

$$\frac{200-x}{20} = \frac{200,24-200}{100} \Rightarrow 5(200-x) = 0,24$$

$$1000 - 5x = 0,24$$

$$5x = 999,76$$

$$x = 199,952 \text{ cm} = L_0$$

$$\Delta L = L_0 \cdot \alpha \cdot \Delta T$$

$$0,24 = 199,952 \cdot \alpha \cdot (100)$$

$$a) \alpha = 1,2 \times 10^{-5} \text{ } ^\circ\text{C}^{-1}$$

$$b) \Delta L = L_0 \cdot \alpha \cdot \Delta T \Rightarrow (L - L_0) = L_0 \cdot \alpha \cdot \Delta T \Rightarrow (L - 180) = 180 \cdot (1,2 \times 10^{-5}) \cdot (-90)$$

$$L - 180 = -0,1944 \Rightarrow L = 180 - 0,1944 = 179,80 \text{ cm}$$

$$2^\circ) I = 11 \text{ A } 15 \text{ min} \Rightarrow 11,25 \text{ A}$$

C	40	11,25
X	...	11,25
36	...	14

$$\frac{x-36}{40-36} = \frac{11,25-14}{10-14} \Rightarrow \frac{x-36}{4} = \frac{-2,75}{-4} \Rightarrow x-36 = 2,75$$

$$x = 38,75 \text{ } ^\circ\text{C}$$

$$K = 273 + 38,75 = 311,75$$

$$3^\circ) \alpha_A = 3 \times 10^{-5} \text{ } ^\circ\text{C}^{-1}; \alpha_B = 1 \times 10^{-5} \text{ } ^\circ\text{C}^{-1}; L_A = 1000 \text{ mm}; L_B = 1001 \text{ mm}; T_0 = 20 \text{ } ^\circ\text{C}$$

$$\Delta L_A = L_A \cdot \alpha_A \cdot \Delta T \Rightarrow (L_{FA} - L_A) = L_A \cdot \alpha_A \cdot (T - 20) \Rightarrow L_{FA} = L_A + L_A \cdot \alpha_A \cdot (T - 20)$$

$$\Delta L_B = L_B \cdot \alpha_B \cdot \Delta T \Rightarrow (L_{FB} - L_B) = L_B \cdot \alpha_B \cdot (T - 20) \Rightarrow L_{FB} = L_B + L_B \cdot \alpha_B \cdot (T - 20)$$

$$\Rightarrow L_A + L_A \cdot \alpha_A \cdot (T - 20) = L_B + L_B \cdot \alpha_B \cdot (T - 20) \Rightarrow L_A [1 + \alpha_A (T - 20)] = L_B [1 + \alpha_B (T - 20)]$$

$$1 + 3 \times 10^{-5} (T - 20) = \frac{1001}{1000} [1 + 1 \times 10^{-5} (T - 20)]$$

$$1 + 3 \times 10^{-5} (T - 20) = 1,001 [1 + 1 \times 10^{-5} (T - 20)] = 1,001 + 1,001 \times 10^{-5} (T - 20)$$

$$3 \times 10^{-5} (T - 20) - 1,001 \times 10^{-5} (T - 20) = 1,001 - 1$$

$$2 \times 10^{-5} (T - 20) = 1 \times 10^{-3} \Rightarrow (T - 20) = \frac{1 \times 10^{-3}}{2 \times 10^{-5}} = 50 \Rightarrow T = 50 + 20 = 70 \text{ } ^\circ\text{C}$$

$$4^\circ) L_0 = 20 \text{ cm}; T_0 = 15; T = -5; \Delta T = -20 \text{ } ^\circ\text{C}; \Delta L_{Co} = 20 \cdot 12 \times 10^{-6} (-20) = -48 \times 10^{-4} \text{ cm}$$

$$\Delta L = L_0 \cdot \alpha \cdot \Delta T$$

$$\alpha_{Co} = 12 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$$

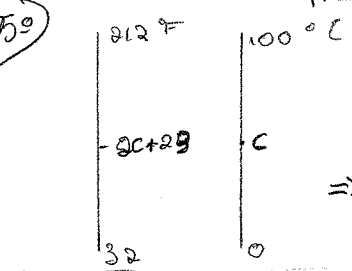
$$\alpha_{BR} = 18 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$$

$$\Delta L_{BR} = 20 \cdot 18 \times 10^{-6} (-20) = -72 \times 10^{-4} \text{ cm}$$

A DIFERENÇA É:

$$\Delta L_{Co} - \Delta L_{BR} = -48 \times 10^{-4} \text{ cm} - (-72 \times 10^{-4} \text{ cm}) = 24 \times 10^{-4} \text{ cm}$$

$$\text{OU } 2,4 \times 10^{-3} \text{ cm}$$



$$\frac{(2C+32)-32}{180} = \frac{C}{100} \Rightarrow \frac{2C-9}{9} = \frac{C}{5} \Rightarrow 9C = 10C - 45 \Rightarrow 10C - 9C = 45 \Rightarrow C = 45 \text{ } ^\circ\text{C}$$

$$6^\circ) F \rightarrow C: \frac{F-32}{9} = \frac{C}{5}$$

$$\frac{122-32}{9} = \frac{C}{5}$$

$$\frac{C}{5} = \frac{90}{9}$$

$$C = 50 \text{ } ^\circ\text{C}$$

$$K = 273 + C$$

$$K = 323 \text{ K}$$

$$7^\circ) C \rightarrow F: \frac{F-32}{9} = \frac{C}{5}$$

$$\frac{F-32}{9} = \frac{92}{5}$$

$$F-32 = 163,6$$

$$F = 197,6 \text{ } ^\circ\text{F}$$

$$8^\circ) \alpha = 1,2 \times 10^{-5} \text{ } ^\circ\text{C}^{-1}; \beta = 2\alpha; \gamma = 3\alpha$$

$$\beta = 2,4 \times 10^{-5} \text{ } ^\circ\text{C}^{-1}$$

$$\gamma = 3,6 \times 10^{-5} \text{ } ^\circ\text{C}^{-1}$$

SUCESSO A TODOS...