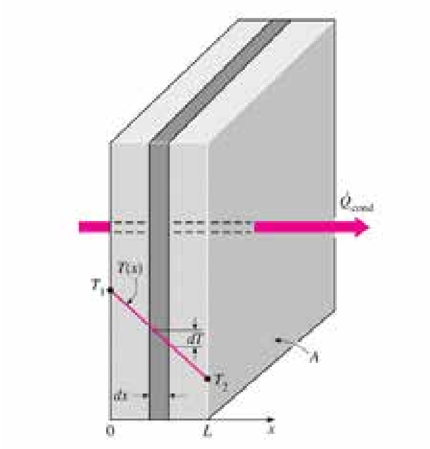
08/10/19 Alessandra Brembati

# 1 st WEEK'S SUBMISSION

Considering a wall of a house whit a thick of 0.4 m and an area of 20 m$^2$. The difference of temperature from inside and outside is of 25°C and the conductivity il 0.78W/mK. Find the rate of heat conduction through the wall.

L= 0.4 m
A= 20 m$^2$
$\Delta$T= 25°C
K= 0.78 W/mK (ability of a material to transfer heat)




- SOLUTION METHOD

Considering $\dot{Q}=KA\frac{\Delta T}{L}$

$\dot{Q}= 0.78 \times 20 \times \frac{25}{0.4} = 975$ J

- SOLUTION RESISTANCE METHOD

Considering $R=\frac{L}{KA}$ and $\dot{Q}= \frac{\Delta T}{R}$

$R= \frac{0.4}{0.78x20} = 0.0256$(°C/W)

$\dot{Q}=\frac{25}{00.0256} = 976.6$ J

WHAT THERE IS BEHIND?

We know that the rate of heat conduction through the wall is **directly proportional** to the conductivity (K) the area (A) and temeperature (T) and **inversely proportional** to the thick (L).

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

This formula is also called **Fourier law** for a solid material and means that heat can transfer to a hot place cold one.In steady conditions the rate of heat conduction through a wall is **constant,** so the heat that goes inside is the same that goes outside.

Another important things is that the temperature is expressed in Kelvin.

$$K= C° + 273,15$$

But the **difference of temperature** is the same number both in **Kelvin** or **Celsius.**

The **thermal resistence** concept is analogy to the electrical resistance because both are defined as the difficulty of heat/eletricity in crossing a solid. Is important to remember that **less is conductive less is resistant to the heat**.