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Олимпиадная работа
по физике
ученица 10 "А" класса
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① Dano:

$$v_{0x} = 54 \text{ km/h} = 15 \text{ m/s}$$

$$t = 40 \text{ s}$$

$$v_{2x} = 72 \text{ km/h} = 20 \text{ m/s}$$

$a_x = ?$ $S_x = ?$

Penyelesaian:

$$a_x = \frac{v_x - v_{0x}}{t} = \frac{(20 - 15) \frac{\text{m}}{\text{s}}}{t} =$$

$$= 0,125 \frac{\text{m}}{\text{s}^2}$$

$$S_x = v_{0x} t + \frac{a_x t^2}{2}$$

$$S_x = 15 \frac{\text{m}}{\text{s}} \cdot 40 \text{ s} + \frac{0,125 \frac{\text{m}}{\text{s}^2} \cdot 1600 \text{ s}^2}{2}$$

$$= 600 \text{ m} + 100 \text{ m} = 700 \text{ m}$$

Jawab: $a_x = 0,125 \text{ m/s}^2$; $S_x = 700 \text{ m}$

② Dano:

$$R_1 = 200 \Omega$$

$$R = 40 \Omega$$

$R_2 = ?$

Penyelesaian:

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \Rightarrow \frac{1}{R} - \frac{1}{R_1} = \frac{1}{R_2}$$

$$\frac{1}{R_2} = \frac{R_1 - R}{R R_1}; R_2 = \frac{R \cdot R_1}{R_1 - R}$$

$$R_2 = \frac{40 \Omega \cdot 200 \Omega}{(200 - 40) \Omega} = 500 \Omega$$

Jawab: $R_2 = 500 \Omega$

③ Dano:

$$\rho_{\text{Hg}} = 0,4 \frac{\text{kg} \cdot \text{m}^3}{\text{m}^3}$$

$$S = 0,2 \text{ m}^2$$

$$t = 5 \text{ mm} = 0,005 \text{ m}$$

$$V = 1 \text{ m} = 0,001 \text{ m}^3$$

$$\rho = 1000 \frac{\text{kg}}{\text{m}^3}$$

Penyelesaian:

$$Q = mc(t_2 - t_1)$$

$$m = \rho V = 1000 \frac{\text{kg}}{\text{m}^3} \cdot 0,001 \text{ m}^3 = 1 \text{ kg}$$

$$Q = 1 \text{ kg} \cdot 4200 \frac{\text{J}}{\text{kg} \cdot ^\circ\text{C}} \cdot (100 - 20)^\circ\text{C}$$

$$= 336000 \text{ J}$$

$$C = 4200 \frac{\text{Dnc}}{\text{K} \cdot ^\circ\text{C}}$$

$$t_1 = 20^\circ\text{C}$$

$$t_2 = 100^\circ\text{C}$$

$$U = 120 \text{ B}$$

$$l - ?$$

$$Q_1 = \frac{U^2}{R} t; R = \frac{U^2 t}{Q_1} = Q = Q_1$$

$$R = \frac{120^2 \text{ B}^2 \cdot 300 \text{ c}}{336000 \text{ Dnc}} \approx 12,86 \text{ Om}$$

$$R = \rho_{\text{Ag}} \cdot \frac{l}{S}$$

$$l = \frac{RS}{\rho_{\text{Ag}}} = \frac{12,86 \text{ Om} \cdot 0,2 \text{ mm}^2}{0,4 \frac{\text{Om} \cdot \text{mm}^2}{\text{m}}} \approx 6,43 \text{ m}$$

Ответа: $l \approx 6,43 \text{ m}$.

4) Дано:

$$S_1 = S_2 = \frac{S}{2} = S'$$

$$V_1 = 2V$$

$$V_2 = V$$

$$V_{\text{cp}} = 14 \text{ m/c}$$

$$V_2 - ?$$

Решение:

$$V_{\text{cp}} = \frac{S}{t}; S = S_1 + S_2 = 2S'$$

$$t = t_1 + t_2; t_1 = \frac{S_1}{V_1} = \frac{S'}{2V};$$

$$t_2 = \frac{S_2}{V_2} = \frac{S'}{V}$$

$$t = \frac{S'}{2V} + \frac{S'}{V} = S' \left(\frac{1}{2V} + \frac{1}{V} \right)$$

$$V_{\text{cp}} = \frac{2S'}{S' \left(\frac{1}{2V} + \frac{1}{V} \right)} = \frac{2}{\frac{1}{2V} + \frac{1}{V}} = \frac{2}{\frac{3}{2V}} =$$

$$= \frac{4V}{3}$$

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