

5. Дано:

$$V = 83 \text{ м}^3$$

$$t_1 = 7^\circ \text{C}$$

$$t_2 = 17^\circ \text{C}$$

$$p_1 = 1120 \text{ Па}$$

$$p_2 = 2200 \text{ Па}$$

$$M = 0,018 \frac{\text{м}}{\text{моль}}$$

$$m_8 - ?$$

Решение:

$$T_1 = t_1 + 273$$

$$T_2 = t_2 + 273$$

$$T_1 = 280 \text{ K}$$

$$T_2 = 290 \text{ K}$$

$$pV = \frac{m}{M} RT$$

$$m = \frac{pVM}{RT}$$

$$m_1 = \frac{p_1 VM}{RT_1}$$

$$m_2 = \frac{p_2 VM}{RT_2}$$

$$m_8 = m_2 - m_1 = \frac{VM}{R} \left( \frac{p_2}{T_2} - \frac{p_1}{T_1} \right)$$

$$m_8 = \frac{83 \cdot 0,018}{8,31} \left( \frac{2200}{290} - \frac{1120}{280} \right) = \frac{83 \cdot 0,018 \cdot 3,586}{8,31} \approx 0,645 \text{ кг} = 645 \text{ г}$$

Ответ: 645 г



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СТР 1 / 2

4. Дано:

$$C_1$$

$$C_2$$

$$R_1$$

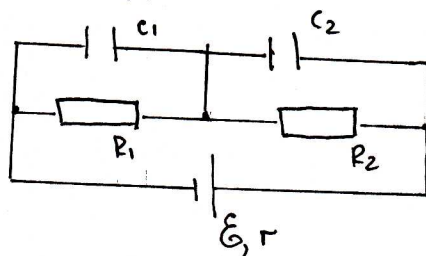
$$R_2$$

$$\mathcal{E}$$

$$r$$

$$\Delta W_2 - ?$$

Решение



$$W = \frac{CU^2}{2}$$

$$\Delta W_2 = \frac{C_2 U_2^2}{2} \text{ (конг.)}$$

$$U_2(\text{конг.}) = U_2(\text{рез.}) \text{ (напряжение на резисторе)}$$

$$I = \frac{\mathcal{E}}{R_{\text{общ}} + r} \quad R_{\text{общ}} = R_1 + R_2 \quad I = \frac{\mathcal{E}}{R_1 + R_2 + r}$$

$$I = I_2 = I_1 = \frac{U_2}{R_2}$$

$$\frac{\mathcal{E}}{R_1 + R_2 + r} = \frac{U_2}{R_2}$$

$$U_2 = \frac{\mathcal{E} R_2}{R_1 + R_2 + r}$$

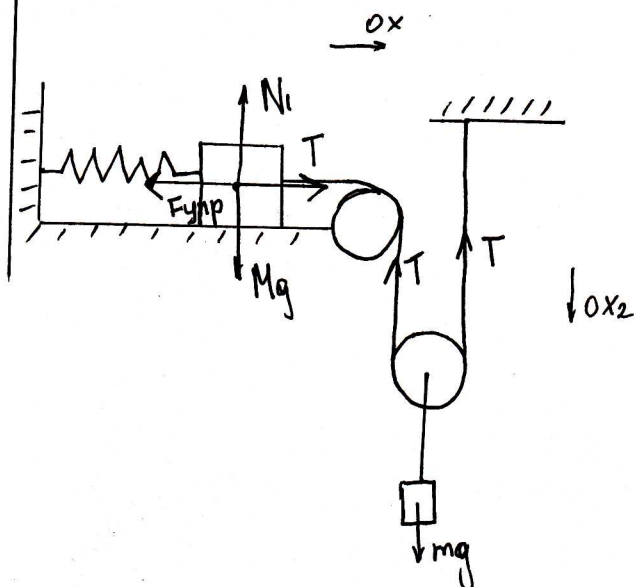
$$\Delta W_2 = \frac{C_2 \mathcal{E}^2 R_2^2}{2(R_1 + R_2 + r)^2}$$

Ответ:  $\frac{C_2 \mathcal{E}^2 R_2^2}{2(R_1 + R_2 + r)^2}$

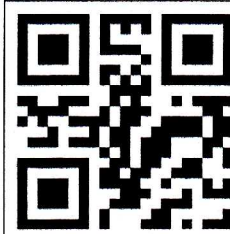
1. Дано:

$K$   
 $M$   
 $v_0 = 0$   
 $m$   
 $v_{\max} = ?$

Решение:



Олимпиада «Смарт Старт», 2016-2017  
 Физика, 10 класс, заключительный этап



9-00057  
 СТР 2 / 2

$$M\vec{a} = \vec{T} + \vec{F}_{\text{fnp}}$$

$$m\vec{a} = m\vec{g} + 2\vec{T}$$

$$Ox_1: Ma = T - F_{\text{fnp}}$$

$$Ox_2: ma = mg - 2T$$

$$ma = mg - 2(Ma + F_{\text{fnp}})$$

$$a(m + 2M) = mg - 2F_{\text{fnp}}$$

$$a = \frac{mg - 2F_{\text{fnp}}}{m + 2M}$$

$$S = \frac{v^2 - v_0^2}{2a} \quad v_0 = 0$$

$$S = \frac{v^2}{2a} \quad a = \frac{v^2}{2S}$$

$$F_{\text{fnp}} = k\Delta x \quad \Delta x = S \quad F_{\text{fnp}} = kS$$

$$\frac{v^2}{2S} = \frac{mg - 2kS}{m + 2M}$$

$$v = \sqrt{\frac{2mgS - 4kS^2}{m + 2M}}$$

3. Дано:

$$T_1 = 800K$$

$$q = 142 \cdot 10^3 \text{ Дж}$$

$$C_v = 21 \frac{\text{Дж}}{\text{моль} \cdot K}$$

$$\frac{P_1}{P_2} = ?$$

Решение:

$$pV = \frac{m}{M} RT$$

$$p_1 V_1 = \frac{m_1}{M_1} RT_1$$

$$p_2 V_2 = \frac{m_2}{M_2} RT_2$$

$$\frac{p_1}{p_2} = \frac{m_1 T_1 \cdot M_2}{M_1 \cdot m_2 \cdot T_2} = \frac{\nu_1 M_1 T_1 M_2}{M_1 \cdot \nu_2 M_2 T_2} = \frac{\nu_1 T_1}{\nu_2 T_2}$$

$$q = c\nu(T_2 - T_1)$$