

**National Institute of Open Schooling**  
**Senior Secondary**  
**Lesson 12 – Heat Transfer and Solar Energy**  
**WORKSHEET – 12**

- Q1.** The second law of thermodynamics state that the natural tendency of heat is to flow spontaneously from a body at higher temperature to a body at lower temperature. The transfer of heat continues until the temperatures of the two bodies become equal. There are three processes by which transfer of heat takes place. These are conduction, convection and radiation. Observe your surroundings and write two examples of each process with explanation how this happens.
- Q2.** How can we capitalize on the principles of heat transfer to improve the way we live? Perform one activity to observe and compare the principle of heat transfer in black and white body.
- Q3.** Why is it important to understand the processes by which transfer of heat takes place? What is the importance of material selection in choosing a pipe for a hot water system?
- Q4.** "Using different materials, we can either maximize heat transfer (with high conductance), or prevent it as much as possible (using insulators)". Observe the surroundings and give at least two examples from daily life.
- Q5.** You all are aware about the solar water heaters which use solar energy to heat water for domestic, commercial, and industrial needs. Explain how solar water heaters capture solar radiant energy and convert it to thermal energy? Observe and write uses of solar water heater.
- Q6.** Newton's law of cooling states that the rate of cooling of a hot body is directly proportional to the mean excess temperature of the hot body over that of its surroundings provided the difference of temperature is small. Observe your surroundings and give two applications of 'Newton's Law of Cooling'.
- Q7.** What is called for the phenomenon when the radiation absorbed by the atmosphere is re-radiated towards the surface of the Earth? Why have experts become worried about the greenhouse effect now? Which is the main feedback gas of the greenhouse effect?
- Q8.** You are required to perform an experiment, in which you take a beaker of water and place it on a Bunsen burner to boil the water. Then add a piece of copper tube into water, such that one end of copper tube is sticking out in air. Identify the forms of heat transfer in this experiment.
- Q9.** A pan filled with hot food cools from  $94^{\circ}\text{C}$  to  $86^{\circ}\text{C}$  in 2 minutes when the room temperature is at  $20^{\circ}\text{C}$ . How long will it take to cool from  $71^{\circ}\text{C}$  to  $69^{\circ}\text{C}$ ?

**Q10.** Water is boiled in a rectangular steel tank of thickness 2cm by a constant temperature furnace. Due to vaporization, water level falls at a steady rate of 1 cm in 9 minutes. Calculate the temperature of the furnace. Given  $K$  for steel =  $0.2 \text{ cal s}^{-1} \text{ m}^{-1} \text{ }^{\circ}\text{C}^{-1}$ )