

1) 10×14

$$L = 12 \text{ cm}$$

$$\dot{q} = \frac{kA \Delta T}{L}$$

$$q = ?$$

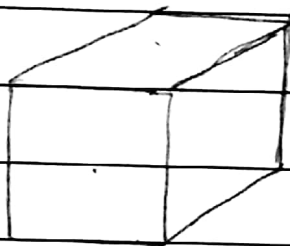
$$t = 5^\circ\text{C}$$

$$\dot{q} = \frac{0.8 \cdot 140}{0.12} (22 - 5)$$

$$t = 22^\circ\text{C}$$

$$k_{\text{con}} = 0.8 \text{ W/mK} \quad \dot{q} = 15.866 \frac{\text{kJ}}{\text{s}}$$

2)



$$l = 20 \text{ cm}$$

$$\phi = 1.2 \text{ cm}$$

$$P = 100 \text{ W}$$

$$t_i =$$

$$T_{\text{ex}} = 20^\circ\text{C}$$

$$\dot{q} = \frac{kA \Delta T}{L}$$

$$\dot{q} = 100 \text{ W} \rightarrow \frac{100}{1.2 \cdot 10^{-2}} = 0.8 \cdot 6 \times 0.2 \times 0.2 (T_i - 20)$$

$$6.25 = (T_i - 20)$$

$$T_i = 26.25^\circ\text{C}$$

3) $\phi = 0.5 \text{ cm}$

$$A = 2 \times 2 \text{ m}$$

$$t = 10^\circ\text{C}$$

$$t = 3^\circ\text{C}$$

$$k_{\text{vid}} = 0.78 \text{ W/mK}$$

$$\dot{q}_1 = \frac{\Delta T}{\frac{L}{kA}}$$

$$\text{ou } \dot{q} = \frac{kA \Delta T}{L}$$

$$\dot{q}_1 = \frac{0.78 \cdot 4}{0.5 \cdot 10^{-2}} (10 - 3)$$

$$q = ? \quad \Delta t = 5 \text{ h}$$

$$\dot{q}_1 = \frac{4.368 \text{ J}}{\text{s}} \times 60 \times 60 \times 5 = 78.6 \text{ MJ}$$

$$\phi_2 = 1 \text{ cm}$$

$$\dot{q}_2 = \frac{0.78 \cdot 4}{1 \cdot 10^{-2}} (10 - 3) = 2.184 \frac{\text{J}}{\text{s}} \quad 60 \times 60 \times 5 = 39.3 \text{ MJ}$$

$$4) \quad 6 \times 3 \times 0,3$$

$$k_{tij} = 0,72 \text{ W/m}^\circ\text{C}$$

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

$$t = -4^\circ\text{C}$$

$$\Delta t = 8 \text{ h}$$

$$\text{kWh} \rightarrow R\$ 0,68$$

$$\dot{q} = \frac{kA}{L} \Delta T$$

$$\dot{q} = \frac{0,72 \cdot 18}{0,3} (17 - (-4))$$

$$\dot{q} = 907,2 \text{ J} \times 8 \text{ horas} = 7,26 \text{ kW} / 1000$$

$$7,26 \times 0,68 = 4,94 \text{ R\$}$$

$$5) \quad L = 3 \text{ cm}$$

$$\dot{q} = \frac{32 \text{ W}}{\text{m}^2}$$

$$\dot{q} = \frac{kA}{L} \Delta T$$

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

$$t = 15^\circ\text{C}$$

$$k = ?$$

$$32 = \frac{k \cdot 1}{0,03} (15 - 7)$$

$$\frac{32 \cdot 0,03}{8} = k \cdot 0,12 \frac{\text{W}}{\text{mK}}$$

$$6) \quad A = 2 \text{ m}^2$$

$$L = 4,0 \text{ mm}$$

$$t = 10^\circ\text{C}$$

$$t = 25^\circ\text{C}$$

$$\Delta t = 9 \text{ h} \rightarrow Q = ?$$

$$k_{vidro} = 0,8 \frac{\text{W}}{\text{m}^\circ\text{C}}$$

$$\dot{q} = \frac{kA}{L} \Delta T$$

$$\dot{q} = \frac{0,8 \cdot 2}{4,0 \cdot 10^{-3}} (25 - 10)$$

$$\dot{q} = 6000 \frac{\text{J}}{\text{s}}$$

$$Q = P \cdot \Delta t$$

$$Q = 6000 \cdot 60 \cdot 60$$

$$Q = 6000 \cdot 3600$$

$$Q = 2,16 \cdot 10^7 \text{ J}$$

$$7) k_{\text{med}} = 0,480 \frac{\text{W}}{\text{m}^\circ\text{C}}$$

$$\dot{q} = \frac{kA(t_i - t_e)}{L}$$

$$L = 21\text{cm} \rightarrow 0,21\text{m}$$

$$\dot{q} = \frac{0,480 \cdot 30,4 \cdot 25}{0,21}$$

$$Q = 9300 \frac{\text{kcal}}{\text{m}^3}$$

$$\dot{q} = 17,37 \cdot 10^3 \frac{\text{J}}{\text{s}}$$

$$1\text{kcal} = 4,19\text{J}$$

$$V = ?$$

$$= 17,37\text{J}$$

$$t = 25^\circ\text{C}$$

$$4,1459$$

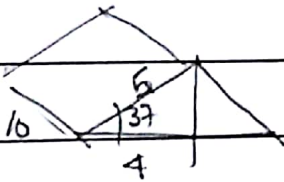
$$t = 0,0^\circ\text{C}$$

$$\dot{q} = 4,15 \cdot 10^3 \frac{\text{kcal}}{\text{s}}$$

$$Q = 4,15 \cdot 10^3 \cdot 60 \cdot 60 \cdot 24 = 358.207.978,2 \text{ cal}$$

Area

$$(8+8+10+10)5 = 180\text{m}^2 + 12\text{m}^2 + 100\text{m}^2 = 304\text{m}^2 + 12\text{m}^2$$



$$V = \frac{358.207.978,2}{9300000} = 38,52\text{m}^3$$

$$\cos 37^\circ = \frac{4}{h}$$

$$0,799 = \frac{4}{h}$$

$$h = 5,0$$

$$5^2 = 4^2 + b^2$$

$$25 = 16 + b^2$$

$$b = 3\text{m}$$

$$A_A = \frac{8,3}{2} 12\text{m}^2$$