

## LESSON - 4 THERMAL ENERGY AND HEAT Eureka plus 7th science Solution

### I. Tick(✓) the correct options.

1. Heat energy always flows from a

a region of lower temperature to a region of higher temperature.

b region of higher temperature to a region of lower temperature.

c. good conductor to a poor conductor.

d. poor conductor to a good conductor.

2. Thermal energy of a substance is due to the

a. temperature.

b. total energy of all the moving molecules.

c. flow of energy.

d. state of the substance.

3. Temperature of a certain amount of water indicates

a. the total internal energy contained in water.

b. the number of molecules present in water.

c. how hot or cold the water is.

c. that water is a good conductor of heat.

4. Plastics, wood, glass and air

a. are poor conductors of heat.

b. are poor insulators of heat.

c. are good conductors of heat.

d. do not conduct heat.

5. The thermos flask is made up of a double-walled glass vessel because glass is

a. a good conductor of heat.

b. poor conductor of heat.

c. Fluid.

d. poor insulator

6. Mercury is a a. gas. B. bad conductor of heat. C. solid. d. metal in liquid form at room temperature.

Ans. 1. region of higher temperature to a region of lower temperature

2. total energy of all the moving molecules

3. how hot or cold the water is

4. are poor conductors of heat

5. poor conductor of heat

6. metal in liquid form at room temperature

## II. Tick (✓) the true statements and cross (X) the false ones.

1. When a tumbler is filled with hot water, heat energy flows from the tumbler to the surrounding air.
2. When a cold metal rod is placed in contact with a flame, heat does not flow from the flame to the metal rod.
3. All metals are good conductors of heat.
4. Liquids and solids transfer heat through convection.
5. Convection currents give rise to breeze in coastal regions.
6. Black or dark-colored clothes reflect heat.

II. Ans 1. ✓      2. X      3. ✓      4. X      5. ✓      6. X

## III. Answer the following questions in one sentence.

1. What is thermal energy?

Ans Thermal energy is the total internal energy contained in a matter.

2. What does temperature of a substance indicate?

Ans : Temperature tells how hot or cold a substance is and also the measure of how fast or slow the molecules are moving.

3. Define heat.

Ans Heat is the thermal energy that flows.

4. Name two good conductors of heat. Ans: Iron and copper

5. What is a heat insulator?

Ans : Substance that does not allow heat to flow through it is called a heat insulator.

6. What is the lower point of an ordinary laboratory thermometer? III. Ans:

Ans: The lower point of an ordinary laboratory thermometer is  $0^{\circ}$ .

## IV. Answer the following questions in two to three sentences.

1. How is temperature different from thermal energy?

Ans: Thermal energy refers to the total energy possessed by a substance, whereas temperature tells how hot or cold a substance is.

2. How does transfer of heat take place?

Ans: Transfer of heat takes place through—conduction, convection and radiation. Solids transfer heat through conduction whereas liquids and gases conduct heat through convection. Radiation is a method of transfer of heat which does not need any medium.

3. How do we read a laboratory thermometer?

Ans: A laboratory thermometer has a thin capillary tube which has markings. The tube contains mercury, which is a good conductor of heat and expands on heating.

There are two fixed points that show the lowest and the highest temperature that can be measured by the thermometer.

When the thermometer comes in contact with a hot object, mercury expands and moves upwards in the capillary tube. This helps us to read a laboratory thermometer.

4. How does the fur of the polar bear help it to live in the Arctic region?

Ans: Polar bears have thick layers of fur which trap air and form an excellent heat insulating layer. This keeps the animals comfortably warm even when the atmospheric temperature drops below  $20^{\circ}\text{C}$

## V. Answer the following questions in detail.

1. Define the following: i. conduction ii. convection iii. radiation

Ans: i. Conduction is the mode of heat transfer when a hot object comes in contact with cold object. Heat energy is transferred from one molecule to other even though the individual molecules remain in the same place.

ii. Convection is the transfer of heat through a fluid from a region of higher temperature to a region of lower temperature by the movement of the fluid itself.

iii. Unlike conduction and convection, radiation is a method of heat transfer that does not need contact between a hotter object and a cooler object.

2. why does cold water kept in an open container become warm on a hot summer afternoon

Ans: An open container of cold water acquires heat from the warmer surrounding air. As a result, cold water becomes as warm as the air around it.

3. Why is the bulb of a thermometer made of thin glass?

Ans: As glass is a poor conductor of heat, the wall of the bulb is kept thin so that transfer of heat between the mercury and its surroundings can take place easily.

4. How does a thermos flask maintain the temperature of liquids kept in it ?

Ans: Thermos flask is made up of a double-walled glass vessel with vacuum (no air) between the walls. Glass being a poor conductor of heat reduces the transfer of heat from inside the flask as well as outside of it.

Convection is minimized by the vacuum in between the glass walls. Heat that could be transferred through radiation is reduced by silvering the walls of the vacuum flask. This reflects the heat rays either trying to enter the flask from outside or leave the flask from inside.

5. How do woollen garments keep us warm?

Ans: Woollen fibre curls and forms air pockets. The air trapped by a woollen garment is made warm by the heat from the body. This keeps the body warm as both wool and air are bad conductors of heat.

6. How do convection currents give rise to breeze in the coastal region?

Ans: Convection currents give rise to breeze in coastal regions. During the day, the land heats up faster than the sea. So the air above the land becomes warmer and rises upwards and in its place cooler air from above the sea rushes towards the land resulting in a sea breeze during the day. At night the opposite happens. The land cools faster than the sea, therefore, the air above the sea is warmer than the air over the land.

At night, cooler air from the land replaces the warmer air above the sea resulting in a land breeze.