# Chapter 9: Heat

**Question. 1. Fill in the blanks with the proper word from the brackets:**
**(radiation, white, conduction, blue, convection, bad conductor, absorb, good conductor, black, reflection)**

(1) Maximum heat is absorbed by a **black** coloured object.
(2) **Radiation** of heat does not require a medium.
(3) Conduction of heat takes place through a **good conductor** substance.
(4) The shining surface in a thermos flask decreases the outgoing heat by **reflection**
(5) Cooking utensils are made from metals due to their property of **conduction**
(6) The earth receives heat from the sun by **radiation**
(7) Some heat is lost from a thermos flask by **conduction** from the lid.
(8) Dark clothes are used in winter because they **absorb** heat.

**Question. 2. Find the odd man out**
**(1) Copper, silver, iron, wood**
**Answer:** Wood
**(2) Tea cup, plastic tumbler, silver vase, glass tumbler**
**Answer:** Silver vase
**(3) Conduction, convection, expansion, radiation**
**Answer:** Expansion

**Question. 3. Write whether the following statements are true or false. Rewrite the false statements after correcting them:**
**(1) Mien is a good conductor of heat.**
**Answer:** False. Metal is a good conductor of heat.
**(2) Plastic is a bad conductor of heat**
**Answer:** True
**(3) Density of hot water is more than that of cold water.**
**Answer:** False. Density of cold water is more than that of hot water.
**(4) For convection of heat cold medium is required.**
**Answer:** False. For convection of heat, a fluid medium (liquid or gas) is required, not necessarily cold.
**(5) Heat flows from cold place to hot place.**
**Answer:** False. Heat flows from hot place to cold place.
**(6) Enclosed air is a good conductor of heat.**
**Answer:** False. Enclosed air is a bad conductor of heat.

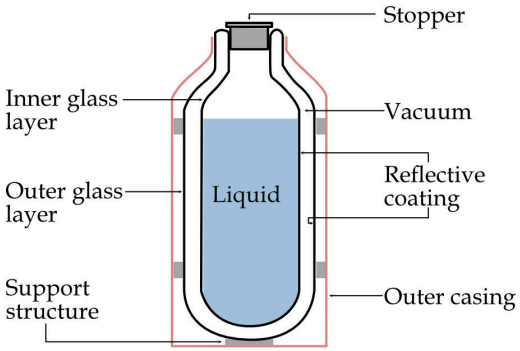
**Question. 4. Answer the following questions in one sentence:**
**(1) How does a fever get lowered with cold compress on forehead of a patient?**
**Answer:** A cold compress absorbs heat from the body through conduction, lowering the body temperature.
**(2) What are the modes of heat transfer?**
**Answer:** The modes of heat transfer are conduction, convection, and radiation.
**(3) What are good conductors of heat? Give 2 examples.**
**Answer:** Good conductors of heat are materials that easily transfer heat. Examples: Copper and Aluminum.
**(4) What are bad conductors of heat? Give 2 examples.**
**Answer:** Bad conductors of heat are materials that do not easily transfer heat. Examples: Wood and Plastic.

**(5) Why are solar cookers painted black from outside?**
**Answer:** Solar cookers are painted black because black absorbs more heat from sunlight, helping to cook food faster.
**(6) Why are cycle tube tyres pumped in with less air in summer?**
**Answer:** In summer, air expands due to heat, so cycle tyres are pumped with less air to prevent them from bursting.
**(7) Why are thermos flask (Dewar flask) used?**
**Answer:** Thermos flasks are used to keep liquids hot or cold by preventing heat transfer through conduction, convection, and radiation.

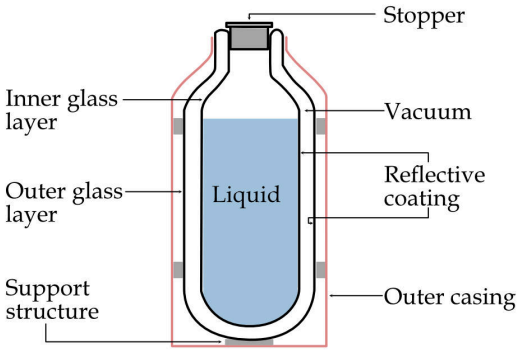
**Question. 5. Answer the following questions in short:**
**(1) Why are the houses in Rajasthan painted white?**
**Answer:** Houses in Rajasthan are painted white to reflect sunlight, which helps in reducing heat absorption and keeps the interiors cool during the hot summers.
**(2) Explain which mode of heat transfer causes sea breezes and land breezes?**
**Answer:** Sea breezes and land breezes are caused by convection, where warm air rises and cooler air from the sea or land flows in to replace it, creating a breeze.
**(3) Why is the outer coat of penguins of Antarctica black?**
**Answer:** Penguins have a black outer coat to absorb heat from sunlight, which helps them maintain body warmth in the freezing Antarctic conditions.
**(4) Why are heaters fitted near the floor and air conditioners, near the ceiling in a room?**
**Answer:** Heaters are fitted near the floor because warm air rises, and air conditioners are placed near the ceiling because cool air sinks, ensuring effective circulation of air in the room.
**(5) Which one of these will absorb the heat?**
**Steel spoon, wooden board, glass, vessel, iron griddle (tava), glass, wooden spoon, plastic plate, soil, water, wax.**
**Answer:** Steel spoon, vessel, iron griddle (tava), and water are good heat absorbers, as they conduct heat well.
**(6) The side of a lantern is provided with holes on the lower side.**
**Answer:** The holes at the bottom allow air to flow in, which helps in maintaining the flame by providing oxygen necessary for combustion.
**(7) Why do we feel warm near the bon fire?**
**Answer:** We feel warm near the bonfire due to radiation, where heat energy travels through the air and warms our body directly.
**(8) Why are thin bottom copper vesela applied with a layer of mud from outside while cooking?**
**Answer:** A layer of mud is applied to copper vessels to prevent direct exposure to high flames, distributing heat evenly and protecting the copper from damage.
**(9) What is an infra-red camera? What is it used for?**
**Answer:** An infrared camera detects heat energy (infrared radiation) emitted by objects and is used for thermal imaging, night vision, and detecting heat loss or electrical faults.
**(10) Why do concrete roads have gaps filled with tar?**
**Answer:** Gaps in concrete roads filled with tar allow for expansion and contraction due to temperature changes, preventing cracks and damage.
**(11) What is meant by thermoware? (HOTS)**
**Answer:** Thermoware refers to insulated containers designed to maintain the temperature of hot or cold items, preventing heat transfer by conduction, convection, and radiation.

**Question. 6. Answer the following questions with neat and well-labelled diagrams:**
**(1) Explain the construction and function of the thermos flask.**
**Answer:**
A thermos flask is designed to minimize heat transfer and maintain the temperature of the contents, whether hot or cold. It consists of the following components:

- **Outer Shell:** Made of plastic or metal for durability and protection.
- **Inner Lining:** Usually made of glass or stainless steel with a reflective coating to prevent heat transfer via radiation.
- **Vacuum Layer:** The space between the inner lining and outer shell is a vacuum, which reduces heat transfer by conduction and convection.
- **Stopper:** Seals the flask, preventing air exchange and minimizing heat loss by convection.
- **Reflective coating:** Reflect the heats




**Function:**
The thermos flask maintains the temperature of liquids by limiting heat transfer. Hot liquids stay warm, and cold liquids stay cool for long durations.
**(2) Draw a well-labelled and neat diagram of thermos flask.**
**Answer:**




**Question. 7. Explain the following:**
**(1) Conduction of heat:**
**Answer:** Heat is transferred through direct contact between particles in solids. It occurs when one part of an object is heated, and the heat spreads to adjacent areas.
**(2) Convection of heat:**
**Answer:** Heat is transferred by the movement of fluids (liquids or gases). Warmer, less dense fluid rises, and cooler, denser fluid sinks, creating a circulation pattern.
**(3) Radiation:**
**Answer:** Heat is transferred through electromagnetic waves, without needing a medium. This type of heat transfer occurs in all directions, like sunlight warming the earth.

**Question. 8. Use your brain power!**
**(1) Why do we wear woollen clothes in winter? (Textbook page 59)**
**Answer:** Woollen clothes trap air, which acts as an insulator, keeping the body warm by preventing heat loss during the cold winter months.
**(2) Why do we use white clothes in summer and dark or black clothes in winter? (Textbook page 61)**
**Answer:** White clothes reflect heat, keeping us cool in summer, while dark or black clothes absorb heat, helping us stay warm in winter.

**(3) Why is there a gap at the joints of rails and of cement concrete bridges? (HOTS) (Textbook page 62)**
**Answer:** Gaps are left to allow for expansion due to heat during summer, preventing damage or bending when materials expand.
**(4) Why is mercury or alcohol used in a thermometer? (Textbook page 62)**
**Answer:** Mercury and alcohol expand uniformly with temperature changes, making them ideal for accurately measuring temperature.

**Question. 9. Give scientific reasons**
**(1) An ordinary glass bottle cracks when boiling water is poured into it, but a borosil glass bottle does not**
**Answer:** Ordinary glass cannot handle sudden temperature changes and expands unevenly, causing it to crack. Borosil glass, with its low thermal expansion, can withstand rapid heating without breaking.
**(2) The telephone wires which sag in summer become straight in winter.**
**Answer:** Metal wires expand due to the heat in summer, causing them to sag. In winter, the cooler temperatures cause the metal to contract, pulling the wires tighter and making them straight.
**(3) Dew drops are formed on the grass, in winter.**
**Answer:** During winter, the temperature of the ground drops, cooling the air around it. This causes the moisture in the air to condense into water droplets, forming dew on the grass.
**(4) In winter, why does an iron pillar feel colder than a wooden pole?**
**Answer:** Iron is a good conductor of heat, so it draws heat from your hand quickly, making it feel colder. Wood, being a poor conductor, does not transfer heat as efficiently, so it feels warmer.
**(5) We can feel the heat of a table lamp under it.**
**Answer:** The heat from the table lamp is transferred through radiation, which warms the area beneath it, allowing us to feel the warmth without direct contact.
**(6) The upper layers of water in a deep well are cool but those in a pond are warm.**
**Answer:** In a deep well, sunlight does not penetrate to warm the water, keeping the upper layers cool, while in a pond, sunlight heats the surface, making the top layers warmer.
**(7) Ice is kept in sawdust to keep it from melting for a longer time.**
**Answer:** Sawdust acts as an insulator. It reduces the transfer of heat to the ice also slowing down its melting process. Hence, Ice is kept in sawdust to keep it from melting for a longer time.
**(8) An iron tyre is heated before it is fitted on a wheel.**
**Answer:** Heating the iron tyre causes it to expand. It make it easier to fit on the wheel. When it cools, it contracts and fits tightly around the wheel.