A brass rod is two metre long at a certain temperature. What is the length for temperature rise of 100 kelvin if the expansivity of brass is 0.0000018/kelvin.

Solution:

The change in length measurements of an object due to thermal expansion is related to temperature change by a linear expansion coefficient ($\alpha = 1.8 \times 10\mu K^{-1}$). It is the fractional change in length per degree of temperature change. Assuming negligible effect of pressure, we may write:

$$\Delta L = L_0 \alpha \Delta T, \quad \text{where } L_0 = 2m - \text{initial length of the rod}$$

$$L = L_0 + \Delta L = L_0(1 + \alpha T) = 2m \cdot (1 + 1.8 \times 10\mu K^{-1} \cdot 100K) = 2.00036m$$

Answer: length of the brass rod for temperature rise of 100 kelvin is $2.00036m$.