



1	2	3	4	5
4	9	10	5	20

№3

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Дано: $P = 200 \text{ Вт}$

$m = 1 \text{ кг}$

$t_{\text{н}} = 1 \text{ мин} = 60 \text{ с}$

$C = 4200 \frac{\text{Дж}}{\text{кг} \cdot \text{°C}}$

$t_1 = 60 \text{ °C}$

$t_2 = 61 \text{ °C}$

$t_{\text{ост}} = ?$

Решение: $E_{\text{э}} = P \cdot t_{\text{н}} = 200 \cdot 60 = 12000 \text{ Дж}$

$Q_1 = cm \Delta t = 4200 \cdot 1 \cdot 1 = 4200 \text{ Дж}$

$Q_2 = E_{\text{э}} - Q_1 = 12000 - 4200 = 7800 \text{ Дж}$

$\Delta t = \frac{Q_2}{cm} = \frac{7800}{4200} = 1.86 \text{ °C}$

$t_{\text{ост}} = \frac{Q_1}{cm} = \frac{4200}{4200} = 1 \text{ °C}$

Ответ: $t_{\text{ост}} = 1 \text{ °C}$

№2

Дано: $m_1 = 110 \text{ кг}$

$m_2 = 40 \text{ кг}$

$\rho_1 = 0,18 \text{ кг/м}^3$

$\rho_2 = 1,29 \text{ кг/м}^3$

$V_{\text{м}} = ?$

$k = ?$

Решение: $F_1 - F_2 \geq 0$

$F_1 = \rho_2 \cdot gV$

$F_2 = (m_1 + \rho_1 \cdot V)g$

$\rho_2 \cdot gV \geq (m_1 + \rho_1 \cdot V)g$

$V_{\text{м}} \geq \frac{m_1}{\rho_2 - \rho_1}$; $V_{\text{м}} \geq \frac{110}{1,29 - 0,18}$; $V_{\text{м}} = 1000 \text{ м}^3$

$V_2 = 2000 \text{ м}^3$; $k = \frac{\rho_2 V_2 - \rho_1 V_2 - m_1}{m_2} = \frac{2560 - 360 - 110}{40}$

$\approx 16 \text{ cel.}$

Objet: $V = 1000 \text{ m}^3$, $K = 16 \text{ cel.}$

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Dans: $\Delta t_1 = 6^\circ\text{C}$

Temperatures

$\Delta t_2 = 4^\circ\text{C}$

$h_1 = 1$

$h_2 = 3$

$\Delta t = ?$

$$\begin{cases} \Delta t_1 (C_{em} m_1 + C_a m_a) = Q_{pu} \\ \Delta t_2 (C_{em} m_2 + h_2 C_a m_a) = Q_{pu} \Rightarrow \\ \Rightarrow C_{em} m_2 \Delta t = Q_{pu} \end{cases}$$

$$\begin{cases} \Delta t_1 (C_{em} m_1 + C_a m_a) = C_{em} m_2 \Delta t \\ \Delta t_2 (C_{em} m_2 + h_2 C_a m_a) = C_{em} m_2 \Delta t \end{cases}$$

$$C_a m_a \Delta t = C_{em} m_2 \Delta t - C_{em} m_1 \Delta t_1$$

$$h_2 C_a m_a \Delta t_2 = C_{em} m_2 \Delta t - C_{em} m_1 \Delta t_1$$

$$\frac{\Delta t_1}{h_2 \Delta t_2} = \frac{\Delta t - \Delta t_1}{\Delta t - \Delta t_1}$$

$$\Delta t_1 (\Delta t - \Delta t_2) = h_2 \Delta t_2 (\Delta t - \Delta t_1)$$

$$\Delta t_1 \Delta t - \Delta t_1 \Delta t_2 = h_2 \Delta t_2 \Delta t - h_2 \Delta t_2 \Delta t_1$$

$$h_2 \Delta t_2 \Delta t_1 - \Delta t_1 \Delta t_2 = h_2 \Delta t_2 \Delta t - \Delta t_1 \Delta t$$

$$\Delta t_1 \Delta t_2 (h_2 - 1) = \Delta t (h_2 \Delta t_2 - \Delta t_1)$$

$$\Delta t = \frac{\Delta t_1 \Delta t_2 (h_2 - 1)}{h_2 \Delta t_2 - \Delta t_1}$$

$$\Delta t = \frac{6 \cdot 4 \cdot 2}{3 \cdot 4 - 6} = 8^\circ\text{C}$$

Objet: $\Delta t = 8^\circ\text{C}$

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Дано: $S_1 = 0,5 S_2$

$S_3 = ?$

Решение: d-интервал

$$S_1 = \frac{a^2 b^2}{2} \quad +$$

$$S_2 = \frac{a(b-d)^2}{2} \quad +$$

$$db = b \left(1 - \frac{\sqrt{2}}{2}\right)$$

$$S_3 = S_1 d$$

$$S_3 = \frac{a^2 b^2}{2} \cdot \left(1 - \frac{\sqrt{2}}{2}\right) = S_1 \left(1 - \frac{\sqrt{2}}{2}\right) \approx$$

$$\approx 0,08 S_1$$

Ответ: $S_3 = 0,08 S_1$

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Дано: $U = 1,5 \text{ В}$

$Q = 90 \text{ мкКл}$

$R = 10 \text{ Ом}$

$r = 15 \text{ Ом}$

$t = ?$

Решение: $Q = I t$; $t = \frac{Q}{I}$

$$I = \frac{U}{R} = \frac{U_1 + U_2 + U_3 + U_4}{r + R_1 + \frac{1}{\frac{1}{R_2} + \frac{1}{R_3}} + \frac{1}{R_4}} = \frac{U}{25,15} =$$

$$= 0,24 \text{ А} = 240 \text{ мА}$$

$$t = \frac{90}{240} = 0,375 \text{ с} = 375 \text{ мс}$$

Ответ: $t = 375 \text{ мс}$.

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