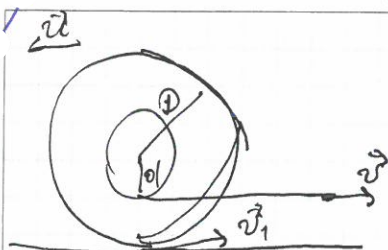


Рубежная контрольная работа
по дополнительной общеразвивающей программе

«Олимпиадная физика.2026» 10 класс

(очно-заочная форма обучения с применением дистанционных образовательных технологий)

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№3

$$1) \omega = \frac{v}{R} = \frac{v_1}{R}$$

$$v_1 = R \omega$$

Относ. скорости осн
в точке соприк. с землей:

$$V_{ц.м.} = v_1 = R \omega = u$$

Ответ: $u = R \omega$

$d, D, v;$
 $u = ?$

$h; k=1,1$
 $\tau = ?$

№7

$$1) v_1 = \sqrt{2gh_1}$$

$$t_1 = \frac{v_1}{g} \quad (\text{от } h \text{ до земли})$$

$$t_2 = \frac{v_1 + v_2}{1,1g} \quad (\text{от земли до } h_2)$$

$$t_3 = \frac{v_1}{1,1g}$$

$$t_4 = \frac{v_1}{(1,1)^2 g}$$

$$t_5 = \frac{v_1}{(1,1)^3 g}$$

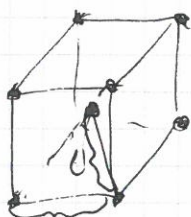
...

$$2) \tau = \frac{v_1}{g} + 2 \frac{v_1}{g} \left(\frac{1}{1,1} + \frac{1}{(1,1)^2} + \frac{1}{(1,1)^3} + \dots \right)$$

$$S = \frac{1}{1,1}$$

$$S = \frac{1}{1 - \frac{1}{1,1}} = 10$$

$$\tau = 21 \frac{v_1}{g} = 21 \frac{\sqrt{2gh}}{g} = 21 \sqrt{\frac{2h}{g}}$$



№5

1) в каждой ячейке:

$$z = 1 + \frac{1}{8} \cdot 8 = 2 \quad (\text{атомов})$$

$$m_{\text{ат}} = \mu z$$

$$V_{\text{ат}} = \frac{\mu z}{\rho_{\text{ат}}} = a^3$$

$\mu = 137 \text{ а.е.м}$
 $\rho = 3500 \text{ кг/м}^3; z = ?$

мет 1/4 $\approx 3,15$



СТУПЕНИ
УСПЕХА





СТУПЕНИ УСПЕХА



$$\begin{aligned}
 2) \quad a &= \sqrt[3]{\frac{\mu_2}{\mu_1 \rho}} \\
 l &= \sqrt{\left(\frac{a}{2}\right)^2 + \left(\frac{\sqrt{2}}{2} a\right)^2} = \frac{\sqrt{3}}{2} a \\
 &= \frac{\sqrt{3}}{2} \sqrt[3]{\frac{\mu_2}{\mu_1 \rho}} = \frac{\sqrt{3}}{2} \cdot \sqrt[3]{\frac{137 \cdot 2}{6 \cdot 3500 \cdot 10^3}} = \\
 &= \frac{\sqrt{3}}{2} \cdot 5,07 \cdot 10^{-9} \approx 4,4 \cdot 10^{-9} \text{ (м)} \\
 &= \boxed{4,4 \text{ (нм)}}
 \end{aligned}$$

№6



$$T = 100^\circ\text{C} = 373\text{K}$$

$$P_0 = 120 \text{ кПа}$$

$$\frac{P_0}{P_1} = \frac{1}{2}$$

$$\frac{V_0}{V_1} = \frac{5}{2}$$

$$\varphi_{\text{отн}} = ?$$

$$1) \quad P_0 V_0 = \nu R T_0$$

$$P_0 + P_0 = 2(P_{c1} + P_{01})$$

$$P_c + \varphi P_{\text{ад}} = 2(P_{c1} + \varphi P_{\text{ад}})$$

$$P_c + \varphi P_{\text{ад}} = 2P_{c1} + 2\varphi P_{\text{ад}}$$

$$\begin{cases} P_{c1} = \frac{P_c}{2} - \frac{\varphi P_{\text{ад}}}{2} \\ P_c + \varphi P_{\text{ад}} = P_0 \end{cases}$$

$$P_{c1} = \frac{P_0 - \varphi P_{\text{ад}} - \varphi P_{\text{ад}}}{2} \quad \#$$

$$\text{т.к. } P_0 = 2(P_{c1} + \varphi P_{\text{ад}})$$

$$\text{м.к. } \text{выражаем } P_{c1}, \varphi_2 = 1$$

$$P_c + \varphi P_{\text{ад}} = 2P_{c1} + 2P_{\text{ад}}$$

$$2) \quad P_0 V_0 = (P_{c1} + P_{\text{ад}}) \cdot \frac{2}{5} V_0$$

$$P_0 = \frac{2}{5} P_{c1} + \frac{2}{5} P_{\text{ад}}; \quad P_{c1} = \frac{5}{2} (P_0 - \frac{2}{5} P_{\text{ад}})$$

$$P_c = P_0 - \frac{2}{5} P_{\text{ад}}$$

$$\begin{aligned}
 P_c &= \left(5P_0 - \frac{4}{5}P_{\text{ад}}\right) + 2P_{\text{ад}} - \varphi P_{\text{ад}} = \\
 &= 5P_0 + 1,2P_{\text{ад}} - \varphi P_{\text{ад}}
 \end{aligned}$$

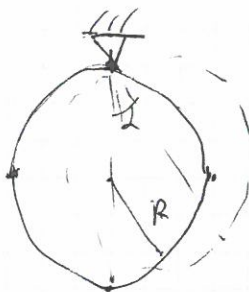
$$P_{c1} \frac{2}{5} V_0 = P_{c0} V_0$$

$$P_{c0} = P_0 - \frac{2}{5} P_{\text{ад}} = P_0 - \varphi P_{\text{ад}}$$

$$\boxed{\varphi = \frac{2}{5} = 0,4 = \text{отв}} \quad \#$$

Муромов Д.А.

√9



$$R = 0,5 \text{ м}$$

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

$$t = ?$$

$$1) T = 2\pi \sqrt{\frac{I_0}{mgR}}$$

$$I_c = mR^2$$

по Т. Паленца - Умеева

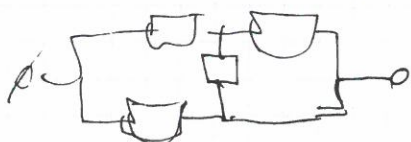
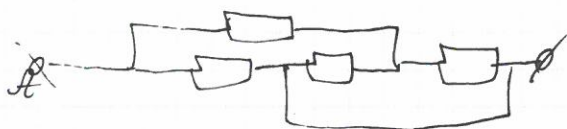
$$I_0 = I_c + mR^2 = 2mR^2$$

$$T = 2\pi \sqrt{\frac{2mR^2}{mgR}}$$

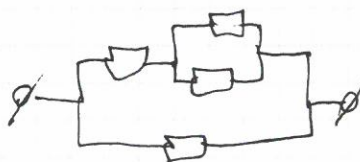
$$t = \frac{T}{4} = \frac{\pi}{2} \sqrt{\frac{2R}{g}} = \frac{3,14}{2} \cdot \sqrt{0,1} \approx$$

$$\approx 0,497 \text{ (с.)}$$

√8



~



$$\frac{1}{R_{\text{эк}}} = \frac{1}{R + \frac{R}{2}} + \frac{1}{R} =$$

$$= \frac{2,5}{2,5R} = \frac{5}{3R}$$

$$R_{\text{эк}} = \frac{3}{5} R$$

√4

$$T_0 = 10^\circ \text{C}$$

$$t = 300^\circ \text{C}$$

$$t_n = ?$$

$$1) Q_{\text{нгр}} = cm(T_k - T_0)$$

$$\frac{Q_{\text{нгр}}}{t} = N$$

$$2) W = \frac{Q_{\text{нгр}}}{t_n} = \frac{Lm}{t_n}$$

$$t_n = \frac{Lm}{W} = \frac{Lm \cdot t}{cm(T_k - T_0)} =$$

$$= \frac{2,3 \cdot 10^6 \cdot 300}{4200 \cdot 90} \approx 1825,4 \text{ (с.)} =$$

$$= 30,423 \text{ (мин)}$$

Муром 3/4 308(0,8,7)

СТУПЕНИ
УСПЕХА

$$T_1 = 360^\circ\text{C}.$$

$$T_2 = 100^\circ\text{C}.$$

$$t = ?$$

$$\sim 4$$

$$1) \quad v_1 = \frac{L}{T_1}$$

$$v_2 = \frac{L}{T_2}$$

$$\frac{L + S_1}{v_1} = \frac{S_1}{v_2}$$

$$T_2 (L + S_1) = T_1 S_1$$

$$S_1 = \frac{T_2^2 v_2}{T_1 - T_2} = \frac{T_2^2 L}{T_1 - T_2}$$

$$2) \quad t = \frac{S_1}{v_1} = \frac{T_2^2 L}{T_1(T_1 - T_2)} \approx 238,5 (\text{с})$$

~ 10

$$E = 1 \text{ ТэВ}$$

$$B = 1 \text{ Тл}$$

$$R = ?$$

$$1) \quad F_1 = q v B \sin \alpha$$

$$E = \frac{m_p v^2}{2}; \quad v = \sqrt{2 m_p E}$$

$$\frac{m_p v^2}{2} = q \sqrt{2} B R$$

$$R = \frac{m_p v}{q B} = \frac{m_p \sqrt{2 m_p E}}{q B} =$$

$$= \frac{(1,67 \cdot 10^{-27})^{1,5} \cdot \sqrt{2}}{1,6 \cdot 10^{-19} \cdot 1} = 6,03 \cdot 10^{-22} (\text{м})$$

~ 2

$$d = 12 \mu$$

$$l = ?$$

$$1) \quad F_A = \rho g V_{\text{об}} = \rho g S l$$

(сила, гравит. давление)

лучи 1/4
(308, 4, 10, 2)