

## CLASS – 7 CHAPTER – 5 HEAT EXERCISE SOLUTIONS

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### A. Choose the correct option.

1. Heat always flows from :

Answer : (a) higher temperature to lower temperature

2. The S.I. unit of heat is :

Answer : (b) joule

3. To convert Celsius temperature into Kelvin temperature, the formula is :

Answer : (a)  $K = ^\circ C + 273$

4. A device used for the measurement of temperature is :

Answer : (a) thermometer

5. The normal temperature of a healthy person is thirty seven degrees on :

Answer : (d) Celsius scale

6. Which of the following is not a method of transfer of heat?

Answer : (c) Convection

7. Which of the following is not an insulator?

Answer : (c) Brass

8. A liquid which is a good conductor of heat is :

Answer : (c) Mercury

9. The process which can transfer heat through the vacuum as well as air is :

Answer : (d) Radiation

### B. Fill in the blanks :

1. The degree of hotness or coldness of a body is called its.....

Answer : temperature

2. In solids, heat is transferred by.....

Answer : conduction

3. The two examples of insulators of heat are.....and.....

Answer : bamboo and cardboard

4. Air is a.....conductor of heat whereas copper is a.....conductor of heat.

Answer : bad, good

5. In liquids and gases, heat is transferred by the process of.....

Answer : convection

6. No medium is required for the transfer of heat by the process of.....

Answer : radiation

7. Iron expands.....than aluminium.

Answer : more

8. Liquids expand.....than gases.

Answer : less

### C. Write T for True and F for False statements :

1. In the CGS system, heat is expressed in joules.

Answer : False

2. Sometimes, however, our senses of touch is not reliable in telling us whether an object is relly hot or cold.

Answer : True

3. Laboratory thermometer is also called as Doctor's thermometer.

Answer : False

4. A laboratory thermometer has no kink.

Answer : True

5. Digital thermometer have mercury.

Answer : False

6. The decrease in size of an object on cooling, is called expansion.

Answer : False

7. Air expands on heating.

Answer : True

8. Wool is a poor conductor of heat due to which woollen clothes stop the flow of heat from our warm body to the cold surroundings.

Answer : True

9. The silvering of the wall of thermos flask minimises the heat loss by radiation.

Answer : True

**D. Give two examples.**

1. Thermometers

Answer : Laboratory thermometer, Clinical thermometer

2. Breeze blow in coastal area

Answer : Land breeze, Sea breeze

3. Insulators

Answer : Cotton, Leather

4. Conductors

Answer : Silver, Copper

5. Heat transfer methods

Answer : Conduction, Convection, Radiation

**E. Complete the following :**

1. Joule : Heat : : .....: Temperature

Answer : Degree of hotness or coldness

2. Temperature of human body : Clinical thermometer : : Temperature of day :  
.....

Answer : Maximum and minimum thermometer

3. Cooling : contraction : : Heating : : .....

Answer : Expansion

4. Wood : Insulator : : ..... : Conductor

Answer : Silver

5. Solids : Conduction : : Liquids and gases :  
.....

Answer : Convection

**F. Answer the following questions in short.**

1. Define heat.

Answer : Heat is a form of energy. The S.I. unit of heat is joule (J).

2. Why should we not rely on our sense of touch for estimating the hotness of an object?

Answer : Two reasons : One is that we can't feel the temperature of an object, we feel the temperature of our own flesh. When you touch something hot, it heats up your skin, and that heat in your skin is what you feel. The other reason is that it isn't really accurate to say that we feel heat in our skin.

3. What is Celsius scale?

Answer : The most common temperature scale marked on thermometers for measuring temperature is the 'Celsius scale'.

4. Who developed Fahrenheit scale?

Answer : The Fahrenheit scale was developed by Daniel Gabriel.

5. Write the difference in between heat and temperature.

Answer : Difference :

Heat	Temperature
It is a form of energy.	It is the degree of hotness or coldness of a body.
It does not determine the direction of flow of heat.	It determines the direction of the flow of heat. It always flows from a body at a higher temperature to a body at a lower temperature.
It is measured in joule or calories, the same units as of energy.	It is commonly measured in Celsius, Kelvin or Fahrenheit.

6. What are the precautions that should be taken by a person using clinical thermometer.

Answer : Precautions in Using a Clinical Thermometer :

(i) The clinical thermometer should be washed before and after use (preferably with an antiseptic solution).

(ii) Before using the clinical thermometer, we should ensure that the mercury level in its tube is below 35°C mark.

(iii) Read the clinical thermometer by keeping the level of mercury along the line of sight.

(iv) The clinical thermometer should never be held by the bulb while reading it (otherwise the bulb will break).

(v) Handle the clinical thermometer with care. The thermometer can break if it hits against some hard object.

**7. Write the difference between digital thermometer and clinical thermometer.**

**Answer : Difference :**

(i) The clinical thermometers use mercury to measure the temperature, whereas, digital thermometers do not use mercury.

(ii) A digital thermometer works with cells but the clinical thermometer is more accurate than the digital one when its cells are weak.

**8. Define conduction. Give one example where heat is transferred by the process of conduction.**

**Answer :** Conduction is the transfer of heat from the hotter part of a material to its colder part (or from a hot material to a cold material in contact with it) without the movement of material as a whole.

**For example :** The heat from a hot liquid makes the cup itself hot.

**G. Answer the following questions in detail.**

**1. Explain how, woollen clothes keep us warm during cold winter days. Discuss why, wearing more layers of clothing during winter keeps us warmer than wearing just one thick piece of clothing.**

**Answer :** Air acts as insulator of heat.

This layer prevents our body heat to escape in the surroundings. More layers of thin clothes will allow more air to get trapped and as a result, we will not feel cold.

So wearing more layers of clothing during winter keeps us warmer than wearing just one thick piece of clothing.

**2. What is a clinical thermometer? What is the range of a clinical thermometer? Explain why, a clinical thermometer cannot be used to measure high temperatures.**

**Answer : Clinical Thermometer :** The thermometer used for measuring the temperature of human body is called the clinical thermometer.

The range of a clinical thermometer is from  $35^{\circ}\text{C}$  to  $42^{\circ}\text{C}$ .

A clinical thermometer cannot be used to measure high temperatures because it has been designed to measure only human body temperature which varies over a short range. If a clinical thermometer is used to measure high temperatures, it will get damaged.

**3. Explain how, the water in a beaker gets heated when a burner is kept below it. Draw a labelled diagram to illustrate your answer.**

**Answer :** When a burner is kept below a beaker, due to radiation of heat the water just above the bottom surface of the beaker gets heated and goes up. This process continues until the whole water is heated. This process is called Convection.



**4. Explain how all the air in a room gets heated when a room heater kept on the floor in a corner of the room is switched on. Draw a labelled diagram to illustrate your answer.**

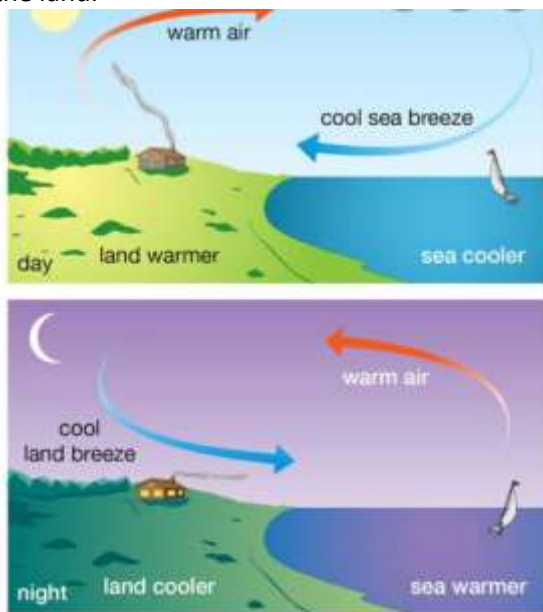
**Answer :** Convection heats up the room when a room heater is kept on a floor in a corner is switched ON. Heated air at one part of the room is transferred heat by convection. This is how all the air gets evenly heated in the room. Once convection current of hot air is set up, it is spread out in the room through radiations.



**5. Describe the blowing of sea-breeze and land-breeze in coastal areas with the help of labelled diagrams.**

**Answer : Land Breeze:** Land is a bad conductor and a good radiator of heat. Therefore, it heats quickly during the day and cools rapidly at night. During the night, since the land cools rapidly, land breeze blows from the land to the oceans.

**Sea Breeze:** On the contrary, water takes a longer time to get heated and loses heat slowly during the night. The sea which is cooler during the day time, gives rise to thesea breeze which blows from the sea to the land.



**6. (a)** Why do people prefer to wear white clothes in summer?

**(b)** Why is it better to wear dark clothes in winter?

**Answer : (a)** We wear white or light color clothes in summer because white or light color clothes having the potential to absorbing less heat and thus keeps us cool.

**(b)** We wear dark coloured clothes in winter to keep us warm as they absorb all the heat radiation coming from the sun whereas light coloured clothes reflect most of the heat radiation that falls on them and therefore we feel more comfortable wearing them in the summer.

**7. (a)** What is a thermometer? Name the thermometer used by doctors and nurses to measure the temperature of human body.

**(b)** Can we use a laboratory thermometer to measure human body temperature? Give reason for your answer.

**Answer : (a)** Temperature is measured by using a device (or instrument) called thermometer.

Clinical thermometer is used by doctors and nurses to measure the temperature of human body.

**(b)** A laboratory thermometer cannot be used to measure the human body temperature. This is because as soon as we take out the bulb of the laboratory thermometer from our mouth, the level of mercury in its tube will start falling quickly. This will give a wrong value of the body temperature.

**8. (a)** Why is the box of a solar cooker painted black from inside?

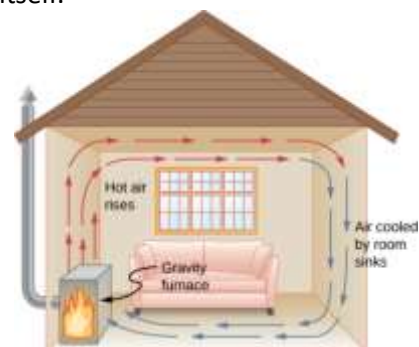
**(b)** In places of hot climate, it is advised that the outer walls of houses be painted white. Why?

**Answer : (a)** Black surfaces are excellent absorbers of radiation and helps in trapping more heat inside a solar cooker, hence improving the efficiency.

**(b)** The white reflects back most of the heat that falls on it, so, it is advisable that the outer walls of houses should be painted white in winters.

**9. What is meant by 'convection'? Explain with the help of an example. Why is it that convection cannot take place in solids?**

**Answer : Convection :** The transfer of heat from the hotter parts of a liquid (or gas) to its colder parts by the movement of the liquid (or gas) itself.



Convection cannot take place in solids because the particles in solids are not free to move.

**10. Define radiation. Give any two examples where heat is transferred by radiation. What is the name of invisible heat rays which transfer heat by radiation?**

**Answer : Radiation :** Radiation is the transfer of heat energy from a hot body to a cold body by means of heat rays, without any material medium between them.

**For example : (i)** When we stand next to a burning fire, we can feel the heat of the fire falling on our face. The heat is transferred from the fire to our face by the process of radiation.

**(ii)** When we sit in front of a room-heater, we get heat directly by the process of radiation. The invisible heat rays which transfer heat by radiation are called infra-red rays.

### Picture-based Questions

**1. Which mode of heat transfer is shown in the given picture? Label it at proper place.**



**2. Observe the given pictures carefully and answer the questions that follow.**



**(a)** Which picture represents a sea breeze and which one a land breeze?

**(b)** Why do these different movements of wind occur?

**(c)** When do sea breeze and land breeze occur?

**Answer : (a)** Picture (a) represents a sea breeze whereas picture (b) represents a land breeze.

**(b) Land Breeze:** Land is a bad conductor and a good radiator of heat. Therefore, it heats quickly during the day and cools rapidly at

night. During the night, since the land cools rapidly, land breeze blows from the land to the oceans.

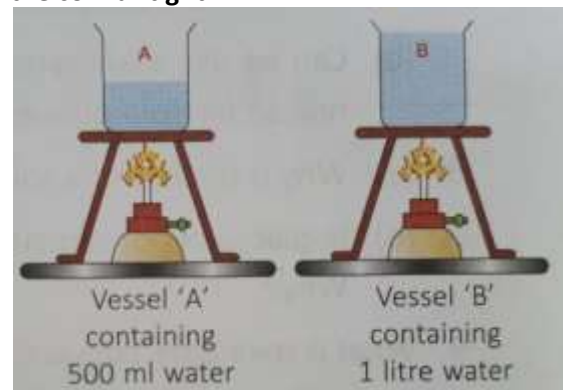
**Sea Breeze:** On the contrary, water takes a longer time to get heated and loses heat slowly during the night. The sea which is cooler during the day time, gives rise to thesea breeze which blows from the sea to the land.

**(c)** Sea breeze occurs during the night time whereas land breeze occurs during the day time.

### Application-based Questions

**A. Make your own thermometer.**

**Take a corked transparent bottle. Remove the cork and pour same coloured water in the bottle. Make a hole in the cork so that a drinking straw can pass through it. Push the cork along with the straw in the bottle. Make the cork airtight.**



**Place the bottle in a trough containing warm water.**

**B. What do you observe? Note your observation after each minute. List five examples which show both conduction and convection.**

**Answer :** We observe that water in coloured bottle when in contact with warm water of trough gets heated up and this hot coloured water starts rising up in the straw due to thermal expansion.

**C. What kind (conduction, convection or radiation) of heat transfer taking place in the following :**

1. A snowball in your hand.....
2. Sun rays warming a puddle.....
3. Pouring cold water in your hot tea.....
4. Using an iron to curl your hair.....

- 5. Baking a cake inside the oven.....
- 6. Melting of butter on warm pancakes.....

**Answer : 1.** Conduction

- 2. Radiation
- 3. Convection
- 4. Conduction
- 5. Convection
- 6. Conduction

**D. Aayushi puts a stainless steel spoon in a glass of hot milk but Avika does not do so. The milk of which glass will cool faster? Give reasons for your answer.**

**Answer :** Aayushi's glass of milk will turn cold faster than the Avika's.

**Reason:** When a steel spoon is placed in a glass of hot milk, the heat from the milk molecules will transfer from milk to spoon and eventually the spoon get hot than the milk.