

TASK 1

Find the rate of heat transfer through the wall if $L = 0.4 \text{ m}$, $A = 20 \text{ m}^2$, $\Delta T = 25$, and $k = 0.78 \text{ W/m K}$ using both simple method and using the resistance concept?

SIMPLE METHOD

$$\dot{Q} = kA \frac{\Delta T}{L} = 0.78 * 20 * \frac{25}{0.4} = 975 \text{ W}$$

RESISTANCE CONCEPT

$$R_{wall} = \frac{L}{kA} = \frac{0.4}{0.78 * 20} = 0.0256 \text{ } ^\circ\text{C/W}$$

$$\dot{Q} = \frac{\Delta T}{R_{wall}} = \frac{25}{0.0256} = 976.56 \text{ W}$$

□

Summary

HEAT TRANSFER- CONDUCTION AND CONVECTION

- In a steady heat transfer through a wall, the transfer is always steady and constant.
- The heat transfer is in horizontal or x- direction.

The rate of heat conduction through a plane wall:

- is proportional to the average thermal conductivity, the wall area, and the temperature difference
- but is inversely proportional to the wall thickness.

Conduction resistance of the wall:

Thermal resistance of the wall against heat conduction.

Thermal resistance of a medium depends on the geometry and the thermal properties of the medium.