

Часть 1

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

Шифр: **21203364**

ID профиля: **347119**

Вариант 7

Условие

№2.

Дано:

$$C_D = \frac{3}{2}R$$

$$Q_{2-1} = 0$$

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

$$b) 2) \gamma = ? \quad C = 0$$

$$b) 3) \eta = ?$$

$$30^\circ = \alpha; 15^\circ = \beta$$

Решение:

a) 1) по закону Менделеева - Клапейрона:

$$p_1 V_1 = \nu R T_1$$

$$p_2 V_2 = \nu R T_2$$

$$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2} \quad (\Rightarrow) \quad \frac{p_1 V_1}{p_0 T_1 V_0} = \frac{p_2 V_2}{p_0 V_0 T_2}$$

$$2) \frac{p_1}{p_0} = \gamma_1; \quad \frac{V_1}{V_0} = x_1; \quad \frac{p_2}{p_0} = \gamma_2; \quad \frac{V_2}{V_0} = x_2$$

$$\frac{x_1 \gamma_1}{T_1} = \frac{x_2 \gamma_2}{T_2}$$

$$3) \frac{x_1}{\gamma_1} = \operatorname{tg} 30^\circ = \operatorname{tg} \alpha$$

$$x_1^2 + \gamma_1^2 = x_2^2 + \gamma_2^2 = R^2$$

$$\frac{\gamma_2}{x_2} = \operatorname{tg} 15^\circ = \operatorname{tg} \beta$$

$$\gamma_1^2 \operatorname{tg}^2 \alpha + \gamma_1^2 = x_2^2 (1 + \operatorname{tg}^2 \beta)$$

$$\frac{\gamma_1^2 \operatorname{tg} \alpha}{T_1} = \frac{x_2^2 \operatorname{tg} \beta}{T_2}$$

$$\frac{\gamma_1^2}{x_2^2} = \frac{1 + \operatorname{tg}^2 \beta}{1 + \operatorname{tg}^2 \alpha}$$

$$\frac{\gamma_1^2}{x_2^2} = \frac{T_1 \operatorname{tg} \beta}{T_2 \operatorname{tg} \alpha} = \frac{1 + \operatorname{tg}^2 \beta}{1 + \operatorname{tg}^2 \alpha}$$

$$\frac{T_1}{T_2} = \frac{\operatorname{ctg} \beta + \operatorname{tg} \beta}{\operatorname{tg} \alpha + \operatorname{ctg} \alpha} = \frac{0,26795 + 3,43205}{\frac{\sqrt{3}}{3} + \sqrt{3}} = \frac{3(4)}{4\sqrt{3}} = \frac{3}{\sqrt{3}} = \sqrt{3}$$

$$\boxed{\frac{T_1 - T_2}{T_2} = \frac{T_1}{T_2} - 1 = \sqrt{3} - 1 \approx 0,732}$$

4

Упробик

NL

$$d; \cos \alpha = \frac{5}{13}$$

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

$$H; a_K;$$

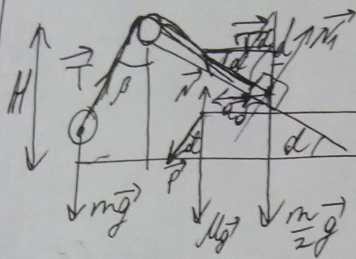
$$\beta; \cos \beta = \frac{3}{5}$$

$$1) a_K?$$

$$2) a_{\delta K}?$$

$$3) t?$$

Земле:



4) m и 3. Кинематика:

$$\vec{N}_1 + \vec{T} + \frac{m}{2} \vec{g} = \frac{m}{2} \vec{a}_{\delta}$$

$$\vec{N} + \vec{P} + M \vec{g} = M \vec{a}$$

$$2) F - P = m a$$

$$N = M g + P \cos \alpha$$

$$-P = N_1$$

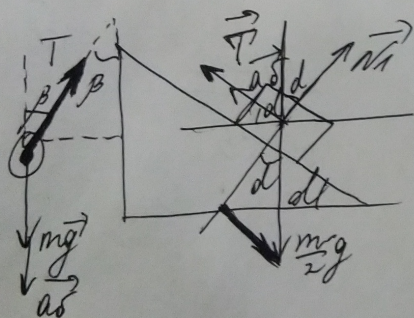
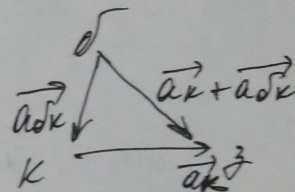
$$|P| = |N_1|$$

$$-N \sin \alpha + T \cos \alpha = m a_{\delta}$$

$$N \cos \alpha + T \sin \alpha = \frac{m}{2} g$$

$$N = \frac{\frac{m}{2} g - T \sin \alpha}{\cos \alpha}$$

$$- \cos \alpha \left(\frac{m}{2} g - T \sin \alpha \right) + T \cos \alpha = m a_{\delta}$$



$$1) T - \frac{m}{2} g \sin \alpha = \frac{m}{2} a_{\delta}$$

$$2T - m g \sin \alpha = m a_{\delta}$$

$$2) -T \cos \beta + m g = m a_{\delta}$$

$$T \sin \beta = a_K m$$

$$N \cos \alpha - T \cos \alpha = \frac{m}{2} a_K$$

$$\frac{8 \cdot 83}{65} = \frac{264}{65}$$

$$T = \frac{m g}{\cos \beta} + \frac{m a_{\delta}}{\cos \beta}$$

$$2 \frac{m g}{\cos \beta} + 2 \frac{m a_{\delta}}{\cos \beta} - \frac{m}{2} g \sin \alpha = \frac{m}{2} a_{\delta}$$

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

$$\frac{397.60}{98}$$

$$a_{\delta} = \frac{g \sin \alpha \cos \beta - 2 g}{\cos \beta \left(1 - \frac{2}{\cos \beta} \right)} = \frac{2 g - g \sin \alpha \cos \beta}{\cos \beta - 2}$$

Черновик

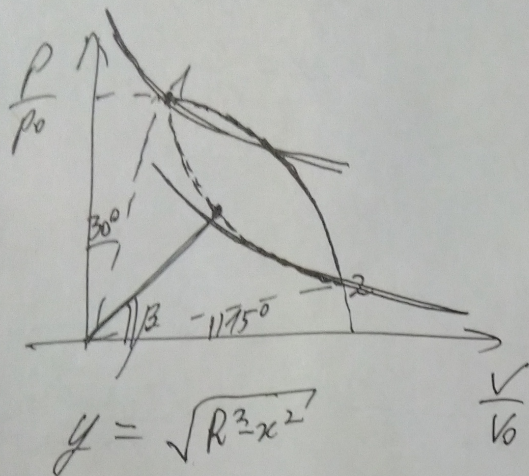
№2.

изг. сферич. газ.

$$C_V = \frac{3}{2} R$$

$$\mu = \frac{3}{2} DRT$$

$$\eta = \frac{Q^+ Q^-}{Q^+}$$



$$K \quad pV = \text{const} = K \quad \frac{5}{2}$$

$$p_1 V_1 = p_2 V_2 \quad p = \frac{K}{V^3}$$

$$Q_{2-1} = 0 \quad V$$

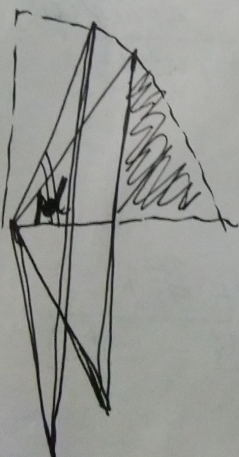
$$Q^+ - Q^- = A_{\text{изг.}}$$

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

$$2) \quad \beta - ? \quad C = 0$$

$$3) \quad \eta \quad ?$$

$$A = \int p dx = \int (\sqrt{R^3 x^2}) dx$$



$$R \quad S = \frac{2R^2 d}{2} = 2R^2 d$$

$$S' = 2R^2 d_2 - \frac{x_2 y_2}{2}$$

$$S'' = 2R^2 d_1 - \frac{x_1 y_1}{2}$$

$$p_0 V_0 = -\frac{1}{3}$$

$$2R^2 d_1 - 2R^2 d_2 - \frac{x_1 y_1}{2} + \frac{x_2 y_2}{2} =$$

$$= 2R^2 \Delta d + \frac{x_2 y_2}{2} - \frac{x_1 y_1}{2} = \frac{x_2 y_2 - x_1 y_1}{2}$$

должно

$$x^2 y^2 = R^2$$

$$\Delta x \cdot 2x + 2y \Delta y = 0$$

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

$$x y = 1$$

$$\Delta x y + \Delta y x = 0$$

$$\frac{\Delta y}{\Delta x} = -\frac{x}{y} = -\frac{y}{x}$$

$$\frac{\Delta y}{\Delta x} = -\frac{y}{x}$$

$$x^2 = y^2$$

Условие:

№1.

Дано:

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

$$\sin \alpha = \frac{12}{13}$$

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

$$\sin \beta = \frac{4}{5}$$

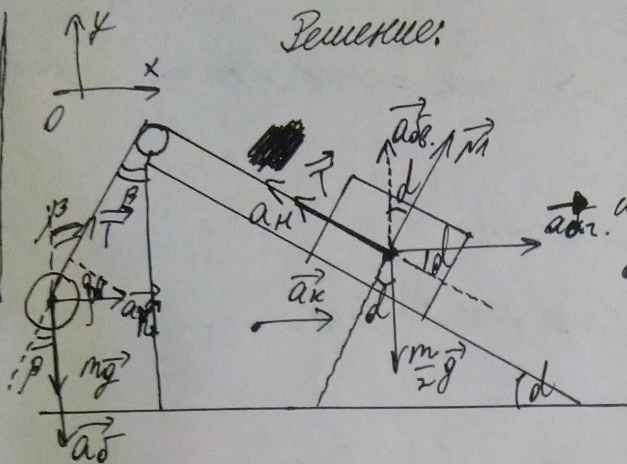
$$m; \frac{m}{2}$$

$$1) a_k - ?$$

$$2) a_{\text{бк}} - ?$$

$$3) t - ?$$

Решение:



1) по II з. Ньютона

$$\text{шар: } \vec{T} + m\vec{g} = m\vec{a}_{\text{ш}}$$

$$\text{блук: } \vec{T} + \vec{N} + \frac{m}{2}\vec{g} = \frac{m}{2}\vec{a}_{\text{бл}}$$

2) для шарика

$$Ox: T \sin \beta = a_k m$$

$$Oy: T \cos \beta - mg = -ma_{\text{бл}}$$

$$mg - T \cos \beta = ma_{\text{бл}}$$

3) нить нерастяжима и невесома $\Rightarrow$ ускорение

бруска и шарика вдоль нити сохраняются.

$$a_{\text{бл}} \cos \beta - a_k \sin \beta = a_{\text{бл}} \sin \alpha - a_{\text{бл}} \cos \alpha = a_k$$

$$T - \frac{m}{2}g \sin \alpha = \frac{m}{2} a_k$$

$$2T - mg \sin \alpha = m (a_{\text{бл}} \cos \beta - a_k \sin \beta) =$$

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

$$3T = mg \cos \beta + mg \sin \alpha$$

$$T = \frac{1}{3} mg \cos \beta + \frac{1}{3} mg \sin \alpha$$

$$4) a_k = T \sin \beta = \frac{1}{3} mg (\cos \beta + \sin \alpha) \sin \beta$$

$$a_k = \frac{g}{3} ((\cos \beta + \sin \alpha) \sin \beta) = \frac{10}{3} \left(\frac{4}{5} \cdot \left(\frac{3}{5} + \frac{12}{13} \right) \right) = \frac{8.99}{3.65} =$$

Чистовик

N1 (продолжение)
для бруска:

5) $N1 = \frac{m}{2} g \cos \alpha \Rightarrow$ ускорение бруска равно a_k .

6) $mg - T \cos \beta = ma_b$

$mg - \frac{1}{3} mg (\cos \beta + \sin \alpha) \cos \beta = ma_b$

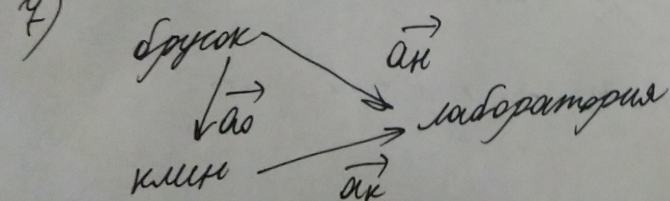
$a_b = g \left(1 - \frac{1}{3} \cos^2 \beta - \frac{1}{3} \sin \alpha \cos \beta \right)$

$a_k = \frac{132}{325} g = 0,406g$

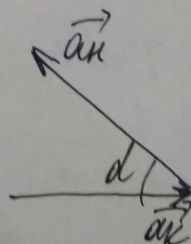
$a_b = g \left(1 - \frac{1}{3} \cdot \frac{9}{25} - \frac{1}{3} \cdot \frac{3}{5} \cdot \frac{12}{13} \right) = g \left(1 - \frac{3}{25} - \frac{12}{65} \right) =$
 $= g \frac{226}{325}$

$a_n = a_b \cos \beta - a_k \sin \beta = g \left(\frac{226}{325} \cdot \frac{3}{5} - \frac{132}{325} \cdot \frac{4}{5} \right) = g \frac{150}{1625} =$
 $= \frac{6}{65} g$

7)



$\vec{a}_0 = \vec{a}_k - \vec{a}_n$



по Т cos!

$a_0^2 = a_k^2 + a_n^2 + 2 a_k a_n \cos \alpha$

$a_0^2 = g^2 \left(\frac{36}{4225} + \frac{17424}{105625} + 2 \cdot \frac{6}{65} \cdot \frac{132}{325} \right) = g^2 \left(\frac{36 \cdot 65 \cdot 5}{65^2 \cdot 5 \cdot 13 \cdot 5} + \frac{17424}{25 \cdot 65^2} + \frac{2 \cdot 25 \cdot 6 \cdot 132}{65^2 \cdot 65 \cdot 5} \right) = g^2 \left(\frac{11400 + 226512 + 39600}{65^3 \cdot 5} \right)$
 $a_0 = 0,45g$

Читовик

№1. (продолжение)

$$b) H = \frac{a\delta t^2}{2}$$

$$t = \sqrt{\frac{2H}{a\delta}}$$

$$t^2 = \frac{2H}{g(1 - \frac{1}{3}\cos^2\beta - \frac{1}{3}\sin\alpha\cos\beta)}$$

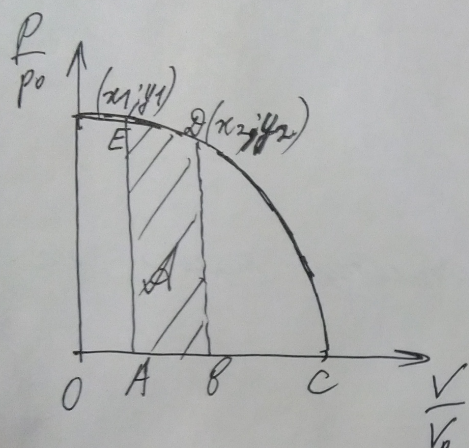
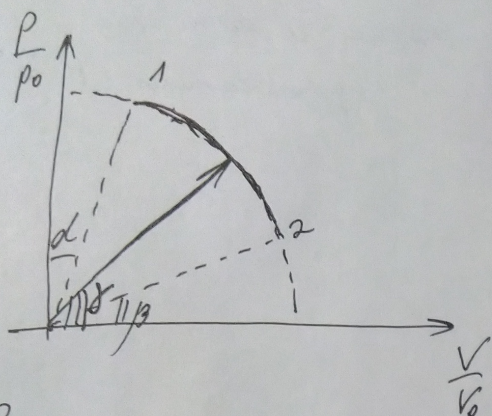
Ответ: 1) $a_k = \frac{132}{325}g = 0,406g = 4,06 \text{ м/с}^2$

2) $a_{bk} = 0,45g = 4,5 \text{ м/с}^2$

3) $t = \sqrt{\frac{2H}{g(1 - \frac{1}{3}\cos^2\beta - \frac{1}{3}\sin\alpha\cos\beta)}}$

3

Условие
 v_2 (пропускает)



д) 4) пусть такая точка
 существует

$$Q = C \Delta T; \quad C = \frac{Q}{\Delta T}$$

$$C=0 \Rightarrow Q=0$$

5) по I закону термодинамики:

$$Q = A_2 + \Delta U = 0$$

$$A = p \Delta V$$

$$\Delta U = \frac{3}{2} \nu R \Delta T$$

$$-A_2 = p(V_1 - V_2) = \frac{3}{2} \nu R \Delta T = \frac{3}{2} \nu R (T_2 - T_1)$$

$$S_{OCC} = \frac{R^2 d_2}{2}$$

$$S_{CDB} = \frac{R^2 d_2}{2} - \frac{x_2 y_2}{2}$$

т.к. $\Delta d \ll 1$, то

$$S_{OEC} = \frac{R^2 d_1}{2}$$

$$S_{CEA} = \frac{R^2 d_1}{2} - \frac{x_1 y_1}{2}$$

$$A = \Delta S = \frac{R^2 d_1}{2} - \frac{x_1 y_1}{2} - \frac{R^2 d_2}{2} + \frac{x_2 y_2}{2} = \frac{x_2 y_2 - x_1 y_1}{2}$$

$$y_2 = \frac{p_2}{p_0}; \quad y_1 = \frac{p_1}{p_0}; \quad x_1 = \frac{V_1}{V_0}; \quad x_2 = \frac{V_2}{V_0}$$

$$\frac{p_2 V_2 - p_1 V_1}{2 p_0 V_0} = \frac{3}{2} \nu R (T_1 - T_2)$$

$$\frac{\nu R (T_2 - T_1)}{2 p_0 V_0} = \frac{3}{2} \nu R (T_1 - T_2)$$

~~по V_0~~

$$(T_2 - T_1) + 3 p_0 V_0 (T_2 - T_1) = 0$$

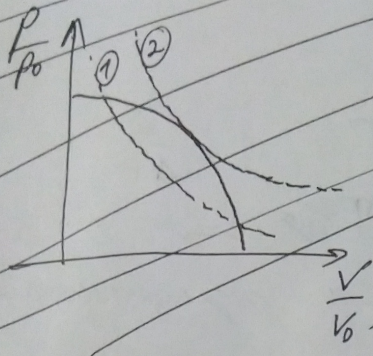
$$(T_2 - T_1) (1 + 3 p_0 V_0) = 0$$

~~по V_0~~ ~~константа, или~~
~~не равна 0~~ ~~1~~ ~~T_2 = T_1~~

Условие

N_2 (прогретое)

$T = \text{const} \Rightarrow$ точки лежат на
гиперболе в координатах $P-V$



$$\text{зр } V_0 = -1$$

$$p_0 = -\frac{1}{3V_0}$$

б) ~~воз~~ ~~использу~~ ~~методом~~ ~~по~~
воз нагреть и охладить ~~температу~~ только на
участке 1-2.

6

$$\frac{10 \cdot 25 (10 + 3 - 26 - 24)}{13 \cdot 13 \cdot 13} = \text{Числовик}$$

$$a_k = \frac{g}{3} \sin \beta (\cos \alpha + \sin \alpha)$$

$$T = \frac{1}{3} mg (\cos \beta + \sin \beta)$$

$$mg - T \cos \beta = ma \delta$$

$$N_1 = \frac{mg}{2} \cos \alpha$$

$$-T + mg \cos \beta = ma_k =$$

$$= 2T - mg \sin \alpha$$

$$325 - 39 - 60 = 325 - 99$$

$$226$$

$$33 \cdot 4 = 132$$

$$a_k = \frac{1}{3} g \cdot \frac{4}{5} \left(\frac{3}{5} + \frac{12}{13} \right) = g \frac{4}{15} \left(\frac{39 + 60}{65} \right) = g \frac{4 \cdot 99}{15 \cdot 65} = \frac{132}{325} g$$

$$a_H = a \delta \cos \beta - a_k \sin \beta$$

$$325 = 65 \cdot 5$$

$$\frac{13}{60} \cdot 3 =$$

$$648$$

$$1324$$

$$528$$

$$150$$

$$\frac{274812}{65 \cdot 5}$$

Черновик

$$11 \cdot 4 + 25 = 169$$

N1.

$$mg - T \cos \beta = ma \delta$$

$$T = \frac{mg - ma \delta}{\cos \beta}$$

$$\sin \alpha = \frac{12}{13}$$

$$\sin \beta = \frac{4}{5}$$

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

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

$$\frac{2mg}{\cos \beta} - \frac{2ma \delta}{\cos \beta} - mg \sin \alpha = ma \delta$$

$$a \delta \cos \beta + 2a \delta = 2mg - g \sin \alpha \cos \beta$$

$$a \delta = \frac{g(2 - \sin \alpha \cos \beta)}{\cos \beta + 2} = \frac{10(2 - \frac{12}{13} \cdot \frac{3}{5})}{2 + \frac{3}{5}} = \frac{10(2 \cdot 65 - 36)}{13 \cdot 5 + 13} =$$

$$= \frac{10(130 - 36)}{130 + 39} = \frac{10(94)}{169} = 5,56 \text{ м/с}^2$$

$$T = \frac{mg - mg \left(\frac{2 - \sin \alpha \cos \beta}{\cos \beta + 2} \right)}{\cos \beta} = mg \frac{\frac{1}{\cos \beta + 2} - \frac{2 - \sin \alpha \cos \beta}{\cos \beta (\cos \beta + 2)}}{1} =$$

$$= mg \frac{1 + \sin \alpha}{\cos \beta + 2}$$

$$a_k = \frac{mg(1 + \sin \alpha) \sin \beta}{(2 + \cos \beta)} = 10 \cdot \frac{4 \left(1 + \frac{12}{13} \right)}{5 \cdot \left(2 + \frac{3}{5} = \frac{13}{5} \right)} =$$

$$a_k = \frac{40 \cdot (25)}{13 \cdot 13} = \frac{4025}{169} = 5,917 \text{ м/с}^2$$

$$N_1 = \frac{m}{2} g \cos \alpha$$

$$\frac{m}{2} g \cos^2 \alpha - mg \frac{1 + \sin \alpha}{2 + \cos \beta} \cdot \cos \alpha = \frac{m}{2} a_k$$

$$g \cos^2 \alpha - 2g \cos \alpha \cdot \frac{1 + \sin \alpha}{2 + \cos \beta} = a_k$$

$$g \cos \alpha \left(\cos \alpha - \frac{2 + 2 \sin \alpha}{2 + \cos \beta} \right) = 10 \cdot \left(\frac{\frac{5}{13} \cdot 2 + \frac{5}{13} \cdot \frac{3}{5} - 2 - 2 \cdot \frac{12}{13}}{2 + \frac{3}{5}} \right) \cdot \frac{5}{13}$$

Часть 2

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

Шифр: **21203364**

ID профиля: **347119**

Вариант 7

Чистовик

N5.

Дано:

$$l = 25 \text{ см}$$

$$\frac{D_g}{D_0} = 3$$

1) $x = ?$

$D_g = ?$

2) $D_0 = ?$

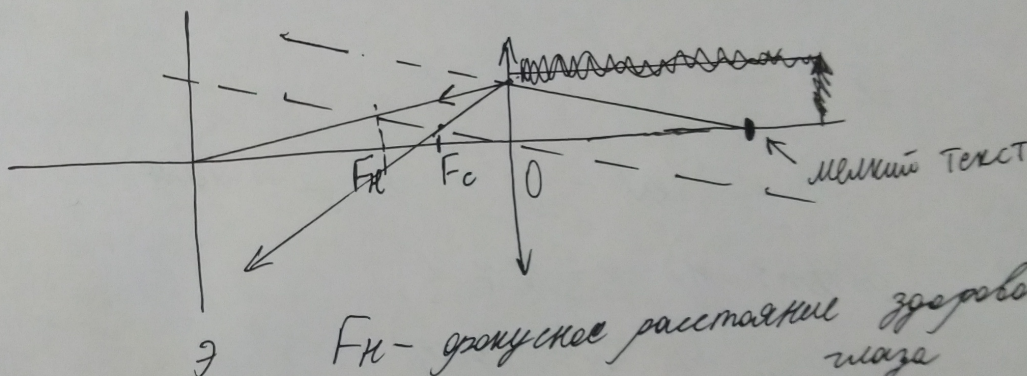
Решение:

1) $D_0 -$

оптическая сила очков для текста на $l = 25 \text{ см}$ для дали

2)

модель глаза:
(если изображение не фокусируется на экране, то человек не видит предмет)
(только видит)



F_n - фокусное расстояние здорового глаза
 F_c - фокусное расстояние больного глаза.

3) по формуле тонкой линзы

$$\frac{1}{F_n} + \frac{1}{d} = \frac{1}{F_n} = D_n$$

$$\frac{1}{F} + \frac{1}{d} = \frac{1}{F_c} = D_c$$

4) нарав очки:

$$\frac{1}{F_n} + \frac{1}{d} = D_c - D_0$$

для дали: $\frac{1}{d} \approx 0$

$$\frac{1}{F_n} = D_c - D_0$$

$$\frac{1}{d} + D_c - D_0 = D_c - D_0$$

$$\frac{1}{d} = D_0; \quad d = l = 25 \text{ см}$$

1

$$D_0 = \frac{1}{d} \Rightarrow D_g = 3D_0 = \frac{3}{2l} = \frac{3}{2 \cdot 0.25} = \frac{3 \cdot 4}{2} = 6 \text{ дптр.}$$

Условие

№5 (продолжение)

$$5) \quad \frac{1}{x} + \frac{1}{50} = 20$$

$$\frac{1}{x} + 20 - 30 = 20$$

$$\frac{1}{x} = 30 = \frac{3}{20}$$

$$x = \frac{20}{3} = \frac{50}{3} \text{ км} = 16,7 \text{ км}$$

$$6) \quad \frac{1}{20} + \frac{1}{50} = 20 - 20 \quad (\text{для компьютера})$$

$$\frac{1}{20} + 20 - 30 = 20 - 20$$

$$20 = 30 - \frac{1}{20} = 6 - 2 = 4 \text{ гнтр}$$

Ответ: 1) $x = 16,7 \text{ км}$

2) $20 = 6 \text{ гнтр}$

3) $20 = 4 \text{ гнтр.}$

2

Установив

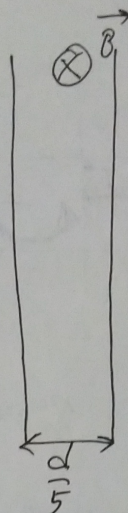
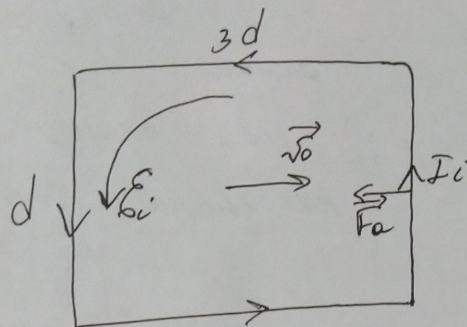
№4.

Дано:
 m, d, v_0, R, B

Найти:

- 1) a_0 ?
- 2) v_1 ?
- 3) v_2 ?

Решение:



по ~~закону~~ закону Фарадея:

$$1) \mathcal{E}_i = - \frac{\Delta \Phi}{\Delta t} = - B \frac{\Delta S}{\Delta t}$$

2) по правилу Ленца определим направление $\mathcal{E}_i$

$$3) I_i = \frac{\mathcal{E}_i}{R}$$

$$4) F_a = B I_i d = \frac{B d}{R} \cdot B \frac{\Delta S}{\Delta t}$$

$\Delta S = v_0 d \Delta t$, за очень малый промежуток Δt

$$F_a = \frac{B^2 d}{R} \cdot v_0 d = \frac{(B d)^2}{R} v_0 = m a_0 \text{ (по II з. Ньютона)}$$

$$a_0 = \frac{(B d)^2 v_0}{m R}$$

5) ~~Время прохождения~~

$$F_a = m a$$

$$- \Delta t F_a = m \Delta v$$

$$\frac{B^2 d}{R} \Delta S = m \Delta v$$

$$\Delta S = d \cdot \frac{d}{5} - 0$$

$$\Delta v = v_1 - v_0$$

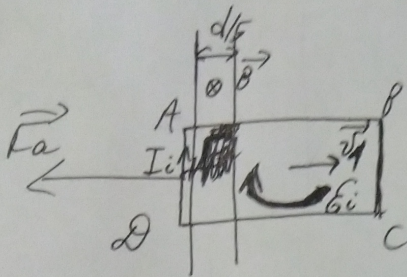
$$\frac{B^2 d}{R} \cdot \frac{d^2}{5} = -m v_1 + m v_0$$

$$v_1 = v_0 - \frac{B^2 d^3}{5 R m} + 0 = v_0 - \frac{B^2 d^3}{5 R m}$$

3

Чистовик

п/4 (продолжение)



б) маг. действие поля на участки AB и CD не уменьшает скорость рамки

г) по правилу Ленца $\vec{E}_i$ направлена по часовой стрелке

$$8) -F_a \Delta t = m \Delta v$$

$$\frac{B^2 d^3}{5R} = -m v_2 + m v_1$$

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

$$v_2 = v_0 - \frac{2 B^2 d^3}{5 R m}$$

Ответ: 1) $a_0 = \frac{(Bd)^2 v_0}{m R}$

2) $v_1 = v_0 - \frac{B^2 d^3}{5 R m}$

3) $v_2 = v_0 - \frac{2 B^2 d^3}{5 R m}$

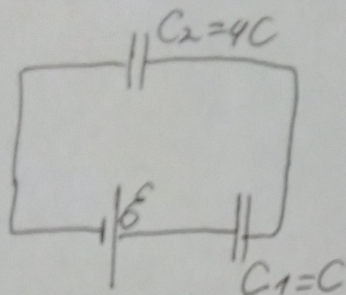
(4)

Условие

№3. Дано: $C; \mathcal{E}; R; L$

Решение:

1) до замыкания ключа:



$$C_0 = \frac{4C \cdot C}{4C + C} = \frac{4}{5}C = \frac{Q}{\mathcal{E}}$$

$$Q = \frac{4}{5}C\mathcal{E}$$

$$U_1 = \frac{Q}{C} = \frac{4}{5}\mathcal{E}$$

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

по II з. Кирхгофа:

$$\mathcal{E} + \mathcal{E}_C = U_1 + I_1 R$$

сразу после замыкания ключа

$$I_1 = 0; U_1 = \frac{4}{5}\mathcal{E}$$

$$\mathcal{E} - L \frac{\Delta I}{\Delta t} = \frac{4}{5}\mathcal{E}$$

$$L \frac{\Delta I}{\Delta t} = \frac{\mathcal{E}}{5}$$

$$\boxed{\frac{\Delta I}{\Delta t} = \frac{\mathcal{E}}{5L}}$$

3) в контуре ABCD будут происходить гармонические колебания

$$W_{\text{маг}} = \frac{4C}{2} \cdot U_2^2 = \frac{2C \cdot \mathcal{E}^2}{25} = \frac{2C\mathcal{E}^2}{25} = W_{\text{элект.}}$$

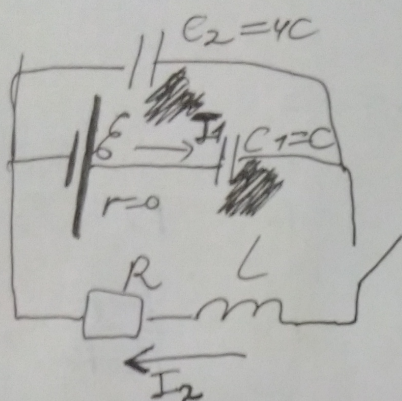
$$\omega = \frac{1}{\sqrt{LC_2}} = \frac{1}{2\sqrt{LC}}$$

5

Ответ: $\frac{\Delta I}{\Delta t} = \frac{\mathcal{E}}{5L}$

13.

Умови



1) $\frac{\Delta I}{\Delta t}$?

2) Q ?

3) I_R ?

$C_1 = I_0$.

$C = \frac{Q}{U}$

$\mathcal{E}_i = -L \frac{\Delta I}{\Delta t}$

$-L \frac{\Delta I}{\Delta t} + \mathcal{E} = \frac{\Delta Q_1}{\Delta t} \mu_1 + R I_1$

$\frac{C Q_1^2}{2} + \frac{\mu_1^2 Q_1^2}{2C} = \text{const}$

$\mathcal{E} = \frac{\Delta Q_1}{\Delta t} \mu_1 + \frac{\Delta Q_2}{\Delta t} \mu_2$

$\mathcal{E} = \frac{\Delta Q}{\Delta t}$

$\mathcal{E} = \mu_1 + I_1 R$

$\mu_1 = \mathcal{E} - I_1 R = \frac{Q_1}{C}$

$I_1 = \frac{\Delta Q}{\Delta t}$

$I_0 = \frac{\Delta Q}{\Delta t}$

$\mathcal{E} + \mathcal{E}_i = \mu_1 + I_1 R$

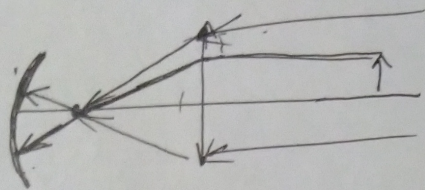
$\mathcal{E} = \mu_1 + \mu_2$

$\mathcal{E} - L \frac{\Delta I}{\Delta t} = \frac{\mathcal{E}}{5} + 0$

$\frac{4}{5} \mathcal{E} = L \frac{\Delta I}{\Delta t}$

Упражнение

15.



$$D = D_1 + D_2$$

$$\frac{1}{F_0} = \frac{1}{F_1} - \frac{1}{F_2}$$

$$F_0 = \frac{F_1 F_2}{F_2 - F_1}$$

$$l = 25 \text{ cm}$$

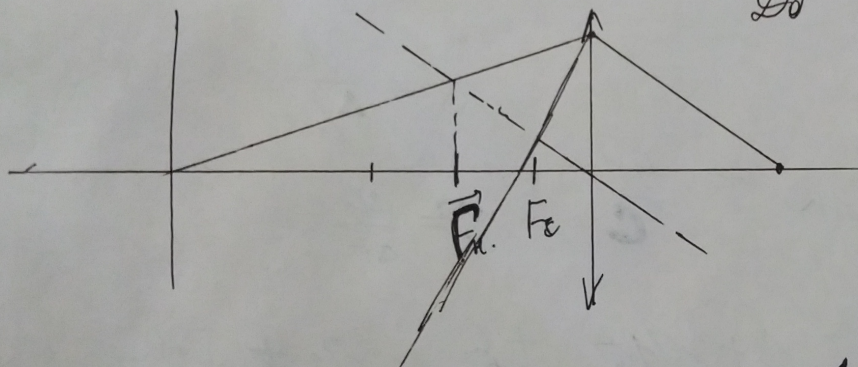
$$\frac{D_g}{D_s} = 3$$

$$F_0 = F_H$$

$$\frac{1}{F_0} = \frac{1}{F_H}$$

$$\frac{1}{F_0} > \frac{1}{F_H} \Rightarrow$$

$$\Rightarrow F_0 < F_H$$



$$\frac{1}{l} + \frac{1}{F_0} = D_c$$

$$\frac{1}{l} + \frac{1}{F_H} = D_c - D_s$$

$$\frac{1}{F_0} = D_c$$

$$\frac{1}{F_H} = D_c - 3D_s$$

$$\frac{1}{x} + \frac{1}{F_H} = D_c$$

$$\frac{1}{x} + D_c - 3D_s = D_c$$

$$\frac{1}{x} = 3D_s = \frac{3}{2l}$$

$$x = \frac{2l}{3} = \frac{50}{3} \text{ cm}$$

$$D_s = \frac{1}{2l}$$

$$\frac{1}{l} = 2D_s$$

$$\frac{1}{l} \neq D_c - 3D_s = D_c - D_s$$

12

Упробук

N5.

$$3\text{дд} = \text{дд} = \frac{3}{2\ell} = \frac{3}{2 \cdot 0,25} = \frac{34}{2} = 6,2 \text{ нт.}$$

2) $d_1 = 50 \mu\text{м}$

$$\frac{1}{d_1} + \frac{1}{d_2} = \text{дс} - \text{до}$$

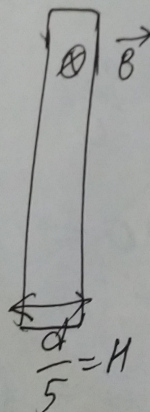
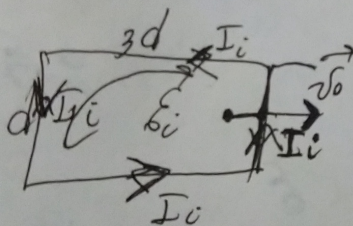
~~$$\text{дс} = \text{до} +$$~~

$$\frac{1}{d_1} + \text{дс} - 3\text{дд} = \text{дс} - \text{до}$$

$$\text{до} = 3\text{дд} - \frac{1}{d_1} = 6 - 2 = 4 \text{ нт.}$$

р4.

m) d, V_0, R, θ



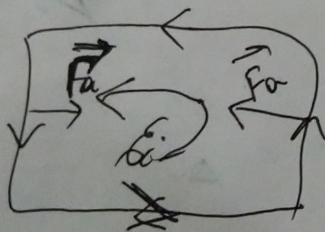
$$\varphi = BS$$

$$\mathcal{E}_i = \frac{\Delta \varphi}{\Delta t} = -B \frac{\Delta S}{\Delta t}$$

$$I_i = \frac{\mathcal{E}_i}{R} = \frac{+BS}{R \Delta t}$$

дс сдс ~~дс~~ сдс

$$F_a = B I d = ma$$



$$\frac{\Delta S}{\Delta t} = \frac{d_o \Delta t}{\Delta t}$$

$$a = \frac{B I d}{m} =$$

$$= \frac{B}{m} d \cdot \frac{B \Delta S}{R \Delta t} = \frac{B d^2}{m R} \frac{\Delta S}{\Delta t}$$

~~$$2\pi n = \mu \cdot 1 \text{ н} \cdot 1 \text{ н} \cdot 1 \text{ н} = 1 \text{ н.}$$~~

~~$$1 \text{ н} = \frac{B}{\mu}$$~~

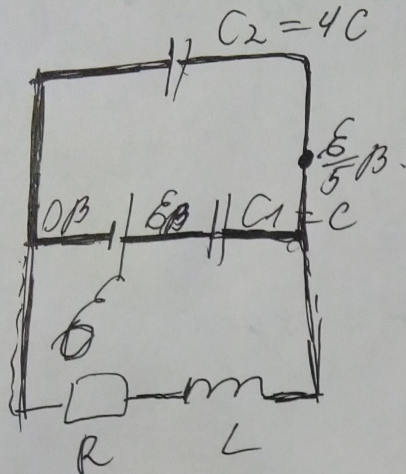
Черновик

$$a = \frac{\Delta v}{\Delta t}$$

$$\Delta F = \Delta p = m \Delta v$$

$$\frac{\partial d}{R} \cdot \frac{\Delta s}{\Delta t}$$

✓ 3.



$$\frac{C \mu \epsilon}{2} + \frac{4 C \mu \epsilon}{2} + q \epsilon = \frac{1}{2} + \frac{q}{2}$$

$$C_0 = \frac{C \cdot 4C}{5C} = \frac{4C}{5} = \frac{9}{5}$$

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

$$C = \frac{9}{u}$$

$$u_1 = \frac{q}{C} = \frac{4\epsilon}{5}$$

$$u_2 = \frac{\epsilon}{5}$$

$$\epsilon = \frac{A}{q}$$

$$\epsilon_i = L \frac{\Delta I}{\Delta t}$$

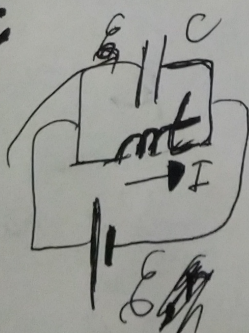
$$\epsilon + \epsilon_i = \frac{q}{C}$$

$$A = 2\epsilon$$

$$\omega = \sqrt{\frac{1}{LC}}$$

$$T = \frac{1}{\omega} = 2\pi \sqrt{LC}$$

$$\epsilon - L \ddot{q} = \frac{q}{C}$$



$$2q = \frac{8}{5} C \epsilon$$

$$\epsilon = \frac{q}{C} ; q = \epsilon C$$

$$\epsilon_i = -L \frac{\Delta I}{\Delta t} = -L \frac{\Delta q}{\Delta t}$$

$$\Delta I = \frac{\Delta q}{\Delta t}$$

$$\epsilon_i = \frac{q}{C}$$

$$q = -LC \ddot{q}$$

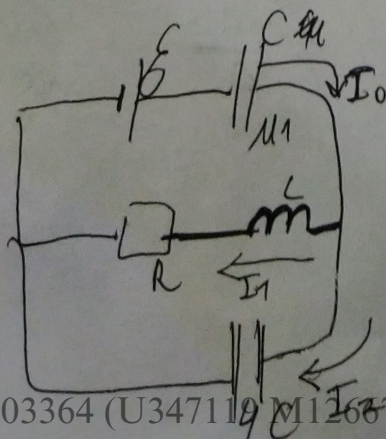
$$I_0 = I_1 + I_2$$

$$a = -\omega^2 x$$

$$\ddot{x} = -\omega^2 x$$

$$q = -LC \ddot{q}$$

$$\epsilon - L \frac{\Delta I}{\Delta t} = I_1 R + \mu_1$$



$$\epsilon = u_1 + u_2 = \frac{q_1}{C} + \frac{q_2}{4C} I_1 R \quad 14$$