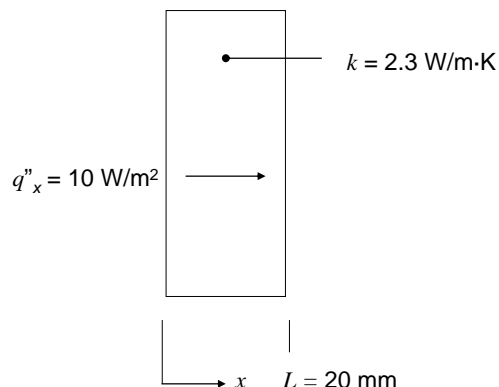# PROBLEM 1.5

KNOWN: Thermal conductivity and thickness of a wall. Heat flux through wall. Steady-state conditions.

FIND: Value of temperature gradient in K/m and in °C/m.

SCHEMATIC:

ASSUMPTIONS: (1) One-dimensional conduction, (2) Constant properties.

ANALYSIS: Under steady-state conditions,

$$\frac{dT}{dx} = -\frac{q_x^{''}}{k} = -\frac{10 \text{ W/m}^2}{2.3 \text{ W/m} \cdot \text{K}} = -4.35 \text{ K/m} = -4.35 \text{ °C/m} \qquad <$$

Since the K units here represent a temperature *difference*, and since the temperature difference is the same in K and °C units, the temperature gradient value is the same in either units.

COMMENTS: A negative value of temperature gradient means that temperature is decreasing with increasing x, corresponding to a positive heat flux in the x-direction.