

## Heat

1) What is heat? State its S.I unit.

Heat is a form of energy which flows from a hot body to a cold body when they are kept in contact.

Its S.I unit is Joule.

2) What is meant by the term temperature?

Temperature is a quantity which tells us the degree of hotness or coldness of a body.

3) State the three units of temperature.

The three units of temperature are Kelvin, degree Celsius and degree Fahrenheit.

4) Name the instruments used to measure the temperature of a body.

Thermometer.

5) Name two scales of temperature. How are they inter-related?

The two scales of temperature are

- Celsius scale
- Fahrenheit scale.

They are related as :  $\frac{C}{5} = \frac{F - 32}{9}$ .

6) How is the size of a degree defined on a Celsius scale?

On a Celsius scale, the ice point is marked as  $0^{\circ}\text{C}$  and steam point is marked as  $100^{\circ}\text{C}$ . The interval between the ice point and the steam point is divided into one hundred equal parts.

7) How is the size of degree defined on a Fahrenheit scale?

On a Fahrenheit scale, the ice point is marked as  $32^{\circ}\text{F}$  and steam point is marked as  $212^{\circ}\text{F}$ . The interval between ice point and steam point is divided into 180 equal parts.

8) State the temperature of (i) ice point  
(ii) steam point, on the Celsius scale.

(i) Ice point =  $0^{\circ}\text{C}$

(ii) Steam point =  $100^{\circ}\text{C}$

9) Write down the temperature of  
(i) lower fixed point (ii) upper fixed point  
on the Fahrenheit scale

(i) lower fixed point =  $32^{\circ}\text{F}$

(ii) Upper fixed point =  $212^{\circ}\text{F}$

10) What is the Celsius scale of temperature?

The scale in which ice point is marked at  $0^{\circ}\text{C}$  and steam point is marked at  $100^{\circ}\text{C}$  is called Celsius scale of temperature.

11) What is the Fahrenheit scale of temperature?

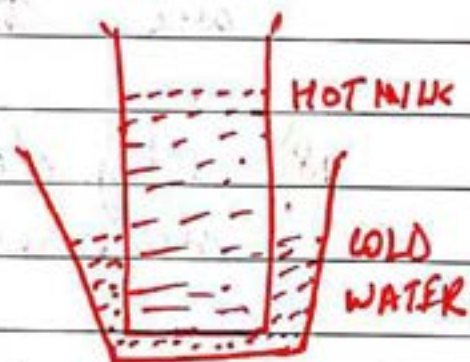
The scale in which ice point is marked at  $32^{\circ}\text{F}$  and steam point is marked at  $212^{\circ}\text{F}$  is called Fahrenheit scale of temperature.

12) what is kelvin scale of temperature?

The scale in which ice point is marked at  $273\text{ K}$  and steam point is marked at  $373\text{ K}$  is called kelvin scale of temperature.

Q13) The fig shows a glass tumbler containing hot milk which is placed in a tub of cold water. State the direction in which heat will flow.

The direction of heat is -  
Heat will flow from hot milk to cold water.



14) Draw a neat labelled diagram of a laboratory thermometer.

Ans: (Fig 5.3) Page 68.

15) write down the body temperature of a healthy person.

The body temperature of a healthy person is  $37^{\circ}\text{C}$  or  $98.6^{\circ}\text{F}$ .

16) What do you understand by thermal expansion of a substance?

The expansion of a substance when heated is called thermal expansion.

17) Name two substances which expand on heating.

Two substances which expand on heating are Iron, steel.

18) Why do telephone wires sag in summer?

When the telephone wires are connected in winter between two poles, they are kept tight because they will expand in summer and thus, will sag.

19) Iron rims are heated before they are fixed on the wooden wheels. Explain the reason.

The iron rims are heated because when heat is applied on the iron rims it expands. The heated iron rim is then fitted on the wheel. When the rim cools, it contracts and makes a tight-fit on the wheel.

20) Why are gaps left between successive rails on a railway track?

Gaps are left between successive rails on a railway track because the rails expand in summer. The gap is provided to allow for this expansion. If no gap is left, the expansion in summer will cause the rails to bend sideways. This may result in train accidents.

21) A glass stopper stuck in the neck of a bottle can be removed by pouring hot water on the neck of the bottle. Explain why?

A glass stopper stuck in the neck of a bottle can be removed by pouring hot water on the neck of the bottle because hot water will make the neck of the bottle expand. And it is due to this expansion, the glass stopper which was stuck on the neck of the bottle gets removed easily.

22) Why is a cement floor laid in small pieces with gaps in between?

A cement floor is not laid out in one piece, because it would crack due to expansion in summer and contraction in winter.

On the other hand, the floor is laid in small pieces with gaps in between to allow for the expansion during summer.

23) One end of a steel girder in a bridge is not fixed, but is kept on rollers. Give the reason.

One end of a steel girder in a bridge is not fixed into concrete pillar but is kept on rollers. The reason is that if there is any rise (or fall) in temperature of atmosphere, the girder can freely expand (or contract) without affecting the pillar.

24) Describe one experiment to show that liquids expand on heating.

Ans → (Page 73). Activity 5.

25) State one application of thermal expansion of liquid.

One application of thermal expansion of liquid is ~~the~~ mercury thermometer.



# HEAT

Q. 26) Describe an experiment to show that air expands on heating.

⇒ Pg. 73 [Activity 6 point no. (i) and (ii)  
fig. 5.9]

Q. 27) An empty glass bottle is fitted with a narrow tube at its mouth. The open end of the tube is kept in a beaker containing water. When the bottle is heated, bubbles of air are seen escaping into the water. Explain the reason.

⇒ When the glass bottle is heated, the air inside it experiences cubical expansion. So, the expanded air escapes into the water in the form of bubbles.

Q. 28) State which expands more, when heated to the same temperature: solid, liquid or gas?

⇒ Gas expands more.

Q. 29) Name the three modes of transfer of heat.

⇒ Conduction, convection and radiation.

Q. 30) Name the mode of transfer of heat in  
a) Solid b) Liquid c) Gas d) Vacuum.

⇒ • Solid - Conduction  
• Liquid - Conduction, convection

- Gas - Conduction and convection
- Vacuum - Radiation.

Q.31) What are good and bad conductors of heat? Give two examples of each.

⇒ The substances which allow heat to pass through them easily are called good conductors. Ex - silver, copper.

The substances which do not allow heat to pass through them are bad conductors or insulators. Example - Wood, plastic.

Q.32) Name a liquid which is a good conductor of heat.

⇒ Mercury.

Q.33) Name a solid which is a good conductor of heat.

⇒ Copper.

Q.34) Select good and bad conductors of heat -

⇒ Good conductors of heat - Copper, mercury, iron, silver.

Bad conductors - Wood, air, saw-dust, cardboard, plastic, wool.

Q.35) Why is an oven made of double walls with the space in between filled with cork?

⇒ Cork is bad conductor of heat and it prevents the heat of the oven to escape. So, an oven is made of double walls with the space in

between filled with cork.

Q. 36) Why do we use cooking utensils made up of copper?

⇒ Cooking utensils are made up of copper because copper being metal is good conductor of heat and so it heats up rapidly. Thus the process of cooking occurs quickly.

Q. 37) Why is a tea kettle provided with an ebonite handle?

⇒ Ebonite being insulator of heat, does not pass heat from the kettle to our hand while making tea. Thus, tea kettle is provided with an ebonite handle.

Q. 38) In summer, ice is wrapped in a gunny bag. Explain the reason.

⇒ In summer, ice is wrapped in a gunny bag. The air filled in the fine pores of the gunny bag is insulator of heat. The air does not allow heat from outside to pass through it to the ice. Thus, ice is prevented from melting rapidly.

Q. 39) Explain why -

- We wear woolen clothes in winter?
- The water pipes are covered with cotton during very cold weather?

⇒ a) We use woollen clothes in winter. Woollen clothes have fine pores which are filled with air. Wool and air are insulators of heat. Thus, heat from our body does not escape through them and they keep us warm.

b) During cold weather, water pipes are covered with cotton. Cotton has air trapped in its fine pores. Cotton and air are insulators of heat. They do not pass heat from water inside the pipes to the outer atmosphere. Thus, cotton prevents the water in the pipes from freezing.

Q. 40) Why are quilts filled with fluffy cotton?

⇒ Quilts are filled with fluffy cotton. Air is trapped in the fine pores of cotton. Cotton and air are insulators of heat. They prevent heat from our body to escape and keep us warm.

Q. 41) State the direction of heat transfer by way of convection.

⇒ By the way of convection, heat is always transferred vertically upwards. The reason being that the medium particles near the source of heat absorb heat from the source and they start moving faster.

Q. 42) Why is a ventilator provided in a room?

⇒ Ventilators are provided in a room for proper ventilation. When we breathe out in a room,

The air in the room becomes warm and impure. The warm air is less dense, i.e., lighter, so it rises up and moves out through the ventilators. Then the cold air comes in the room through the windows to take its place. Thus, the continuous circulation of fresh air keeps the air in the room fresh.

Q.43) Why are chimneys provided over furnaces in factories?

⇒ Chimneys are provided over the furnace in factories. This is because the hot gases coming out of the furnace are less dense than air. They rise up through the chimney. The smoke, fumes etc around the furnace rush in so as to take their place and they are sucked out. Thus, the chimney helps to remove undesired fumes, smoke etc from the premises.

Q.44) What are land and sea breeze? Explain their formation.

⇒ During summer in places near the sea, a breeze blows from the land towards the sea during the night which is called land breeze and from the sea towards the land during the day which is called sea breeze.

Land breeze:- At night, the land cools much faster than the sea, so, the

sea water is warmer than the land. The air near the sea being warm, is less dense or lighter, so it rises up and cold current of air blows from the cold land to the warm sea to take its place. This is land breeze.

Fig - 5.17 (p. 79)

Sea breeze :- During the day, the land becomes more warm than the sea, so the air above the land being warm becomes less dense or lighter. It rises up and the cold air from the sea blows towards the land to take its place. Thus convection current of air is set. This is called sea breeze.

Fig - 5.20 (p. 79)

Q. 45) Why is the freezing chest in a refrigerator fitted near its top?

⇒ A refrigerator is provided with its freezing chest near its top. The air near the top in contact with the freezing chest gets cooled. It becomes denser or heavier and thus descends down. The hot air from the lower part rises up. Thus, the convection currents are formed.

The cold air coming down from the cooling chest cools the entire space and things present in the refrigerator below the chest.

Q. 46) Explain briefly the process of heat transfer by radiation.

⇒ Radiation is the process of heat transfer in

which heat directly passes from one body at high temperature to another body at lower temperature without affecting the medium. No medium is required for the transfer of heat by the process of radiation. In vacuum, heat transfer takes place only by the process of radiation.

Q.47) Give one example of heat transfer by radiation.

⇒ When we sit in the sun, we feel warm. We cannot get heat from the sun by the process of conduction or convection because most of the space between the sun and the earth is a vacuum and both of these modes of heat transfer require a medium. Thus, we must be getting heat from the sun by radiation.

Q.48) Why do we prefer to wear white or light coloured clothes in summer and black or dark coloured clothes in winter?

⇒ We prefer to wear white clothes in summer. White clothes reflect most of the sun's heat and absorb very less of it, thus they keep our body cool.

We prefer to wear black or dark coloured clothes in winter. Black or dark coloured clothes absorb most of the sun's heat and keep our body warm.

Q.49) The bottom of a cooking utensil is painted black. Give reason.

⇒ The bottom of a cooking utensil is painted black. The reason is that a black surface absorbs more heat and so the contents of the utensil get cooked rapidly if its bottom part is painted black.

[Kindly note:- Q. no- 50 is omitted as thermos flask is excluded from final syllabus]