Heat - Quiz

Multiple Choice Questions: Choose the most appropriate answer.

Q1. In which method of transfer of heat do the molecules travel from the hot to the cold portion?

a. Conduction b. Convection c. Radiation d. All of the above.

Q2. Handles of cooking utensils should be made of a material that

a. Conducts heat well b. does not conduct heat well

c. Radiates heat well d. does not radiate heat well

Q3. Convection occurs in

a. Solids only b. liquids only c. gases only d. liquids and gases only

Q4. Mercury does not rise or fall in a clinical thermometer when taken out of the mouth because

i) It is smaller than a laboratory thermometer.
ii) It has a thin stem.
iii) It has a kink just above the bulb of the thermometer.
iv) None of the above.

Q5. The inside of a solar cooker and the pipes of a solar water heater are painted black because black surface is a

i) Good reflector of heat
ii) Good absorber of heat
iii) Poor absorber of heat
iv) Good radiator of heat

Q6. A marble tile would feel cold as compared to a wooden tile on a winter morning. Because the marble tile

a) Is a better conductor of heat than the wooden tile.
b) Is polished while wooden tile is not polished.
c) Reflects more heat than wooden tile.
d) Is a poor conductor of heat the wooden tile.

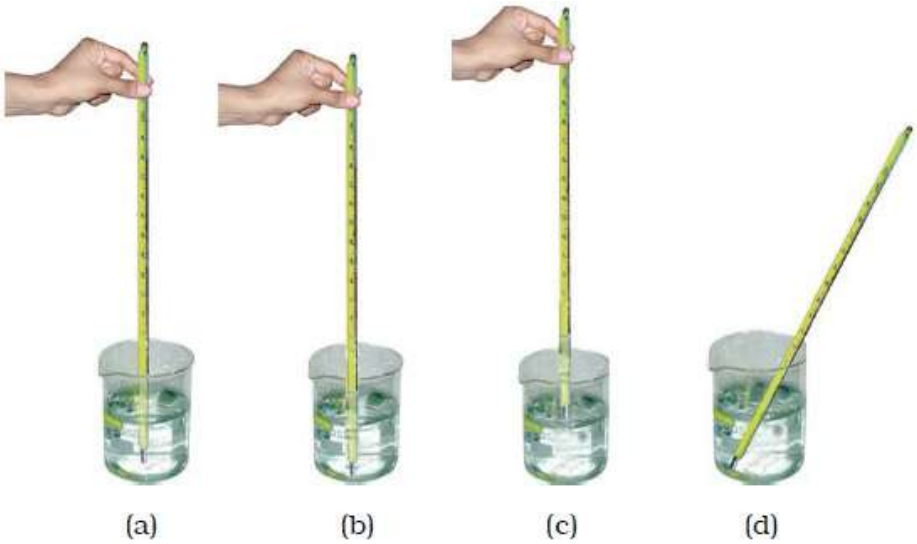
Q7. A beggar wrapped himself with a few layers of newspaper on a cold winter night. This helped him to keep himself warm because

a) Friction between the layers of newspaper produces heat.
b) Air trapped between the layers of newspaper is a bad conductor of heat.
c) Newspaper is a conductor of heat.
d) Newspaper is at a higher temperature than the temperature of the surrounding.

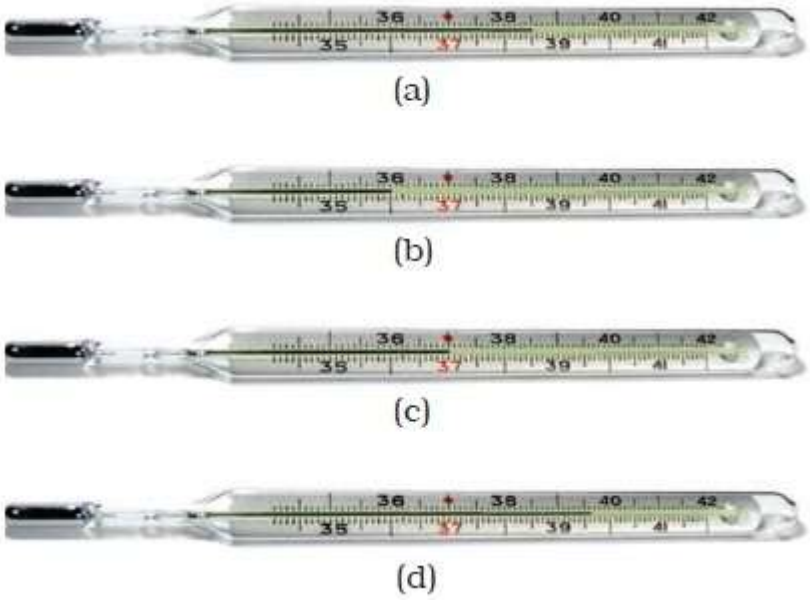
Q8. Ram and Shyam measured their body temperature. Ram found his to be 98.6 F and Shyam recorded 37 C. Which of the following statement is true?

a) Ram has a higher body temperature than Shyam.
b) Ram has a lower body temperature than Shyam.
c) Both have normal body temperature.
d) Both are suffering from fever.

Q9. Four arrangements to measure temperature of ice in beaker with laboratory thermometer are shown in given figure (a, b, c, d). Which one of them shows the correct arrangement for accurate measurement of temperature?



Q10. In given figure shows the readings on four different thermometers. Indicate which of the reading shows the normal human body temperature?

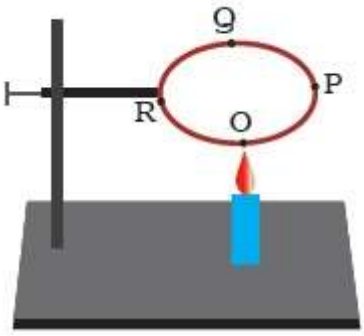


Very Short Answer Questions

Q1. Shopkeepers selling ice blocks usually cover them with jute sacks. Why?

Q2. To keep her soup warm Seema wrapped the container in which it was kept with a woolen cloth. Can she apply the same method to keep a glass of cold drink cool? Give reason for your answer.

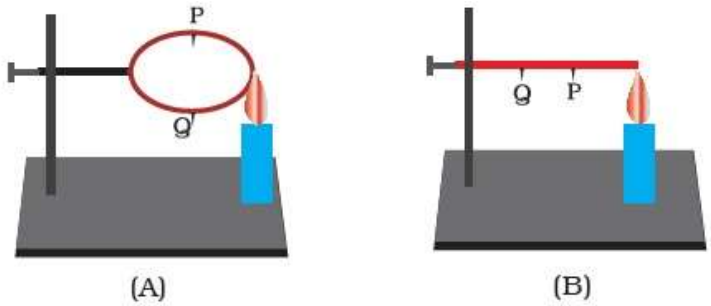
Q3. A circular metal loop is heated at point O as shown in given figure.



(i) In which direction would heat flow in the loop?

(ii) In which order the pins at points P, Q and R fixed with the help of wax fall if points O, P, Q and R are equidistant from each other?

Q4. In the arrangements A and B shown in given figure, pins P and Q are fixed to a metal loop and an iron rod with the help of wax. In which case are both the pins likely to fall at different times? Explain.



(A) (B)

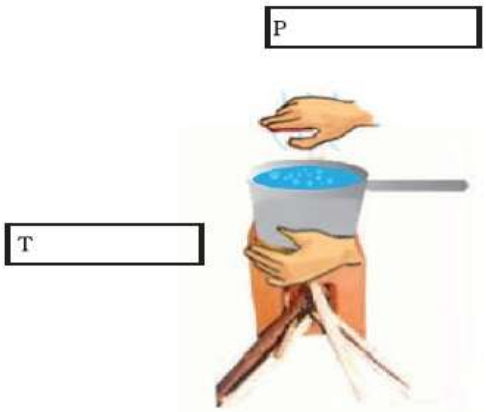
Q5. For setting curd, a small amount of curd is added to warm milk. The microbes present in the curd help in setting if the temperature of the mixture remains approximately between 35 C to 40 C. At places, where room temperature remains much below the range, setting of curd becomes difficult, Suggest a way to set curd in such a situation.

Q6. You may have noticed that a few sharp jerks are given to clinical thermometer before using it. Why is it done so?

Q7. At a camp site there are tents of two shades one made with black fabric and the other with white fabric. Which one will you prefer for resting on a hot summer afternoon? Give reason for your choice. Would you like to prefer the same tent during winter?

Q8. While constructing a house in a coastal area, in which direction should the windows preferably face and why?

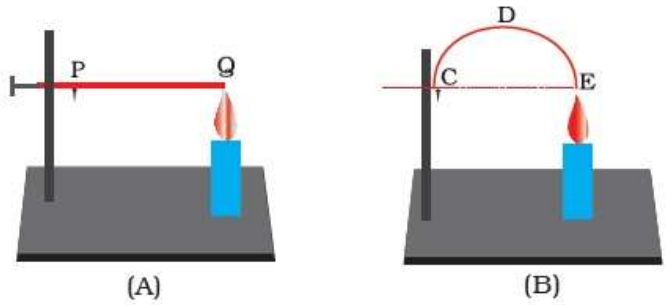
Q9. Observe the picture given. Water is being boiled in a pan of wide bases.



(i) Which position P or T will feel warmer?

(ii) Fill up the boxes P and T to indicate the mode of flo0w of heat to the hand.

Q10. Look at the given figure



The length of wire PQ in case of A is equal to the diameter of the semicircle formed by the wire CDE, incase B. One pin is attached to each wire with the help of wax as shown in figure. Which pan will fall first? Explain.

Q11. By which mode is heat transferred in solids?

Q12. Are most metals good or bad conductors of heat?

Q13. Gases are insulators of heat. True or false?

Q14. By which mode is heat transferred in liquids?

Q15. Name a liquid which is a good conductor of heat.

Q16. When you heat water in a pan, by which mode does most of the heat travel in water conduction, convection or radiation?

Q17. In which mode of transfer of heat does the medium not get heated up?

Q18. A thermos flask consists of a double-walled glass vessel with the space between them filled with air, which is a bad conductor of heat. True or false?

Q19. Radiant heat falling on a body is partly absorbed and partly _____. Some of it may also be _____.

HOTS Questions: Think and Answer.

Q1. Give reasons for the following:

(a) It saves fuel if we cook food in a vessel which is blackened at the bottom and polished from the sides.
(b) Birds puff up their feathers in winter.
(c) Two thin woolen sweaters are warmer than a thick woolen sweater.

Q2. In water, heat travels up much faster than it travels down. Explain.

Q3. In places with hot climate, it is advised that the outer walls of houses be painted white. Explain why.

Q4. Two objects at the same temperature - on bigger than the other - are placed in contact. Will heat be transferred from one object to another? Explain.

Q5. In a room it is best to place a room heater on the floor but an air conditioner near the ceiling. Why?

Q6. Why are cloudy nights warmer than clear nights?

Q7. Why are back of refrigerators painted black?

Q8. How does a thermos flask work?

Answer

Multiple Choice Questions: Choose the most appropriate answer.

Q1. b). Convection

Q2. b). does not conduct heat well.

Q3. d). liquids and gases only.

Q4. iii) it has a kink just above the bulb of the thermometer.

Q5. ii) good absorber of heat.

Q6. a). Is a better conductor of heat than the wooden tile.

Q7. b). air trapped between the layers of newspaper is a bad conductor of heat.

Q8. c). Both have normal body temperature.

Q9. (a)

Q10. (c)

Very Short Answer Questions

Q1. Since, a jute sack is a thermal insulator therefore it helps ice not to melt immediately. So, shopkeepers must use insulating materials like sack, saw dust, newspaper etc, to cover the ice.

Q2. Yes, she can apply the same method to keep a glass of cold drink cool because wool is a thermal insulator, and it cannot allow heat to pass through it.

Q3. (i) Heat will flow from point O towards pins at point R & pin at Point P. So, pins at R & P will fall first.

(ii) Later the pin at point Q will get heated enough to fall.

Q4. In case of B, the pin P will fall earlier than Q because it will get heated first. However in case of A both the pins will get equally heated and will fall almost at the same time.

Q5. For the setting of curd at places where temperature is below room temperature, the container in which curd is to be made, must be kept in a thermally insulated cover or it can be wrapped either by a woollen material or a jute sack so that temperature is maintained for the setting of curd.

Q6. So as to get the mercury level down below the normal body temperature.

Q7. Since white colour is a bad absorber of heat & reflects it. I would like to sleep in it during summers as it will be cooler. In winters, I will prefer the black tent as it will be warmer.

Q8. The windows should preferably face towards the sea as the cool sea breeze will keep it cool during day time.

Q9. (i) P will be warmer because of the hot air rising up.

(ii) P = Convection T = Radiation

Q10. Pin in figure (A) will fall first as the heat will reach it before it reaches C in figure (B).

Q11. Conduction

Q12. Good conductors.

Q13. True.

Q14. Convection

Q15. Mercury

Q16. Convection

Q17. Radiation

Q18. True.

Q19. Reflected, transferred.

HOTS Questions: Think and Answer.

Q1.

(a) Black colour is a good absorber of Electricity. A shiny metal however reflects back heat. Hence by painting the bottom black, the utensil is able to absorb maximum heat. The shiny coating inside makes sure that the heat absorbed is not lost and stays within the utensil by reflection.

Hence, by having black bottom and shiny inner surface we can utilise the maximum heat given to the utensil.

(b) When the *birds puff up their feather*, they trap a large amount of air which is a bad conductor of heat. So birds fluff up in the cold to trap as much air in their feathers as possible. The more trapped air, the warmer the bird."

(c) Multiple layers of clothing has air pockets between the layers. Air is an insulator of heat and it does not allow our body heat to be lost into the outside surroundings. Hence heat gets trapped in this air between the 2 sweaters. *wool* is also an insulator that itself doesn't allow our body heat to escape. This coupled with air adds to our warmth.

A single sweater however will allow the air to pass, thus making you feel less warm.

Q2.

Heat moves through water by the process of convection - convection is when molecules of a fluid rise up when they get warmer accompanied by sinking of heavier cold molecules of the same fluid.

This movements of the fluid molecules is what is referred to as convection. Convection takes place due to the gain and loss of heat within a fluid.

In fluids, warm molecules are lighter than cold molecules making the warm molecules rise above the cold ones, and the cold ones sink below the warm ones.

The faster rise of water molecules, or any other fluid for that matter, is due to the fact that heated molecules gain higher levels of kinetic energy. When temperature rises within matter, the kinetic energy also rises. This makes the molecules to have more energy and move faster.

As for the movement downwards, the cold water molecules that move down, have less kinetic energy and thus are slower.

This explains the reason why water molecules move up faster than down during convection movements.

Q3.

White colour reflects back heat . The outer walls of houses are prone to be continuously heat by the outside temperature in the hot areas. If painted with dark colours, these outer walls would absorb heat and pass it on to the building inside, hence making it hot. Hence it is advised to paint these outer walls white so that they reflect the heat back and keep the houses relatively cooler.

Q4.

Heat will definitely be transferred but there won't be a temperature change: this is because the bodies will be in a state equilibrium. i.e. they both have the same temperature and hence the net amount transferred will be zero.

That doesn’t mean energy transfer isn’t going on; but it is the same in both directions.

In fact, energy does transfer between the two bodies continuously even if they are at the same temperature. There is always exchange of packets of energy at the interface of each and every body, whether in thermal equilibrium or not. The point that should be noted is that, there is **no net energy transfer** between the bodies.

Q5.

The work of an AC is to cool warm air. We all know that warm air being lighter moves up. Here, if it is cooled by an AC which is placed at a height, it will get cooled by the AC. The cool air is dense and it will go lower down into the room from where it will occupy space and will push up the warm air present there. This warm air will now go on top, get cooled and come down. This process will continue till the AC is ON and will cool the room.

Heaters however are placed near the floor since we know that cold air settles more in the bottom. Hence a heater will heat up the cold air below and make it rise up making the room warmer. The cool air that takes it place near the floor will get heated and will rise up. Such convectional currents will help to keep the room warm.

Q6.

The sun heats up the land during the day time but at night the heat gets radiated back and lost into the atmosphere. However when it is cloudy, the clouds behave as insulators, due to which it remains trapped on the earth's surface.

This is what keeps the temperature warmer when compare to clear nights.

Q7.

The back of refrigerators are coloured dull black to radiate heat more effectively in order to cool down the refrigerators pipes.

Q8.

A hot object loses heat to the surroundings by conduction, convection and radiation. Similarly, a cold object gains heat from the surroundings by these three modes. So, to keep a hot body hot or a cold body cold, we need to reduce the loss or gain of heat respectively due to these three modes.

A thermos flask is used to keep things warm or cold for a time. It consists of a double-walled vaccum flask. A vaccum flask is a bottle made of glass or metal with hollow walls. The narrow region between the inner and the outer walls is evacuated of air and sealed together. The walls are silvered.

The vessel is put in a metallic case and is separated from it by cork or plastic supports, which prevents the glass vessel from breaking. The mouth of the vessel is closed by a stopper made of an insulating material like cork or plastic.

The vaccum between the two glass walls of the thermos flask considerably reduces the flow of heat by conduction and convection. This is because both conduction and convection need molecules of a medium for transfer of heat. The silvered surfaces reflect the heat back, thus, reducing radiation.