

Олимпиадная работа  
по физике  
ученицы 10 "А" класса

1005

376

N1

Дано:

$$v = 54 \frac{\text{км}}{\text{ч}} =$$

$$= 15 \frac{\text{м}}{\text{с}}$$

$$t = 40 \text{ с}$$

$$v_2 = 72 \frac{\text{км}}{\text{ч}} =$$

$$= 20 \frac{\text{м}}{\text{с}}$$

$$S = ?$$

$$a = ?$$

Решение:

$$a_x = \frac{v_x - v_{0x}}{t} = \frac{(20 - 15) \frac{\text{м}}{\text{с}}}{40 \text{ с}} = 0,125 \frac{\text{м}}{\text{с}^2}$$

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

$$S_x = 15 \frac{\text{м}}{\text{с}} \cdot 40 \text{ с} + \frac{0,125 \frac{\text{м}}{\text{с}^2} \cdot (40 \text{ с})^2}{2} = 600 + 100 = 700 \text{ м}$$

Ответ:  $S = 700 \text{ м}$ ;  $a = 0,125 \frac{\text{м}}{\text{с}^2}$  55

N2

Дано:

$$R_1 = 200 \text{ Ом}$$

$$R_{\text{общ}} = 40 \text{ Ом}$$

$$R_2 = ?$$

Решение:

$$\frac{1}{R_{\text{общ}}} = \frac{1}{R_1} + \frac{1}{R_2} \Rightarrow R_2 = \frac{R_1 \cdot R_{\text{общ}}}{R_1 - R_{\text{общ}}} = \frac{200 \text{ Ом} \cdot 40 \text{ Ом}}{200 \text{ Ом} - 40 \text{ Ом}} = \frac{8000 \text{ Ом}}{160 \text{ Ом}} = 50 \text{ Ом}$$

Ответ:  $R_2 = 50 \text{ Ом}$  66

N3

Дано:

$$S = 0,2 \text{ мм}^2$$

$$t = 5 \text{ мин} =$$

$$= 300 \text{ с}$$

$$U = 120 \text{ В}$$

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

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

$$U = 120 \text{ В}$$

$$c_0 = 4200 \frac{\text{Дж}}{\text{кг} \cdot ^\circ \text{C}}$$

$$\rho = 0,4 \frac{\text{Ом} \cdot \text{мм}^2}{\text{м}}$$

$$l = ?$$

Решение:

$$t_2 - t_1 = 100^\circ \text{C} - 20^\circ \text{C} = 80^\circ \text{C} = \Delta t$$

$$\frac{U^2}{R} \cdot t = c \cdot \rho \cdot V \cdot \Delta t$$

$$l = \frac{U^2 \cdot t}{c \cdot \rho \cdot V \cdot \Delta t} = \frac{0,2 \text{ мм}^2 \cdot (120 \text{ В})^2 \cdot 300 \text{ с}}{4200 \frac{\text{Дж}}{\text{кг} \cdot ^\circ \text{C}} \cdot 0,4 \frac{\text{Ом} \cdot \text{мм}^2}{\text{м}} \cdot 1 \cdot 80^\circ \text{C}} =$$

$$= \frac{0,2 \cdot 14400 \cdot 300}{134400} = \frac{864000}{134400} = 6,43 \text{ м}$$

Ответ:  $l = 6,43 \text{ м}$

126

N4

Dano:

$$v_1 = 2v_2$$

$$v_{cp} = 14 \frac{m}{c}$$

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$$v_1 = ?$$

Penyelesaian:

$$v_{cp} = \frac{s_1 + s_2}{t_1 + t_2};$$

$$s_1 + s_2 = S$$

$$t_1 = \frac{s_1}{v_1} = \frac{s_1}{2v_2}; \quad t_1 + t_2 = \frac{S(v_1 + v_2)}{2v_2 \cdot v_1};$$

$$t_2 = \frac{s_2}{v_2};$$

$$t_1 + t_2 = \frac{3S}{4v_2}; \quad v_{cp} = \frac{4v_2}{3};$$

$$v_2 = \frac{3v_{cp}}{4} = \frac{3 \cdot 14 \frac{m}{c}}{4} = 10,5 \frac{m}{c}$$

$$v_1 = 2 \cdot 10,5 \frac{m}{c} = 21 \frac{m}{c}$$

$$\text{Jawab: } 21 \frac{m}{c} \quad 128$$

N5

Dano:

$$t_1 = 0^\circ C$$

$$m_k = 200 \text{ g}$$

$$m_b = 150 \text{ g}$$

$$t_1 = 25^\circ C$$

$$t_2 = 5^\circ C$$

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$$m_1 = ?$$

28