



Класс 11 Вариант 7 Дата Олимпиады 19.02.17

Площадка написания КНИТУ

Задача	1	2	3	4	5	Σ		Подпись
						Цифрой	Прописью	
Оценка	5	9	5	-	4	23 25	двадцать пять	Ситенко

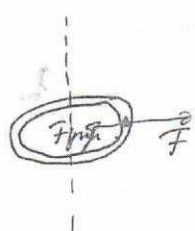
~1 Демо:

L - длина
m - масса

k, ω

Найти:

R - ?



Решение: 1) $\omega = 2\pi\nu = \frac{2\pi\delta}{2\pi R} \Rightarrow \delta = R\omega$

или ось Ox:

$$2) k\Delta x = ma; \quad k\Delta x = m\frac{v^2}{R}$$

$$k\Delta x = m\omega^2 R$$

$$k = \frac{k\Delta x}{m\omega^2}$$

1 - 2
2 -
3 - 1
4 -
5 - 2/5

$$3) \Delta x = 2\pi R - L \Rightarrow k = \frac{k(2\pi R - L)}{m\omega^2} \Rightarrow R = \frac{kL}{2\pi k - m\omega^2}$$

Ответ: $R = \frac{kL}{2\pi k - m\omega^2}$

~2 Демо:

T; $V_1 = \frac{1}{3}V$

$$V_2 = \frac{L}{3}V$$

$$V_1' = \frac{2}{3}V$$

$$V_2' = \frac{1}{3}V$$

$$T_1' = T_2$$

Найти:

T_2 - ?

1) I $\begin{matrix} T & T \\ V/3 & V/3 \end{matrix}$ II

2) I' $\begin{matrix} T & T_2 \\ 2/3V & 1/3V \end{matrix}$ II'

$$p_1 \frac{1}{3}V = \nu_1 RT \quad p_1 = p_2 \Rightarrow$$

$$p_2 \frac{2}{3}V = \nu_2 RT \quad \nu_2 = 2\nu_1$$

$$p_1' \frac{2}{3}V = \nu_1 RT$$

$$p_2' \frac{1}{3}V = \nu_2 RT_2$$

$$\frac{2}{1} = \frac{\nu_1 T}{\nu_2 T_2} \Rightarrow \frac{T}{T_2} = \frac{4}{1}$$

1 - 3
2 - 1
3 - 1
4 - 2
5 - 2

$$T_2 = \frac{1}{4}T = 0,25T$$

Ответ: $T_2 = 0,25T$

9

5 Дано:

$$m_1 = 6 \text{ кг.}$$

$$t_1 = 24 \text{ ч.}$$

$$m_2 = 6 \text{ т. } 6000 \text{ кг.}$$

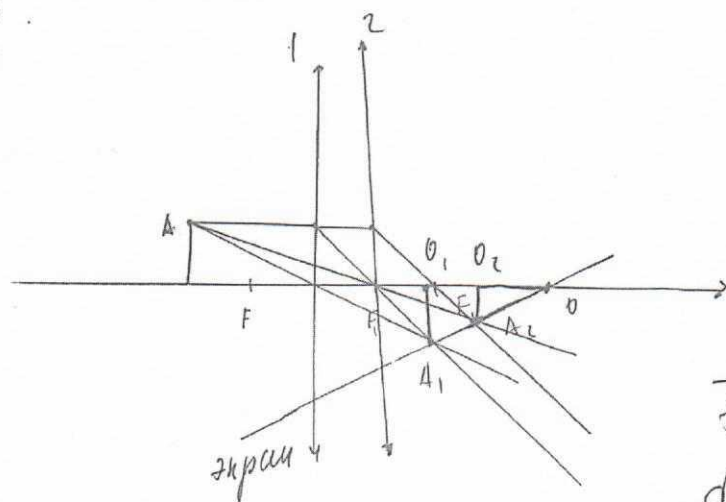
$$t_2 = ?$$

$$P = F' = \frac{dT}{dx}$$

$$P_1 = P_2 = P$$

Ответ: 1000 дней

3.



Решение:

$$P \cdot t = m_1 \cdot A \quad A = \frac{P \cdot t_1}{m_1} = \frac{P \cdot 24}{6} = 4P$$

$$A = \frac{P \cdot t_2}{m_2} = \frac{P \cdot t_2}{6000} = 4P$$

$$t = 6000 \cdot 4 = 24000 \text{ часов} = 1000 \text{ дней}$$

1 - 1
 2 - 1
 3 - 1
 4 - 1
 5 - 1 → 1
 5

$$\begin{cases} d + f = L \\ d_1 + f_1 = L \\ \frac{d}{f} = m \frac{d_1}{f_1} \\ \frac{1}{f} + \frac{1}{d} = ? \end{cases}$$

$$\frac{1}{f} + \frac{1}{d} = \frac{1}{f_1} + \frac{1}{d_1}$$

$$\frac{d+f}{fd} = \frac{d_1+f_1}{f_1 d_1}; \quad \frac{L}{fd} = \frac{L}{f_1 d_1}$$

$$\begin{cases} fd = f_1 d_1 \\ \frac{d}{f} = m \frac{d_1}{f_1} \end{cases} \Rightarrow \frac{d}{d_1} = \sqrt{m} \quad d = \sqrt{m} d_1$$

$$d = \sqrt{m} d_1$$

$$\sqrt{m} d_1 + f = d_1 + f_1$$

$$d_1 (\sqrt{m} - 1) = f_1 - f; \quad d_1 = \frac{f_1 - f}{\sqrt{m} - 1}$$

$$\frac{f}{f_1} = \frac{A_1 O_1}{A_2 O_2} = m; \quad f = m f_1; \quad d_1 = \frac{f_1 (m - 1)}{\sqrt{m} - 1}$$

$$\frac{1}{d_1} + \frac{1}{f_1} = \frac{\sqrt{m} - 1}{f_1 (m - 1)} + \frac{1}{f_1} = \frac{\sqrt{m} - 1 + m - 1}{f_1^2 (m - 1)} = \frac{\sqrt{m} + m - 2}{f_1^2 (m - 1)}$$

$$f_1 + \frac{f_1 (m - 1)}{\sqrt{m} - 1} = L, \quad f_1 ((\sqrt{m} - 1) + (m - 1)) = L(\sqrt{m} - 1)$$

$$f_1 = \frac{L(\sqrt{m} - 1)}{\sqrt{m} + m - 2}$$

$$\sim 3 \quad D = \frac{(\sqrt{m} + m - 2)^3}{L^2 (\sqrt{m} - 1)^2 (m - 1)} = \frac{((\sqrt{m} - 1)(\sqrt{m} + 2))^3}{L^2 (\sqrt{m} - 1)^2 (m - 1)} = \frac{(\sqrt{m} - 1)(\sqrt{m} + 2)^3}{L^2 (m - 1)}$$

$$= \frac{(\sqrt{m} + 2)^3}{L^2 (\sqrt{m} + 1)}$$

Ответ: $\frac{(\sqrt{m} + 2)^3}{L^2 (\sqrt{m} + 1)}$

$$\begin{array}{r}
 1 - 3 \\
 2 - 1 \\
 3 - 1 \\
 4 - \\
 5 - \\
 \hline
 5
 \end{array}$$

$$\sim 4 \quad P = I^2 R$$

$$R = \frac{P L}{S}$$

$$\cancel{D B L} = m a.$$

$$g D B = m a$$

$$\begin{array}{r}
 1 \rightarrow 1 \\
 2 - 0 \\
 3 - 0 \\
 4 - 0 \\
 5 - 0 \\
 \hline
 1.
 \end{array}$$