



МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ
имени М.В.ЛОМОНОСОВА

дешифр

Вариант 01

Место проведения Москва
город

ПИСЬМЕННАЯ РАБОТА

Олимпиада школьников Росатом
наименование олимпиады

по физике
профиль олимпиады

Манеева Егора Михайловича
фамилия, имя, отчество участника (в родительном падеже)

Дата

«12» апреля 2025 года

Подпись участника

[Signature]

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86-69-44-99
(156.3)

17	4	3	2	1	1
17	0	0	0	9	3
2	0	0	3	3	3
2	0	0	3	3	3

с семнадцатого

Черновик.

$t_1 = 700 \text{ c}$

$\uparrow K_1$ $\uparrow K_2$

$\uparrow \uparrow \uparrow \uparrow$

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of

of end

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Черновик! Чистовик! и т.

Вопрос:

$$v_{1a} = \sqrt{2}v = \sqrt{2} \cdot v^2 + v^2$$

$$v_{1a} = \sqrt{2} \cdot v^2 = \sqrt{2}v$$

Известно $\angle 1 \frac{v}{c}$ - Выгода.

$$t_{1a} = 700 = t_y$$

* $S_g =$

$$V_{gq} = \sqrt{2} \cdot V_{1a} = \frac{S}{t_2} = \frac{S}{t_1 \cdot \sqrt{2}} = \frac{S}{1} \cdot \frac{\sqrt{2}}{t_2} = \frac{S\sqrt{2}}{t_2}$$

$$\sqrt{2} V_{1a} = \frac{S\sqrt{2}}{t_2}$$

$$V_{1a} = \frac{S}{t_2}$$

$$V_{1a} = \frac{S}{700c}$$

$$V_{1a} = 1. \quad V_{1a} = 1 \frac{m}{c}$$

$$S_{1a} - 0 = 400 \mu.$$

$$t = 700c + \frac{400c}{\sqrt{2}} = S = 1400 \mu$$

$$V_g = \frac{1400 \mu}{1} : (700c \sqrt{2} + \frac{400c}{\sqrt{2}}) = \frac{1400 \mu}{1} \cdot \frac{\sqrt{2}}{\sqrt{2} \cdot 700(\sqrt{2}+1)} = \frac{1400 \mu}{700(\sqrt{2}+1)} = \frac{\sqrt{8} \mu}{\sqrt{2}+1}$$

$$V_a = \frac{700\sqrt{2}}{700} = \sqrt{2} \cdot \frac{m}{c}$$

$$S_a = \sqrt{2} \cdot (700c + \frac{400c}{\sqrt{2}}) = \sqrt{2} \cdot 700c + 400c = 700(\sqrt{2}+1) \mu.$$

$$S_{1a} = 400(\sqrt{2}+1) - 1100 = 400(\sqrt{2}-1)$$

$$S_g = \frac{\sqrt{8}}{\sqrt{2}+1} \cdot (700 + \frac{400}{\sqrt{2}}) = \frac{\sqrt{8} \cdot (700 + \frac{400}{\sqrt{2}})}{\sqrt{2}+1} = \frac{700\sqrt{8} + \frac{\sqrt{8} \cdot 400}{\sqrt{2}}}{\sqrt{2}+1} = \frac{1400\sqrt{2} + 400}{\sqrt{2}+1} = \frac{1400(\sqrt{2}+1)}{\sqrt{2}+1} = 1400 - 400(\sqrt{2}-1) = 400(2 - \sqrt{2} - 1 + 1) = 2100 - 400\sqrt{2} = 400(3 - \sqrt{2}).$$

$$V_{avg} = \frac{\sqrt{8}}{\sqrt{2}+1} + \sqrt{2} \cdot \frac{\sqrt{2}+1}{\sqrt{2}+1} = \frac{2\sqrt{2}+2+\sqrt{2}}{\sqrt{2}+1} = \frac{3\sqrt{2}+2}{\sqrt{2}+1}$$

$$t = \frac{S}{V} = \frac{1400 - 400(3-\sqrt{2})}{\frac{3\sqrt{2}+2}{\sqrt{2}+1}} = \frac{1400 - 2100 + 400\sqrt{2}}{\frac{3\sqrt{2}+2}{\sqrt{2}+1}} = \frac{400(-1+\sqrt{2})}{\frac{3\sqrt{2}+2}{\sqrt{2}+1}} = \frac{400(\sqrt{2}-1)(\sqrt{2}+1)}{3\sqrt{2}+2} = \frac{400(2-1)}{3\sqrt{2}+2} = \frac{400}{3\sqrt{2}+2} \approx 139,5 c.$$

$$t_1 = 700c$$

$$t_2 = \frac{t_1}{\sqrt{2}}$$

$$t_3 = ?$$

Чертовик!

№4.

Дано:

$$v(t) = v_0 - \mu g t$$

$$v(t) = v_0 - \mu g t$$

$$v(t) = v_0 - \mu g t \text{ — зависит от } t.$$

$$S = v_{cp} t = \left(\frac{v_0}{2} \right) t = \frac{v_0 t}{2}$$



Задача:

$$L = 16 \text{ м}$$

$$\mu = 0,1$$

$$v_2 = 0 \text{ км/ч}$$

$$v_0 = 0 \text{ км/ч}$$

$$g = 10 \frac{\text{м}}{\text{с}^2}$$

$$t?$$

$$\mu g = \mu g$$

$$S_{cp} = \frac{v_0 + v_1}{2}$$

$$= \frac{v_1 + v_1}{2} = \frac{v_1}{2}$$

$$S = v_{cp} t$$

$$16 \text{ м} = \frac{v_1}{2} t$$

$$32 = v_1 t$$

$$32 = 1 \frac{1}{2} t$$

$$t = \frac{32 \cdot 2}{3} = 21 \frac{1}{3} \text{ с}$$

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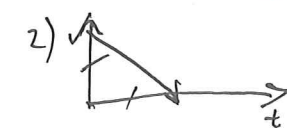
$$t = 21 \frac{1}{3} \text{ с}$$

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$$v^2 = v_0^2 - 2 \mu g S$$

$$v(t) = v_0 - \mu g t$$

$$32 = v_1 t$$

$$v = \sqrt{32} = 4\sqrt{2}$$

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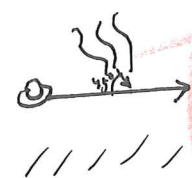
$$v = \sqrt{32} = 4\sqrt{2}$$

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Вопрос:



КАКОЙ ВОЗДУХ !!!

№2.

гениал

КАКАЯ

1000 км/ч = 1000 км/ч

0,8 км = 0,8 км

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мб=0,2 км Мал ДАННО!

Чертовик.

№3.

Дано:

$$h = 4 \text{ см}$$

$$x_1 = 4 \text{ см}$$

$$T_1 = 4,5 \text{ Н}$$

$$x_2 = 12 \text{ см}$$

$$T_2 = 5,01 \text{ Н}$$

$$x_3 = 16 \text{ см}$$

$$T_3 = ?$$

$$T_4 = ?$$

$$T_5 = ?$$

$$T_6 = ?$$

$$T_7 = ?$$

$$T_8 = ?$$

$$T_9 = ?$$

$$T_{10} = ?$$

$$T_{11} = ?$$

$$T_{12} = ?$$

$$T_{13} = ?$$

$$T_{14} = ?$$

$$T_{15} = ?$$

$$T_{16} = ?$$

$$T_{17} = ?$$

$$T_{18} = ?$$

$$T_{19} = ?$$

$$T_{20} = ?$$

$$T_{21} = ?$$

$$T_{22} = ?$$

$$T_{23} = ?$$

$$T_{24} = ?$$

$$T_{25} = ?$$

$$T_{26} = ?$$

$$T_{27} = ?$$

$$T_{28} = ?$$

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$$T_{36} = ?$$

$$T_{37} = ?$$

$$T_{38} = ?$$

$$T_{39} = ?$$

$$T_{40} = ?$$

$$T_{41} = ?$$

$$T_{42} = ?$$

$$T_{43} = ?$$

$$T_{44} = ?$$

Решение:

$$T = F_{\text{тяг}} - F_A = m g - \rho g V = g(m - \rho V)$$

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$$T_1 = 4,5 \text{ Н}$$

$$T_2 = 5,01 \text{ Н}$$

$$T_3 = ?$$

Чистовик.

№2.

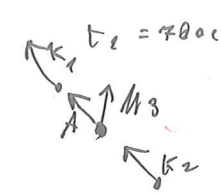
Недостаточно данных.

№1.

В конце №1. →.

Черновик!

№1.



$$t_2 = \frac{t_1}{\sqrt{2}} \approx 495$$

№2.
 $V = 1$

Смел:
 $80\%V = 0.8$
Ост. - вода (в равновесии)

$$t_k = 100^\circ \text{C}$$

$$T = 42 \text{ мм.}$$

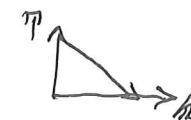
$$T_{\text{пр}} x_2 = 12 \text{ см.}$$

$$5,5 \text{ Н} = 10 (m - 12000 \text{ г})$$

$$5,5 = 10m - 120000 \text{ г}$$

$$220000 \text{ г} = 10m - 5,5$$

$$S = \frac{10m - 5,5 \text{ Н}}{220000 \text{ г}}$$



$$F_{\text{мощ}} = F_n$$

$$m g = \rho g V$$

$$m = \rho h S$$

$$h_1 \rho_1 = \rho h$$

$$h_1 \rho_1 = \rho h$$

$$h = \frac{h_1 \rho_1}{\rho}$$

$$h = \frac{h_1 \rho_1}{\rho}$$

$$h = \frac{\rho_1}{\rho} \cdot \frac{h_1}{1000}$$

$$h_H = \frac{\rho_1}{\rho} \cdot \frac{h_1}{1000} = \frac{\rho_1 - 1000}{250}$$

№3.

Вопрос:

$$h = 9 \text{ см}$$

$$H = 12 \text{ см} - \text{избыток.}$$

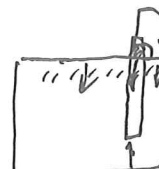


Задача:

1) ↓ ↑

$F_{\text{мощ}}$ F_n

Верно



$$F_v = F_{\text{мощ}} - F_n$$

$$T = mg - \rho g V = g(m - \rho V)$$

Тогда $x_1 = 8$

$$7,5 \text{ Н} = 10 \frac{\text{г}}{\text{см}^2} (m - 4000 \text{ г}) = 10 \frac{\text{г}}{\text{см}^2} (10 \text{ м} - 4000 \text{ г})$$

$$7,5 - 10 \text{ м} = -4000 \text{ г}$$

$$10 \text{ м} - 4,5 = 4000 \text{ г}$$

$$S = \frac{10 \text{ м} - 4,5 \text{ Н}}{4000}$$

$$10 \text{ м} - 1000 \text{ г}$$

$$Q = 10000 \text{ г}$$

$$x = \frac{16}{16} = \frac{4,125}{0}$$

$$x = \frac{16}{16} = \frac{5,5}{16}$$

$$x = \frac{12 \cdot 5,5}{16}$$

$$x = 4,125 \text{ м.}$$

$$\begin{array}{ccc} 4,5 & 5,5 & 4,5 \\ 8 & 1 & 1 \\ 16 & 20 & \end{array}$$

$$2 \text{ Н} - 8 \text{ см}$$

$$1 \text{ Н} - 4 \text{ см.}$$

$$1 \text{ Н} - 4 \text{ см.}$$