



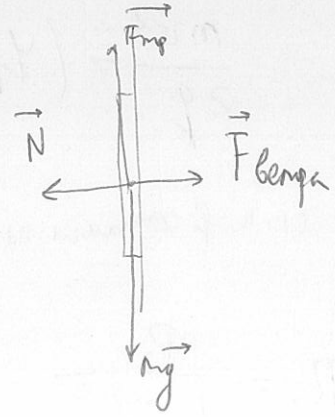
Олимпиада школьников  
Звезда - таланты  
на службе обороны  
и безопасности

Шифр 10-11-121

Вариант 2

Задание	1	2	3	4	5	6	7	Всего
Баллы	20	15	15	10	15			75

N1 Dano:  
 $v, u, k, \rho, S$



$F_b = \rho v \cdot S$  Оплакивает скорость  $= v+u$

$F_b \cdot \Delta t = \rho v \cdot S \cdot \Delta t = m_b \cdot (v+u) - 0$

$F_b = \frac{m_b \cdot (v+u)}{\Delta t}$

$m_b = \rho \cdot S \cdot (v+u) \cdot \Delta t \Rightarrow$

$F_b = \rho S (v+u)^2$

Условие  $mg = m \cdot x \Rightarrow m_y = k \cdot N$  ( $N = F_b$  по III з. ньютона)  $\Rightarrow$

$mg = k \rho \quad m = \frac{k \rho}{g} = \frac{k \rho S (v+u)^2}{g}$  Ответ:  $\frac{k \rho S (v+u)^2}{g}$

N2 Dano:

- $T_x = 273^\circ K$
- $T_n = 373^\circ K$
- $m_n = 1 \text{ кг}$
- $r = 2,26 \cdot 10^6 \text{ Дж/кг}$
- $\lambda = 3,55 \cdot 10^5 \text{ Дж/кг}$

$\frac{T_x - T_n}{T_x} = \frac{|Q_x| - Q_n}{|Q_x|} \Rightarrow$

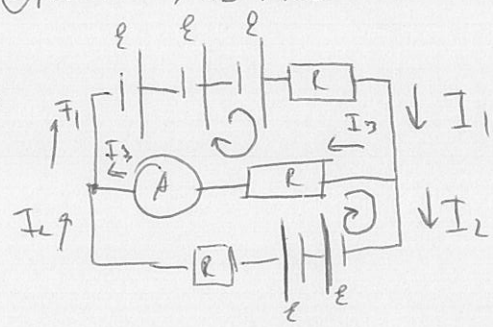
$\frac{T_x - T_n}{T_x} \cdot |Q_x| = |Q_x| - Q_n$

$\left(1 - \frac{T_x - T_n}{T_x}\right) \cdot m_x \cdot \lambda = m_n \cdot r$

$m_x = \frac{m_n \cdot r \cdot T_x}{\lambda \cdot T_n} = \frac{2,26 \cdot 10^6 \cdot 273}{3,55 \cdot 10^5 \cdot 373} \cdot 1 = 4,94 \text{ кг}$

Ответ:  $4,937 \text{ кг} = 4937 \text{ г}$

N3



$$\begin{cases} E + E + E = I_1 R + I_3 R \\ E + E = I_1 R - I_3 R \\ I_1 = I_2 = I_3 \end{cases}$$

$$\begin{cases} I_1 = \frac{3E - I_3 R}{R} \\ I_2 = \frac{2E + I_3 R}{R} \end{cases}$$

$3E + I_3 R = 2E + I_3 R + I_3 R$

$$\Rightarrow I_3 = \frac{E}{3R}$$

$$I_3 = \frac{\mathcal{E}}{3R} \Rightarrow I_3 = 0,2 \text{ A} \quad \text{Ombem: } 0,2 \text{ A}$$

N4 Dano:

$$R_1 = 0,1 \text{ M}$$

$$m = 10^{-4} \text{ kg}$$

$$\varphi = 5 \cdot 10^3 \text{ B}$$

$$v = 1 \text{ m/s}$$

$$R_2 = ?$$

m.n be oskonnim nimmom  $\frac{m \text{osk } v^2}{2} = \Delta \varphi \cdot q_{\text{osk}}, \text{ zhe}$

y beera gummara s q (~~gummara~~ cpepa)  $\Rightarrow$  b ckhile

namyrem

$$\frac{m v^2}{2} = \Delta \varphi \cdot q$$

$$\frac{m v^2}{2q} = (\varphi_1 - \varphi_2)$$

$$\frac{m v^2}{2q} = \left( \varphi_1 - \frac{\varphi_1 \cdot R_1}{R_2} \right) \quad (\text{n.n. } q \text{ common nimmom})$$

$$\frac{m v^2}{2q \varphi_1} = \left( \frac{R_2 - R_1}{R_2} \right); \quad R_2 = \frac{R_1}{1 - \frac{m v^2}{2q \varphi_1}}$$

$$q = \frac{\varphi_1 \cdot R_1}{K} \Rightarrow R_2 = \frac{R_1}{1 - \frac{m v^2 \cdot K}{\varphi_1^2 \cdot R_1 \cdot 2}} \approx 12 \text{ cm}$$

Ombem: 12 cm

N5

$$R_1 = 50 \text{ cm}$$

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

$$n = 1,5$$

$$\Gamma = ?$$

$$f = ?$$

$$1) D = \left( \frac{n_{\text{A}}}{n_{\text{B}}} - 1 \right) \cdot \frac{1}{R_{\text{A}}} = (n_{\text{A}} - 1) \cdot \frac{1}{R_{\text{A}}} = 1$$

$$2) D_{\text{system}} = D \cdot 2 = 2 ?$$

$$3) \frac{1}{d} = \frac{1}{f} = \frac{D \cdot 2}{1} ?$$

$$f = \frac{1}{-D \cdot 2 + \frac{1}{d}} = \frac{1}{-2 + \frac{1}{0,25}} = +\frac{1}{2} = 0,5 \text{ cm}$$

$$4) \Gamma = \frac{f}{d} = \frac{0,5}{0,25} = 2$$

Ombem:  $f = 0,5 \text{ cm}; \Gamma = 2$