

## Answer on Question 49189, Physics, Mechanics | Kinematics | Dynamics

### Question:

The temperature of a 1 m long aluminum rod is 20°C. If the temperature is increased to 70°C, what is the length of the rod?

### Solution:

By the definition of the linear thermal expansion we have:

$$\Delta L_a = \alpha_a L_{0a} \Delta T,$$

where  $\Delta L_a$  is the change in the length of the aluminum rod after the change of temperature,  $\alpha_a = 23 \cdot 10^{-6} \text{ } ^\circ\text{C}^{-1}$  is the coefficient of linear expansion for aluminum,  $L_{0a}$  is the length of the aluminum rod before the change of temperature,  $\Delta T$  is the change of temperature.

Therefore, substituting all data from condition of the problem to the formula for linear thermal expansion we obtain:

$$\Delta L_a = 23 \cdot 10^{-6} \text{ } ^\circ\text{C}^{-1} \cdot 1\text{m} \cdot (70^\circ\text{C} - 20^\circ\text{C}) = 0.00115\text{m}.$$

Then the length of the aluminum rod would be:

$$L = L_{0a} + \Delta L_a = 1\text{m} + 0.00115\text{m} = 1.00115\text{m}.$$

### Answer:

The length of the aluminum rod is 1.00115 meters.