Summary of second lesson (9th of October, 2019).
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1) COVECTIVE HEAT TRANSFER

Rate of convective heat transfer depends on:
- Difference of temperature
- Velocity of liwuid or gas
- Kind of liquid or gas

In according with Newton's law of cooling, is possible to say that
- When the convective heat transfer coefficient is very large, the convective resistance becomes zero
- The surface offers no resistance to convection, and so it doesn't slow down the heat transfer process
- This situation is approached in practice at surfaces where boiling and condensation happen

Thanks to an example about heat loss through a single pane window, it was possible to understand that increasing the thickness of a single pane glass doesn't increase the total resistance; the thickness is important only for the mechanical stability, so, the fact that I need a minimum thickness of glass, is given by the need for the glass not to break.
The increasing of the glass thickness bring such a small advantage, that it's not worth it. The value, instead, changes a lot if two glasses are used, so it's worth it.

2) MISTAKES MADE IN CLASSROOM

I didn't find any big mistakes in class, my problem was the timing. Using, for example, Socrative, I was unable to enter two answers, because I was still calculating when the session had been closed. I realized that in some cases I need more time.

3) SOLVE THE EXERCISE

Consider a 0,8m-high and 1,5m-wide double-pane window consisting of two 6mm thick of glass (k=0,78 W/m°C) separated by 13mm-wide stagnant air space (k=0,026W/m°C).
Determine the steady rate of heat transfer through this double-pane window and the temperature of its inner surface.

1st step: calculate the total resistance

$$R_g = \frac{L_g}{k_g * A} = \frac{0{,}006}{0{,}78 * 1{,}2} = 0{,}0064\ \frac{°C}{W}$$

$$R_{AirGap} = \frac{L_{AirGap}}{k_{AirGap} * A} = \frac{0{,}013}{0{,}026 * 1{,}2} = 0{,}4167\ \frac{°C}{W}$$

$$R_{conv.1} = \frac{1}{h_1 * A} = \frac{1}{10 * 1{,}2} = 0{,}0833\ \frac{°C}{W}$$

$$R_{conv.2} = \frac{1}{h_2 * A} = \frac{1}{40 * 1{,}2} = 0{,}0208\ \frac{°C}{W}$$

$$R_{tot} = R_{conv.1} + R_{conv.2} + 2 * R_g + R_{AirGap} = 0{,}0833 + 0{,}0208 + 2 * 0{,}0064 + 0{,}4167 = 0{,}5336\frac{°C}{W}$$

2nd step: calculate $\dot{Q}$

$$\dot{Q} = \frac{T\infty_1 - T\infty_2}{R_{total}} = \frac{20 - (-10)}{0{,}5336} = \frac{30}{0{,}5336} = 56{,}221W$$

$$T1 = T\infty_1 - \dot{Q} * R_{conv.1} = 20°C - 56{,}221W * 0{,}0833\frac{°C}{W} = 15{,}3\ °C$$