) $\varepsilon = -\frac{Q_1}{C} + \frac{Q_2}{3C}$

$Q_1 + Q_2 = 0$

$3\varepsilon C = -3Q_1 + Q_2 \Rightarrow Q_1 = -\frac{3}{4}\varepsilon C$

2) ключ замк

(1) $\varepsilon = -\frac{Q_1}{C} + \frac{Q_2}{3C}$

(2) $\varepsilon = -\frac{Q_1}{C} + I_L R + L\frac{dI_L}{dt} \overset{t=0}{\Leftrightarrow} \varepsilon = \frac{3}{4}\varepsilon + L\frac{dI_L}{dt}\Big|_{t=0}$

$I_L = 0$
$Q = -\frac{3}{4}\varepsilon C$

$$\boxed{\frac{dI_L}{dt}\Big|_{t=0} = \frac{\varepsilon}{4L}}$$ 1

(1) $\frac{d}{dt} \Leftrightarrow 0 = -\frac{\dot{Q}_1}{C} + \frac{\dot{Q}_2}{3C} \Rightarrow \dot{Q}_1 = \frac{1}{3}I_0$

$\boxed{\dot{Q}_2 = I_0}$

$I_L = \dot{Q}_1 + \dot{Q}_2 = \frac{4}{3}I_0 \Rightarrow \boxed{U_R = \frac{4}{3}I_0 \cdot R}$ 3

4

Чистовик

Физика 11кл II тур

Вариант 11-06

Продолжение задачи №3

На резисторе перестанет выд. ток, если.

$$\begin{cases} I_L = 0 \\ \frac{dI_L}{dt} = 0 \end{cases} \quad \text{из } \begin{matrix}(1)\\(2)\end{matrix} \Big| \Rightarrow \quad Q_2 = 0, \quad Q_1 = -\mathcal{E}C$$

Из-за отсутствия других источников ток через C_1 течет только в одном направлении $\Rightarrow$

$$\Rightarrow \dot{Q}_1 \le 0 \Rightarrow \int_0^\infty |\dot{Q}_1| dt = \frac{1}{4}\mathcal{E}C$$

з-д, прош через источник

ЗСЭ

$$\mathcal{E}\int_0^\infty |\dot{Q}_1|\, dt + \frac{Q_{10}^2}{2C} + \frac{Q_{20}^2}{2C} = Q + \frac{Q_{1\infty}^2}{2C} + \frac{Q_{2\infty}^2}{2C}$$

$$\frac{1}{4}\mathcal{E}^2C + \frac{9}{16 \cdot 2}\mathcal{E}^2C + \frac{3}{16 \cdot 2}\mathcal{E}^2C = Q + \frac{1}{2}\mathcal{E}^2C$$

$$\boxed{Q = \frac{1}{3}\mathcal{E}^2C} \; (2)$$

Ответ: 1) $\left.\frac{dI_L}{dt}\right|_{t=0} = \frac{1}{4}\frac{\mathcal{E}}{L}$

2) $Q = \frac{1}{3}\mathcal{E}^2C$

3) $U_R = \frac{4}{3}I_0R$