Часть 1

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

Шифр: **21202204**

ID профиля: **850153**

Вариант 2

Чистовик

Физика 11 кл

№2. Дано: ν; T_0; $C(T) = \frac{5}{2}R\frac{T}{T_0}$

Найти: Q_1 – ? ($T_0 \to \frac{1}{2}T_0$); T_1 – ? (A_{min}); A_{min} – ?

Решение:

1) При малом изменении температуры теплоёмкость можно считать постоянной

$$dQ = \nu C dT$$

$$dQ = \frac{5}{2}\nu R\frac{T}{T_0}dT$$

$$Q_1' = \int_{T_0}^{\frac{1}{2}T_0} dQ = \int_{T_0}^{\frac{1}{2}T_0} \frac{5}{2}\nu R\frac{T}{T_0}dT = \frac{5\nu R}{2T_0}\int_{T_0}^{\frac{1}{2}T_0} T\,dT =$$

$$= \frac{5\nu R}{2T_0}\cdot\frac{T^2}{2}\Big|_{T_0}^{\frac{1}{2}T_0} = \frac{5\nu R}{4T_0}\left(\frac{T_0^2}{4} - T_0^2\right) = \frac{5\nu R}{4T_0}\cdot\left(-\frac{3}{4}T_0^2\right) = -\frac{15}{16}\nu R T_0$$

Q_1' – кол-во полученной теплоты

$$Q_1 = -Q_1' = \frac{15}{16}\nu R T_0$$

2) $Q = A + \Delta U$; $\Delta U = \frac{3}{2}\nu R(T_1 - T_0)$

$$A = Q - \Delta U = \frac{5\nu R}{4T_0}(T_1^2 - T_0^2) - \frac{3}{2}\nu R(T_1 - T_0)$$

при A_{min} $A' = 0$

$$A = \nu R(T_1 - T_0)\left(\frac{5}{4}\cdot\frac{T_1 + T_0}{T_0} - \frac{3}{2}\right)$$

$$A' = \nu R\left(1\cdot\left(\frac{5}{4}\cdot\frac{T_1 + T_0}{T_0} - \frac{3}{2}\right) + (T_1 - T_0)\left(\frac{5}{4T_0}\right)\right) = 0$$

$$\frac{5}{4}\frac{T_1 + T_0}{T_0} - \frac{3}{2} = (T_0 - T_1)\cdot\frac{5}{4T_0}$$

$$\frac{5}{4}\frac{T_1}{T_0} + \frac{5}{4} - \frac{3}{2} = \frac{5}{4} - \frac{5T_1}{4T_0}$$

$$\frac{5T_1}{2T_0} = \frac{3}{2} \Rightarrow T_1 = \frac{3}{5}T_0$$

3) $A_{min} = \frac{5}{4}\frac{\nu R}{T_0}\left(\frac{9}{25}T_0^2 - T_0^2\right) - \frac{3}{2}\nu R\left(\frac{3}{5}T_0 - T_0\right) = \frac{5}{4}\nu R\cdot\left(-\frac{16}{25}T_0\right) -$

$$- \frac{3}{2}\nu R\cdot\left(-\frac{2}{5}T_0\right) = -\frac{4}{5}\nu R T_0 + \frac{3}{5}\nu R T_0 = -\frac{1}{5}\nu R T_0$$

Ответ: $Q_1 = \frac{15}{16}\nu R T_0$; $T_1 = \frac{3}{5}T_0$; $A_{min} = -\frac{1}{5}\nu R T_0$

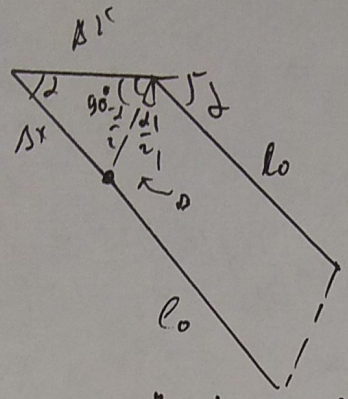
(1)

Чистовик Физика 11 кл

№1. Дано:
$\cos\alpha = \frac{4}{5}$
H

Решение:
1) Когда клин сдвигается на Δx, шнур укорачивается на Δx

$\beta - ?$
$a_k - ?$
$\frac{m_ш}{m_k} - ?$
$T - ?$

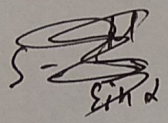


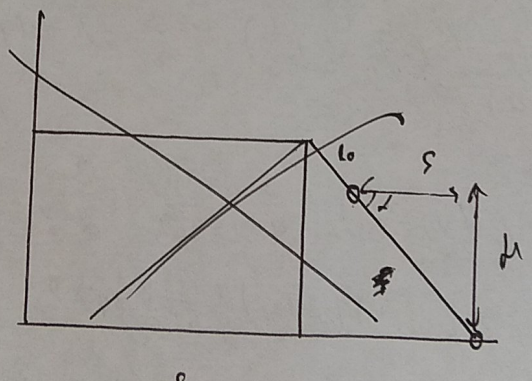
$\beta \downarrow 90° - \frac{\alpha}{2} = 90° \Rightarrow \beta = \frac{\alpha}{2}$

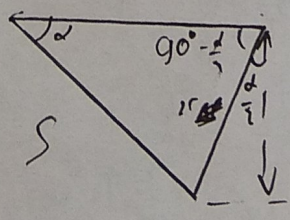
$\cos^2\frac{\alpha}{2} = \frac{1+\cos\alpha}{2}$

$\cos^2\frac{\alpha}{2} = \frac{1+\frac{4}{5}}{2} = \frac{9}{10} \Rightarrow \cos\frac{\alpha}{2} = \frac{3}{\sqrt{10}} = \cos\beta$

2) S - путь клина







$\frac{H}{x} = \cos\frac{\alpha}{2}$

$\frac{x}{\sin\alpha} = \frac{S}{\cos\frac{\alpha}{2}} \Rightarrow x = \frac{S\cdot\sin\alpha}{\cos\frac{\alpha}{2}}$

$\frac{H}{\cos\frac{\alpha}{2}} = \frac{S\cdot\sin\alpha}{\cos\frac{\alpha}{2}}$

$S = \frac{H}{\sin\alpha}$

$S = \frac{H}{\sin\alpha}$

Чистовик Физика 11 кл

$$\begin{cases} S = \dfrac{a_k t^2}{2} \\ \vdots \end{cases}$$

$M = \dfrac{a_m t^2}{2} \cos\dfrac{\alpha}{2}$ – Верт. перемещ. шарика

$$\frac{S}{H} = \frac{a_k}{a_m \cos\frac{\alpha}{2}} = \frac{1}{\sin\alpha}$$

$$a_k = \frac{a_m \cos\frac{\alpha}{2}}{\sin\alpha} \Rightarrow a_m \cos\frac{\alpha}{2} = g \Rightarrow a_k = \frac{g}{\sin\alpha} = \frac{5g}{3}$$

3) ЗСИ: $0 = M v_k - m v_{mx}$; $v_{mx} = v_m \cdot \sin\frac{\alpha}{2}$
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$$M v_k = m v_{mx}$$

$$M \cdot \frac{v_m \cdot \cos\frac{\alpha}{2}}{\sin\alpha} = m v_m \cdot \sin\frac{\alpha}{2}$$

$$\frac{m}{M} = \frac{1}{\sin\alpha \cdot \operatorname{tg}\frac{\alpha}{2}};$$

$$\operatorname{tg}^2\frac{\alpha}{2} = \frac{1}{\cos^2\frac{\alpha}{2}} - 1 = \frac{10}{9} - 1 = \frac{1}{9}$$

$$\operatorname{tg}\frac{\alpha}{2} = \frac{1}{3}$$

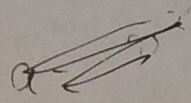
$$\frac{m}{M} = \frac{1}{\frac{3}{5}\cdot\frac{1}{3}} = 5$$

4) $H = \dfrac{a_{my} t^2}{2} \Rightarrow t = \sqrt{\dfrac{2H}{a_{my}}} = \sqrt{\dfrac{2H}{a_m \cdot \cos\frac{\alpha}{2}}} = \sqrt{\dfrac{2H}{g}}$

Ответ: $\cos\beta = \dfrac{3}{\sqrt{20}}$; $a_k = \dfrac{5g}{3}$; $\dfrac{m}{M} = 5$; $t = \sqrt{\dfrac{2H}{g}}$

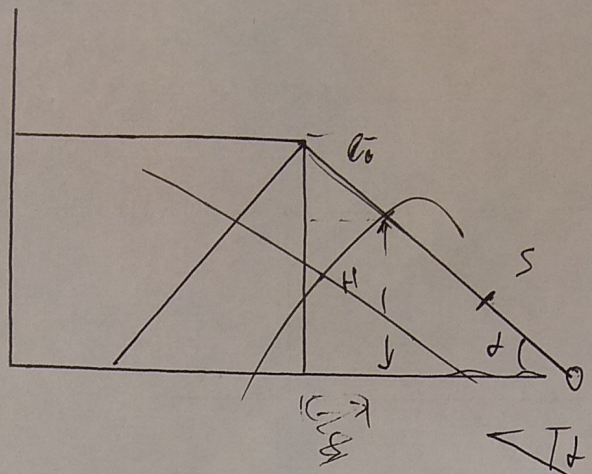
Черновик

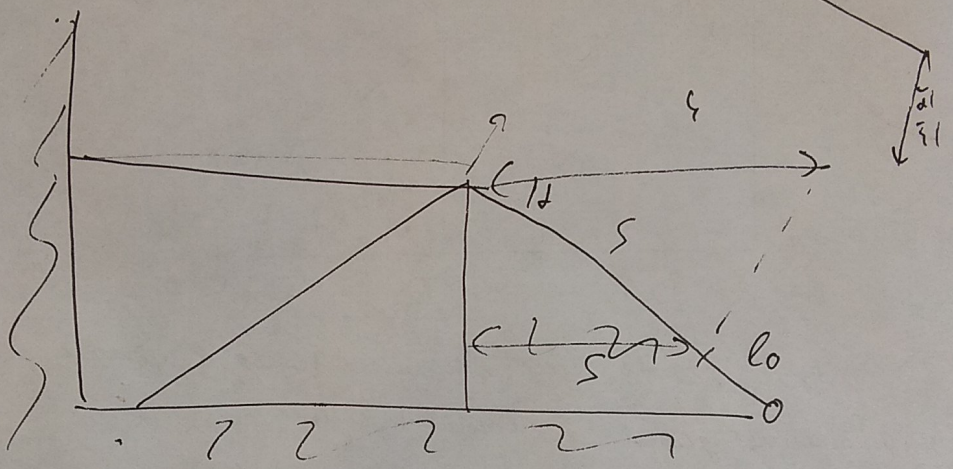
Физика 11 кл

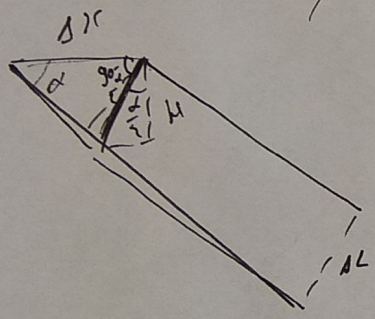


$$S = \frac{v^2}{2a}$$

$$a = \frac{v^2}{2S}$$

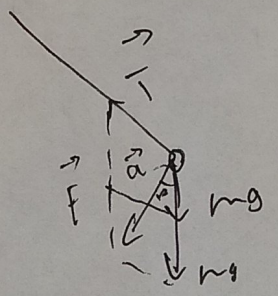




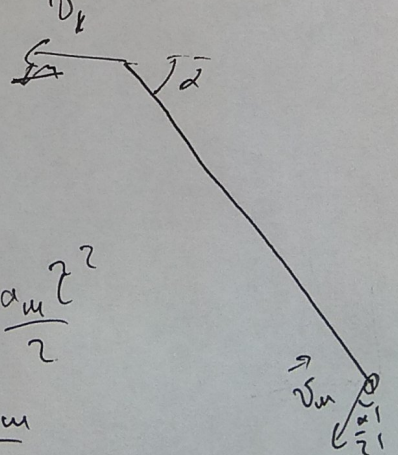


$$\frac{\Delta x}{\sin(90 - \frac{\alpha}{2})} = \frac{\Delta L}{\sin\alpha}$$

$$\frac{\Delta x}{\cos\frac{\alpha}{2}} = \frac{\Delta L}{\sin\alpha}$$



$$\vec{T} + m\vec{g} = \vec{F}$$



$$\Delta x = \frac{a_k t^2}{2}$$

$$\Delta L = \frac{\Delta x \sin\alpha}{\cos\frac{\alpha}{2}} = \frac{a_m t^2}{2}$$

$$\frac{a_k \sin\alpha}{2\cos\frac{\alpha}{2}} = \frac{a_m}{2}$$

$$\boxed{a_k \frac{\sin\alpha}{\cos\frac{\alpha}{2}} = a_m}$$

(2)

Черновик

Физика 11 кл

№1.

Решение:

Дано:

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

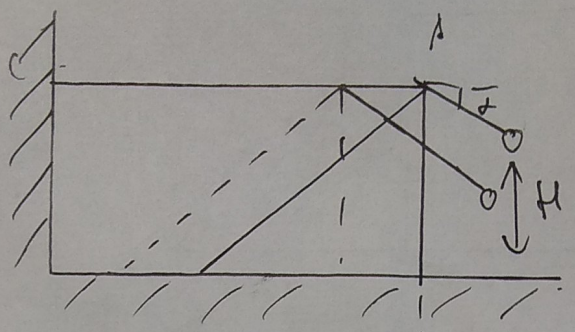
H

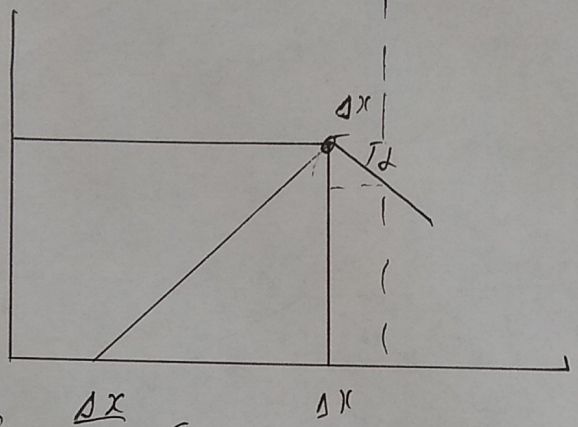
$\beta - ?$

$a_k - ?$

$\frac{m_ш}{m_k} - ?$

$T - ?$

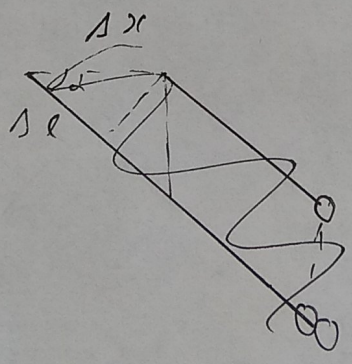


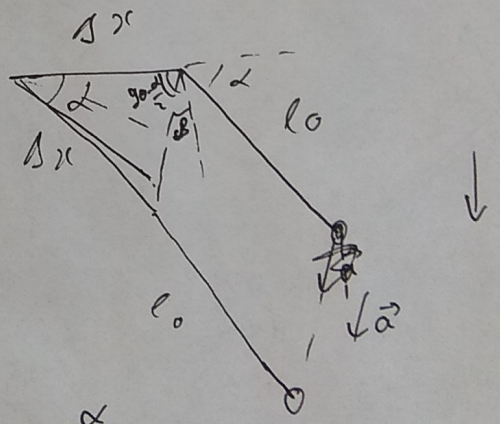


1) $\Delta\ell = \frac{\Delta x}{\cos\alpha} \Rightarrow$

$\Delta\ell \sim \Delta x \Rightarrow$ шар приближается к стене по прямой $\Rightarrow$

$\Rightarrow$ направление ускорения постоянно





$\beta = \frac{\alpha}{2}$

$\cos^2\frac{\alpha}{2} = \frac{1+\cos\alpha}{2}$

$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha = 2\cos^2\alpha - 1$

$\Rightarrow \cos\alpha = 2\cos^2\frac{\alpha}{2} - 1$

$\cos^2\frac{\alpha}{2} = \frac{1+\frac{4}{5}}{2} = \frac{9}{10}$ $\boxed{\cos\frac{\alpha}{2} = \frac{3}{\sqrt{10}}}$

(1)

Чертовских Физика 11 кл

№2. Дано:

ν, T_0

$C(T) = \frac{5}{2} R \frac{T}{T_0}$

Q_1 – ?

$(T_0 \to \frac{T_0}{2})$

T_1 – ?

(A_{min})

A_{min} – ?

Решение:

1) $C = \frac{Q}{\nu \Delta T}$

$Q = C \nu \Delta T$

$dQ = C \nu dT$

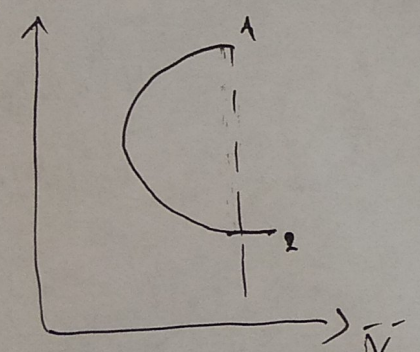
$dQ = \frac{5}{2} R \frac{T_1}{T_0} \nu dT$

$Q_1 = \int \frac{5}{2} R \frac{T}{T_0} dT = \frac{5R}{2T_0} \int T dT =$

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

$= \frac{5 \nu R}{4 T_0} \cdot \frac{3}{4} T_0^2 = \frac{15 \nu R}{16} - \frac{15}{16} \nu R T_0$

2)



$Q = A + \Delta U$

$\Delta U = C_V \nu \Delta T$

$\frac{5}{2} R \frac{T_1}{T_0} \nu dT = A + \frac{3}{2} \nu R dT$

$A = \frac{1}{2} \nu R dT \left(5 \frac{T_1}{T_0} - 3 \right)$

$Q = \frac{5 \nu R}{4 T_0} (T_1^2 - T_0^2)$

$\frac{5 \nu R}{4 T_0} (T_1^2 - T_0^2) - \frac{3}{2} \nu R (T_1 - T_0) = A$

$\nu R (T_1 - T_0) \left(\frac{5 (T_1 + T_0)}{4 T_0} - \frac{3}{2} \right) = A$ (3)

A_{min} при $(T_1 - T_0) \left(\frac{5 (T_1 + T_0)}{4 T_0} - \frac{3}{2} \right)' = 0$

$$(T_1 - T_0)' \left(\frac{5(T_1+T_0)}{4 \cdot T_0} - \frac{3}{2}\right) + (T_1 - T_0)\left(\frac{5(T_1+T_0)}{4T_0} - \frac{3}{2}\right)' =$$

$$= 1 \cdot \left(\frac{5}{4}\frac{(T_1+T_0)}{T_0} - \frac{3}{2}\right) + (T_1 - T_0)\left(\frac{5}{4T_0}\left(\frac{T_1+T_0}{T_0}\right)'\right) =$$

$$= \frac{5}{4}\left(\frac{T_1+T_0}{T_0}\right) - \frac{3}{2}\Big) + (T_1 - T_0)\left(\frac{5}{4T_0}\right) = 0$$

$$\frac{5T_1 + 5T_0}{4T_0} - \frac{3}{2} = (T_0 - T_1) \cdot \frac{5}{4T_0}$$

$$\frac{5T_1}{4T_0} + \frac{5}{4} - \frac{3}{2} = \frac{5}{4} - \frac{5T_1}{4T_0}$$

$$\frac{5T_1}{2T_0} = \frac{3}{2}$$

$$\frac{5T_1}{T_0} = 3$$

$$T_1 = \frac{3}{5}T_0$$

3) $A = \frac{5}{4}\frac{\nu R}{T_0}\left(\frac{9}{25}T_0^2 - T_0^2\right) - \frac{3}{2}\nu R\left(\frac{3}{5}T_0 - T_0\right) =$

$$= \frac{5\nu R}{4} \cdot \left(-\frac{16}{25}T_0\right) - \frac{3}{2}\nu R \cdot \left(-\frac{2}{5}T_0\right) = -\frac{4}{5}\nu R T_0 + \frac{3}{5}\nu R T_0 = -\frac{1}{5}\nu R T_0$$

4

$$\Delta L_{общ} = \frac{\mu}{\cos\frac{\alpha}{2}}$$

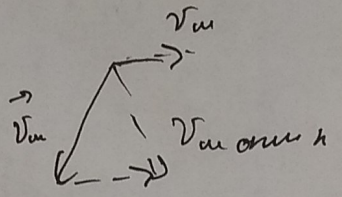
$$\Delta x_{общ} = \frac{\Delta L_{общ}\cos\frac{\alpha}{2}}{\sin\alpha} \qquad v_к = v_м \frac{\cos\frac{\alpha}{2}}{\sin\alpha}$$

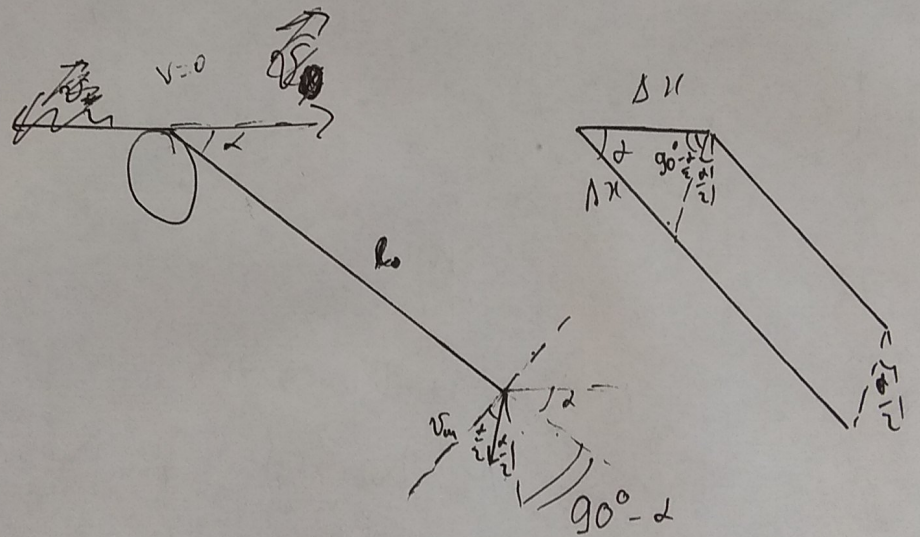
$$\Delta x_{общ} = \frac{\mu}{\sin\alpha}$$

$$\vec{v}_{м\,отн\,к} + \vec{v}_к = \vec{v}_м$$

$$\vec{v}_{м\,отн\,к} = \vec{v}_м - \vec{v}_к$$

$$\frac{a\tau^2}{2} = \frac{\mu}{\sin\alpha}$$





T

$$90° - \alpha + \frac{\alpha}{2} = 90° - \frac{\alpha}{2}$$

2) $\beta = \frac{\alpha}{2}$ ~~и~~ $\frac{S}{S_{тр}} = \frac{1}{\sin\alpha}$

$S = \frac{a_к t^2}{2}$

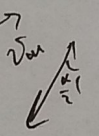
$H = \frac{a_м t^2 \cdot \cos\frac{\alpha}{2}}{2}$

$\frac{S}{H} = \frac{a_к}{a_м \cos\frac{\alpha}{2}} = \frac{1}{\sin\alpha}$

$a_к = \frac{a_м \cos\frac{\alpha}{2}}{\sin\alpha} = a_м \cdot \frac{3}{\sqrt{10}} \cdot \frac{5}{3} = \frac{5}{\sqrt{10}} = \frac{\sqrt{10}}{2}$

$a_м \cos\frac{\alpha}{2} = g$

$\boxed{a_к = \frac{g}{\sin\alpha} = \frac{5g}{3}}$



$v_к = \frac{v_м \cos\frac{\alpha}{2}}{\sin\alpha}$

3) ЗСИ: $0 = M v_к - m v_м x$
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$M v_к - m v_м \cdot \sin\frac{\alpha}{2} = 0$

$M \cdot \frac{v_м \cos\frac{1}{2}}{\sin\alpha} = m v_м \sin\frac{\alpha}{2}$

$\frac{m}{M} = \frac{1}{\sin\alpha \cdot \operatorname{tg}\frac{\alpha}{2}}$

$\sin^2\frac{\alpha}{2} + \cos^2\frac{\alpha}{2} = 1 \mid : \cos^2\frac{\alpha}{2}$

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

$\operatorname{tg}^2\frac{\alpha}{2} = \frac{1}{\cos^2\frac{\alpha}{2}} - 1 = \frac{10}{9} - 1 = \frac{1}{9}$

$\operatorname{tg}\frac{\alpha}{2} = \frac{1}{3}$

$\frac{m}{M} = \frac{1}{\frac{3}{5} \cdot \frac{1}{3}} = 5$

Часть 2

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

Шифр: **21202204**

ID профиля: **850153**

Вариант 2

Чистовик

Физика 11 кл

№4. Дано:

$B; L; m; R$

$\frac{m}{2}; 4R$

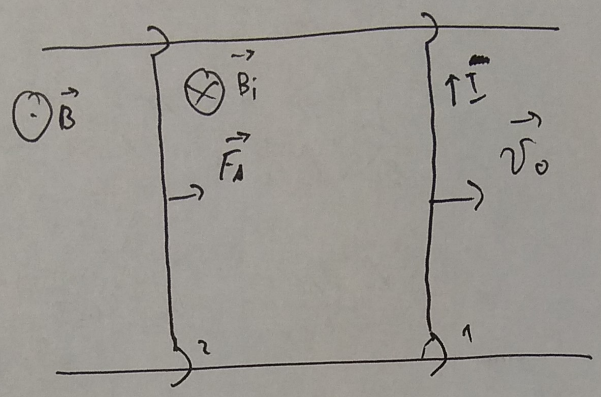
v_0

$a_2 - ?$

$v'_{1,2} - ?$

$\Delta x - ?$

Решение:



1) $\Delta\Phi > 0 \Rightarrow \vec{B_i} \uparrow\downarrow \vec{B}$

$|\mathcal{E}_i| = \Delta\Phi' = B\Delta S' = Bv_0L$

$F_A = \frac{m}{2}a_2$; $F_A = BIL$

$I = \frac{\mathcal{E}_i}{R_{общ}} = \frac{Bv_0L}{5R}$

$\frac{B^2v_0L^2}{5R} = \frac{m}{2}a_2 \Rightarrow a_2 = \frac{2}{5}\frac{B^2v_0L^2}{Rm}$

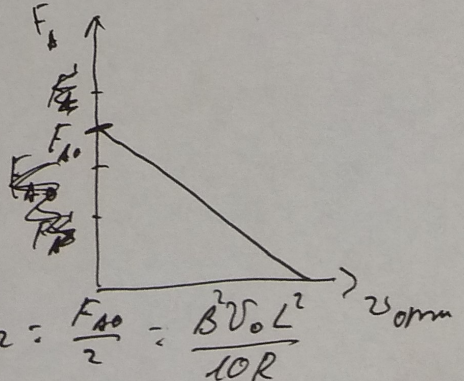
Состояние будет изменяться, пока скорости не сравняются

2) ~~Перемычки будут по сближаться, то отталкиваться, пока их скорости не сравняются~~: $v_1' = v_2' = u$

ЗСИ: $mv_0 = (m + \frac{m}{2})u$

$u = \frac{2}{3}v_0$

3) $A_A = F_{Acp}\Delta x$; $F_A \sim I$, $I \sim v \Rightarrow F_A \sim v$



$A_A = \Delta W = W_1 - W_2$

$W_1 = \frac{mv_0^2}{2}$

$W_2 = \frac{m \cdot 4v_0^2}{2 \cdot 9} + \frac{\frac{m}{2} \cdot 4v_0^2}{2 \cdot 9} = \frac{2mv_0^2}{9} + \frac{mv_0^2}{9} = \frac{mv_0^2}{3}$

$F_{Acp} = \frac{F_{A0}}{2} = \frac{B^2v_0L^2}{10R}$

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Чистовик

Физика 11 кл

$$F_{A\text{ср}}\,\Delta x = \frac{3}{2}\frac{mv_0^2}{2} - \frac{2}{3}\frac{mv_0^2}{3} = \frac{mv_0^2}{6}$$

$$\frac{B^2v_0L^2}{10R}\Delta x = \frac{mv_0^2}{6}$$

$$\Delta x = \frac{mv_0^2 \cdot 10R}{6B^2v_0L^2} = \frac{5}{3}\frac{mv_0^2R}{B^2v_0L^2} = \frac{5}{3}\frac{mv_0R}{B^2L^2}$$

Ответ: $a_2 = \frac{2}{5}\frac{B^2v_0L^2}{Rm}$; $U = v_{1\text{н}}' = \frac{2}{3}v_0$; $\Delta x = \frac{5}{3}\frac{mv_0R}{B^2L^2}$

Чистовик

Физика 11 кл

№3. Дано:

$C_2 = C$

$C_1 = 3C$

R; E

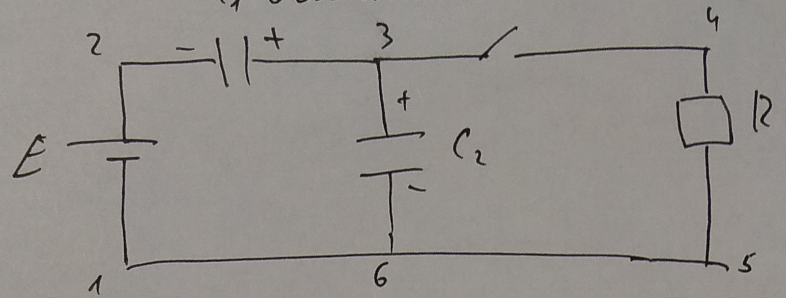
I_R - ?

Q - ?

U_R - ?

$(I_{C2} : I_0)$

C_1 сначала:



1) До замык. ключа $q_{C1} = q_{C2} = q_0$

1-2-3-6-1: $E = -\frac{q_0}{3C} + \frac{3q_0}{C} = \frac{2q_0}{3C}$

$q_0 = \frac{3CE}{2}$

Сразу после замык. ключа: $q_{C2}' = q_0$

$U_{C2} = U_R$

$\frac{3}{2}E = I_R \cdot R \Rightarrow I_R = \frac{3E}{2R}$

2) $A_{ист} = W_{C1}' + W_{C2}' - W_{C1} - W_{C2} + Q$

$W_{C1} = \frac{q_0^2}{6C} = \frac{9C^2E^2}{4 \cdot 6C} = \frac{3CE^2}{8}$

$W_{C2} = \frac{q_0^2}{2C} = \frac{9 \cdot C^2E^2}{4 \cdot 2C} = \frac{9CE^2}{8}$

В уст. режиме $I_{уст} = 0 \Rightarrow U_R = 0 \Rightarrow U_{C2} = 0 \Rightarrow$

$\Rightarrow U_{C1} = E = \frac{q_1}{3C} \Rightarrow q_1 = 3CE$

$A_{ист}: \Delta q E = (q_1 - q_0)E = (3CE + \frac{3}{2}CE)E = \frac{9}{2}CE^2$

$W_{C2}' = 0$

$W_{C1}' = \frac{q_1^2}{6C} = \frac{9C^2E^2}{6C} = \frac{3CE^2}{2}$

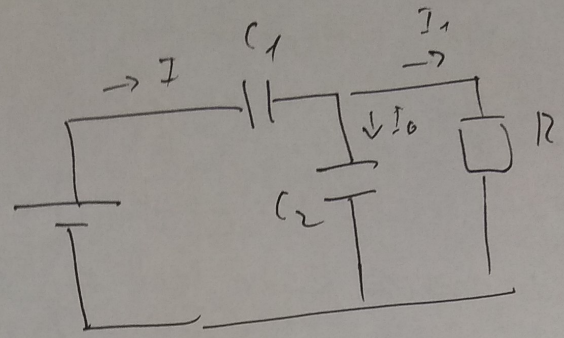
$Q = \frac{9}{2}CE^2 - \frac{3CE^2}{2} + \frac{3CE^2}{8} + \frac{9CE^2}{8} = 2CE^2 + \frac{3}{2}CE^2 =$

$= \frac{7}{2}CE^2$

(3)

Чистовик Физика 11 кл

3) $\begin{cases} \frac{I_0\,dt}{C} = I_1 R \\ I = I_1 + I_0 \\ E = \frac{I\,dt}{3C} + \frac{I_0\,dt}{C} \end{cases}$



$E = \frac{2I_1\,dt}{3C} + \frac{4}{3}\frac{I_0\,dt}{C}$

$I_1\,dt = 3CE - 4I_0\,dt$

$I_1 = \frac{3CE}{dt} - 4I_0$

$U_R = I_1 R = \left(\frac{3CE}{dt} - 4I_0\right)R$

Ответ: $I_R = \frac{3E}{2R}$; $Q = \frac{9}{2}CE^2$; $U_R = \left(\frac{3CE}{dt} - 4I_0\right)R$

(4)

№5. Дано:

$F = 12$ см

$H = 9$ см

$d = 48$ см

$S = 24$ см

$x - ?$

$D_m - ?$

$L - ?$

Решение:

1) $\frac{1}{d} + \frac{1}{f} = \frac{1}{F} \Rightarrow f = \frac{dF}{d-F} = \frac{12 \cdot 48}{36} = 16$ см

$x = f + S = 16 + 24 = 40$ см

2) При $D < H$ точки, находящиеся на расстоянии больше $\frac{D}{2}$ от центра часов, будут фокусироваться в фокальной пл-сти линзы, а точки, удалённые менее чем на $\frac{D}{2}$ от центра, будут фокусироваться на расстоянии $f = 16$ см

$D_m = H$

3) Все ~~лучи~~ лучи от предмета будут проходить через правый фокус линзы $\Rightarrow$ если его закрыть, то все лучи не ~~будут~~ пройдут дальше $\Rightarrow L = 12$ см

Ответ: $x = 40$ см; $D_m = H$; $L = 12$ см (справа от линзы)

5

Иванов Физика 11 кл

№ 8. Дано:

$C_2 = C$

$C_1 = 3C$

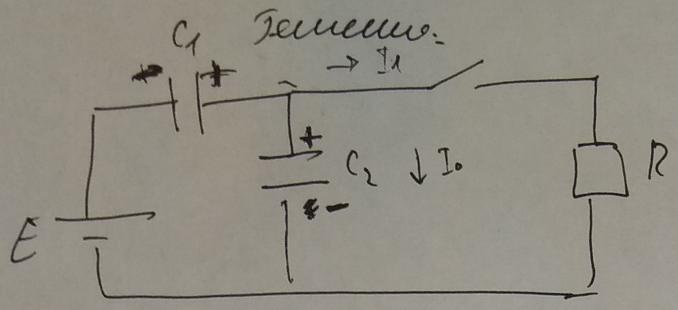
$E; R$

$I_R - ?$

$Q - ?$

$U_R - ?$

$(i_{c2} = I_0)$



Решение:

$q_R = U_{c2}$; $U_{c2} = \frac{q}{C}$

1) ~~$I_R \cdot R =$~~

$U_R = U_{c2}$

$I_R R = U_{c2}$

$\frac{q_2}{C}$

$E = U_{c1} + U_{c2} = \frac{q_1}{3C} + \frac{q_2}{C}$

$q_1 = q_2 = q_0$

$E = \frac{q_0}{3C} + \frac{q_0}{C} = \frac{2q_0}{3C}$; $q_0 = \frac{3CE}{2}$

$E = \frac{CE}{6} + \frac{CE}{2} = \frac{3CE}{2 \cdot 3C} + \frac{3CE}{2R} = \frac{E}{2} + \frac{3E}{2}$

$I_R \cdot R = \frac{q_0}{C} = \frac{3CE}{2C} = \frac{3}{2}E$

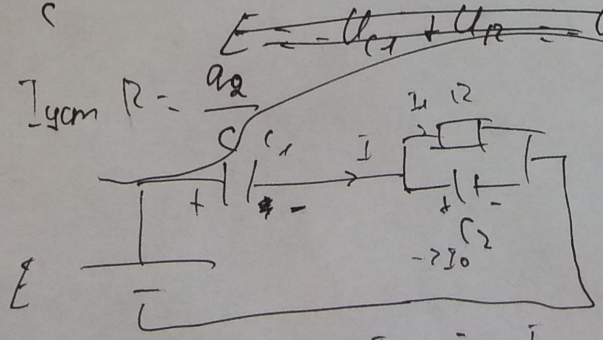
$I_R = \frac{3E}{2R}$

2) ЗСЭ: $A_{ист} = W_{c1}' + W_{c2}' - W_{c1} - W_{c2} + Q$

$E = -\frac{q_1}{3C} + \frac{q_2}{C}$

~~$E = -U_{c1} + U_R = U_{c1}$~~

$I_{уст} R = \frac{q_2}{C}$



$\begin{cases} I = I_1 + I_0 \\ E = U_{c1} + I_1 R \\ E = U_{c1} + U_{c2} \end{cases}$

$E_2 = U_1 = \frac{q_1}{3C}$; $q_1 = 3CE$

$\Delta q = 3CE + \frac{3CE}{2} = \frac{9}{2}CE$

$A_{acm} = \frac{9}{2}CE^2 =$

$$\begin{cases} \frac{q_2}{C} = I_1 R \\ I = I_1 + I_0 \\ E_1 = \end{cases}$$

$$\begin{cases} \frac{I_0 dt}{C} = I_1 R \\ I = I_1 + I_0 \\ E = \frac{I dt}{3C} + \frac{I_0 dt}{C} \end{cases}$$

$$E = \frac{I_1 dt}{3C} + \frac{I_0 dt}{3C} + \frac{3 I_0 dt}{C} = \frac{9}{3}\frac{I_0 dt}{C} + \frac{I_1 dt}{3C} = \frac{(9I_0 + I_1)dt}{3C}$$

$$\frac{I dt}{3C} = E - \frac{9 I_0 dt}{3 C}$$

$$I dt = 3CE - 9 I_0 dt$$

$$I = \frac{3CE}{dt} - 9 I_0$$

$$\left(\frac{3CE}{dt} - 9 I_0\right)$$

Чернова Физика 11 кл

№5. Дано:

$F = 12$ см

$H = 9$ см

$d = 48$ см

$f = 24$ см

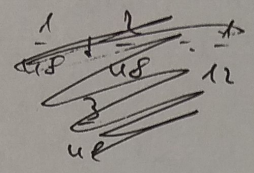
$x - ?$

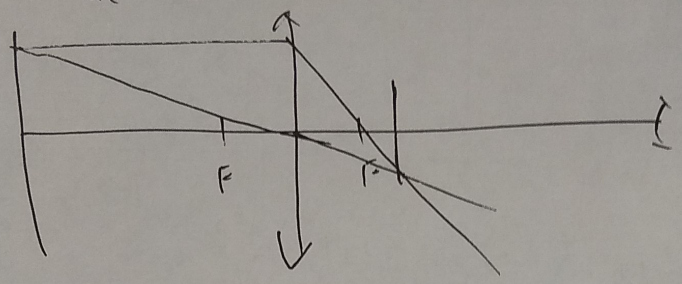
$P_m - ?$

$\angle - ?$

Решение:

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

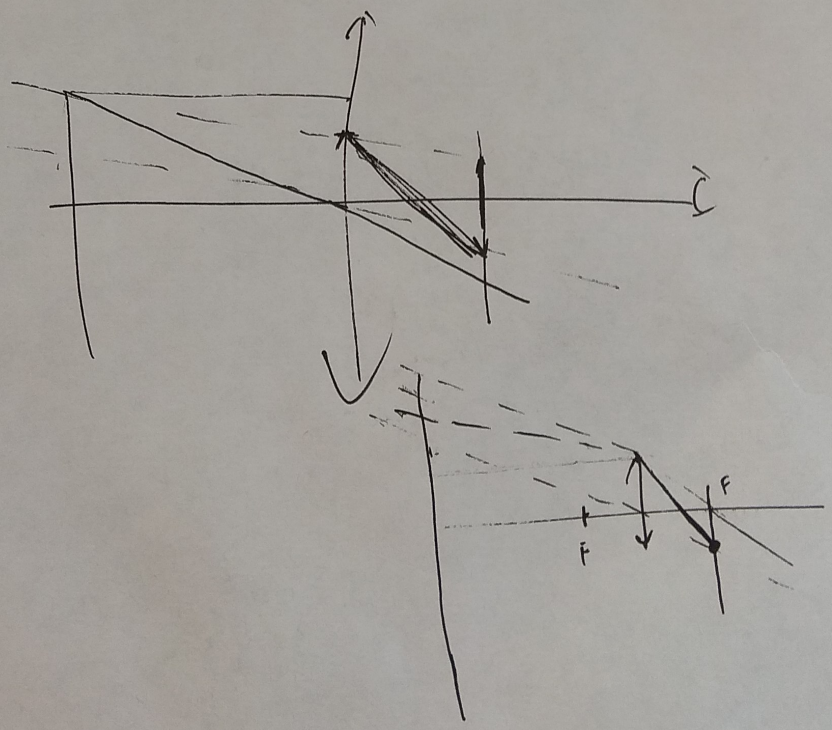




1) $f = \frac{Fd}{d-F} = \frac{12 \cdot 48}{36} = 16$ см

$x = 16 + 24 = 40$ см $\quad \Gamma = \frac{f}{3}$

2)



Чернобак

Физика 11 кл

№4 Дано:

B ; L ; m ; R

$\frac{m}{2}$; $4R$

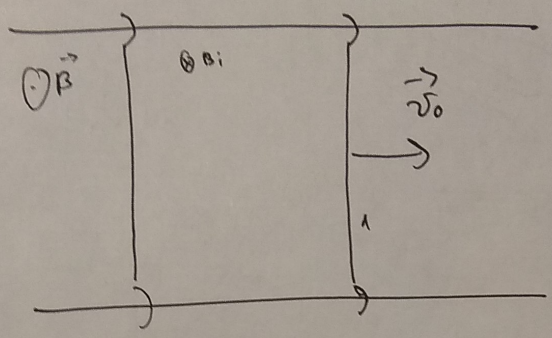
v_0

a_2 - ?

$v'_{1,2}$ - ?

Δx - ?

Решение:



1) $\Delta\Phi > 0 \Rightarrow \Rightarrow B_i \uparrow\downarrow B$

$\mathcal{E}_i = B v_0 L$

$F_A = BIL = \frac{m}{2} a_2$

$I = \frac{\mathcal{E}_i}{R_{общ}} = \frac{\mathcal{E}_i}{5R}$

$F_A = \frac{B \cdot B v_0 L}{5R} \cdot L = \frac{m}{2} a_2$

$a_2 = \frac{2B^2 v_0 L^2}{5Rm}$

2) ЗСИ: $mv_0 = (m + \frac{m}{2}) v'$

$mv_0 = \frac{3}{2} m v'$

$v' = \frac{2}{3} v_0$

3)

$C_{общ} = \frac{3}{4} C$ $\quad W_0 = \frac{\frac{3}{4}C E^2}{2} = \frac{3}{2} C E$

$3,5 = 1,5 - 1,5$

Чертеж

физико 11 кл