Школьный этап Всероссийской олимпиады по физике

2019 - 2020 уч. год

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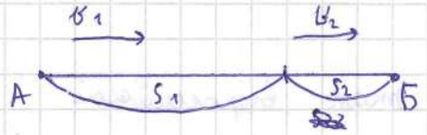
10М класс.

№1

Дано:
$S_1 = \frac{2}{3} S$
$S_2 = \frac{1}{3} S$
$v_1 = 90 \frac{км}{ч}$
$v_2 = 15 \frac{км}{ч}$

$v_{ср.} - ?$



Решение:

1) $v_{ср.} = \frac{S_{об.}}{t_{об.}}$ +3

$t_1 = \frac{S_1}{v_1}$

$t_2 = \frac{S_2}{v_2}$

2) $t_1 = \frac{2}{3} S \cdot \frac{1}{90} = \frac{S}{135}$

$t_2 = \frac{1}{3} S \cdot \frac{1}{15} = \frac{S}{45}$

$t_{об.} = \frac{S}{135} + \frac{S^{13}}{45} = \frac{4S}{135}$

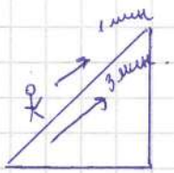
3) $v_{ср.} = S \cdot \frac{135}{4S} = 33{,}75 \frac{км}{ч}$

Ответ: $v_{ср.} = 33{,}75 \frac{км}{ч}$ +2

№2

Дано:
$t_д = 1$ мин.
$t_п = 3$ мин

$t_{д+п} - ?$



Решение:

$t_{д+п} = \frac{t_1 \cdot t_2}{t_1 + t_2}$

1) $t_{д+п} = \frac{(1 \cdot 3)\text{ мин}}{1\text{ мин} + 4\text{ мин}} = 0{,}75\text{ мин} =$ +2

$= 45$ с +1

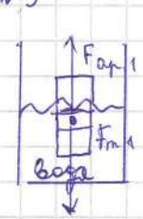
Ответ: $t_{д+п} = 45$ с

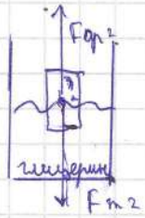
№3

Дано:
$v_{1,пгт} = \frac{3}{4}$
$\rho_в = 1000 \frac{кг}{м^3}$
$\rho_м = 12500 \frac{кг}{м^3}$

$v_{2,пгт} - ?$

1)





Решение:

2) $F_{A1} = \rho_в g \cdot v_{1,пгт}$

$F_{A2} = \rho_м g \cdot v_{2,пгт}$

$F_{A1} = F_{т1}$ +2

$F_{A2} = F_{т2}$

(одинаковый груз)

$F_{A1} = F_{A2}$

$\frac{F_{A1}}{F_{A2}} = \frac{\rho_в g v_{1,пгт}}{\rho_м g v_{2,пгт}} =$ +2

$= 0{,}6 \, v_{2,пгт}$

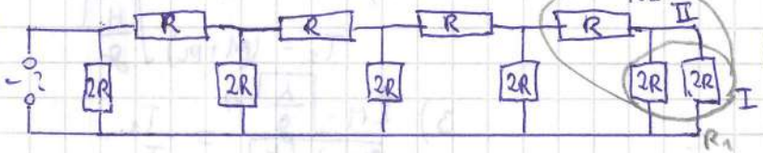
$v_{2,пгт} = \frac{3}{5}$ +2

Ответ: $v_{2,пгт} = \frac{3}{5}$

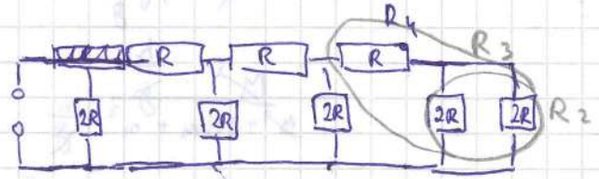
№4

Дано:

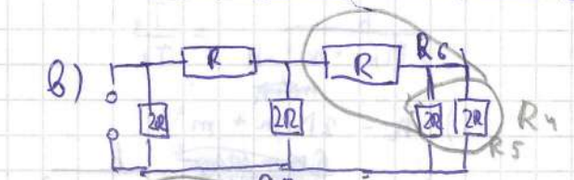
а)



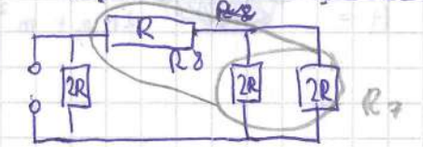
б)



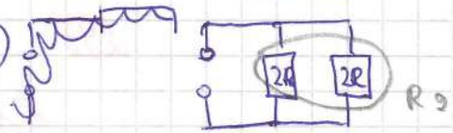
в)



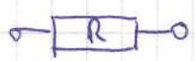
г)



д)



е)



Решение:

1) $R_1 = \frac{1}{2R} + \frac{1}{2R} = \frac{2}{R}$

$R_1 = R$

2) $R_2 = R + R_1$

$R_2 = 2R$

3) $R_3 = \frac{1}{2R} + \frac{1}{2R} = \frac{1}{R}$

$R_3 = R$

4) $R_4 = R + R_3 = 2R$

5) $R_5 = \frac{1}{2R} + \frac{1}{2R} = \frac{1}{R}$

$R_5 = R$

6) $R_6 = R + R_5 = 2R$

7) $R_7 = \frac{1}{2R} + \frac{1}{2R} = \frac{1}{R}$

$R_7 = R$

8) $R_8 = R + R_7 = 2R$

9) $R_9 = \frac{1}{2R} + \frac{1}{2R} = \frac{1}{R}$

10) $R_g = R$

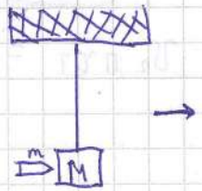
+10

Ответ: $R_g = R$.

№ 5

Дано:
$m_1 = M$
$m_2 = m$

$H - ?$



+1

Решение:

1) $T_1 = m_1\sqrt{\frac{h}{g}}$

$T_2 = m_2\sqrt{\frac{H}{g}}$

2) $T_1 = M\sqrt{\frac{h}{g}}$

$T_2 = (M+m)\sqrt{\frac{H}{g}}$

3) $\frac{M\cdot\sqrt{\frac{h}{g}}}{(M+m)\sqrt{\frac{H}{g}}} = \frac{T_1}{T_2}$

$\frac{M^2\cdot\frac{h}{g}}{M^2+2Mm+m^2\cdot\frac{H}{g}} = \frac{T_1}{T_2}$

$\frac{h}{2Mm+m^2\cdot H} = \frac{T_1}{T_2}$

4) $h = 2M\cdot m + m^2 H$

$H = \frac{h}{2Mm+m^2}$

Ответ: $H = \frac{h}{2M\cdot m+m^2}$.

295

58%