1. The rate of heat conduction through a plane wall:
   - is proportional to the average thermal conductivity, the wall area, and the temperature difference
   - is inversely proportional to the wall thickness

$$\dot{Q} = kA\frac{\Delta T}{L}$$

2. We can calculate the rate of heat conduction through a wall by analogy between thermal an electrical resistance concept: rate of heat transfer is similar to electric current, thermal resistance is similar to electrical resistance and temperature difference is similar to voltage difference so:

$$I = \frac{V1 - V2}{Re} \quad \longrightarrow \quad \dot{Q} = \frac{T1 - T2}{R}$$

EX:

$$\mathrm{K}=0.78\ \mathrm{W/m\,k}\,,\ \mathrm{A}=20\ \mathrm{m2}\,,\ \Delta T = 25°k,\ \ L = 0.4m$$

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

Harder Way:

$$R_{wall} = \frac{L}{kA} = \frac{0.4}{0.78 * 20} = 0.0256\,°\frac{k}{W}$$

$$\dot{Q} = \frac{\Delta T}{R_{Wall}} = \frac{25}{0.0256} = 976.5625\ W$$