Reminders 1-23-08:

- 1st Homework due Thursday.
- 1st POW due Monday 1/28 by 5PM.
- Log onto Mastering Physics ASAP, MPCALABRESE0003!!!
- Log in/out when entering Physics Tutoring Center & lab S-107
- Read Chapter 17 and 18
- Sign up for Physics 4Z. 1st meeting today S-105C. Homework and problem solving will be discussed in this class.

Outline:

- Heat Transfer Processes- Conduction (Convection & Radiation to be covered in lab)
- Ideal Gas Law
- Kinetic Theory

Phy 4Z Meets in S-105C

$$H_1 = H_2$$

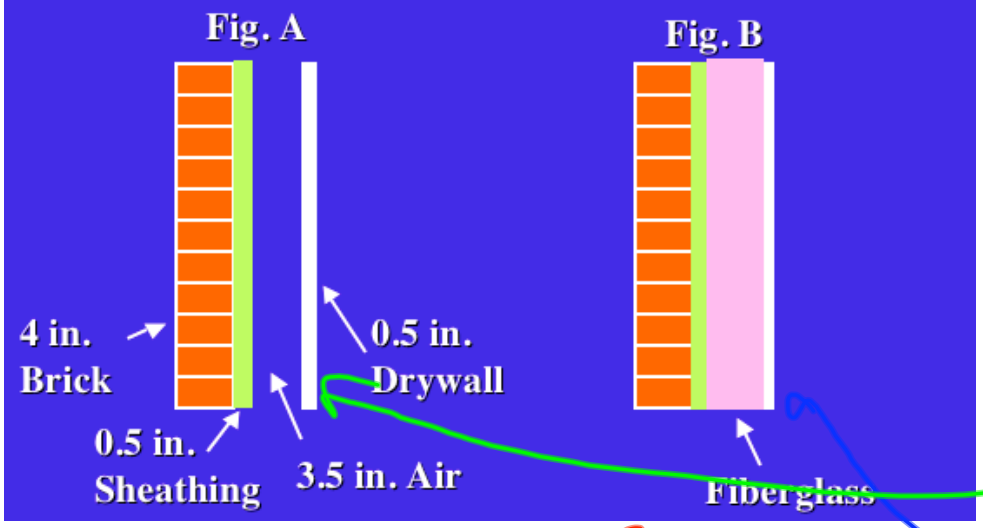
$$H_1 = \frac{k_1 A \Delta T_1}{L_1} \qquad H_2 = \frac{k_2 A \Delta T_2}{L_2}$$

$$\Delta T = \Delta T_1 + \Delta T_2$$

$$\Delta T = \frac{H_1 L_1}{k_1 A} + \frac{H_2 L_2}{k_2 A} = H\left[\frac{L_1}{k_1} + \frac{L_2}{k_2}\right]\frac{1}{A}$$

$$H = \frac{A \Delta T}{\frac{L_1}{k_1} + \frac{L_2}{k_2}} = \frac{A \Delta T}{\sum \frac{L_i}{k_i}}$$

Calculate the total R value for a wall constructed as shown in Figure A below. If a layer of fiberglass batting replaces the dead-air space as shown in Figure B, what is the new R value? By what factor is the thermal energy loss reduced?



Look up R values

$R_{Brick} = 4$

$R_s = 1.32$

$R_{air} = 1.01$

$R_{dw} = .45$

6.89

$R = 16.67$

$\Sigma R = R_{eff}$

- Two rods of copper and aluminum, each of length 50 cm and radius 1.0 cm, are placed in contact end to end. The sides of the rods are insulated. The other end of the Cu rod is at 80 °C and that of the Al is 10 °C. What is the temperature at the junction?

$H_1 = H_2$

$$H_1 = \frac{K_1 A_1 (T - T_1)}{L_1} = H_2 = \frac{K_2 A_2 (T_2 - T)}{L_2}$$

$$K_1 (T - T_1) = K_2 (T_2 - T)$$

$$K_1 T - K_1 T_1 = K_2 T_2 - K_2 T$$

$$T (K_1 + K_2) = K_2 T_2 + K_1 T_1$$

$K_1 = 400$

$K_2 = 240$

$$T = \frac{K_2 T_2 + K_1 T_1}{K_1 + K_2}$$

$$= 53.8\,^\circ C$$

Van der Waals

$$\left(P + \frac{an^2}{V^2}\right)\left(V - nb\right) = nRT$$

intermolecular forces

Volume of 1 mole of molecules

- An automobile tire is pumped to a gauge pressure of 200kPa when it is at 20°C. After the car have been driven at high speed, the temperature has been increased to 50°C. Assuming the volume is unchanged, find the new gauge pressure. Repeat, if the tire expands by 10 percent.

$PV = nRT \qquad \frac{P}{T} = \frac{nR}{V} = \text{constant}$

$$\frac{P_0}{T_0} = \frac{P_f}{T_f} \qquad P_f = \frac{T_f}{T_0} P_0$$

$$= \frac{323K}{293}(200kPa + 101kPa)$$

$$P_f = 332kPa$$

$$P_{f\,gauge} = 332kPa - 101kPa$$

$$= 231kPa$$