TES-Week4 submission

Tuesday, October 29, 2019 7:31 PM

Task 1:

R wood [section-A]= 0.03+0.14+0.11+0.63+0.079+0.12=1.109 m2. $^\circ \frac{C}{W}$

R Insulation [section B]= 0.03+0.14+0.11+3.528+0.079+0.12=4.007 m2. $^\circ \frac{C}{W}$

R overall=1/U overall

U wood=1/R wood

U wood= 1/1.109=0.9017 W/m2.°C

U insulation= 1/4.007=0.2496 W/m2. °C

U overall= (U*f area)insulation + (U*f area)stud

U overall= (0.9017*0.25)+(0.2496*0.75)=0.4126 W/(m2.°C)

Δ T= 22-(-2)=24 °C

$\dot{Q}$= U overall * A total * Δ T

Area= length * height = 50*2.5=125 m2

20 % wall's area = 0.8

$\dot{Q}$= 0.4126*(50*2.5)*0.8*24=990.24 W

Task 2:

There are 3 types of heat transfer:

1. Conduction;
2. Convection;

3. Radiation.

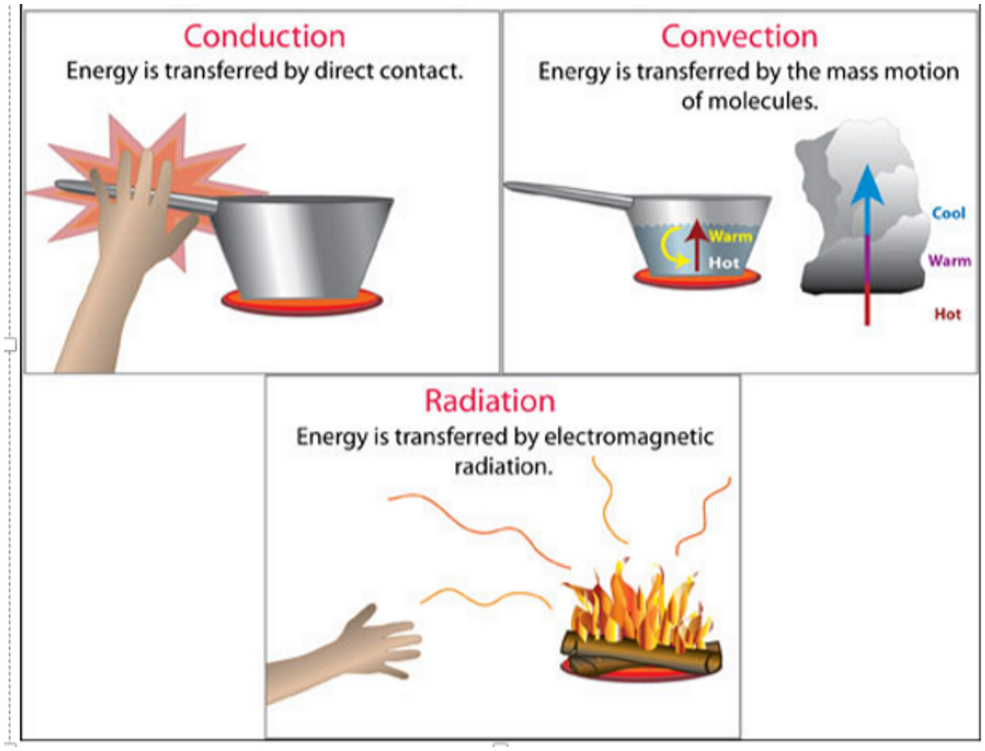


Figure 1- Source: http://www.neilorme.com/3typesofheattransfer.shtml

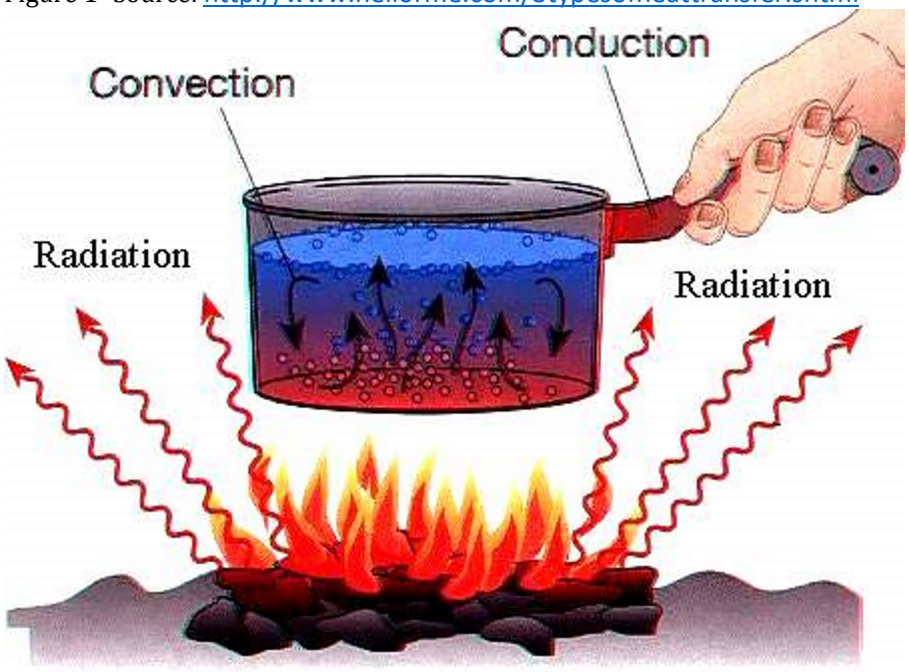


Figure 2 - Source: http://www.neilorme.com/3typesofheattransfer.shtml

Unless conduction and convection which need direct contact for transferring heat the Heat transfer through Radiation is the act of transferring heat between two bodies that are not in physical contact with each other and the heat transfers from a body with higher temperature to another body with lower temperature.

This kind of heat transfer can happen for all kinds of objects such as liquids,

solids or gas and it consist of electromagnetic waves that can travel at the speed of light. All objects are capable of absorbing and emitting radiation.

When the absorption and emission of energy become equal the object's temprature becomes stable; however if the absorption is higher than emission the temprature rises and vice versa if the emittion of energy is more than absorption the temprature of the object decreases.
If an object is a good absorber it can also emit energy well and of course if it can not absorb well it will be a poor emitter of energy.

The intensity of such energy flux depends on the temperature of the body and the nature of its surface . The radiation occurs at all temperatures.

The medium between two bodies have effect on the amount of heat transfer and if the medium is vacuum like outside earth's atmosphere the radiation is in its higher efficiency. A tangible example of heat transfer through radiation is the radiation of sun to our bodies. Unless the sun isn't in direct contact with us we can feel the heat when the sun shines and the radiation is more efficient in outer space.

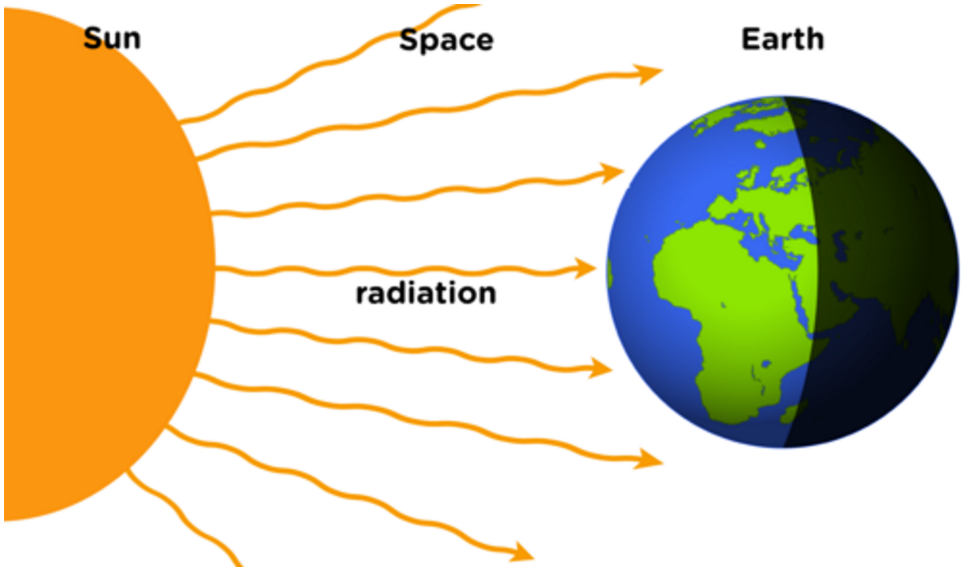
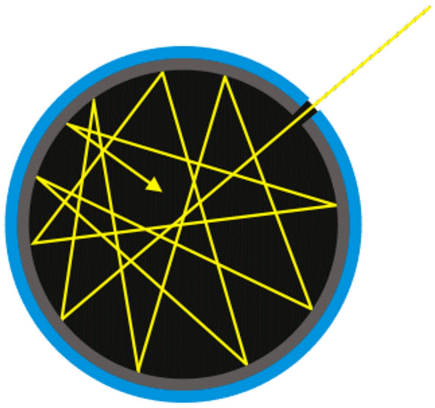


Figure 3 - Source:https://www.quora.com/Why-Heat-cannot-passes-through-vacuum

Black body: black body is a surface that absorbs radiation and reflects nothing.



Conceptual Black Body

Source: https://www.electrical4u.com/black-body-radiation/