

Heat

Exercise 26:

Solution 1(a):

When you rub your palms heat is generated and on touching your cheeks your palms feel warm.

Solution 1(b):

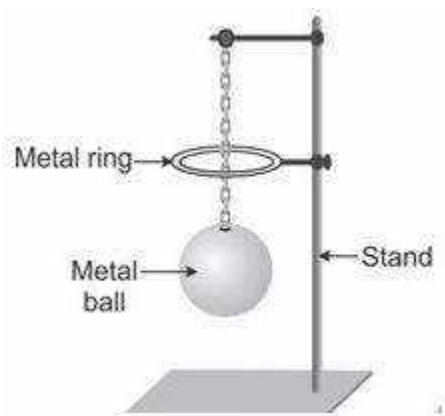
Objects	Hot or Cold
Ice cream	Cold
Cup of tea	Hot
Iced water	Cold
Stone placed in sunlight	Hot
Wet clothes	Cold
Piece of Ice	Cold

Exercise 28:

Solution 1(a):

A heated sphere cannot pass through a ring of almost the same diameter because on heating the sphere expands and its size increases.

Solution 1(b):



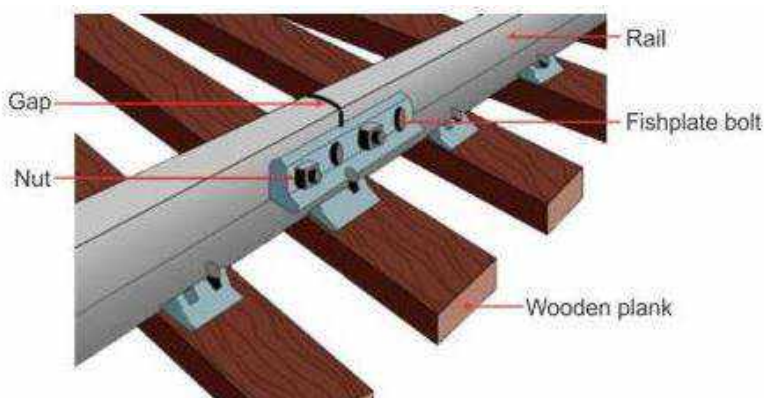
Yes, the cold sphere can pass through a ring of almost the same diameter. This is because when we heat the sphere it expands and its size increases. But when it is cooled down it contracts and regains the same size thus passing easily through the ring.

Solution 1(c):

If a cold metallic sphere does not pass through a ring, we can heat the ring. Due to heating, the ring expands and its diameter increases. Thus, the cold metallic sphere can now be passed through the ring.

Solution 1(d):

Metals expand on heating. Rail tracks are made of steel. During summer there is linear expansion of the rails due to heat. If no gaps are kept between the rails they would bend sideways and get distorted. This would increase the chance of train accidents. Hence, at the joint of two rails of railway, a small gap is always kept.



The side-plate holding the two rails together also has slits in which bolts can slide along with the rails.

Solution 1(e):

All metals expand when heated and contract when cooled. Electric cable wires are made of metals. In summer these cable wires expand due to heat and bend more between two poles as compared to winter.

Exercise 29:**Solution 1(a):**

To cover a wheel of a bullock cart with an iron ring, the blacksmith makes the iron ring slightly smaller in diameter than that of the wheel. The ring is heated when it is to be fitted onto the wheel. Due to heating, the ring expands and fits the wheel. Then it is cooled by pouring cold water over it. The ring contracts on cooling and fits tightly over the wheel.

Solution 1(b):



Water expands on heating and its volume increases. When we heat the glass bottle, the water in it gets heated and expands. Due to expansion, the volume of the water increases and more water enters into the refill, i.e. the level of water in the refill rises.

Solution 1(c):

Water contracts on cooling and its volume decreases. Thus, when the water cools, the water level in the refill decreases due to contraction.

Exercise 30:

Solution 1(a):

The shape of the balloon changes and it gets inflated.

This is because when the glass bottle is heated, the water in the bottle gets heated and vapourises. Due to this the air molecules above the surface of the water in the bottle gets heated and expand. The expanded air fills the space in the balloon. Hence, the balloon is inflated and its shape changes.

Solution 1(b):

When the bottle is cooled down the balloon deflates and comes back to its original form. This is because when the bottle is cooled, the gas molecules present in the bottle contract and the volume decreases.

Exercise 31:

Solution 1(a):

Air expands when heated. In summer, air molecules in the tyre expand due to the heat. This increases the volume of the air molecules in the tyre. Thus these air molecules occupy more space and the tyre is forced to expand, eventually bursting.

Solution 1(b):

In a pressure cooker, at very high temperature and pressure steam is produced. As the

temperature increases, the enclosed steam causes extreme pressure inside the cooker. When the pressure reaches a certain level, it raises the heavy whistle of the cooker. Due to this, some steam escapes out of the cooker and the pressure inside is maintained.

Exercise 32:

Solution 1(a):

In solids thermal transformation takes place by conduction method.

Solution 1(b):

The pins attached to the end of the wire close to the candle flame (right side) will fall down first because it gets heated first, melting the wax holding the pins.

Solution 1(c):

The pins attached to the end of the metal strip away from the candle flame (left side) fall down last. The wax holding these pins melts last, as it takes time to get heated by the rod.

Solution 1(d):

The candle is placed below the right side of the rod. So, initially the right side of the rod gets more heat from the candle flame and gets heated first. The left side of the rod remains relatively cool. On further heating, heat is transferred from the hotter end to the colder end of the rod. As heat travels from the hotter end to the colder end along the rod, it melts the wax which holds the pins. Due to this the pins fall one at a time, and not together.

Exercise 33:

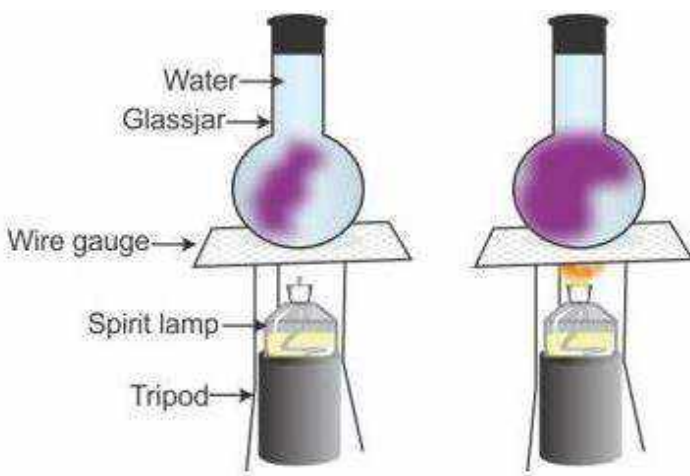
Solution 1(a):

Frying pan, pressure cooker, tongs, vessel (pan), griddle, and so on.

Exercise 34:

Solution 1(a):

When crystals of potassium permanganate are added to water, it slowly dissolves and forms a purple coloured solution around itself. Then, slowly purple coloured streaks rise from the bottom of the glass jar to the surface of the water and sink near the walls of the glass jar as shown in the figure.



These purple streaks show the convection currents in the water, which transfer heat.

Solution 1(b):

When water is heated, the water molecules near the burner get heated first and become lighter. Thus, it rises upward. The cold air above sinks downwards to the bottom of the jar to take place of the hot water molecules. This process of hot water molecules moving upwards and cold water molecules moving downwards happens repeatedly.

Solution 1(c):

1. Roof extractor fan: It works as a ventilator and increases the circulation of air in factories. It helps the hot air to escape from the room through the top. Due to this, fresh air can enter the room in its place.
2. Ventilator: It helps hot air in the room to escape out and allows fresh air to enter the room. This way, circulation of air takes place in the room.

Exercise 35:

Solution 1(a):

When a dish is kept in sunlight for some time it becomes hot.

Solution 1(b):

The dish kept in sunlight becomes hot due to the heat transferred from the Sun by the process of radiation.

Solution 1(c):

1. Firewood is used for cooking food.
2. An electric bulb gives us light.

3. An oven is used for baking.
4. A solar cooker is used to cook food.
5. A solar heater is used for heating water.

Exercise 36:

Solution 1(a):

In the following instruments heat is transported by radiation:

1. Solar dryer
2. Thermos flask
3. Thermo ware tiffin boxes

Solution 1(b):

In our daily life, we keep wet clothes in the sunlight to help them dry. Food grains, harvested crops, certain pickles and some edible food like papad, wafers are also kept in the sunlight for drying. In all these substances drying occurs by the radiation of heat.

Solution 1(c):

Solar energy reaches the surface of the Earth by radiation. The surface of the Earth absorbs the heat and becomes hot. In contrast, the intervening air or the air above the Earth's surface is heated to a lesser extent. So, the air is comparatively cool on hill stations located situated on mountains. Hence, people go to hill stations in summer.

Solution 1(d):

Instruments heated by heat conduction	Substances heated by heat convection
Vessels, frying pan, pressure cooker, griddle, tongs etc.	Liquids like water or milk kept for heating in a vessel, the hot air in the kitchen, hot air coming from the chimney of a kitchen etc.

Exercise 37:

Solution 1(a):

The wax on the copper strip melts first.
 The on the iron strip wax does not melt.
 The wax on the copper and aluminum strips melts.

Solution 1(b):

Good conductors of heat	Bad conductors of heat
Iron, mercury, gold, silver, bronze, aluminum, copper, brass, etc.	Wood, Bakelite, wool, saw dust, plastic, paper, leather, rubber, glass, asbestos, etc.

Exercise 38:

Solution 1(a):

Plastic, wood and ebonite are poor conductors of heat. . This enables a person to pick the cooking vessel even when it is hot since these handles prevent heat transfer. Therefore they do not become hot and so do not cause burns. Hence, these materials are used to make handles of cooking utensils.

Exercise 39:

Solution 1:

No, there is no change in the temperature of the water.

Solution 2:

There is a plastic bottle inside the bottle. The space between these two bottles is filled with paper. Plastic and paper are both poor conductors of heat. This prevents the outer atmospheric heat from entering in the interior of the bottle. Hence, there is no transfer of heat the water in the bottle remains cool for a longer duration of time.

Solution 3:

Paper is a poor conductor of heat. The layers of papers ensure that there is the transfer of heat is very low. Hence paper is used in the bottle.

Exercise 40:

Solution 1(a):

Thermocol is a poor conductor of heat. If ice is placed in thermocol, it prevents the outside heat from reaching the ice and melting it. Hence, when placed in thermocol, ice can be stored for a longer time period without melting.

Solution 1(b):

Yes. Thermocol is a poor conductor of heat. If hot objects are placed in a thermocol box, then heat from the hot object does not come in contact with the outer atmosphere. This helps the object kept in the box to remain hot for a longer time period.

Solution 1(c):

Sr. No.	Instrument (Object)	Good conductor or poor conductor	Uses
1.	Leather shoes or chappals	Poor conductor	To walk on the ground.
2.	Steel vessel or pan	Good conductor	To cook food
3.	Cotton clothes	Poor conductor	To protect from heat
4.	Handle of a pan	Poor conductor	To hold the hot pan with the help of the handle.

Exercise 41:

Solution 1:

Convection, conduction and radiation are three ways in which transfer of heat takes place.

Solution 2:

Yes. In this case transfer of heat takes place by radiation.

Solution 3:

Ventilators are constructed on the upper parts of walls to remove hot air from a room. The hot air in a room becomes lighter and rises up. This hot air escapes out from the ventilators and fresh air enters the room to take its place. This is how ventilators help in circulating air in a room.

Solution 4:

Poor conductors: Paper, leather, plastic, cloth, asbestos, wool, feather, a cardboard, a cork, ebonite.

Good conductors: Iron

Solution 5.1:

We use a piece of cloth or a pair of tongs to take a pan away from the stove. This is because the pan becomes hot due to heating and if touched directly can burn our hands. Since a piece of cloth acts as a poor conductor of heat it can be used to lift the pan. Also, when tongs are used, there is no direct contact with the hot pan, and hence we do not burn our hands.

Solution 5.2:

Cotton and leather are poor conductors of heat.

Cotton clothes absorb sweat and do not make us feel uneasy by the hot sweltering

weather.

Leather chappals prevent our feet from coming in direct with the hot road so that our feet do not burn.

Solution 6.1:

KMnO_4

Solution 6.2:

Thermocol box