

## NCERT QUESTIONS WITH SOLUTIONS

1. Choose the correct option in each case  
Your father bought a saucepan made of two different materials, A and B (Figure). The materials A and B have the following properties—



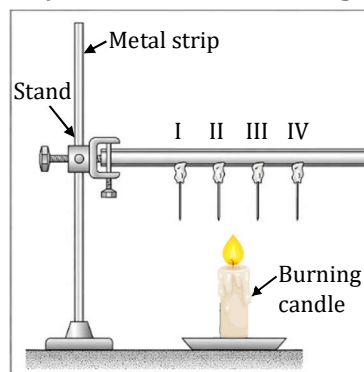
- (1) Both A and B are good conductors of heat
- (2) Both A and B are poor conductors of heat
- (3) A is a good conductor and B is a poor conductor of heat
- (4) A is a poor conductor and B is a good conductor of heat

### Option (3)

### Solution

The base of the saucepan (A) is directly in contact with the flame. Therefore, it must be made of a good conductor of heat such as copper, aluminium, or steel so that heat is quickly transferred to the food for cooking. The handle of the saucepan (B) is meant to be held by hand. Hence, it must be made of a poor conductor (insulator) like wood or plastic so that it does not get hot and can be held safely.

2. Pins are stuck to a metal strip with wax and a burning candle is kept below the rod (Figure). Which of the following will happen?



- (1) All the pins will fall almost at the same time
- (2) Pins I and II will fall earlier than pins III and IV
- (3) Pins I and II will fall later than pins III and IV
- (4) Pins II and III will fall almost at the same time

### Option (2)

### Solution

When the candle flame heats one end of the metal strip, heat is conducted along the strip from the heated end towards the other end. The pins that are nearer to the flame (pins I and II) receive heat first. The wax holding them melts earlier, so these pins fall before the ones placed farther away (pins III and IV). This shows that metals are good conductors of heat.

3. A smoke detector is a device that detects smoke and sounds an alarm. Suppose you are fitting a smoke detector in your room. The most suitable place for this device will be:
- (1) Near the floor
  - (2) In the middle of a wall
  - (3) On the ceiling
  - (4) Anywhere in the room

**Option (3)****Solution**

When something burns, the surrounding air becomes hot. This hot air along with the smoke rises upward due to convection. As a result, the maximum amount of smoke accumulates near the ceiling. Therefore, placing the smoke detector on the ceiling ensures that it senses the smoke at the earliest and gives a timely alarm.

4. A shopkeeper serves you cold lassi in a tumbler that has a small leak. You put it in another tumbler. Will this arrangement help to keep the lassi cold for a longer time? Explain.

**Solution**

When the tumbler with the lassi is placed inside another tumbler, a thin layer of air is trapped between the two tumblers. Air is a poor conductor of heat, so this air layer acts as an insulator and slows down the flow of heat from the warm surroundings into the cold lassi. As a result, the lassi remains cold for a longer time. This principle is similar to how a thermos flask works.

5. State with reason(s) whether the following statements are True (T) or False (F).

- (i) Heat transfer takes place in solids through convection.

**Solution:** False

**Reason:** In solids, particles are fixed in position and can only vibrate. Since there is no bulk movement of particles, heat transfer occurs by **conduction**, not convection.

- (ii) Heat transfer through convection takes place by the actual movement of particles.

**Solution:** True

**Reason:** In liquids and gases, the warmer and lighter regions rise, while the cooler and denser regions sink. This actual movement of particles sets up **convection currents** which transfer heat.

- (iii) Areas with clay materials allow more seepage of water than those with sandy materials.

**Solution:** False

**Reason:** Clay has very small pores, so water movement is very slow. Sandy soil has larger pores, which allow water to seep through much more easily.

- (iv) The movement of cooler air from land to sea is called land breeze.

**Solution:** True

**Reason:** At night, land cools faster than sea. The air above the land becomes cooler and denser, so it moves towards the sea, while the warmer sea air rises. This movement is called **land breeze**.

6. Some ice cubes placed in a dish melt into water after some time. Where do the ice cubes get heat for this transformation?

**Solution**

The temperature of ice is lower than that of its surroundings. Heat always flows from a warmer body to a colder one. Therefore, heat energy is transferred to the ice from the warmer air around it, from the dish in which it is kept, and from our hands if we touch it. This heat supplied by the surroundings weakens the bonds between the ice particles, which allows the solid ice to change into liquid water. Thus, the ice melts into water by absorbing heat from its surroundings.

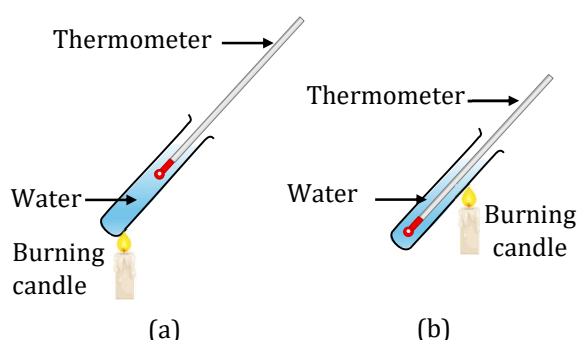
7. A burning incense stick is fixed, pointing downwards. In which direction would the smoke move? Show the movement with a diagram.

### Solution

When the incense stick burns, the air around its tip gets heated. This heated air expands, becomes lighter (less dense), and rises upward. The smoke particles produced by the burning stick are carried along with this rising warm air. Thus, the smoke always moves upward due to convection currents in the air.



8. Two test tubes with water are heated by a candle flame as shown in figure (a) and figure (b). Which thermometer will record a higher temperature? Explain.



### Solution

In figure (a), the thermometer is placed at the top of the test tube while the candle flame heats the bottom. The water at the bottom gets heated first. As it becomes warm, it rises upward due to **convection currents**, carrying heat to the upper region where the thermometer is located. Thus, the thermometer in this position quickly shows a rise in temperature.

In figure (b), the thermometer is placed at the bottom of the test tube, but the flame is heating the side. Side heating is less effective in transferring heat directly to the water near the thermometer bulb at the bottom. Hence, the thermometer in figure (a) records a higher temperature than the one in figure (b).

9. Why are hollow bricks used to construct the outer walls of houses in hot regions?

### Solution

Hollow bricks trap air inside them. Since air is a poor conductor of heat, this trapped air acts as an insulator. It reduces the transfer of heat from the hot outside environment to the inside of the house. As a result, the interiors remain cooler and more comfortable in hot regions.

10. Explain how large water bodies prevent extreme temperature in areas around them.

### Solution

Large water bodies such as seas and oceans help to keep the climate of nearby areas moderate.

**During the day:** Land heats up faster than water. The air above the land becomes hot and rises, while the cooler air above the sea flows towards the land. This **sea breeze** keeps the land cooler.

**During the night:** Land cools down faster than water. The air above the sea stays warmer, while the cooler, denser air from the land moves towards the sea. This **land breeze** helps in balancing the temperature. Thus, the continuous exchange of air between land and sea prevents extreme temperatures and keeps coastal regions moderate.

11. Explain how water seeps through the surface of the Earth and gets stored as groundwater.

**Solution**

Water seeps through the surface of the Earth by slowly passing through the soil and porous rocks. This process is called infiltration. As the water continues to move downward, it fills the pores and cracks present in the soil and rocks. The water thus stored beneath the surface is called groundwater.

The underground layers of soil, sand, and rocks that can hold and supply water through their pore spaces are known as **aquifers**. These aquifers act as natural reservoirs of groundwater, which can be tapped for use through wells, hand pumps, and tube wells.

12. “The water cycle helps in the redistribution and replenishment of water on the Earth.” Justify the statement.

**Solution**

The water cycle ensures the continuous movement of water between the land, oceans, and atmosphere, which helps in its redistribution and replenishment on Earth.

Water from oceans, rivers, lakes, and other water bodies evaporates due to the Sun’s heat. This water vapour rises up, cools, and changes into tiny droplets to form clouds (condensation). These droplets combine and fall back to the Earth as precipitation in the form of rain, snow, or hail.

The rainwater then refills rivers, lakes, and groundwater through infiltration.

Thus, the water cycle maintains the balance of water on Earth and ensures its continuous availability for all living beings.