Conduction heat transfer is an exchange of energy by direct interaction between molecules of a substance containing temperature differences, it occurs in gases, liquids, or solids and has a strong basis in the molecular kinetic theory of physics.

[from White, Frank M., *Heat Transfer*]

Question:

L= 0.4m, A= 20m^2, ΔT= 25K, and k=0.78$\frac{W}{mK}$, find the rate of heat transfer through the wall.

Solution:

By using simple method,
$$\dot{Q} = kA\frac{\Delta T}{L} = 0.78\frac{W}{mK} * 20m^2 * \frac{25K}{0.4m} = 975W;$$

By using the resistance concept,

$$R_{Wall} = \frac{\Delta T}{L} = \frac{0.4m}{0.78Wm^{-1}K^{-1}*20m^2} \approx 0.0256KW^{-1}$$

$$\dot{Q} = \frac{\Delta T}{R_{Wall}} = \frac{25K}{0.0256KW^{-1}} \approx 976.6W;$$