1. ***Heat Transfer*** is a process of how heat transfers through either a solid, liquid, gas matter. If it is through Solid matter, it is called Conduction and an example of this was the last, last week's discussion of heat transfer through a wall. If it is through liquid and gas, it is called Convection just like the discussion of last week which consist of a double glass pane window that has an airgap in between glasses. The basic requirement for heat transfer is the presence of a temperature difference. The temperature difference is the driving force for heat transfer, just as voltage difference for electrical current.

   Convection heat transfer also is always in the presence of bulk fluid motion. Bulk fluid motion means that most of that fluid is moving. In the case of the Conduction heat transfer there is an absence of build fluid motion because solid matter is compact.

   The reason why increasing the thickness of the glass will not have any effect at all to the total resistance is because the glass has a very small thermal resistance than the thermal resistance between glass and air. Every material has its own property of Thermal resistance.

2. To be honest, I was not getting any of it, so I didn't even try to solve the problem in the first place.

3.

$A = 0.8m * 1.5m = 1.2m^2$ $t1 = 20\,°C$ $t\Delta = 20 - (-10) = 30°C$

K = 0.78 W/m °C *t2 = -10°C* *K-air = 0.026 W/m°C*

L-air = 13mm *h1 = 10 W/m²*

L = 6mm *h2 = 40 W/m²*

a) To get total thermal resistance of conduction of the 2 6mm glass:

$$Rg1 = Rg2 = \frac{L}{k*A} = \frac{0.006m}{0.78\frac{W}{m}°C * 1.2m^2} = 0.0064\,°\frac{C}{W}$$

b) To get thermal resistance of the convection between the inner layer of the glass and the air:

$$Rconv_1 = \frac{1}{h_1 * A} = \frac{1}{10\frac{W}{m^2} * 1.2m^2} = 0.0833\,°\frac{C}{W}$$

c) To get thermal resistance of the convection between outer layer of the glass and the air:

$$Rconv_2 = \frac{1}{h_1 * A} = \frac{1}{10\frac{W}{m^2} * 1.2m^2} = 0.02083\,°\frac{C}{W}$$

d) To get the total thermal resistance of conduction of the 13mm of air gap:

$$R_{airgap} = \frac{L_{air}}{K_{air} * A} = \frac{0.0013m}{0.026\frac{W}{m}°C * 1.2m^2} = 0.41666\,°\frac{C}{W}$$

e) To get the total resistance of the window:

$$R_t = R_{conv1} + R_{conv2} + (Rg * 2) + R_{airgap}$$

$$R_t = 0.0833 \circ \frac{C}{W} + 0.02083 \circ \frac{C}{W} + \left(0.0064 \circ \frac{C}{W} * 2\right) + 0.41666 \circ \frac{C}{W}$$

$$R_t = 0.53359 \circ \frac{C}{W}$$

f) To get the steady rate of heat transfer through the pane window:

$$Q^{\cdot} = \frac{t\Delta}{R_t} = \frac{30°C}{0.53359° \frac{C}{W}} = 56.223W$$