1) Summary of convective heat transfer phenomenon

The convective heat transfer is one of the three ways of heat transfer and it is also called as heat convection. It is a phenomenon that occurs between 2 moving fluids such as Liquid to liquid, gas to liquid, gas to gas or it takes place between solids and moving fluids like gas and solid.

Convection is caused mainly because of the difference of temperature between the two fluids in motion or between a solid and a fluid.

Heat is usually transferred from the object which is hot to the cooler object. And there will be a change in the temperature in both the objects. The temperature of colder object increases, whereas the cooler object's temperature increases.

Convection is of 2 types, they are free convection or natural convection and forced convection.

Free convection is when two moving fluids or a solid and a moving fluid with different temperature contact without an external force, the heat is being transferred from the hotter part to the cooler part.

Forced convection is when two moving fluids or a solid and a moving fluid with different temperature contact due to an external force, yet the heat is transferred from the hotter part to the cooler part.

2) reviews of the mistake made

Did not consider the thickness of the wall while solving the problem.

3) Solve the same problem as that of double pane window with the air- gap thickness of 13 mm and glass thickness of 6 mm, comment on your results and explain why we have an optimal range for the air-gap's distance.

$$R_{g_1} = R_{g_2} = \frac{L_g}{(K_g \times A)} = \frac{0.006}{0.78 * 0.8 * 1.5} = 0.0064\,^\circ\frac{C}{W}$$

$$R_{airGap} = \frac{L_{airGap}}{(K_{airGap} \times A)} = \frac{0.013}{0.026 * 1.2} = 0.4166\ ^\circ C/W$$

$$R_{conv_1} = \frac{1}{h_1 \times A} = \frac{1}{10 * 1.2)} = 0.0833\,^\circ C/W$$

$$R_{conv_2} = \frac{1}{h_2 \times A} = (\frac{1}{40 * 1.2)} = 0.0208\,^\circ\frac{C}{W}$$

$$R_{tot} = 0.0833 + 0.0208 + 2 * 0.0064 + 0.4166 = 0.5335 \,^{\circ}\frac{C}{W}$$

$$\dot{Q} = \frac{\Delta T}{R_{Tot}} = \frac{30}{0.5335} = 56.2324\, W$$