Class 7 Chapter: 6 Temperature and Heat

II. Very short answer type questions

A: Name the following.

Q.1 The scale in which the melting point of ice and the boiling point of water are taken as 0 and 100, respectively. Ans: Celsius scale

Q.2 The silvery grey liquid used in clinical thermometers. Ans: Mercury

Q.3 The breeze that flows from the land to the sea during night time. Ans: Land breeze

Q.4 The type of waves via which heat and light energy travel. Ans: Radiation

Q.5 A unit for measuring heat energy. Ans: Calorie

III. Short answer type questions

Q.1 Under what conditions does heat flow from a hot body to a cold body by conduction?

Ans: Heat flows from a hot body to a cold body by conduction when they are in direct contact with each other. Conduction occurs primarily in solids, where particles are closely packed and transfer energy by vibrating and passing it along to neighboring particles.

Q.2 Give one advantage of using alcohol as the liquid in a thermometer as compared to using mercury.

Ans: Alcohol can be used in very low-temperature conditions as it has a lower freezing point than mercury. Additionally, alcohol can be dyed, making it more visible in the thermometer tube.

Q.3 List two characteristic features of a mercury clinical thermometer.

Answer: The two characteristic features of a mercury clinical thermometer are: -

1. It has a kink in the capillary tube to prevent the mercury from falling back, allowing an accurate reading even after removing it from the body.
2. It usually has a temperature range of 35°C to 42°C, which is suitable for measuring human body temperature.

Q.4 Why do we wear woolen clothes in winter?

Ans: We wear woolen clothes in winter because wool is a poor conductor of heat and traps a lot of air in its fibers. This trapped air acts as an insulator, preventing body heat from escaping and keeping us warm.

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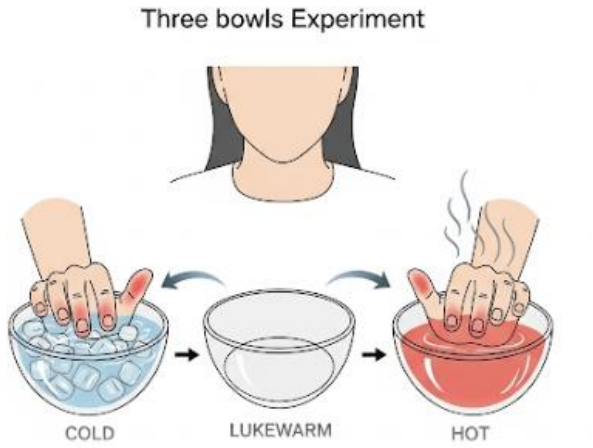
IV. Long answer type questions

Q.1 Describe a simple experiment which can demonstrate that the terms ‘hot’ and ‘cold’ as we feel them are only relative.

Ans: The Three Bowls Experiment



This classic experiment, also known as the **relative temperature illusion**, shows that our sense of touch is not a reliable measure of absolute temperature. It highlights how our perception of temperature is influenced by the temperature we were previously exposed to.

Materials

a) Three large bowls b) Cold water c) Lukewarm water d) Hot water (not boiling)

Procedure

1. Fill one bowl with cold water, one with lukewarm water, and one with hot water.
2. Place the bowls next to each other.
3. Place your left hand in the bowl of cold water and your right hand in the bowl of hot water simultaneously. Keep them there for about one minute. You will feel a strong difference between the two temperatures.
4. After one minute, quickly and simultaneously move both hands and place them into the bowl of lukewarm water.

Observation and Conclusion

1. The hand that was previously in the cold water will now feel the lukewarm water as hot.
2. The hand that was previously in the hot water will now feel the same lukewarm water as cold.
   The key takeaway is that both hands are in the exact same bowl of lukewarm water, yet they perceive the temperature differently. This clearly demonstrates that our subjective feeling of 'hot' and 'cold' is relative to the temperature we have just experienced, not an absolute measure of the object's temperature.

Q.2 What are temperature scales? Explain how Celsius and Fahrenheit scales are defined.

Ans: Temperature scales are systems used to measure and quantify temperature numerically. They provide a standardized way to express how hot or cold an object is by using a set of reference points, or fixed points, to define the scale's divisions.

Celsius Scale

The Celsius scale, formerly known as centigrade, is based on two primary fixed points:

a) Freezing point of water: defined as 0°C.
b) Boiling point of water: defined as 100°C.

The interval between these two points is divided into 100 equal parts, with each part representing one degree Celsius. This is why it was historically called "centigrade" (from Latin *centum* for 100 and *gradus* for steps).

Fahrenheit Scale

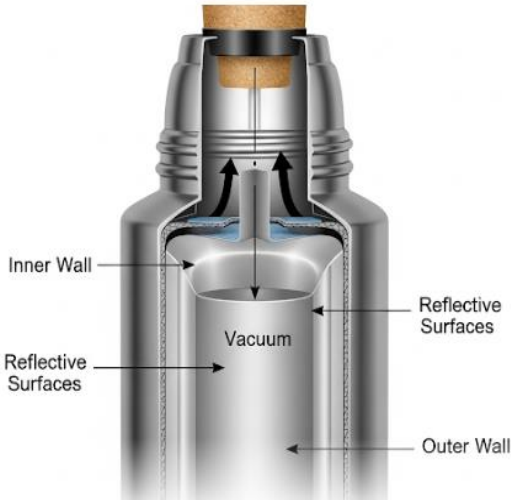
The Fahrenheit scale is primarily used in the United States and a few other countries. It is also based on the freezing and boiling points of water, but with different assigned values:

a) Freezing point of water: defined as 32°F.
b) Boiling point of water: defined as 212°F.

The interval between these two fixed points is divided into 180 equal parts

Q.3 With the help of diagram, explain the working of a thermos flask.

Ans: A thermos flask is an excellent insulator that keeps your drink hot or cold by blocking the three main types of heat transfer: conduction, convection, and radiation.



a) Vacuum Insulation: The most important feature is the vacuum—an empty space—between the inner and outer walls. Since there are no air molecules in this space, there is nothing to transfer heat through conduction (direct contact) or convection (heat moving through fluids). This makes the vacuum a highly effective insulator.

b) Reflective Surfaces: The shiny surfaces on both the inner and outer walls are key to preventing heat loss or gain through radiation. These surfaces act like mirrors, reflecting thermal radiation (heat waves) back into the flask if the liquid is hot, or reflecting external heat away from the flask if the liquid is cold.

c) The Stopper: A tight, insulating stopper (often made of plastic or cork) seals the flask's opening. This prevents heat from escaping or entering through the top by both convection and conduction.

V. Numerical-based questions

1. Express the following temperatures in the Fahrenheit scale.

a. 110°C b. 85°C c. 225°C

Ans: a. **110°C**

°F = (9/5 × 110) + 32 = 198 + 32 = **230°F**

b. **85°C**

°F = (9/5 × 85) + 32 = 153 + 32 = **185°F**

c. **225°C**

°F = (9/5 × 225) + 32 = 405 + 32 = **437°F**

2. Express the following temperatures in the Celsius scale.

a. 131°F b. 149°F c. 32°F d. 23°F

Ans: a. **131°F**

°C = (5/9) × (131 - 32) = (5/9) × 99 = **55°C**

b. **149°F**

°C = (5/9) × (149 - 32) = (5/9) × 117 = **65°C**

c. **32°F**

°C = (5/9) × (32 - 32) = (5/9) × 0 = **0°C**

d. **23°F**

°C = (5/9) × (23 - 32) = (5/9) × (-9) = **-5°C**